

ECONOMICS
Global Economics

The Business of Ageing

Older workers, older consumers: big implications for companies

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Analyst Certification

We, John Llewellyn and Camille Chaix-Viros, hereby certify (1) that the views expressed in this report accurately reflect our personal views about any or all of the subject securities or issuers referred to in this report and (2) no part of our compensation was, is or will be directly or indirectly related to the specific recommendations or views expressed in this report.

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Inevitably, however, errors will remain, of logic, fact, and detail. For those, we, as authors, remain solely responsible.

Executive Summary

Key elements of the ageing of populations

Almost everywhere, populations are getting older. Over the coming 50 years, all regions stand to see an increase in their median age, with the developing countries ageing fastest.

This ageing of populations – i.e. the rise in median age – is basically the product of two long-established trends: a rising trend of longevity and a decreasing trend of birth rates. Superimposed on these two trends, for a number of countries, is an anomaly: the post-World War II baby boom, which brought a surge in birth rates for almost 20 years.

In developed countries, it is the ageing of this baby-boom generation that constitutes the main challenge. Initially, this demographic bulge lowered populations' median ages: but as it passed through the generations, it progressively moved the skew of the age distribution from the younger end to the older end. And now the baby boomers are about to start turning 65.

Redefining 'old'

Not only are people living longer, but the additional years are, by and large, healthy ones. The onset of chronic diseases and disability occurs at an ever-later age, so that healthy life expectancy is apparently increasing at least as fast as life expectancy itself.

This necessitates a redefinition of 'old'. If 'old' is taken to mean a given degree of health or disability, then the age at which people become 'old' is moving further and further out. Similarly, if 'old' is taken to mean 'not capable of working', the age at which people need finally to withdraw from the workforce is rising. To the extent that in 1950 it might have been appropriate to consider a 65-year-old as 'old', today that term would apply only to a person who has reached nearly 80.

Population ageing and the economy

On present trends and economic conditions, the changing age structure of populations poses several challenges. It is often suggested that economic growth will slow, particularly because of fewer people in the labour force. Public pension and health systems would thereby come under increasing pressure, both because of slower growth of the resources to pay for them, and an increasing proportion of retirees.

However, these conclusions rest on key assumptions; and these may well not be met. The most important of these relate to the size of the labour force. On present policies, a large and growing proportion of the population lie outside what is conventionally considered to be "of working age". Moreover, a significant proportion of the working-age population retire even before the official retirement age.

Both these tendencies can change, however. One element will be to weaken present incentives to leave the workforce even before the official retirement age. Some of these incentives owe to public policy; but the private sector too, particularly defined-benefit pension schemes, has provided artificial incentives to retire early. Both sets of disincentives to continued working are starting to be reduced, in a range of countries.

Another element would be to raise the official retirement age. One reason for this is that in most countries, the official retirement age has scarcely changed in decades, notwithstanding the trend increase in longevity. Thus, it would be rational for countries to establish some sort of link between the official age of retirement and longevity; indeed, this is starting to happen in some countries.

The challenge of an older workforce

Companies will find their workforces getting older, for two principal reasons: the ageing of the population itself and, more importantly, changes to incentive structures that lead people to work longer. Surprisingly, however, few companies seem to be preparing for the inevitable challenges, which will be considerable. A worker aged 65 has different characteristics from another one aged, say, 40, as well as different needs. Companies will find themselves having to implement strategies to adapt to these different characteristics and needs.

This will include:

- recognising the different abilities of workers of different ages so as to benefit from the comparative capabilities of each;
- implementing specific training programmes for workers to offset declining abilities and motivation as they age;
- adapting work schedules to meet a general wish among older workers to have more flexible working options; and
- re-thinking compensation schemes to keep pay in line with evolving productivity.

In many cases, the requisite changes may require a rather fundamental rethinking of the business model so as to adapt to an age structure of the workforce that, inevitably, reflects the ageing structure of the population at large. We judge that the age-related workplace changes that lie ahead are among the most significant challenges to which companies will have to adapt.

Population ageing and financial markets

Economic considerations suggest that young societies, which have a relatively large proportion of their population at work, will tend to build up assets, while ageing societies, with a smaller proportion of their population in work, will run them down.

This would imply that, starting in the coming few years, the downward underlying trend that has characterised (real) interest rates and equity yields in many OECD economies could flatten out and then turn upwards; while in young societies, most notably the developing economies, the trend would be downwards. In turn, that could imply that the underlying trend in the currencies of the ageing OECD economies would be upwards *vis-à-vis* the currencies of the developing economies.

Such underlying trends, the result of slow-moving demographic developments, are not easy to discern: they tend to be swamped by shorter-term developments, such as the dynamics of asset markets. Nonetheless, the underlying movements in several major financial markets have been broadly along expected lines and we doubt that this is wholly the result of chance. More developments in the expected direction seem likely in the years ahead.

Challenges and opportunities for companies

In addition to such 'macro' effects of population ageing, which are discussed in the first part of this study, population ageing will lead to important changes in individual sectors: some of these potential implications are considered in the second part, written by our equity analysts.

The challenges are substantial. Companies are beginning to face a new situation in the market place, particularly as a result of the ageing of the baby boomer generation, which:

- constitutes the biggest generation ever;
- will soon start reaching the age of 65;
- will be the first generation to reach this age yet not be poor; and
- accounts for a large part of total consumption for many goods and services.

Yet curiously, few companies are prepared for this. Many seem stuck in the groove of automatically targeting their efforts at the younger generations: so far at least, many companies have failed to age with their customers. As with all forces for change, ageing presents a challenge and an opportunity. Companies that analyse the situation correctly and adapt successfully should prosper. Those that do not stand to suffer.

Preamble: The Ageing of Populations – Problem or Opportunity

Ageing cannot be denied. We can, if so minded, choose to deny the science of, for example, climate change. But ageing, by contrast, is evident every time we look in the mirror. There simply is no getting away from it.

At the same time, ageing is apparently not one of life's top issues – at least not judged by web mentions. Typing "ageing" into Google yields 1.5 million hits; and "longevity" 2.5 million. This scarcely compares with 111 million for "retirement", 245 million for "birth", or 590 million for "death" – let alone with 235 million for "baseball", 444 million for "football", or 1,690 million for "shopping".

Furthermore, a scan of around 600 recent headlines in newspapers in China, France, Italy, Japan, the United Kingdom and the United States, suggests that most of the articles about "ageing" concern health or beauty aspects: comparatively few are about the implications for the workplace. And that is odd, because the workplace is already starting to be affected in a significant way by the phenomenon of population ageing. Moreover, these changes are set to continue, indeed to strengthen, over at least the next several decades, wreaking quite fundamental changes in the place where the majority of people spend the greater part of their time for the bulk of their lives.

This comparative absence of discussion about ageing and its consequences, especially for the workplace, might not matter particularly, if the likely consequences were intuitively understandable and clearly foreseeable. But that does not seem to be the case. As we dug into the issue, we were surprised to find a number of quite fundamental and widely-held misconceptions about various consequences of ageing – see Box: *Ten Ageing Fallacies*, for some examples.

Equally surprising is the paucity of international analysis of some of the key elements of the story, such as how ageing affects productivity, hence warranted incomes, and even the very employability, of older workers. Indeed, it is surprisingly hard even to find data on a number of the most important issues: we have in general been obliged to take the data from wherever they are available, trusting – or hoping – that they are reasonably representative, at least of broadly similar societies.

That said, it is a big world out there and, notwithstanding the wonders of the IT revolution, and all that it has done for researchers, we are not at all confident that we have tapped all the available data or analysis, or surveyed all the relevant strands of thought. We would welcome having sins of omission, as well as sins of commission, drawn to our attention, not least because we may well, if the response so warrants, come back to this issue in a second volume, as we did with *The Business of Climate Change II*.

Two key thoughts stand above all the others. First, the fact that people are living ever-longer and that the additional years are, on average, healthy ones, must surely be seen as a positive, from the standpoint both of the individual and of society as a whole. To the extent, therefore, that increased longevity poses issues for pension systems, health systems, companies, or whatever, the presumption surely has to be that policy must adjust to longevity; it can scarcely be the other way around.

Second, taking the all-important case of the workplace, it is striking that, even though the ageing of populations is proceeding as inexorably as day follows night, few companies are preparing themselves appropriately. As with any force for change, this represents both a challenge and an opportunity.

The companies that fail to prepare themselves will likely fare poorly. By contrast, those that best analyse the situation and its implications and then implement the best policies stand to prosper.

Ten Ageing Fallacies¹

The issue of population ageing induces its fair share of fallacies. Here are 10 common ones:

The trend increase in longevity over the past 160 years cannot continue. Quite possibly wrong. The trend has been remarkably robust and has shown no sign of levelling off. Yet even the most optimistic life-expectancy projections include some tailing-off in the downward trend in mortality, often on the argument that past increases in life expectancy have been achieved through eliminating the 'easy' causes of death, whereas the remaining causes are 'difficult' to cure. But it has always been the case that that which is known is easy, while that which is not known is difficult. Given that the tailing-off argument has been wrong for 160 years, we incline more to the theories that predict its continuance. For more, see *Key Elements of the Ageing of Populations*.

Increased longevity simply means more years of ill health. Not true. The 'additional' years are, by and large, healthy ones. The onset of chronic diseases and disabilities comes ever later: healthy life expectancy apparently is increasing broadly as fast as life expectancy itself, and perhaps even slightly faster. For more, see *Redefining 'Old'*.

Increasing longevity will explode healthcare budgets. No. The 'additional' years are generally healthy ones. The great bulk of a person's health expenditure occurs in the final year of life. However, healthcare expenditure is set to rise significantly, both as a result of rising incomes (healthcare is a 'luxury' good that attracts an increasing share of total expenditure as income rises) and as a result of the baby-boom-related population bulge (a higher proportion of older people does increase the (total) volume of health expenditure as these people enter the final stages of their lives). For more, see *Population Ageing and the Economy*.

Ageing populations will slow economic growth, and bankrupt public pension schemes. Very probably not. Not only public, but also some private policies (most notably defined-benefit schemes) induce many people to retire either at, or often even before, a fixed official retirement age. But policies are changing in many countries. When artificial incentives that favour early retirement have finally gone, the proportion of the population in work, and hence the pace of economic growth, may well be much as at present. For more, see *Population Ageing and the Economy*.

Older workers should be encouraged to retire early to free up jobs for young people. No. This 19thC 'lump of labour' fallacy, still periodically heard in continental Europe, is bad economics. The number of jobs in an economy is not fixed. Were it otherwise, unemployment would have risen continually in every country that has had a growing population. For more, see *Population Ageing and the Economy*.

It is politically impossible to get people to work longer. Not so. Changes in public policy have already achieved this in a number of countries. And in the private sector, the change from defined-benefit to defined-contribution pension schemes is reinforcing this trend. Most important, however, the evidence is that many people will voluntarily choose to work longer, once artificial incentives to retire early have been withdrawn. For more, see *Population Ageing and the Economy*.

Workers' abilities decline with age. Too sweeping. Some cognitive abilities do decline with age: but others improve with experience. Moreover, the cognitive consequences of ageing can apparently be offset, in whole or in part, by appropriate (re)education and (re)training. For more, see *The Challenge of an Older Workforce*.

There is no point in companies training older workers. Not so. As a country's population ages, so will its workforce. In addition, many workers will work to a later age than is the case today. Companies will therefore increasingly find it in their interests to (re)train their older workers – both to keep their skills current and to keep them motivated and challenged. And indeed this is already happening. For more, see *The Challenge of an Older Workforce*.

Workers retire at their peak seniority and highest salary. No longer. This used to be the case, particularly under defined-benefit, final salary, pension systems. But with their replacement by defined-contribution schemes, and as populations age and people work longer, increasingly more people will work beyond their peak income years. For more, see *The Challenge of an Older Workforce*.

Marketing is best targeted at young people. No longer. Marketing and advertising have traditionally focused on the younger generations, mainly because they have been the major consumer group. However, as society gets older, the elderly are becoming a growth market, with the over 50s holding over 80% of personal wealth. For more, see *Challenges and Opportunities for Companies*.

¹ The inspiration for this section came from Lord Turnbull (2007).

Key Elements of the Ageing of Populations

The fundamentals of population ageing

Populations nearly everywhere are ageing

Populations nearly everywhere are getting older. Globally, the median age – the age that divides the population in two – has increased by about four years over the past half century – from 23.9 in 1950 to 28.0 in 2005.² Naturally, there have been some exceptions, generally ‘man-made’, such as in Africa (Figure 1), where in some countries life expectancy for men and women has actually fallen. In Zimbabwe, the life expectancy of women has reportedly dropped by around 25 years since 1985.

The oldest region today is Europe, with a median age of 38.9 years – Italy and Germany, for example, currently have a median age of around 42. The oldest country is Japan, with a median age of nearly 43. Other regions, however, are still young or very young: in India more than half of the population is younger than 25. And in the Middle East, the median age is about 24.

By 2050, all regions are expected to age further, with developing countries ageing the fastest

All regions are likely to experience an increase in their median age (Figure 1). The United Nations projects that, by 2050, all developed countries will have median ages above 40; and Japan is expected to remain the world’s oldest, with a median age of 55. Most countries in Asia and Latin America are set to age faster than the developed countries. For example, while it took 114 years for the population aged 60 and older to double from 7% to 14% of the total population in Sweden, this transition could take just 25-28 years in China and India.³ In Africa as a whole, the median age is set to rise, but is nevertheless likely to remain low by world standards.

Figure 1. Median age by region

Region	1950	2005	2050
World	23.9	28.0	38.1
More developed regions	29.0	38.6	45.7
Less developed regions	21.5	25.5	36.9
Africa	19.1	19.0	28.0
Asia	22.2	27.6	40.2
Europe	29.7	38.9	47.3
Latin America and Caribbean	20.0	26.0	40.1
Northern America	29.8	36.3	41.5
Oceania	28.0	32.3	40.0

Source: UN World Population Prospects: The 2006 Revision.

In the ‘oldest’ countries, one person in five is aged over 65

As populations age, their structure changes, often fundamentally. Since 1950, the number of people aged 65 and over has risen in almost all regions. Today, one out of every 14 people in the world is 65 or older. By 2050, this proportion will likely have surged (Figure 2) to around one in six⁴ – the proportion in present-day Florida and in the oldest countries (e.g. Italy and Japan), one person in five is over 65.

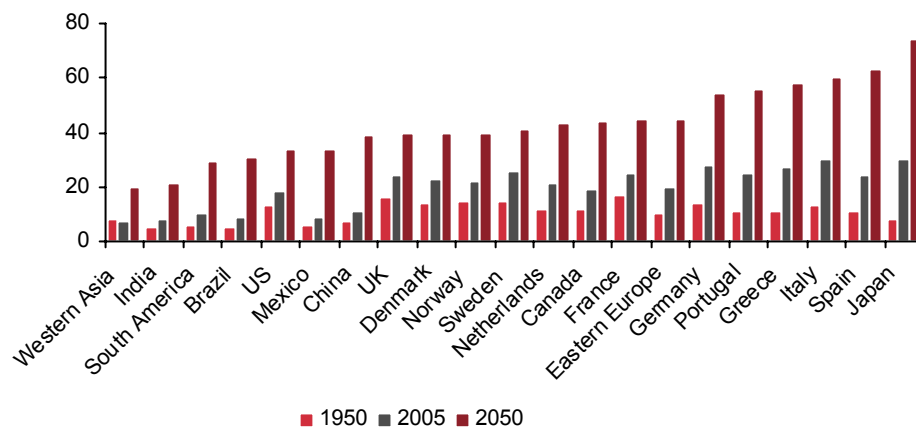
² UN World Population Prospects: The 2006 Revision.

³ United Nations Population Fund (2002).

⁴ UN World Population Prospects: The 2006 Revision.

Although the oldest populations are in developed countries, nearly two thirds of older people alive today are in developing countries. By 2050, nearly 80% of those aged 60 or above are expected to be in developing countries.⁵ In India, for example, the population aged 65 or older is set to rise to 20% of the population by 2050, from 7.5% in 2000.

Figure 2. Population aged 65 and over (%) in 1950, 2005, and 2050



Source: UN World Population Prospects: The 2006 Revision.

Furthermore, in most countries it is the older population itself that is ageing: the 'oldest old' – people aged 80 or over – are the fastest-growing segment of the population. The number of 'oldest old' will likely increase more than four-fold globally to 402 million by 2050, and six-fold in Africa, Asia, and Latin America. The number of centenarians is also projected to increase, 14-fold, from around 265,000 in 2005 to 3.7 million by 2050.⁶

Two trends and an anomaly

Population ageing is the result of two trends and an anomaly

The ageing of populations is basically the product of two trends and an anomaly:

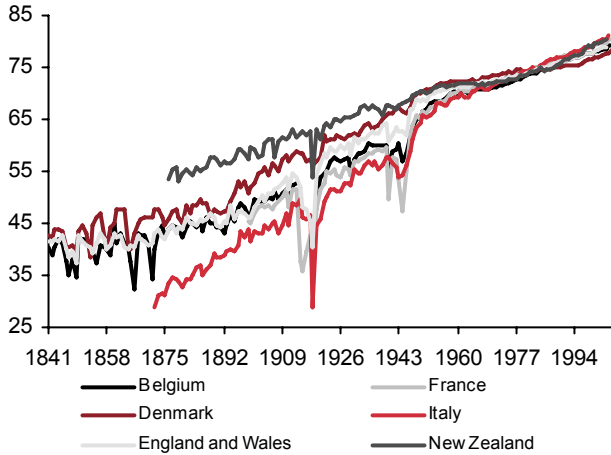
- **A rising trend of longevity** (Figure 3): Over the past 160-odd years, global life expectancy has steadily increased – by approximately two years per decade since 1840 – to reach global averages of 65 for men and 70 for women.
- **A falling trend of birth and fertility rates**⁷ (Figure 4): Birth rates have been in a trend decline over the past century, in some countries to as low as a quarter of the rates prevailing at the end of the 19th century.
- **The post-World War II 'baby boom'** (Figure 5): This anomaly – a surge in birth rates, particularly in North America, Europe, and Australasia – initially skewed the age distribution to the left, reducing median age. But as the baby boomers have grown up, the 'demographic bulge' has moved rightwards, tending to raise populations' median age, and reinforcing the two underlying trends in that direction (Figure 6).

⁵ United Nations (2006).

⁶ United Nations (2006).

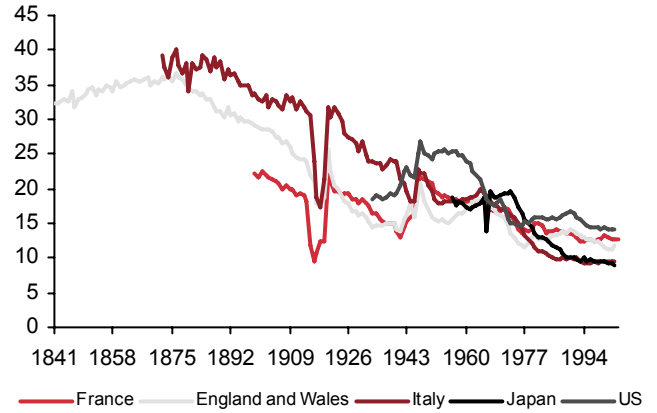
⁷ Birth rate is the number of children per thousand people; fertility rate is the number of children per woman.

Figure 3. Life expectancy since 1841 (years)



Source: Human Mortality Database, www.mortality.org.

Figure 4. Birth rates since 1841 (per thousand)



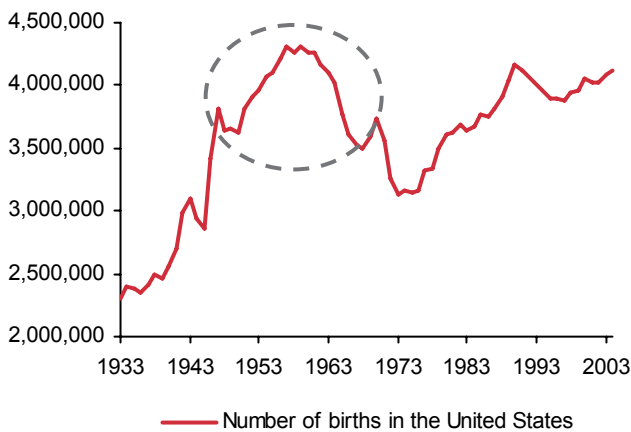
Source: Human Mortality Database, www.mortality.org.

The ageing of the baby boomers is the main challenge

In developed countries, it is the ageing of these baby boomers that constitutes the principal economic challenge. The first of the baby boomers will reach the age of 65 in about three years, and the last will reach that age in around 2029. Assuming that they live, on average, into their mid-80s, the resultant progressive skewing of the age distribution should continue to around 2050.

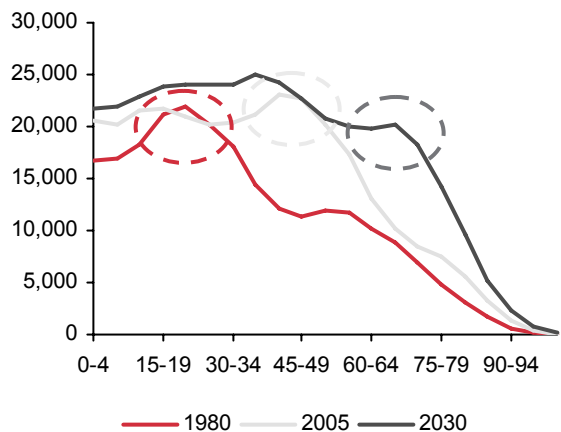
Once the anomaly has made its way through the population, the impact of the baby boom generation on the ageing of populations will fade. From 2050, the main influences will likely be, once again, just the two fundamental trends: rising longevity and decreasing fertility.

Figure 5. The post-World War II baby boom in the US



Source: Human Mortality Database, www.mortality.org.

Figure 6. The demographic bulge through time: Population by five-year age group, US (thousand)



Source: UN World Population Prospects: The 2006 Revision.

Age pyramids

Age pyramids have changed fundamentally and will continue to do so

The two basic trends, combined with the post-World War II baby boom anomaly, have together produced fundamental changes in the shape of age pyramids (see Picture Book).

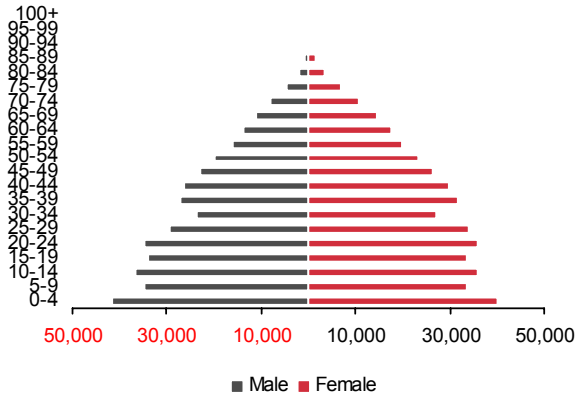
In 1950, the age pyramid for the most developed countries (Figure 7) had a so-called 'expansive' shape – a wide base, reflecting large numbers of young people, and a narrower top. By 2005, the pyramid had changed to a 'constrictive' shape (Figure 8), with fewer younger people and more older people – indicating a greying population.

All developed countries are expected to see their age pyramids moving towards constrictive shapes by 2050, with narrower bases and an increasing number of people living ever longer (Figures 9 to 16). Indeed, Japan has already reached that phase.

Developing countries, too, are experiencing changes in the shape of their pyramids. China's pyramid, which is stationary today, is expected to take a constrictive shape by 2050 – essentially the consequence of its one-child policy (Figures 17 and 18).

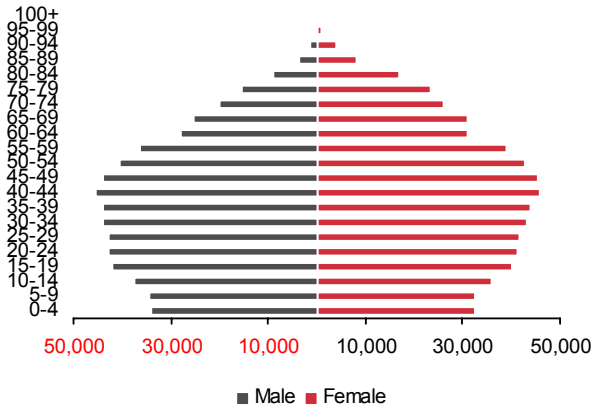
Picture book: Age Pyramids

Figure 7. Most developed countries, 1950: Expansive



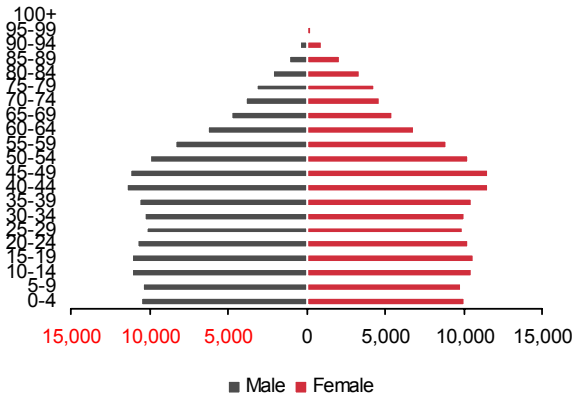
Source: UN World Population Prospects: The 2006 Revision.

Figure 8. Most developed countries, 2005: Constrictive



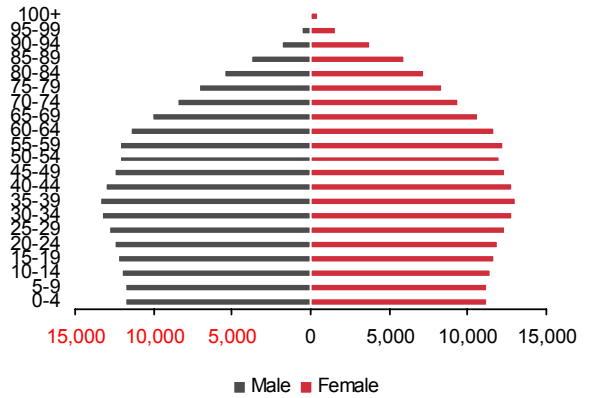
Source: UN World Population Prospects: The 2006 Revision.

Figure 9. United States, 2005: Stationary



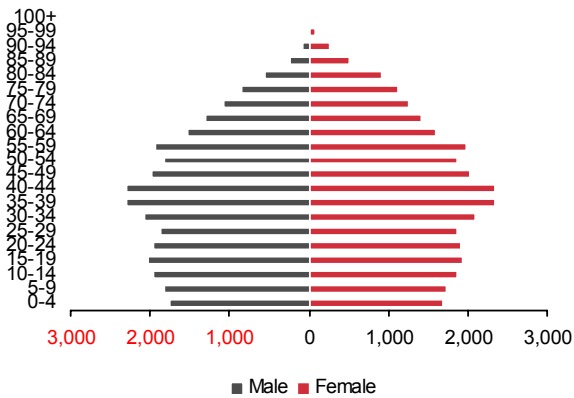
Source: UN World Population Prospects: The 2006 Revision.

Figure 10. United States, 2050: Constrictive



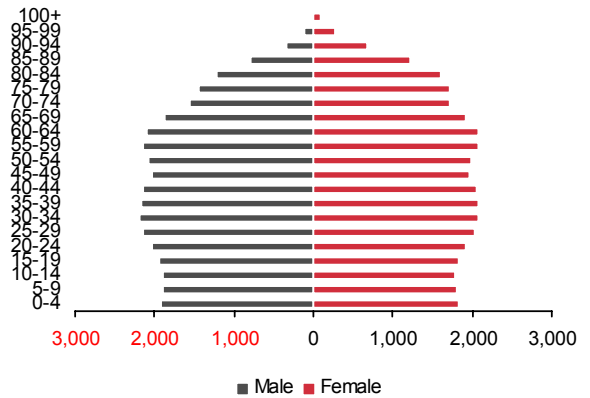
Source: UN World Population Prospects: The 2006 Revision.

Figure 11. United Kingdom, 2005: Stationary



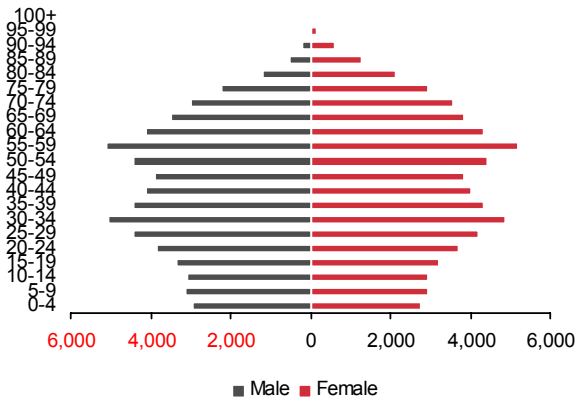
Source: UN World Population Prospects: The 2006 Revision.

Figure 12. United Kingdom, 2050: Constrictive



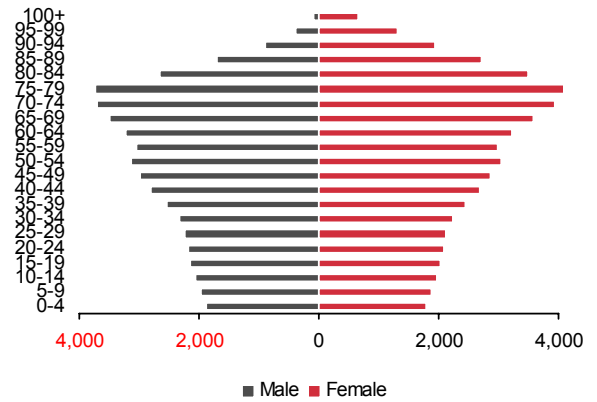
Source: UN World Population Prospects: The 2006 Revision.

Figure 13. Japan, 2005: Constrictive



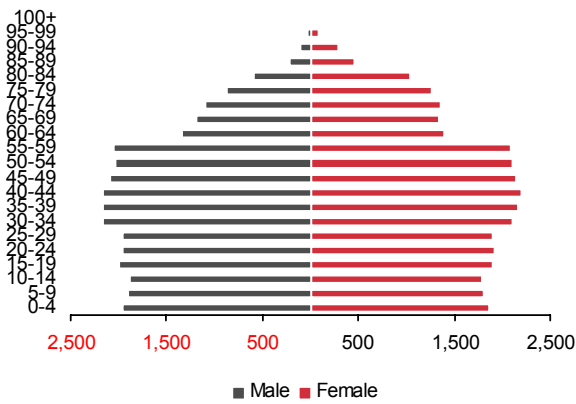
Source: UN World Population Prospects: The 2006 Revision.

Figure 14. Japan, 2050: Constrictive



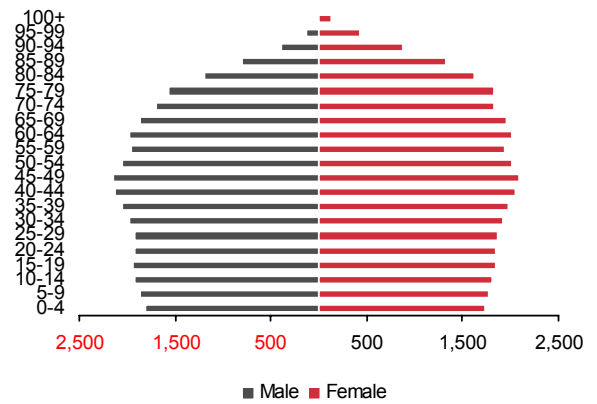
Source: UN World Population Prospects: The 2006 Revision.

Figure 15. France, 2005: Stationary



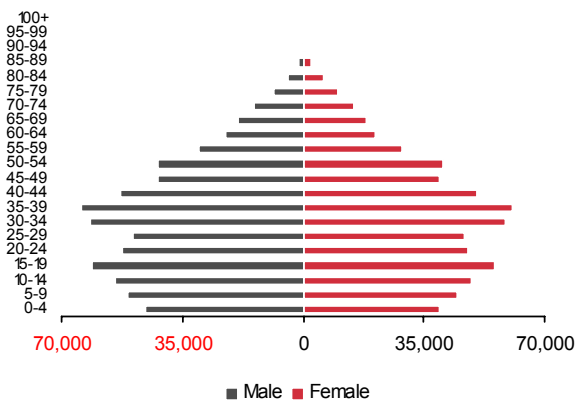
Source: UN World Population Prospects: The 2006 Revision.

Figure 16. France, 2050: Constrictive



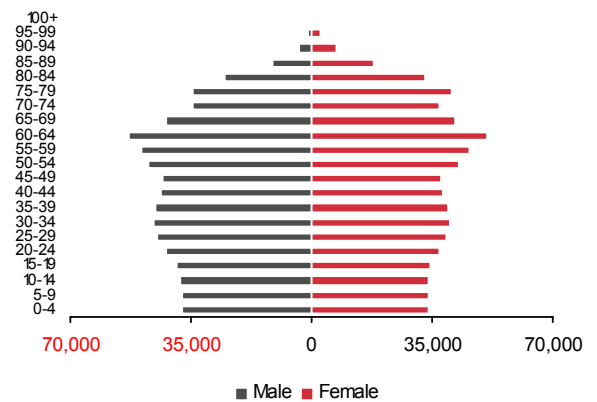
Source: UN World Population Prospects: The 2006 Revision.

Figure 17. China, 2005: Stationary



Source: UN World Population Prospects: The 2006 Revision.

Figure 18. China, 2050: Constrictive



Source: UN World Population Prospects: The 2006 Revision.

The rising trend of longevity

The past trend

The rising trend of longevity started with the Industrial Revolution

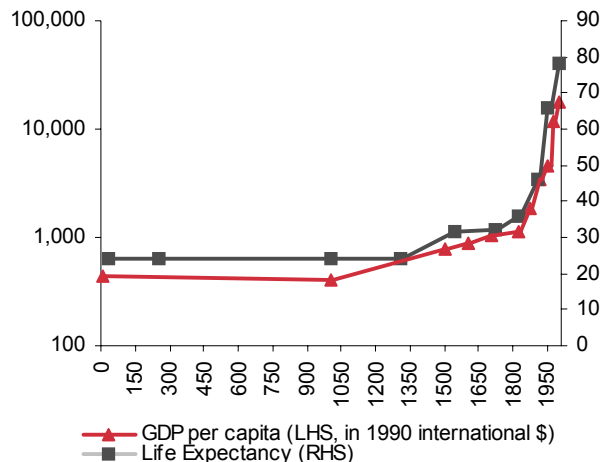
The steep trend increase in life expectancy began in the 19th century, more or less simultaneously with the rising GDP per capita that accompanied the Industrial Revolution (Figure 19).⁸

Over the 160-odd years since, various medical factors have contributed to rising longevity. Until around 1950, most of the gains in life expectancy stemmed from: large reductions in death rates at younger ages (largely the result of improvements in sanitation); a reduction in the number of severe epidemics and better management of them when they did occur; better nutrition; and general improvements in living standards and health behaviour.

More recent rises in life expectancy – i.e. since around 1950 – have been the result mainly of rising survival rates after the age of 65, particularly through progress against chronic diseases, improvements in surgical procedures, and refinements of medical therapies.

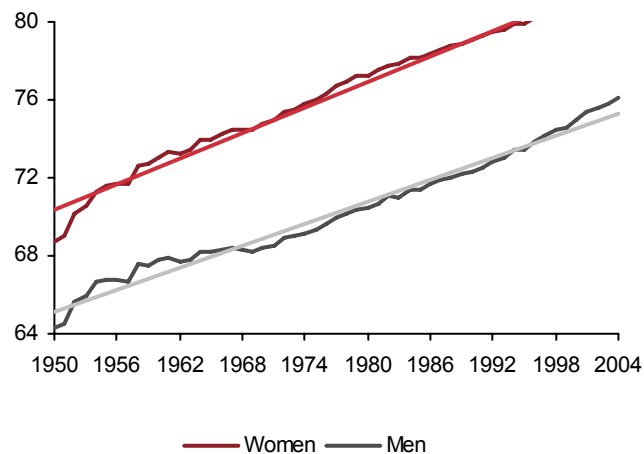
One consequence of these medical developments has been that, on average across OECD countries, life expectancy at birth has risen by 10.1 years since 1960 for women (reaching 81.1 in 2004) and by 9.4 years for men (reaching 75.4) (Figure 20). Meanwhile, life expectancy at age 65 in OECD countries has reached about 15 years for men and 19.5 years for women, an increase of 3.3 years and 4.5 years, respectively, since 1960.⁹

Figure 19. Life expectancy and GDP/capita since OAD



Source: Maddison, A. (2001).

Figure 20. Life expectancy in OECD countries¹⁰



Source: Human Mortality Database, www.mortality.org.

⁸ Increase in life expectancy actually started before, in the 10th century, but was very slow (10 years increase in 800 years time).

⁹ OECD (2007).

¹⁰ Total OECD countries less Greece, Ireland, Korea, Luxembourg, Mexico, Poland, and Turkey.

The debate about the future trend

Notwithstanding the varying causes of rising longevity, the rate of improvement has followed a remarkably reliable trend from the mid 19th century. This might suggest that such a trend would make longevity forecasting a relatively easy, perhaps even accurate, process. However, almost as reliable as the trend itself has been the unwillingness of forecasters to accept that it will continue. There have been two, opposing, theories.

'Limit theorists' predict that life expectancy will tail off...

1. The 'limit theorists': This school considers that there is a biological limit to life expectancy, and that it is set to be reached fairly soon. In that vein, Olshansky et al. (2001) have proposed that average life expectancy cannot go beyond 88.¹¹ Moreover, the 'limit theorists' air a general perception that past increases in life expectancy were achieved through the elimination or mitigation of causes of death that were relatively easy to address, whereas the remaining causes, such as cellular senescence, will prove far more difficult.¹² They also highlight future risks to longevity, such as antibiotic-resistant diseases, bird flu, and obesity (see Box: *The Obesity 'Epidemic'*) rather than future, but perforce unknown, advances in medicine, nutrition, and general health infrastructure.

This disbelief in a continuation of the past trends in longevity has led to a consistent tendency to predict an imminent tailing-off. This has been the case with most international organisations and national statistics institutes, which generally assume a slowdown over the coming 50 years of almost 50% relative to the pace in the second half of the previous century (Figure 21).

Figure 21. Projected gains in life expectancy at birth and past gains (years/decade)

Region / Country	Average gains 1960-2000 (a)	Projected gains 2000-2050 (b)	Difference (b-a)
EU15 average	2.0	1.2	-0.8
OECD average	2.2	1.2	-0.9
Canada	2.0	0.9	-1.1
France	2.2	1.8	-0.4
Germany	2.0	1.2	-0.8
Italy	2.4	1.8	-0.6
Mexico	4.1	1.2	-2.9
United Kingdom	1.8	1.6	-0.2
United States	1.7	1.4	-0.3

Source: Antolin, P. (2007).

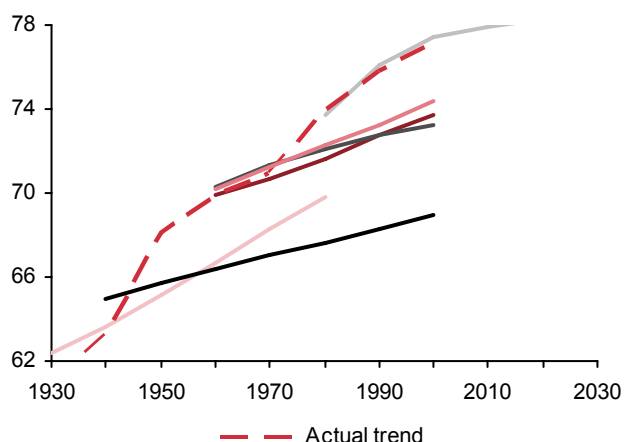
...but they have consistently under-predicted the increase in longevity

As a result, the future rate of longevity improvement has consistently tended to be under-predicted – with the result that the ceilings of the projections have continually had to be raised (Figures 22 and 23).

¹¹ Olshansky, S.J. et al. (2001).

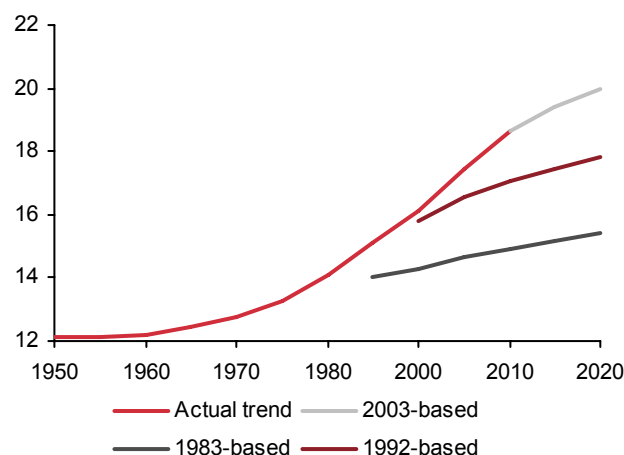
¹² Olshansky, S.J. et al. (1990).

Figure 22. Life expectancy projections in the US by the Social Security Administration



Source: Lee, R.D. and Tuljapurkar, S. (2000).

Figure 23. Projections of UK life expectancy at 65 by the Government Actuary's Department (GAD)



Source: Pensions Commission (2006), Appendix E.

This belief that life expectancy improvements will slow is particularly well anchored among company actuaries, who generally assume lower longevity than do government actuaries. In the United Kingdom, for example, trustees and their actuaries assume that a man retiring at age 65 will live a further 18 years, and a woman 22 years,¹³ whereas the Government Actuary's department (GAD) assumes figures of 20.7 years and 23.2 years, respectively. And in North America, a review of mortality projections shows that actuaries tend to project lower rates of mortality decline than do demographers (Figure 24).

Figure 24. Estimates of average annual reductions in US mortality rates for ages 65 and older after 2020 for men, by profession of forecaster

Profession	Number	Median
Actuary	29	0.60
Demographer	4	0.70
Economist	5	0.65
Other	3	0.70

Source: Waldron, H. (2005).

The 'no-limit theorists' predict that the past rising trend will continue

2. The 'no-limit theorists': Opposed to the advocates of the tailing-off of longevity are the 'no-limit theorists', who observe that, although the 'limit theorists' have long asserted that life expectancy is approaching a ceiling, empirical data have consistently proved them wrong (Figure 25).¹⁴ The most basic expression of this view simply extrapolates the historical rising trend of longevity into the future, without any tailing-off.

¹³ PricewaterhouseCoopers (2007).

¹⁴ Sometimes, the limit was exceeded even before the publication date, presumably because of delays in transmitting information between countries.

Figure 25. Theoretical limits to life expectancy and date exceeded

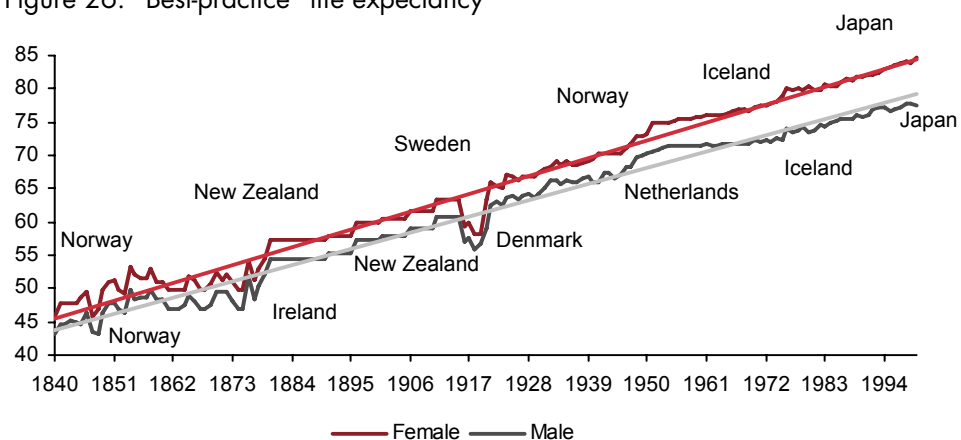
Source	Limit	Date published	Date exceeded	Exceeded by females in
Dublin	64.75	1928	1922	New Zealand
Dublin	70.8	1941	1946	Norway
Wunsch	76.8	1970	1967	Norway
Freijka	77.5	1981	1972	Sweden
Bourgeois-Pichat	78.2	1952	1975	Iceland
Siegel	79.4	1980	1976	Iceland
Bourgeois-Pichat	80.3	1978	1985	Japan
Demeny	82.5	1984	1993	Japan
United Nations	82.5	1989	1993	Japan
Olshansky et al.	85	1990	1996	Japan
Fries	85	1980/1990	1996	Japan
United Nations	87.5	1999		
Olshansky et al.	88	2001		
World Bank	90	1990		

Source: Vaupel, J.W. and von Kistowski, K.G. (2005).

Some 'no-limit theorists' go so far as to assume that there will never be any limit to life expectancy. Oeppen and Vaupel (2002)¹⁵ point to the intriguing fact that a 'longevity line' joining up the various "best practice" countries has, for the past 160 years, risen not only at the impressively brisk pace of almost three months per year (see Figure 26), but has also done so remarkably steadily.

In 1840, for example, the longevity record was held by Norway, whose people then lived an average of 45 years. Today the record-holder is Japan, where life expectancy at birth is currently 82. And over the intervening period, at least 10 different countries have held the record.

Figure 26. "Best-practice" life expectancy



Source: Oeppen, J. and Vaupel, J.W. (2002).

¹⁵ Oeppen, J. and Vaupel, J.W. (2002).

The 'no-limit extrapolationist' camp also points to:

- the acceleration in the number of people over 85 years of age and the rapid increase in the number of centenarians and super-centenarians;¹⁶ and
- the deceleration of the trajectory of death rates at advanced ages.

The pure extrapolationist approach fits the facts, but has no theoretical content

A big weakness of the purely extrapolationist approach to longevity projection, however, is that, at least in its simplest form, it lacks any direct scientific or other theoretical content. On the other hand it has, so far at least, basically fitted the facts. By contrast, the more content-rich 'limit theorists' approach, which incorporates all the scientific knowledge available at the time the projection is made, thereby has the advantage of being comparatively rich in content. But it has a poor record of predicting life expectancy.

On balance, we prefer the postulate that the rising trend of longevity is likely to continue, for two, quite separate, reasons.

First, probably much can still be done, even without further new technologies, to increase longevity. This is suggested by evidence that some population sub-groups enjoy higher life expectancy than do others. For example, the life expectancy of the Mormon population in the United States is well above the US average, and it seems likely that this is a result of lifestyle differences rather than genetic differences (Box: *Lifestyle and Longevity: The Case of the Mormons*).

Moreover, a number of studies have shown how lifestyle changes can increase life expectancy. A recent study led by Cambridge University suggests that a combination of four behaviours can increase life expectancy by as much as 14 years:¹⁷

- Being a non-smoker
- Eating five or more vegetables or fruits per day
- Consuming alcohol in only modest amounts
- Engaging in regular exercise

However, the trend may be proxying for (rising) real income and other causal relationships

More fundamentally, however, we incline to the extrapolationist view because, although the pure time-trend method is devoid of direct theoretical content, that time-trend may be proxying for a causal set of variables – the most important, perhaps, being (rising) real per capita income – that interact in a fundamental way with life expectancy. This notion is embodied in the so-called 'technophysio evolutionists' theory, more details of which are given in the Box: *The 'Technophysio' Theory*.

¹⁶ People who have reached the age of 110 years or more.

¹⁷ Khaw, K. et al. (2008).

The 'Technophysio' Theory

This school considers that not all improvements in the outcome of exposure to health risks between, say, 1840 and today stem from improvements in medical technologies. Instead, they believe, the improvements reflect improved physiologies of later birth cohorts, the consequence of improved technologies in areas ranging from food production to public health practices to personal hygiene and diet.

To the extent that that is so, one implication is that the underlying, fundamental, cause of the strong (rising) trend in longevity since the start of the Industrial Revolution has been the rising trend of real per capita incomes, which has led to a complex, causal interaction between a rising, real-income-led, demand for, and hence supply of, a healthier public environment and ever-better health services.

This explanation has been advanced particularly by Fogel (2003), who concludes, on the basis of a massive statistical study, that unlike the genetic theory of evolution through natural selection, which applies to the whole history of life on earth, technophysio evolution applies only to the past 300 years of human history, and particularly to the past century. In Fogel's words:

"The theory of technophysio evolution rests on the proposition that during the last 300 years, particularly during the last century, human beings have gained an unprecedented degree of control over their environment – a degree of control so great that it sets them apart not only from all other species, but also from all previous generations of Homo sapiens. This new degree of control has enabled Homo sapiens to increase its average body size by over 50 percent, to increase its average longevity by more than 100 percent, and to greatly improve the robustness and capacity of vital organ systems..."

The theory of technophysio evolution implies that health endowments in a given population change with the year of birth. It also points to complex interactions between date of birth and the outcome of exposures to given risk factors. Hence, not all improvements in the outcome of exposure to health risks between, say, 1970 and 1990 [have been] due to health interventions during that period. Improvements in life expectancy may [have depended] only partly on the more effective medical technologies of those years. [They may] also reflect the improved physiologies experienced by later birth cohorts that are due to improved technologies in food production, public health practices, personal hygiene, diets, and medical interventions put into place decades before 1970, and hence cannot be attributed exclusively, perhaps even primarily, to health inputs between 1970 and 1990."¹⁸

To the extent that the 'technophysio' approach represents a broadly appropriate description of the determinants, at the most fundamental level, of the processes underlying increasing longevity, there is a range of implications for forecasting likely trends over the coming century and beyond. These include, in addition to longevity itself: the age at onset of chronic diseases; body size; and the efficiency and durability of vital organ systems, as well as a range of public policy issues such as the growth in populations, in pension costs, and in health care costs.

In addition, there is a consideration that has already proved to be quantitatively significant and that may well become, in this age of improved communication, increasingly important: the tendency for longevity to converge across countries.

The phenomenon of convergence

Longevity tends to converge across countries

Longevity has tended to increase fastest in the countries that are relatively behind 'best practice' – and conversely (Figure 28). Reasons for this may include: quick transmission of best-practice (health) information between countries; changes in life styles as a result of better information; and political pressure on health service providers to import best-practice techniques.

¹⁸ Fogel, R.W. (2003).

Given this convergence tendency, countries such as the United Kingdom or the United States, which currently are below the average life expectancy of the most developed countries, could be expected to see their life expectancy rise faster in the coming years than in other above-average life-expectancy countries, such as Japan. However, few official projections, it would appear, give much weight to this phenomenon.

Illustrative projections of life expectancy

Jointly, the 'technophysio' and convergence theories imply rapid longevity growth

To illustrate the extent to which the assumptions of the 'limit theorists', and the ignoring of the convergence assumption, may be leading to under-projection of future longevity, we have constructed a simple set of projections, on the following basis:

- The continuation of past trends in longevity, in the spirit of the 'technophysio evolutionist' theory summarised above; and
- The observed property that, over time, cross-country longevity tends to converge.¹⁹

The resulting projections imply significantly higher longevity than governmental projections typically do: our projections suggest that all countries could reach a life expectancy of at least 89 by 2050, whereas the UN, for example, projects 83 for the United States, 84 for the United Kingdom, and 87 for Japan (Figures 27 and 29).

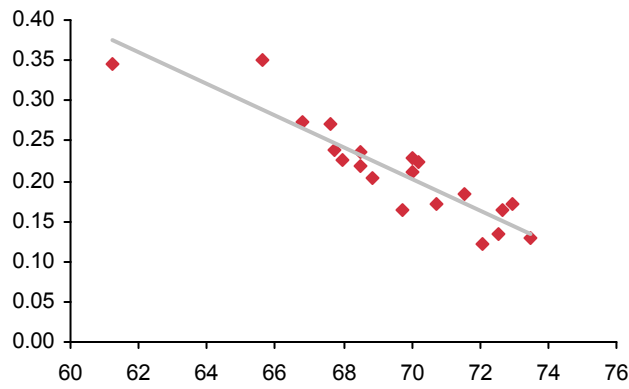
Figure 27. Life expectancy projections: The technophysio/convergence model vs. official projections in 2050

Country	Life expectancy in 2050, using the model	Life expectancy in 2050, according to UN projections
Australia	89.7	86.0
Canada	89.6	85.3
England and Wales	89.5	84.1
France	89.6	85.1
Germany	89.5	84.1
Italy	89.7	85
Japan	89.9	87.1
Spain	89.6	85.4
United States	89.4	83.1

Source: Human Mortality Database, UN World Population Prospects: The 2006 Revision, and Nomura.

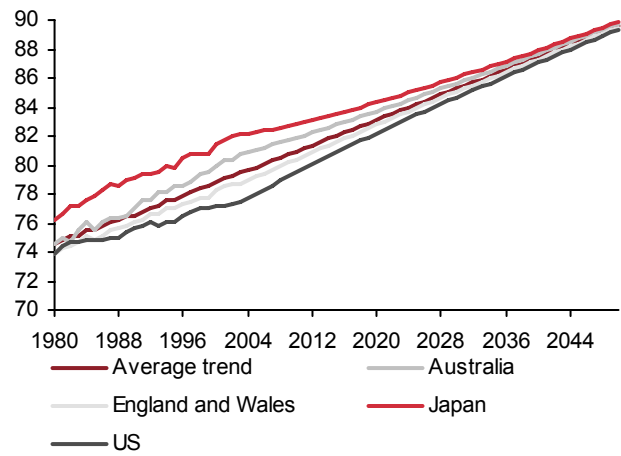
¹⁹ We assume a convergence factor of 4.5% per year – i.e. 4.5% of the life expectancy gap between a specific country and the developed country average is closed each year.

Figure 28. Life expectancy in 1956 and average change per year, 1956-2003



Source: Human Mortality Database, www.mortality.org.

Figure 29. Projected life expectancy by means of the technophysio/convergence model



Source: Nomura.

The Obesity 'Epidemic'

Recent trends in obesity, body mass index, and life expectancy

Although there are many potential risks to the continuation to the upward trend in longevity, perhaps the most discussed, and the most quantifiable, is the sharp increase in obesity in many countries. Based on consistent measures of obesity over time, the rate of obesity has more than doubled over the past 20 years in the US, while it has almost tripled in Australia, and more than tripled in the UK (Figure 30).

Given that obesity is known to be associated with a number of health risks (ranging from cancer and coronary heart disease to type-2 diabetes, osteoarthritis, and gallbladder disease), it seems natural to conclude that this significant rise in obesity will have a powerful effect on longevity. Indeed, a widely-cited study by Olshansky et al. (2005)²⁰ suggests that the rise in obesity in the US may actually cause life expectancy to fall. However, most research finds that this study both understates likely future improvements in medical technology and overstates the impact of obesity; hence the impact of obesity on longevity is still likely significant, but less severe. For example, a widely cited study by Flegal et al. (2005)²¹ found results (corroborated by other studies) that imply at least some potential mitigation of the impact of obesity:

- 1) More recent data show that the impact of obesity on life expectancy is falling – perhaps reflecting improved medical technology, or that people classified as obese today are actually healthier than in the past.
- 2) Being 'overweight' (Body Mass Index (BMI) between 25 and 30) actually appears (statistically) significantly to increase life expectancy relative to the presumed ideal (BMI between 18.5 and 25), among older people.
- 3) Being classified as moderately obese (BMI between 30 and 35) does not have a statistically significant association with life expectancy relative to the 'ideal' case (though the researchers' central estimate suggests a slight reduction of life expectancy, particularly in the younger age groups).

Estimating the link between rising BMI and life expectancy

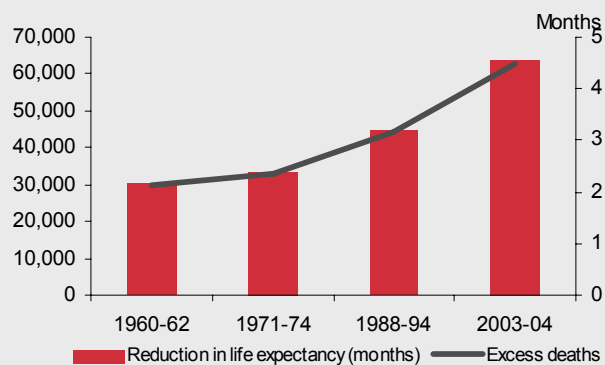
To calibrate the importance of the obesity epidemic, we have undertaken some calculations of the impact of the trend increase in BMI on life expectancy in the United States. Figure 31 shows the estimated impact of the actual distribution of BMI in the US over the past 40 years on excess deaths and life expectancy, relative to the ideal (BMI between 18.5 and 25). We estimate that, in 2003-04, the actual distribution of BMI in the US was responsible for more than 60,000 excess deaths, and a reduction of about 4 ½ months relative to a hypothetical situation in which all Americans had BMIs within the ideal range. The results suggest that, although there has probably been a steady rise in excess deaths related to rising BMI over the past 40 years, that rise has not been sharp relative to the general (upward) trend in life expectancy. We estimate that rising BMI may have reduced life expectancy by about 3 months over the past 40 years, which is approximately equal to the average rise in life expectancy that has occurred every year over that period. Hence, unless the rise in BMI accelerates appreciably in coming years, it is hard to see obesity alone as being the cause of a marked change in current mortality trends.

Figure 30. Percentage of obese population (BMI>30), 2004 or latest available year



Source: 2004 OECD Health Statistics.

Figure 31. Excess deaths and reduced life expectancy due to deviation from ideal BMI in the US



Source: NHANES, Flegal, K.M. et al. (2005), Stevens, J. et al. (1999), and Nomura.

²⁰ Olshansky, S.J. et al. (2005).

²¹ Flegal, K.M. et al. (2005).

Lifestyle and Longevity: The Case of the Mormons

A group that has received particular attention in the demographic literature is the Mormon community in the United States. Mormons are genetically similar to the rest of the American population, but have significantly longer life expectancy (Figures 33 and 34). It seems likely that this is related to healthier lifestyles, given that the Mormon Church has particularly strong guidelines on the lifestyles of its members. Church doctrine discourages the use of tobacco, alcohol, coffee, and tea, and recommends a nutritious diet. It also encourages marriage and family, education, and religious activity. There is some evidence that all these behaviours, together with the stronger social networks associated with religious communities, influence life expectancy (Figure 32).

Figure 32. Estimated additional life expectancy: Mormon vs. non-Mormon (selected US studies)

Study	Men	Women
Manton et al (1991), Mormon insured population, 1980-1988	14.2 years	9.6 years
Merrill (2004), Utah Mormons, 1994-1998	7.3 years	5.8 years
Enstrom and Breslow (2007), California Mormons, 1980-2004	9.8 years	5.6 years

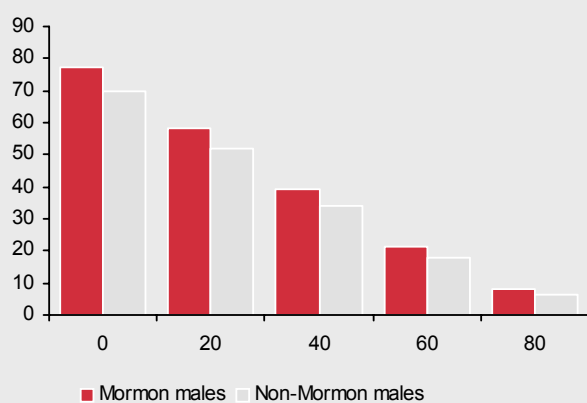
Source: Studies quoted in the table.

Estimating life expectancies for a subgroup presents a number of challenges – particularly when the study sample is short. Of the three studies summarised above, that by Enstrom and Breslow²² is probably the most authoritative to date, given its long sample and follow-up. However, all studies (including others not reported here) suggest that the Mormon community has significantly greater life expectancy than does the non-Mormon community (especially compared with non-church attendees) with the difference being particularly marked for males.

Overall, the evidence from Mormon communities suggests that significant advances in life expectancy can be achieved simply by lifestyle changes, even without using existing medical technology.

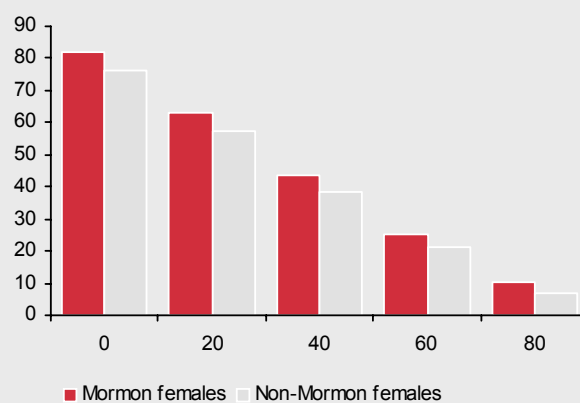
To the extent that lifestyle is important for longevity, this has a number of potentially important implications. Japan is a case in point. In many ways, it is surprising that Japan is the country where people live longest. The average Japanese lifestyle is by no means ideal: smoking and drinking are prevalent, the Japanese diet contains a considerable amount of salt and pickled food, and many Japanese live highly stressful lives. Indeed, Japan has among the highest suicide rates in the world, and the highest rate among the G8 countries (24 suicides per 100,000 people in 2004²³). Arguably, therefore, if or when various aspects of the Japanese lifestyle improve, Japanese longevity could be expected to rise further.

Figure 33. Years of life expectancy by age, in Utah, 1994-1998 (men)



Source: Merrill, R.M. (2004).

Figure 34. Years of life expectancy by age, in Utah, 1994-1998 (women)



Source: Merrill, R.M. (2004).

²² Enstrom, J.E. and Breslow, L. (2007).

²³ World Health Organisation.

The decreasing trend of fertility

The second major element in the ageing of populations is the declining trend of fertility that accompanied the rising trend of (real) per capita income that came with the Industrial Revolution. The main medical reason that fertility rates began to fall at that time was the progressive fall in infant mortality rate. This resulted in an increasing proportion of children reaching adulthood. Thus, to be reasonably certain of having four or five adults to support them later in life, parents 'needed' progressively fewer children.

This downward trend in fertility was then interrupted, temporarily, in a number of countries by the post-World War II baby boom (discussed in the following section).

Almost all OECD countries have fertility rates below the replacement rate

By 1964, however, fertility rates had resumed their downward trend. Today, in all OECD countries other than Turkey and Mexico, the fertility rate is lower than the replacement rate, i.e. below 2.1 children per woman (Figure 35). Some countries have even reached so-called "lowest-low" fertility rates: Italy, for example, currently has a fertility rate of just 1.25. The fertility rate in the Republic of Korea fell to as low as 1.08 in 2005, but has now rebounded to 1.26 as a result of government policy. The former East Germany reached a fertility rate of just 0.77 in 1993 before catching up again with the West German rate of around 1.3 in 2006.²⁴

Some countries have experienced modest increases. In France, for example, the fertility rate is currently 1.98 children per woman, well above the rate in the 1990s (1.73 in 1995),²⁵ and the European average of 1.5 children per woman – perhaps a consequence of French pro-natal public policies.

Slight increases have also been observed in the United Kingdom, Sweden, Finland, Denmark, Austria, Greece, Spain, and Italy. Germany is one major European exception, with only 1.3 children per woman. And in Portugal, the fertility rate has decreased in the past several years to around 1.45.

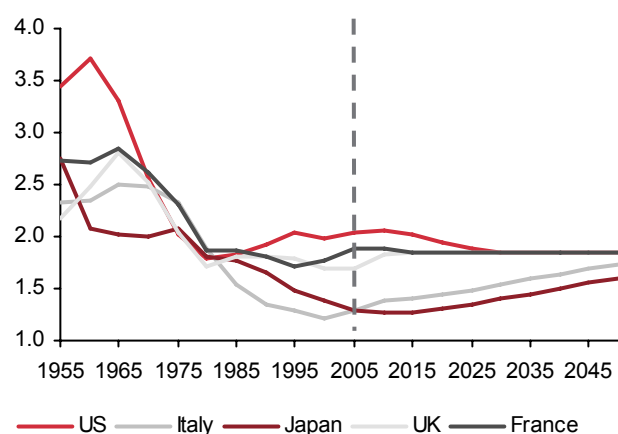
The UN predicts that the long-term decreasing trend of fertility rates may stabilise. That said, predicting fertility rates is a complicated exercise and, so far, fertility rates have generally been overestimated (Figure 36²⁶).

²⁴ Statistisches Bundesamt Deutschland.

²⁵ Institut National de la Statistique et des Etudes Economiques, www.insee.fr.

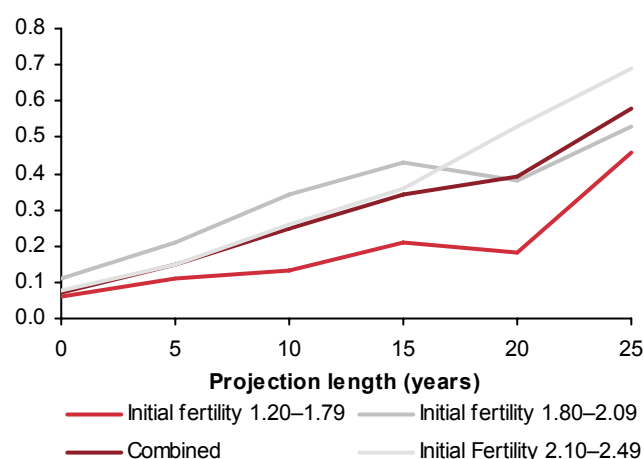
²⁶ Errors across countries and forecasts, for cases in which initial level was below 2.5.

Figure 35. Fertility rate in OECD countries (children per woman)



Source: UN World Population Prospects: The 2006 Revision.

Figure 36. Errors in projected fertility rate (children per woman)



Source: United Nations (2000a).

The anomaly: The post-World War II baby boom

The end of World War II brought a surge in birth rates in many countries...

The third, and crucial, element of the ageing of the populations in many countries is the boom in birth rates that occurred particularly in North America, Europe, and Australasia.

The post-World War II baby boom is dated, for most countries, as having taken place between 1946 and 1964, and it represented a dramatic, albeit temporary, reversal of the more than 100-year-long trend towards low fertility rates.

The term "baby boom" was apparently coined in May 1951, in a column by Sylvia F. Porter in *The New York Post*:

"Take the 3,548,000 babies born in 1950. Bundle them into a batch, bounce them all over the bountiful land that is America. What do you get? Boom. The biggest, boomiest boom ever known in history."

Possible causes

The precise causes of this baby boom, which followed a 20-year period of difficult times in which to raise children – the Great Depression and the Second World War – have been much discussed. Easterlin (1961), for example, explained the baby boom in terms of a relative income hypothesis, postulating that fertility decisions are driven by the gap between couples' actual and expected material well-being. He argues that people who grew up during the Great Depression, and who had low material aspirations, were overwhelmed by the prosperity that followed the Second World War, and which thereby increased both their wish and their willingness to have children. Others, such as Greenwood et al. (2005), argue that, with the diffusion of appliances such as refrigerators, washing machines, dishwashers, etc., women became able to take care of their households in much reduced time, decreasing the 'time cost' of a child.

Doepke et al. (2007) link the baby boom to the rise in demand for female labour during World War II: women who had worked during the war tended to stay in the labour force, 'crowding out' inexperienced younger women, who elected to have more children instead.

The consequences

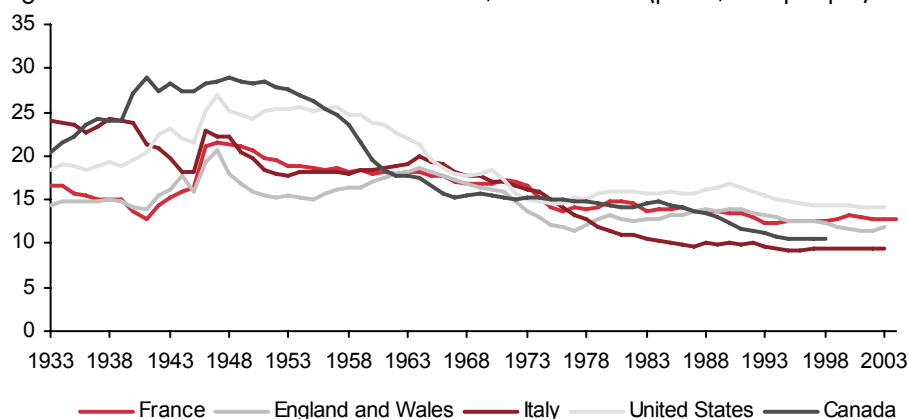
Whatever the causes, the consequences of the post-war baby boom have been quantitatively important. For example, in the United States alone, approximately 76 million babies were born between 1946 and 1964. Furthermore, annual US births first reached 4 million, and did not drop below that figure until 1965, by which time four out of 10 Americans were under the age of 20. In Canada, too, the post-World War II baby boom was of major importance.

Many European countries experienced a baby boom, if to a somewhat smaller extent (Figure 37). In France for example, whereas there were about 600,000 births per year before the Second World War, this number surged to about 850,000 immediately after it. Some countries, including England and Italy, experienced a second baby boom during the 1960s. In England, the birth rate surged from 16 births per thousand people in 1945 to 19 in 1946, decreased to 15, and then surged again to more than 18 children per thousand people from 1962. This second baby boom ended at the beginning of the 1970s.

...resulting in the "baby boomers" – the largest generation ever

The result is that the "baby-boomers" constitute the largest generation ever: in the United States, France, Germany, and the United Kingdom, they account for around one third of the population. The ageing of this generation will create challenges and opportunities for the economy, the workplace, and consumption and demand patterns.

Figure 37. Birth rates in selected countries, 1933-2004 (per 1,000 people)



Source: Human Mortality Database, www.mortality.org.

Conclusion

Longevity improvements have been systematically under-predicted. Longevity increase is not a purely medical matter: it involves a fundamental and complex interaction between rising (real) per capita incomes, science, medicine, technology, public health, and lifestyles.

There seems little reason to expect the long-established upward trend in longevity to tail off in the immediate future. We judge that official estimates significantly underestimate future improvements – quite possibly by five years or more.

However, more important from a quantitative perspective, including in respect of pension and health budgets, is the ageing of populations that has resulted, and will likely continue to result, from the post-World War II baby boom that was so important in North America, Europe, and Australasia. In these regions, around one third of the total labour force will start turning 65 in three years.

Redefining 'Old'

Introduction

The quality of life, rather than the length, has become the central preoccupation

The focus of attention over the past several decades has moved away from considering the *length* of life to considering the *quality* of (remaining) life. The concern has become not so much how long a given person is likely to live, but whether the extra years of life are likely to be good years. Hence, at the societal level, to the extent that chronic diseases have displaced infectious diseases such that being ill does not so systematically and inevitably result in dying, life expectancy is no longer a sufficient indicator for assessing population health.

In 1997, the World Health Organisation (WHO), in its World Health Report, summarised the point thus²⁷:

"... increased longevity without quality of life is an empty prize, i.e. health expectancy is more important than life expectancy."

The concept of health expectancy as a health indicator was proposed by Sanders (1964), who introduced the notion of an analysis that "... would not only determine for each age the probability of survival, but also the subsidiary probability of those surviving on the basis of their functional effectiveness".²⁸ The first example of such a calculation was published in a report of the US Department of Health Education and Welfare in 1971.²⁹

Scenarios for future trend of healthy life expectancy

The WHO gives the following definition of healthy life expectancy (or health expectancy) at birth: the "... average number of years that a person can expect to live in 'full health' by taking into account years lived in less than full health due to disease and/or injury."³⁰

The relationship between life expectancy and healthy life expectancy is depicted in Figure 1, which distinguishes three concepts:

- **Mortality** – the area under the mortality line representing life expectancy (LE).
- **Disability** – the area under the disability line representing disability-free life expectancy (DFLE).
- **Morbidity** – the area under the morbidity line representing life expectancy without chronic disease (DisFLE).³¹

²⁷ www.who.int/whr/1997/media_centre/dgmessage_en/en/index.html.

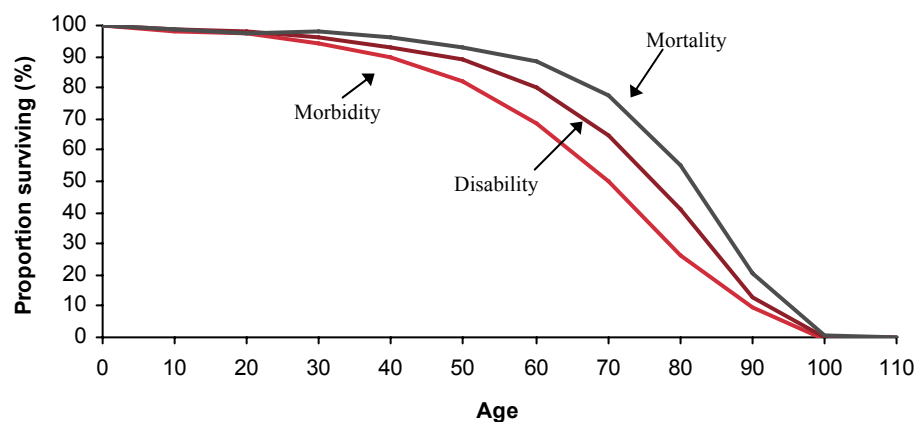
²⁸ Sanders, B.S. (1964).

²⁹ Sullivan, D.F. (1971).

³⁰ www.who.int/whosis/indications/2007HALE0/en/.

³¹ Those denominations were found in Robine, J.M. and Jagger, C. (2005).

Figure 1. Mortality, disability, and morbidity



Source: World Health Organisation (1984).

The area between the mortality and the disability curves represents life expectancy with disability, and the area between the morbidity and the disability curves represents life expectancy with at least one chronic disease, but without disability.

There is no consensus about future trends in healthy life expectancy

These three concepts have given rise to three main theories about possible future trends in healthy life expectancy:

- **Expansion of morbidity.** According to this theory, increasing longevity is linked to a prolonged period of morbidity and disability at the end of life, because of the improved survival rates of sick persons, and a growing prevalence of age-related diseases. Gruenberg (1977), in particular, predicted a surge in chronic diseases through the increased average duration of conditions whose fatal complications societies have learned how to postpone. According to this theory, the disability and morbidity curves of Figure 1 would move less quickly towards the right than would the mortality curve.
- **Compression of morbidity.** This theory predicts that the period of ill health and disability before death becomes shorter, i.e. healthy life expectancy increases faster than does life expectancy. Fries (1980) argues, optimistically, that chronic illness may be postponed by changes in life style. According to this theory, the disability and morbidity curves move more quickly than does the mortality curve.
- **Dynamic equilibrium.** This theory predicts that the prevalence of severe disability decreases, while the prevalence of light to moderate disability increases.³²

Empirical studies

United States studies

US data suggest that the extra years of life are broadly healthy...

Studies in the United States, for which data seem the most reliable, suggest reasonably strongly that the 'extra' years of life are in general broadly healthy, with relatively fewer disabilities than earlier; and that the average age of onset of chronic diseases has risen.

³² Manton, K.G. (1982).

Perhaps the most comprehensive study of the relationship between healthy life expectancy and overall life expectancy is the US "early indicator project". This examines a range of detailed characteristics of a large sample of people over a long period – back to individuals born in the early 19th century – using, among other sources, union army records. Fogel (2003) has reported on some key findings of this study, which found a number of striking results.

The data show that the prevalence of chronic diseases among the elderly used to be much higher than it is today, and that the onset of chronic disease now comes later in life. For example, of white men aged 50-54, the proportion free of all chronic conditions was 41% in 1994, up from 33% a century earlier. At age 60-64, white males today are 2.5 times more likely to be free of chronic diseases than was the case a century ago (Figure 2).

Figure 2. Proportion of white males without chronic conditions

Age interval	1890-1910	1994
50-54	33%	41%
55-59	21%	29%
60-64	10%	25%
65-69	3%	14%

Source: Fogel, R.W. (2003).

The delay in the onset of a chronic condition has been about nine years for heart disease and about 11 years for respiratory disease. Furthermore, the delay in the onset of chronic disabilities between 1900 and the 1990s for those who lived until age 50 – some 10 years – has been greater than the increase in life expectancy at age 50 over the same period – some 6.6 years. Thus, the study finds that the average age of onset of chronic diseases has risen significantly faster than overall life expectancy over the sample period.

Many factors have been responsible for this change, from reduced exposure to infectious diseases in early life to occupational shifts. The data also suggest that this process has – if anything – accelerated since the mid 1980s, perhaps as a result of advances in education and the information-technology revolution, which have increased public awareness of, and thereby the ability to reduce, the risk of chronic disease.

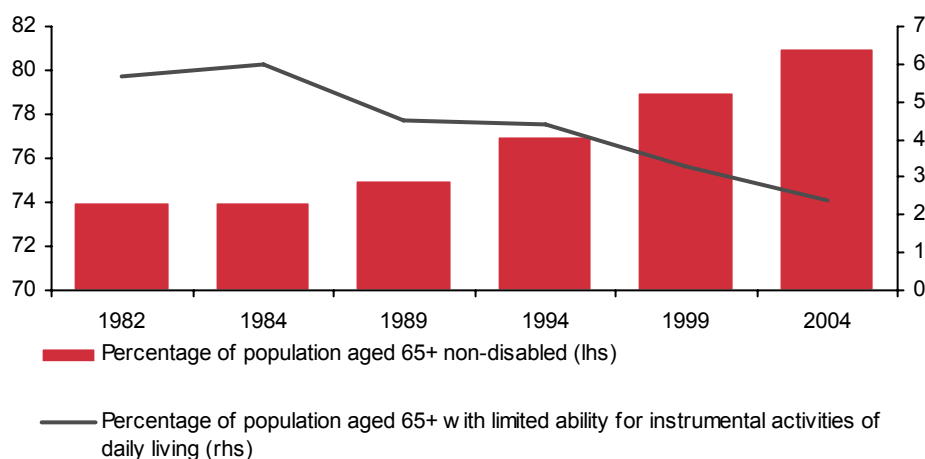
Drawing on data for a shorter period, Manton (2007) draws similar conclusions, from the 1982-2004 National Long-Term Care Survey (NLTCS) data. Not only has there been a significant decline in the prevalence of chronic disability above age 65 since 1982 in the United States, but the pace of decline has been accelerating, reaching 2.2% per year between 1999 and 2004 (Figure 3).³³ However, Manton points to the uncertainties regarding the effects of obesity, and its potential impact on the rate of disability improvement.

...pointing to a 'compression of morbidity' scenario

Thus, both studies point to the second theory about the trend of healthy life expectancy, i.e. the 'compression of morbidity' scenario, in which healthy life expectancy increases faster than does life expectancy.

³³ Manton, K.G. (2007).

Figure 3. Disability in the United States



Source: Manton, K.G. (2007).

Cross-country studies

Cross-country analysis is complicated by differences in definitions and assessment methods...

Comparing trends in healthy life expectancy across countries is more complicated because, although data are now available for many countries, each has its own definition of the term – there seem to be as many definitions of health expectancy as there are health concepts. For example, several indicators measure “healthy” life expectancy: life expectancy in “good perceived health”; “disease-free” life expectancy; “active life expectancy”, i.e. without loss of performance for daily activities; etc.

Another difficulty relates to data collection, which often relies on self-assessment, and is thereby sensitive to the economic, social, and cultural environment. It is probable that different people with similar health conditions give different answers to the same question, depending on such factors as the level of development of their countries.

One attempt at harmonising definitions has been made by the International Network on Health Expectancy and the Disability Process (REVES – Réseau Espérance de Vie et Santé) which promotes the use of standardised methods for collection of underlying health and disability data and for the calculation of health expectancies. Calculations have been made for more than 50 countries, and time series are available for almost all low-mortality countries, covering the period 1958-98. The series show:³⁴

- an increasing trend in life expectancy at age 65, both for men and for women, in all 50 countries;
- a relatively constant (upward) trend in almost all countries’ disability-free life expectancy at age 65, both for men and for women – Australia is perhaps the one exception; and
- a clear increasing trend for severe-disability-free life expectancy in line with increases in life expectancy.

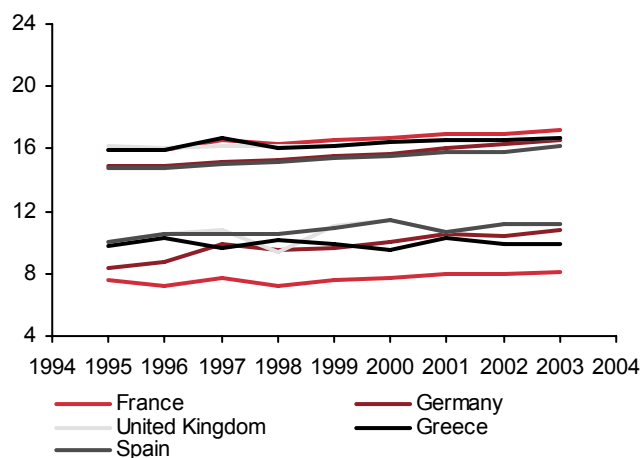
These data thus seem to support the “dynamic equilibrium” theory over the last few decades. However, details of country studies give mixed evidence.

³⁴ Robine, J.M. and Jagger, C. (2005).

...but, at the very least, the results are not inconsistent with a 'compression of morbidity' scenario

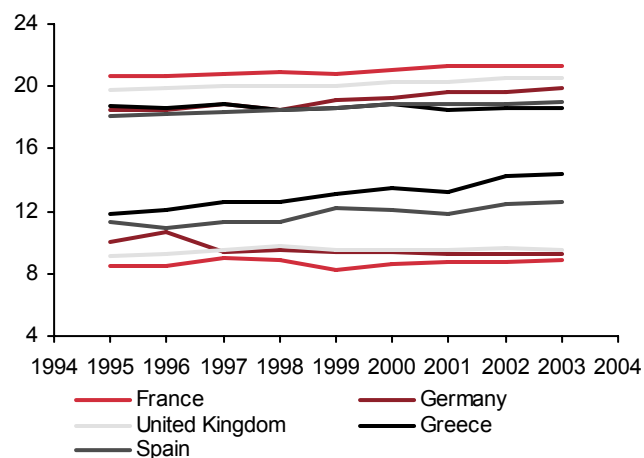
For Europe, the only historical harmonised data constructed so far have been the European Community Household Panel (ECHP) – a survey based on a standardised questionnaire that involves annual interviewing of a representative panel of households in every member state, covering a wide range of topics, including health. Using these data, the EHEMU (European Health Expectancy Monitoring Unit) has found that the overall trend over the past 10 years has been a slight increase of the disability-free life expectancy at age 65³⁵ (Figures 4 and 5).

Figure 4. Male life expectancy (LE) and disability-free life expectancy (DFLE) at age 65 (years)



Source: Jagger, C. (2005).

Figure 5. Female life expectancy (LE) and disability-free life expectancy (DFLE) at age 65 (years)



Source: Jagger, C. (2005).

Countries fall into three groups, according to whether the ratio of healthy life expectancy over life expectancy has (Figure 6):

- increased, suggesting a compression of disability;
- decreased, suggesting an expansion of disability; or
- remained broadly constant.

For most countries, trends for men and women have been rather different, and there is no apparent overall trend, whether of expansion or compression of morbidity in Europe.

However, although data from the ECHP should, in principle, provide harmonised data, changes over time and differences in survey design across countries make the analysis less than fully reliable. To address this, the Survey on Health, Ageing and Retirement in Europe (SHARE) project was launched in 2001 to collect reliable and harmonised data. The first data were collected in 2004, but the run so far is too short to permit significant conclusions to be drawn about any trend.

³⁵Jagger, C. (2005).

Figure 6. Proportion of life spent disability-free at age 65 in the EU, 1995-2001

DFLE trend	Men	Women
%DFLE/LE increases (relative variation > 5%)	Austria, Belgium, Finland, Germany, Italy	Belgium, Italy, Sweden
%DFLE/LE remains constant (-5% < relative variation < 5%)	France, Greece, Ireland, Spain	Austria, Denmark, Finland, France, Spain, UK
%DFLE/LE declines (relative variation < -5%)	Denmark, Netherlands, Portugal, Sweden, UK	Germany, Greece, Ireland, Netherlands, Portugal

Source: Jagger, C. (2005).

Cross-section analysis

Cross-section analysis also tends to support the 'compression of morbidity' scenario

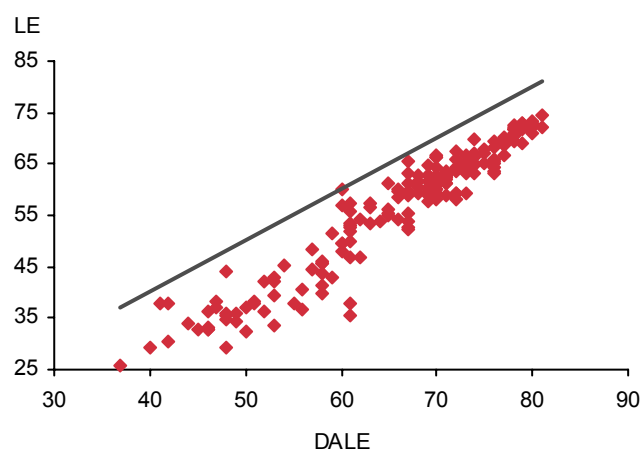
Simpler than tracking healthy life expectancy over time is to take a snapshot for a given year across countries. For a large sample of 191 countries, the data suggest that healthy life expectancy has a small, but statistically significant, tendency to converge on actual life expectancy, as life expectancy rises (Figure 7).

The same result is found for OECD countries (Figure 8). Put another way, countries with high life expectancy tend to have a slightly smaller gap between that life expectancy and healthy life expectancy. Again, this supports the 'compression of morbidity' theory, i.e. that healthy life expectancy increases (slightly) faster than overall life expectancy.

Thus, overall, both cross-section data and US time series data point to a compression of morbidity. Time series data from other countries are inconclusive, largely because of definitional issues. But, at the very least, it seems there is little evidence to refute the basic proposition that, on average, the number of healthy years increase at least as fast as the rise in longevity. As data become more refined and definitions more harmonised, we suspect that they will point towards a compression of morbidity, with a delay in the onset of chronic diseases and a faster rise in healthy life expectancy than in life expectancy.

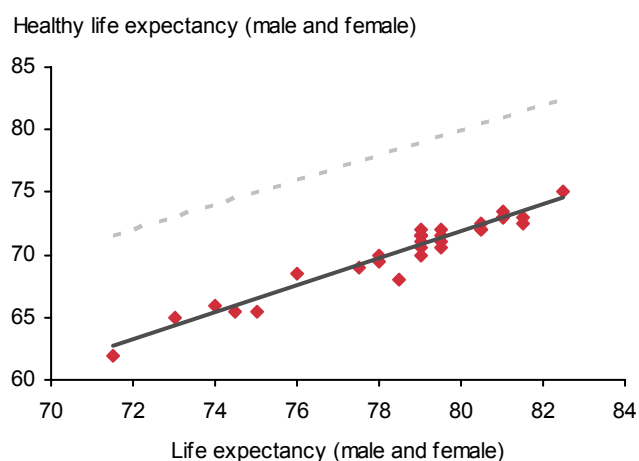
Further supporting this tentative conclusion is the observed tendency for health outcomes between similar countries to converge over time: it would seem unlikely that, at least over the longer run, different countries would have trends in healthy life expectancy as different as the current data seem to suggest.

Figure 7. Disability-adjusted life expectancy and life expectancy in 191 countries



Source: Mathers, C.D. et al. (2001) and World Health Organisation.

Figure 8. Life expectancy and healthy life expectancy in OECD countries



Source: World Health Organisation and Nomura.

Conclusion: A redefinition of 'old'

To the extent that the onset of chronic diseases and disability occurs at an ever-later age, it becomes appropriate to consider the implications for the definition of the term 'old':

- If, for example, the age at which a person becomes 'old' is defined as specific and unvarying then, with the passage of time, an increasing proportion of the population will be 'old'. Thus, if age 65 and above continues to be taken as the definition of 'old', then, whereas in 1950 only 8% of the population in the more developed countries was old, today more than 15% are 'old'.
- However, if 'old' is taken to mean a given degree of health or disability, then the age at which people become 'old' is moving further and further out. For the developed countries, the OECD-wide evidence is of a modest compression of morbidity over time, with a delay in the onset of chronic diseases and a faster increase in healthy life expectancy than in life expectancy. Hence, to the extent that in 1950 it was appropriate to consider a 65-year-old as 'old', then today, on the basis of an increase in life expectancy of three months per year, that term would apply only to a person who has reached nearly 80.
- Similarly, to the extent that, in 1950, 65 was taken to be the age at which, on average, people could no longer reasonably be expected to work, today, on the basis of healthy life expectancy data, that age too would be about 80. Moreover, to the extent that most jobs today are less physical than they used to be, largely due to the new technologies, work can in many cases be undertaken from home, arguably the definition of 'old' could be an even higher number.

Population Ageing and the Economy

'Business as usual' assumptions about the proportion of the population of working age imply that:

The conventional wisdom

Public discussion frequently reveals pessimism about population ageing and various of its likely macro impacts – for example, that:

- **output growth will slow**, because of fewer people in the labour force;
- **productivity growth will slow**, because of the lower productivity of an older workforce;
- **fiscal strains will intensify** as public pensions and health systems come under pressure from slower output growth, slower productivity growth, and a rising proportion of retirees.

Like all conclusions, however, these rest on key assumptions. Of particular importance is the assumption that the age of 65 marks the limit beyond which people should not, or will not, work. However, a number of these assumptions are, for a range of reasons, likely to be changed. Indeed, this is already starting to happen in some countries. Such changes stand to modify, possibly quite fundamentally, basic, conventional, conclusions about the macro impacts of population ageing.

Accordingly, the following section summarises the outlook for economic growth, public pensions, and public health expenditures on the basis of common assumptions about 'business as usual' policies. The chapter then considers how these assumptions, and hence outcomes, stand to be changed.

The labour force and economic growth

Economic growth will slow...

The UN has projected that by 2050, for the most developed regions as a whole, the working-age population, as conventionally defined – i.e. people aged 15-64 – will have fallen by almost 100 million, from around 820 million currently.³⁶ For the OECD region as a whole, on the basis of a similar definition and assuming unchanged participation rates, the number of workers aged 50 and over leaving the labour force could rise from around 8.5 million per year in 2000-05 to around 12 million per year in 2025-30.³⁷

Such developments would represent, depending on the country, a decline of 10-15 percentage points in the proportion of the population that is of working age (Figure 1). And in some countries, such as Japan and Italy, the working-age population could amount, by 2050, to only just over half of the total population.

Were this to happen, there would almost certainly be important effects on economic growth. The OECD for example has calculated that, assuming no changes in participation rates and productivity growth, GDP growth in the OECD region might decline to around 1.7% per year over the coming three decades – nearly one third lower than the 1970-2000 rate.³⁸

³⁶ UN World Population Prospects: The 2006 Revision.

³⁷ OECD (2006).

³⁸ OECD (2006).

The labour force and productivity growth

...labour productivity growth will be reduced...

Conventional wisdom also often has it that not only the quantity of labour, but also its quality, is affected by the ageing of populations, on the argument that a worker's productivity inexorably decreases with age. To the extent that this is so, a rising share of older workers in the labour force could be expected to reduce overall labour productivity growth, and thereby economic growth, even further. This matter is taken up in *The Challenge of an Older Workforce*.

Public pension and public health expenditures

...and fiscal strains will develop as pensions and health systems come under pressure

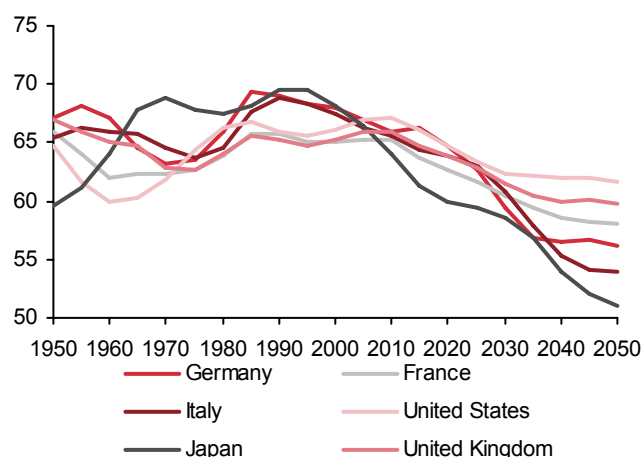
Developments such as those outlined above would be accompanied by a fall in the proportion of the population that is of working age, relative to the population aged 65 and older. The UN has projected that, for the most developed economies, taken in aggregate, the number of people aged 65 and above per 100 people of working age will increase from 23 in 2005 to 45 in 2050 (Figure 2).

The OECD, similarly, has estimated for the OECD countries that, on the basis of unchanged work and retirement patterns, the ratio of older inactive people (taken to be those aged 60 or more) to those of working age would almost double, from around 38% in 2000 to over 70% by 2050. In Japan, the ratio is set to rise to around 93%, and in Europe, the ratio could rise to almost 100%, while reaching as high as 112% in Italy.

Thus, the ageing of populations could, under 'business as usual' projections, massively increase the burden on those in work – and hence, almost certainly, put downward pressure on the value of pensions. Similar pressures would apply also to the provision of (publicly funded) healthcare: and these would come on top of other, underlying, non-demographic forces which also tend to raise the healthcare burden (Box: *Principal Influences on Healthcare Spending*).

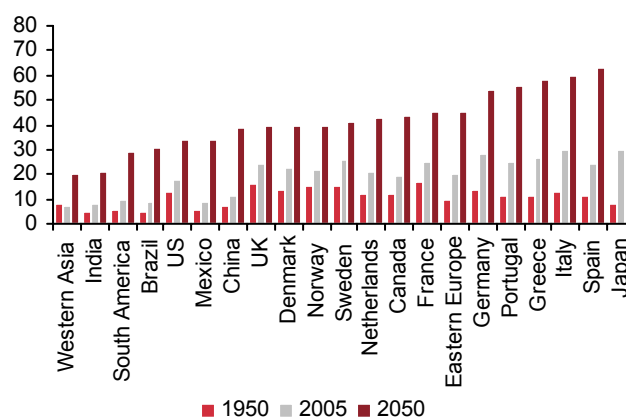
Moreover, the concerns do not stop there. The potential negative impact on fiscal finances also stands to damage infrastructure spending: while important in many countries, this could be particularly so for developing economies in which public infrastructure is a particular constraint on continuing development.

Figure 1. Working-age population (aged 15-64, as a percentage of the total population)



Source: UN World Population Prospects: The 2006 Revision.

Figure 2. Old-age dependency ratio (number of people aged 65 and over per 100 persons of working age)



Source: UN World Population Prospects: The 2006 Revision.

Principal Influences on Healthcare Spending

Public expenditure and long-term care shows a steady upward trend: in the OECD economies, taken as a group, total public health spending has almost doubled, from about 3.5% in 1970 to about 6.5% of GDP in 2005 (Figure 3).³⁹

It is often supposed that it is because people are living longer that healthcare spending is rising so rapidly. However, this is not so, largely because, as shown in *Redefining 'Old'*, the additional years of life are by and large healthy years.

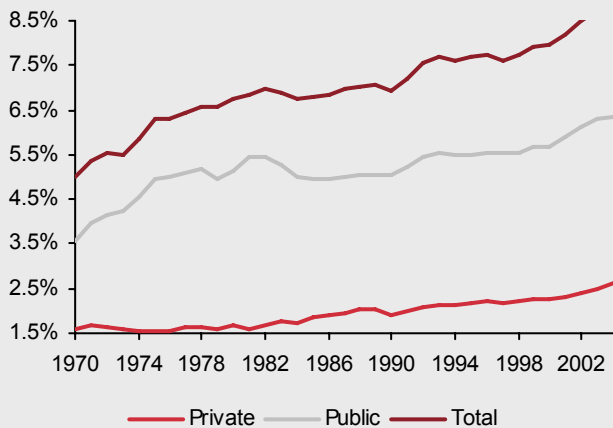
However, any bulge in the number of people nearing the end of their life does increase the volume of health expenditure, because the great bulk of health expenditure occurs in the last year or so of life. In the US, for example, a study of Medicare beneficiaries has shown that individual health expenditure increases from \$2,000 in the 12 months before death to \$8,000 in the last months of life (Figure 4).⁴⁰ Therefore, the ageing of the baby boom generation does cause a (substantial) increase in healthcare demand and spending.

In addition, a number of non-demographic factors contribute importantly to the upward trend in healthcare spending:

- 1) An increasing propensity to buy healthcare services as real income per capita increases, i.e. an income-elasticity of demand for health that is greater than 1.
- 2) The tendency for the price of (labour-intensive) health services to rise relative to the general price level.
- 3) Advances in medical technology that create new, 'must-have', medical goods and services.

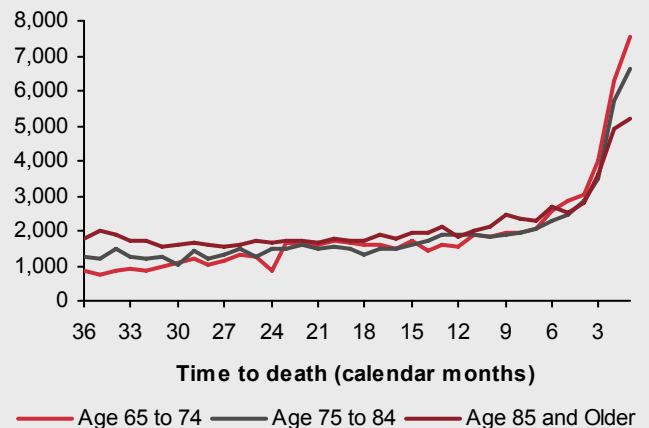
Thus, healthcare expenditure has a powerful growth dynamic of its own, over and above that which derives from evolving demographics.

Figure 3. Total, public, and private OECD health spending (% of GDP)



Source: Dormont, B. et al. (2007).

Figure 4. Individual health expenditure and death proximity in the US (\$)



Source: Yang, Z. et al. (2003).

³⁹ Oliveira Martins, J. and de la Maisonneuve, C. (2006).

⁴⁰ Yang, Z. et al. (2003).

Expanding the labour force

Such prognostications rest, however, on key assumptions

Clearly, the projections summarised above, which flow essentially from a set of 'business as usual' assumptions about the growth of the population of working age, and its ratio to those above working age, would imply, at the limits, either:

- a substantial, and in some cases massive, rise in the tax burden on those in work; or
- an equally large fall in the (real) value of expenditure on public pensions and public health.

Neither outcome would be likely to be politically acceptable: some compromise between the two would be more likely, probably involving at least some increase in government borrowing and, hence, the national debt.

In practice, there is considerable scope to raise the participation rate of older workers

More important, however, is a quite different policy option: to the extent that the problem arises because of a decrease in the proportion of the population that is deemed to be of working age, and to the extent that people are living, on average, both longer and healthier, the 'third way' is for policy to encourage a greater proportion of the population to remain in work beyond the present age of retirement. And there is considerable scope for this to happen, in many cases with the willing consent of those involved.

In many economies, the greatest scope for policy to increase the size of the labour force, and thereby to reduce the (old-age) dependency ratio, lies in raising the age at which people quit the labour force:

- One element would be to reverse the widespread and, until recently, increasing, trend to early retirement that has characterised most countries since the 1950s.
- A second element would be to raise the official retirement age.⁴¹

Not only are public policies likely to evolve in this direction – indeed this has already begun in some countries – but so, too, are some private-sector pension arrangements, including via the shift from defined-benefit (DB) to defined-contribution (DC) schemes.⁴²

Reversing the trend to early retirement

The participation rate among older workers has been low...

In most major economies, including even the United States, there had, from 1950 until comparatively recently, been a progressive decrease in the participation rate of older people in the labour force (Figure 5). Taking the OECD area as a whole, fewer than 60% of those aged 50-64 were in employment in 2004, compared with 76% for the 24-49 age group.⁴³ The fall in the participation rate in Europe since 1950 has been even greater than in the US. Japan has been one of the major exceptions to this general trend.

More recently – and particularly since the 1990s – this trend towards low participation rates has reversed in some countries: but it has not yet gone sufficiently far to take rates back to where they were in the 1950s.

⁴¹ See *Key Terms* section for explanations.

⁴² See *Key Terms* section for explanations of defined-benefit and defined-contribution schemes.

⁴³ OECD (2006).

Figure 5. Economic activity rate of people aged 60-64 in 1950 and 2000 (%)

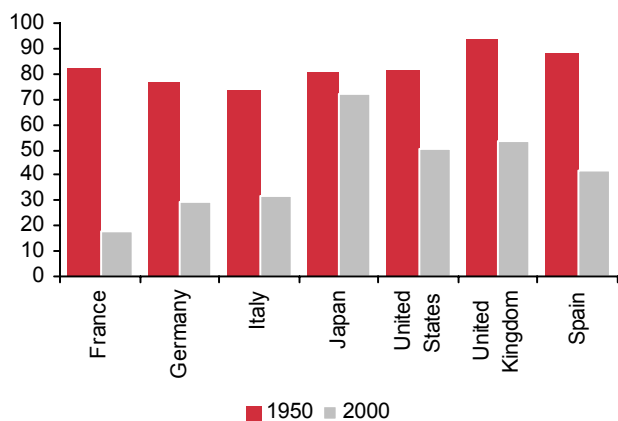
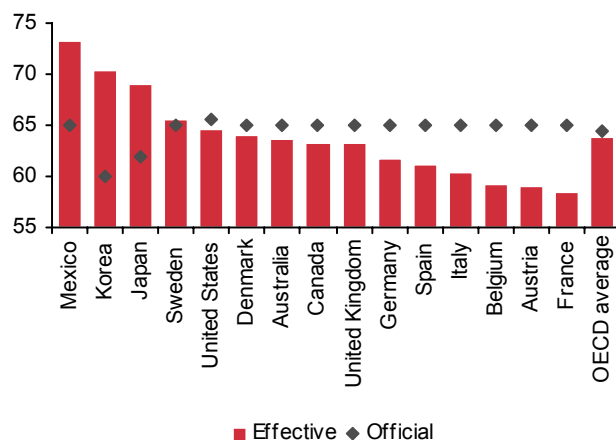


Figure 6. Effective vs. official retirement age in 2005, men



Source: UN Statistics Division, <http://unstats.un.org/unsd/cdb/>.

Source: OECD (2006).

..., the result of public and private incentives

The practice of workers withdrawing from the labour market before reaching even the present official retirement age (Figure 6) has often been the result of a range of public and private incentives:

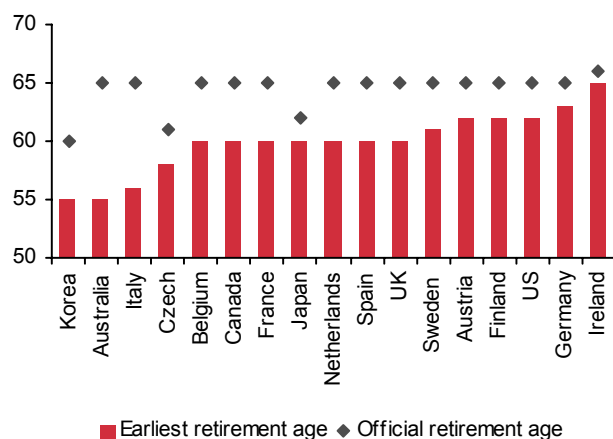
1. **The age at which retirement benefits can be claimed:** Workers can often claim a full pension significantly before the official retirement age (Figure 7) – sometimes conditional on their having a sufficient number of years of contributions, as in France, for example. A number of continental European countries introduced such early retirement provisions in the belief that having older workers quit their jobs early would boost youth employment.
2. **The so-called ‘generosity’ of the replacement rate:** In some countries, the pension rate is high relative to the average wage – and in a few (e.g. Luxembourg, Turkey, and Greece⁴⁴) exceeds it. And some methods of calculation explicitly encourage early retirement, especially where no penalty attaches to career length.
3. **The implicit tax rate on continuing in work:** If the cost of remaining in the labour force – i.e. the pension foregone and the contributions paid – is not offset by expected gains – i.e. future pensions – then there is an implicit tax on continuing in work. In many countries, and especially in continental Europe, this implicit tax rate has been high. And it correlates strongly with early departures and the number of people out of the workforce from the age of 55. Figure 8 shows how the so-called “tax force to retire”⁴⁵ – i.e. the tax on continued work, with a measure of 15 implying a 100% tax rate on all earnings beginning at age 55 – correlates with the spare labour force capacity between ages 55 and 64.

⁴⁴ OECD (2006).

⁴⁵ Gruber, J. and Wise, D. (1998).

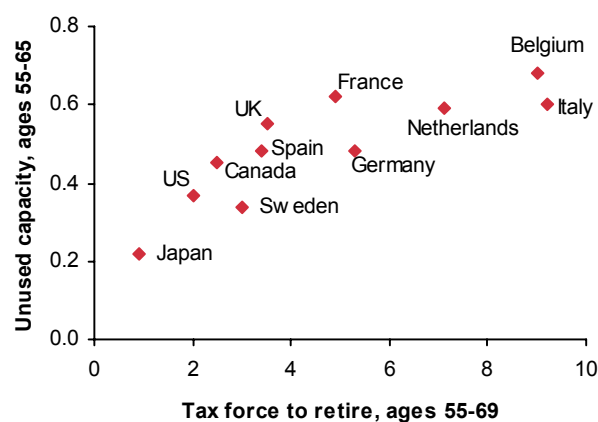
4. **Early and other de-facto retirement schemes:** In some countries – particularly Finland – entitlement to unemployment benefit has tended to be linked with other schemes, including sickness and disability benefits, thereby creating what has been termed an “unemployment tunnel”. Before 2005, older workers could retire at 55 by first receiving *unemployment benefit*, then an *unemployment pension* from the age of 60, and finally the customary *pension benefit* from the official pension age of 65.⁴⁶
5. **Inflexibility in the choice between work and pensions:** Workers often are not permitted both to work (part time) and to start receiving retirement benefit – they must choose one or the other. In most cases this leads them to choose retirement. In a study of older US workers who left their jobs between 1992 and 2000, for example, Penner et al. (2002) found that around 13% of those workers would have stayed in their jobs had their employer permitted them to reduce their hours.
6. **Private-sector defined-benefit schemes:** Not all the (dis)incentives to working up to the official retirement age come from public policy. Private sector incentives, too, have been important, particularly in the area of defined-benefit, final-salary pension schemes, which often bias the worker towards opting for retirement when his or her income is judged to be at its likely maximum (see: *Defined-Benefit Pension Schemes and Retirement Decisions*).

Figure 7. Age of eligibility for pension benefits



Source: OECD (2006).

Figure 8. “Tax force to retire” and spare labour force capacity



Source: Gruber, J. and Wise, D. (1998).

To reverse the trend to early retirement, those incentives will be removed

As policymakers find themselves under increasing pressure to avoid reducing real public pension and health expenditures, or raising the tax burden on those in work, there will be a natural move towards reversing the policies that have been giving rise to the trend to early retirement; viz. by some combination of:

- raising the earliest age at which benefits can be claimed;
- decreasing the ‘generosity’, or replacement ratio, of the public pension;

⁴⁶ OECD (2006).

- introducing steeper rewards and penalties based on the timing of retirement;
- restricting options for early retirement; and
- allowing more flexibility in combining work and pensions.

These options are not mere theoretical *curiosi*: a number of countries are already proceeding down these paths (Figure 9). And it seems likely that an increasing number of workers will willingly go along with such policy developments. There is a growing body of evidence that remaining in employment – or, more precisely, avoiding an abrupt cessation of employment – prolongs the period of good mental and physical health.⁴⁷ Hence, measures that permit workers to remain longer in employment, particularly if they allow for more flexibility over hours worked, and that permit a combining of work and pensions, could be expected to find widespread approval among many older workers.

Furthermore, these moves are likely to be buttressed by the private sector trend towards defined-contribution schemes.

⁴⁷ Dave, D. et al. (2006).

Figure 9. Examples of pension reforms in some countries

Raising the official pension age		
Australia	Official age for women: from 60 to 65	1995-2014
	Earliest age: from 55 to 60	2015-2050
United Kingdom	Official age for women: from 60 to 65	2010-2020
	Earliest age for men: from 60 to 65	2010-2020
United States	Official age for men and women: from 65 to 67 for full eligibility	2000-2027
Reducing replacement rates if retirement behaviour unchanged		
France	Increase in the required contributions for a full pension in line with changes in life expectancy	2008-2020
	Gradual increase in the number of years for calculating pension entitlements from 10 to 25 best years	1993-2008
Sweden	Switch from best 15 years to lifetime earnings basis	From 1999
Korea	Income replacement rate lowered from 60% to 50% in 2008, and reduced by 0.5% annually henceforth, to reach 40% in 2028	From 2008
Increasing rewards and penalties associated with timing of retirement		
Australia	Lump-sum bonus for deferral up to five years	1998
Germany	Pension 3.6% lower if retire aged 63-64; 6% higher for each year after 65	1997-2004
United Kingdom	Higher pension for retirement between 65 and 70: raised from 7.5% to 10.4% for each year, with lump-sum option added	2005
Korea	Early old-age pension reduction rate increased from 5% to 6% Additional 0.5% added to pension amount for each deferred month for income-earning persons over 60 eligible for Active Old-Age Pension If a beneficiary who has not worked since the age 55 re-engages in income-earning activities, his/her pension payment rate is increased by 6% annually for every working year	From 2008
Restricting options for early retirement		
Belgium	Require 35 rather than 30 years of contribution to retire early (at 60)	1997-2005
Italy	Seniority pensions for employees available from age 57 or with 40 years of contribution	2002-2008
General reforms		
China	Employers contribute no more than 20% of each employee's wage, while employee contributes a maximum of 8%	2000-2006
	Of this 28%, 11% goes to personal accounts, the other 17% to a mutual assistance program	From 2000
India	The New Pension System propositions: A shift of all new central government employees to a DC scheme At the time of exit from the workforce (at 60 years-old or after), it is mandatory to invest 40% of the pension wealth to purchase an annuity, the remaining 60% being paid as a lump sum If individuals leave the workforce before age 60, mandatory annuitisation would be 80%	Still under discussion in Parliament

Source: OECD (2006).

Defined-Benefit Pension Schemes and Retirement Decisions

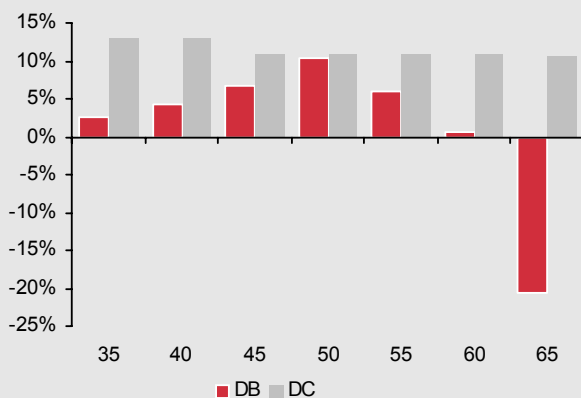
Although it is the incentives to early retirement that are implicit in state tax and benefit schemes that tend to get most attention, arguably it is private-sector schemes that, to date, have had the more important (perverse) incentive effect in encouraging early retirement. Although the details of private, defined-benefit, schemes differ considerably, both within and across countries, most tend to generate maximum marginal benefits for those who retire either at the 'early' retirement age, or at the officially designated state retirement age, and offer negative effective returns to those who continue in employment beyond the official retirement age.

Figure 10 illustrates this effect for a large sample of US schemes analysed by Gustman and Steinmeier (1995). It shows the pension accrual (i.e. the increase in the expected present value of a pension from working an extra year, expressed as a proportion of earnings in that year⁴⁸), for both the average defined-benefit (DB) scheme and the average defined-contribution (DC) scheme. The average DC scheme shows a smooth profile, with accruals being broadly similar for all ages, thereby not distorting retirement incentives. The average DB scheme, on the other hand, shows a striking pattern whereby accruals rise steadily until age 50, but then tail off sharply, such that the accrual rate is strongly negative at age 65. In other words, the expected present value of the average DB pension falls for anyone who continues working past age 65. In addition, Gustman and Steinmeier (1995) find significant spikes in the value of DB schemes at both the early retirement age – around 55 in their sample – and the normal retirement age (62), which further encourage workers to retire at those dates.

Such incentives appear rather important in determining actual retirement decisions. In a study of the UK and the US, Zissimopoulos et al. (2007) find a striking difference between the retirement patterns of workers on DB vs. DC schemes. Figure 11 shows the likelihood of staying in employment for another two years at given ages for US and UK workers on the two different types of schemes (after controlling for other characteristics). There is a clear tendency in both countries for those on DB schemes to retire at the normal retirement age (which is the point at which the value of the average DB pension is maximised), whereas those on DC schemes are far more likely to continue in employment past that date – presumably because their pensions continue to rise in value.

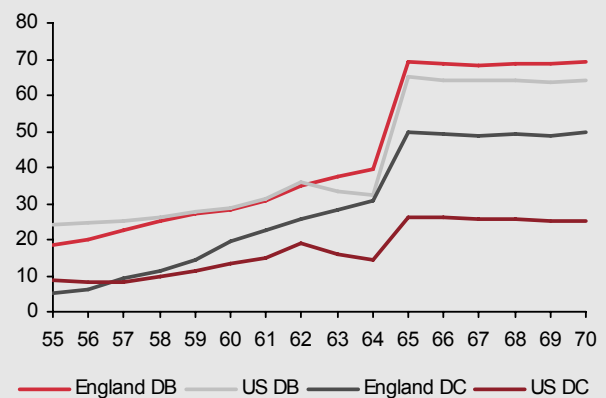
Such evidence suggests that the distorted retirement incentives of most DB schemes are an important factor in encouraging retirement either at, or before, the normal retirement age. DC pension schemes – which tend to be disincentive-free, i.e. the value of the pension rises broadly in line with the contributions made to it – show that without the (dis)incentives created by the DB system, individuals are far more likely to carry on working beyond the official retirement age. This evidence in turn suggests that, even without changes to state tax and benefit systems, a general transition from private sector DB to DC schemes will tend to raise the average age at which many people retire from the labour force.

Figure 10. Pension accrual as a share of annual wage by age (assumed age of hire 25)



Source: Gustman, A.I. and Steinmeier, T.L. (1995).

Figure 11. Percentage working in 2002, but not in 2004, by age



Source: Zissimopoulos, J.L. et al. (2007).

⁴⁸ More precisely, the accrual rate is the increase in the expected value of the pension after allowing for interest earned on existing pension assets and allows for the fact that another year of work reduces the likely number of years over which the pension will be paid.

Raising the 'official retirement age'

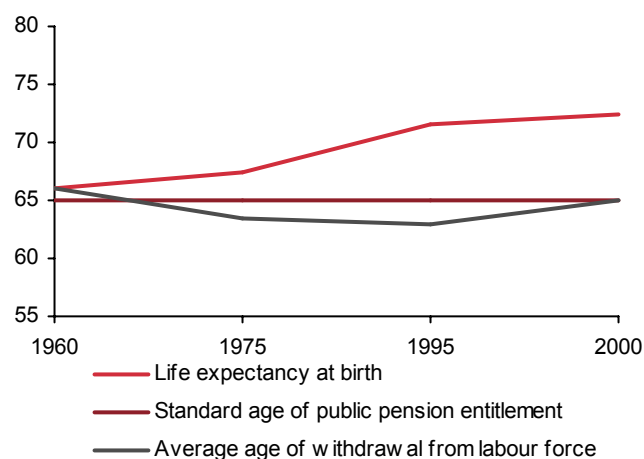
Not only is life expectancy rising fast, but healthy life expectancy is also rising quickly – possibly even faster (see *Redefining 'Old'*). Taken by itself, this implies that the average age at which people retire from employment should also tend to rise.

In most countries, the official retirement age has scarcely changed in decades

However, in most OECD countries the official, or standard, retirement age has remained virtually unchanged since the 1960s, notwithstanding the trend increase in longevity. When public pension systems were first established, people could typically look forward to only a few years of retirement. For example, when the US Social Security Program was first instituted – in 1935 – financial benefits began to be accessible to retirees at age 65: yet average life expectancy at that time was only 61. In 2005, by contrast, life expectancy in the US at age 65 was 17.2 years for men, and 20.0 for women.⁴⁹

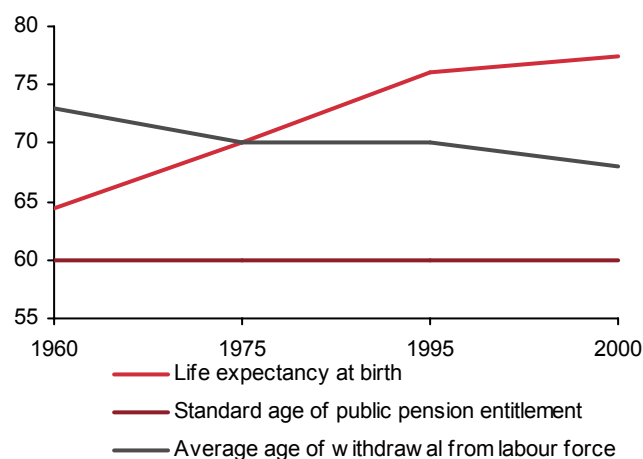
Similarly, for OECD countries taken as a group, life expectancy at age 65 is now around 15 years for men and 19.5 years for women. Thus, over the period since pension systems were first implemented, the gap between the official retirement age and life expectancy has widened enormously (see Figures 12 and 13 for the US and Japan examples).

Figure 12. Life expectancy and retirement age, US



Source: IMF (2004), chapter III.

Figure 13. Life expectancy and retirement age, Japan



Source: IMF (2004), chapter III.

A link between retirement age and longevity would be rational

Thus, it would seem rational for countries to establish a link between the official age of retirement on the one hand and longevity on the other. Indeed this is starting to happen: the OECD (2007) reports that some two thirds of pension reforms in OECD countries in the past 15 years contain measures that will automatically link future pensions to changes in life expectancy. We expect such reforms to go considerably further in the years ahead.

However, any decision to raise the official age of retirement must be the outcome of political negotiation – both about the age itself and, more fundamentally, about what 'official retirement age' should mean.

⁴⁹ Centers for Disease Control and Prevention, www.cdc.gov/nchs/data/hus/07.pdf#027.

From the standpoint of many workers, an official retirement age has become something of an acquired right; on the part of those near the present retirement age there is particular resistance to any raising of the age. By contrast, younger workers have an interest in seeing the official retirement age raised so that the burden of supporting the increasingly long-lived is borne more equitably between those in work and those who have retired.

However, the matter is more complicated than that. At least some of the people who are nearing retirement would like to work beyond the present official retirement age; or at least they would do so, were (dis)incentives not in place.

The consequences of making such changes are potentially large. For example, in the 1990s, New Zealand raised its standard retirement age from 60 to 65. This reform was followed by a sharp increase, of 15 percentage points, in the labour force participation and employment of the 55-64 age group.⁵⁰

It is therefore to be expected that, perhaps on the back of slogans such as "80 is the new 65", the official retirement age will be raised progressively in most countries. The extent of the rise will be determined by political negotiation; but it is possible to infer at least broadly what sort of increase would be rational.

An attempt to calculate the 'disincentive-free' retirement age

Any official age of retirement unavoidably represents a compromise. This will be drawn at different ages in different countries. Up to a point, however, some guidance as to what would be rational can be inferred from the revealed preferences of various age groups.

It seems likely that most advanced countries will continue to maintain the notion of an official retirement age, the reaching of which will qualify workers for a state pension. However, the realities of an increasingly less favourable (old-age) dependency ratio will mean that workers will also increasingly be offered a policy 'deal' whereby, to the extent that they choose to work beyond the official retirement age, they may pay less tax, and receive a higher pension when they do finally retire.

Were all disincentives removed, people would likely be willing to work longer

Such a 'deal' could be attractive not only to the individual but also to the state, because of the 'double whammy' that every additional year that the individual works is a year in which he or she pays taxes and does not draw a pension. We have attempted to illustrate the age at which, given their revealed preferences, people might choose to retire today, were all the disincentives removed.

Two key, and offsetting, trends influence retirement decisions:

- **Rising life expectancy:** As life expectancy – and healthy life expectancy – rise, people tend to choose to retire later.
- **Rising incomes:** As (real) incomes rise, people tend to 'buy' increased leisure by working fewer hours.

⁵⁰ OECD (2006).

It is difficult to estimate the magnitude of the income effect, or how it will manifest itself, because non-working time can be increased in a number of ways: fewer hours of work per week; fewer weeks of work per year; or fewer years of work per lifetime. In the absence of better information, we make the simplifying assumption that increased leisure tends to be spread equally across these three options.⁵¹ By assuming also that the overall demand for leisure follows its long-run trend⁵², it is possible to generate some illustrative projections of the retirement age that people might opt for in the absence of economic distortions (Figure 14).

Figure 14. 'Disincentive-free' retirement age in four countries, 2005 and 2050

Country	2005	2050
United States	67.0	68.6
United Kingdom	68.0	67.6
Japan	68.6	69.4
France	68.1	68.8

Source: UN World Population Prospects: The 2006 Revision and Nomura.

These calculations are almost certainly conservative: yet, even so, they suggest that, on average, people now and in the future would be willing to work for several more years than they do at present, if only the disincentives were abolished.

Other policies to increase the number of workers in the labour force

Other policies, too, can expand the labour force

Other policies, too, have the potential to increase the size of the labour force. Two of the most talked about are pro-fertility and pro-immigration policies:

- **Pro-fertility policies.** Although an increase in fertility reduces the old-age dependency ratio once the resulting children enter the labour force, in the nearer term it *increases* the overall dependency ratio (the ratio of those not in the labour force to those of working age). Furthermore, the direct impacts of so-called pro-natal policies can be quite short-lived. In Sweden, for example, the 'family-friendly' measures introduced in the 1980s pushed up fertility rates to 2.1 in 1990, but by 2000, this rate had dropped back to 1.5.⁵³
- **Pro-immigration policies.** Net immigration tends, in the short term, to increase the proportion of younger persons in the population, thereby reducing the dependency ratio, sometimes significantly. However, this effect typically does not last. As immigrants age, they tend to bring in their dependents, and their fertility rate declines towards that of the host country. The OECD (2000) has found that, in a range of OECD countries, the age profile of the foreign population is not particularly different from that of the native population. This in turn implies, as the United Nations⁵⁴ has argued, that to maintain the old-age dependency ratio at, say, its 2000 level would require enormous increases in migration flows in all regions and countries studied.

⁵¹ In fact, reduced hours per week have historically been the most important source of increased leisure.

⁵² Reduction in overall working time as a share of available time of about 0.8% per annum: derived from Ausubel, J.H. and Grubler, A. (1995).

⁵³ Murray, A. (2008).

⁵⁴ United Nations (2000b).

In some countries, however, immigration policies are seen as the possible solution to a fast-ageing population. In Singapore, for example, where the fertility rate is very low, perhaps because of a particularly high male and female participation rate in the labour force, the government has planned to boost immigration to tackle the forthcoming lack of young people.

Moreover, it is possible that the progressive disappearance of borders between countries and regions will further enhance the flows of people. Some long-term implications of such flows are discussed in Box: *The Flow of People: Longer-Term Implications*.

The Flow of People: Longer-Term Implications

Historically, migration flows of young people have had a smaller, and shorter-lasting, effect on the median age of populations than is commonly supposed. But this may change. To the extent that present trends towards borderless regions continue, it may be that a larger and wider range of consequences will flow from the ageing of at least some populations. The United States perhaps is a harbinger. It is now common for older Americans to move south in retirement or partial retirement – the Florida phenomenon. But somewhat similar movements could conceivably occur both in Europe and Asia – indeed to some extent they already are.

In Europe, significant numbers of northern Europeans now relocate in retirement to southern France, Spain, and Portugal, in movements made possible by the increasing homogeneity of legal frameworks and other policies within the European Community. Looking further ahead, it is imaginable that, depending on political stability, the security of land titles, enforceability of contracts, and other such considerations, at least some North African countries (or “southern Mediterranean” countries in this context) could become similar destinations for some sun-seeking European retirees. Conversely – and to some extent this, too, is already happening – the youth of these countries could become a source of labour in the ageing economies of the north.

In Asia, likewise, a number of countries – India and the Philippines, for example – have particularly youthful populations, whereas others – such as Japan, most notably, and Taiwan – have particularly old populations. Already, a number of Japanese retirement villages have been established in other countries in the region, most notably, perhaps, in Australia. This practice could extend significantly to at least some of the other countries in the region. On the other side of the coin, the future could well see a growing, and ultimately huge, demand by Japan for health-care and other workers from these countries. In turn, foreign remittances could become big drivers of the current account balances of such economies as India and the Philippines. Correspondingly, in Asia as in Europe, many jobs involving physical labour could well be outsourced increasingly to countries with younger populations.

- **Other policies.** Beyond pro-fertility and pro-immigration policies there is scope, significant in some countries, to increase the number of people in work by:
 - raising participation rates of certain other groups, particularly women; and
 - using structural policies to reduce the unemployment rate and the number of people who are outside the labour force because of disability.

In Europe, the so-called “Lisbon agenda” for structural reform could, to the extent that it is implemented, prove to be important.

Illustration: The potential impact of raising the participation rate

Most of the macro impacts stem from the fact that people leave the workforce too soon

A significant part of the so-called public pension and public health problem derives not from the fact that people are living longer, but from their leaving the workforce much sooner than they used to. While it might have been expected that the average age at which people retire would, at least to some extent, increase with rising longevity, in practice people have increasingly been leaving the workforce even *before* reaching the – unchanging – official retirement age.

It follows that reversing incentives for early retirement, together with increasing the official, or standard, age of retirement at least somewhat, could do much to reduce the pension and public health issues that would otherwise arise. Public policy is moving in this direction in a number of countries, and the effects are being buttressed by the trend away from defined-benefit pension schemes towards defined-contribution schemes. Other policies, such as pro-natal policies and pro-immigration policies, might contribute, too, but their consequences are likely to be relatively small in comparison.

To illustrate the potential impact on the labour force of raising the participation rate, we have estimated the number of people who could be active if the principal economic disincentives to continuing in work were removed.

We assume that half of the people who were active in their 40s (the years of peak activity) are still working at the projected ‘disincentive-free’ retirement age and that the distribution of activity rates around that age takes the same functional form as current rates.

For 2005 and 2050, we present two scenarios (Figure 15):

- **The base case scenario** shows the active population as it was in 2005, and as it would be in 2050 if participation rates did not change.
- **The high participation scenario** calculates the active population in the absence of economic distortions, i.e. on the assumption that half of the population is still active at the projected ‘disincentive-free’ retirement age.

Figure 15. Participating population in 2005 and 2050, base case scenario vs. high participation scenario (% of total population)

Country	Base case, 2005	High participation, 2005	Base case, 2050	High participation, 2050
United States	47%	49%	49%	52%
United Kingdom	51%	56%	46%	52%
Japan	52%	56%	43%	48%
France	45%	52%	39%	49%

Source: OECD Stat Extracts, UN World Population Prospects: the 2006 Revision and Nomura.

Raising the participation rate of older workers could largely solve the issue

The calculations suggest that, if economic distortions were removed, and people retired, on average, at the ‘disincentive-free’ retirement age – thereby raising the participation rate – the number of people in activity as a proportion of the total population would increase substantially. Indeed, in the “high participation 2050” case, the proportion of the population that is in work is in most countries as high as it was in 2005. In short, the dependency ratio problem disappears.

The case of France is particularly striking because its participation rates for older workers are currently among the lowest in OECD countries. The difference between the two scenarios amounts to around 7 million additional workers. In other countries, including Japan and the United States, the difference between the two scenarios, although substantial, is less marked, mainly because participation rates of older workers today are relatively high. Nevertheless, the high-participation scenario implies an extra 15 million workers for the US, and 5 million for Japan. Furthermore, for all countries other than Japan, the high participation scenario of 2050 implies participation rates above current levels.

Conclusion

All the predicted problems in financing pension and health schemes that result from a rising old-age dependency ratio could be avoided. All that would be required would be to remove the public policy and private incentives that at present induce people to give up work sooner than they might freely choose to do.

Importantly, this is the direction in which, in many countries, policy has already started to move, and will, in our judgement, continue. Such policy changes, by changing the age profile of the workforce, stand to have major consequences for the corporate sector, and a number of these are considered in *The Challenge of an Older Workforce*.

The Challenge of an Older Workforce

Facing an older workforce

Companies will be affected by the ageing of their workforces because...

One of the most potent influences on companies in coming years will be the ageing of the workforce. And, unlike many of the other forces for change that will affect companies, this one is completely foreseeable.

This increase in the median age of the workforce will arise for two principal reasons:

- The ageing of the population itself.
- Changing employment incentive structures – both public and private.

...their workforces will tend to mirror the ageing of the overall population and...

The population effect. As populations age, the proportion of older workers rises. In the United States, for example, the proportion of the workforce aged 55-64 is already growing faster than any other age group. This is reflected in the age structure of companies' workforces. Thus in the US energy sector, for example, more than one third of the workforce is already older than 50, and this age group is expected to grow by more than 25% by 2020. In Japan's financial services sector, the number of workers over the age of 50 is projected to rise by around 60% between now and 2020. In China, the number of manufacturing workers aged 50 and above is set to more than double over the coming 15 years.⁵⁵

Globally, the number of people aged 65 or more is projected to rise from 7.3% of the population today to 16.2% by 2050. In the more developed economies taken together, this proportion is projected to increase from 15.3% to more than 25% of the population. And in the oldest countries, the projected increase is even more striking: in Japan, for example, the number of people aged 65 or more is forecast to increase from almost 20% of the population to almost 40%, and in Italy, from almost 20% to 33% in 2050.⁵⁶

...changes to incentive structures will encourage people to work longer

The incentive effects. In addition to the population effect itself, an evolving pattern of incentive structures stands to amplify the consequences for companies.

Some of the evolution of incentives is taking place in the private sector. As demonstrated in *Population Ageing and the Economy*, in many countries there was until recently an increasing tendency for employees to retire before the official, or standard, age of retirement – a fact attributable in significant part to the incentive structure embedded in many defined-benefit, particularly final-salary, pension schemes. Most recently, however, there has been a trend towards replacing defined-benefit schemes by defined-contribution schemes, at least for new entrants to the labour force. This seems almost certain to continue in most countries and stands to weaken, and ultimately largely to eliminate, the incentive to retire early.

Incentive structures are also changing in the public sectors of many countries. As shown in *Population Ageing and the Economy*, a number of countries have begun to implement public policy changes to increase the proportion of the population who are in work – and this trend too seems highly likely to continue. One element of the policy shift involves weakening or eliminating public policy incentives to early retirement; a second part involves raising the official, or standard, age of retirement itself.

⁵⁵ Strack, R. et al. (2008).

⁵⁶ UN World Population Prospects: The 2006 Revision.

In combination with these developments which should increasingly motivate people to work longer than they have in recent years, will be demand-side policies to encourage companies to employ older workers. Indeed, such policies are already being implemented in some countries, and more seem likely to follow.

Anti-age-discrimination legislation is a case in point. The United States has been a pioneer: its 1967 *Age Discrimination in Employment Act* protects people aged 40 and over. In Europe, the EU Directive in 2000 spurred national legislation by requiring EU countries to enact age-discrimination legislation, in conformity with the directive, by 2006.

Other measures too will likely oblige companies to elaborate, and adopt, strategies in respect of older workers. Such has been the case in France, for example, with the Delalande contribution: employers are obliged, when making redundant any worker aged 50 or over, to pay a special contribution to the unemployment administration. This is to compensate for the longer time, on average, that older people spend in unemployment.

This increase in the median age of the labour force – as a result of population ageing and changing private and public incentives affecting both individual and corporate behaviour – stands to have a quantitatively significant effect on the participation rate. On the basis of UN population projections and our projections of the proportion likely to be actively engaged in work in 2050 (assuming that all economic distortions are removed), we calculate that the median age of the workforce may well increase by around five years or so. And this is probably a conservative estimate.

Such increases will be accompanied by a striking rise in the proportion of the workforce aged 60 or over. In France, for example, only 2.2% of the workforce was 60 years old or older in 2005, but this proportion is likely to surge to 20% by 2050. In Japan, the proportion is likely to double, from almost 15% to around 30%. And in the United States and the United Kingdom, workers aged 60 or above are likely to account for around 17% of the workforce, compared with 7.8% and 6.3%, respectively, in 2005 (Figure 1).

Figure 1. Median age of the workforce in four countries, 2005 and 2050

Country	Median age in 2005	Median age in 2050	Workforce aged 60+ in 2005	Workforce aged 60+ in 2050
United States	38	42	7.8%	17.5%
United Kingdom	39	42	6.3%	17.0%
Japan	44	49	14.4%	29.6%
France	39	45	2.2%	19.9%

Source: Nomura.

Companies and older workers

However, few companies are preparing for this challenge

Notwithstanding the virtually unassailable fact that companies will be faced with an ageing workforce, however, singularly few seem to be preparing themselves. A survey conducted by Manpower⁵⁷ of more than 28,000 employers across 25 countries found that only 14% had a strategy for recruiting older workers, and only 21% a strategy for retaining workers past the current retirement age.

There are just a few exceptions – most notably Singapore and Japan, two countries with a history of planning for the future and taking the long view (Figure 2). In Singapore, for example, the government has enhanced the employability of older workers through a programme (*Advantage!*) that offers incentives to companies to employ workers over the age of 40, or to re-employ workers over the age of 62. One of the incentives is a reward that can reach a maximum of \$200,000.⁵⁸

Figure 2. Worker recruitment and retention survey results

Country	Recruit older workers				Retain older workers			
	Yes	No	?	NA	Yes	No	?	NA
Global	14	80	5	0	21	72	7	0
United States	18	78	4	0	28	65	7	0
France	6	92	2	0	8	87	5	0
Germany	18	76	6	0	11	84	5	0
Italy	8	91	1	0	6	90	4	0
United Kingdom	13	82	5	0	24	69	7	0
Japan	12	78	10	0	83	12	5	0
China	18	73	8	1	19	77	4	0
India	14	79	7	0	16	71	13	0
Singapore	48	48	4	0	43	41	6	0
New Zealand	19	75	6	0	33	59	7	1

Source: Manpower (2007a).

Nevertheless, even in countries where there has so far been a tradition of not employing older workers, there are some exceptions, i.e. companies that do have strategies with respect to older workers. And there have been successes – see, for example, Box: *The Case of B&Q*. So far, however, such cases are rare in the majority of countries.

⁵⁷ Manpower (2007a).

⁵⁸ OECD (2006).

The Case of B&Q

In 1989, B&Q, the world's third largest DIY retailer and the biggest in Europe, implemented a strategy on older workers, abolishing its retirement age to allow employees to continue to work beyond 60 and opening two stores staffed entirely by over-50s. B&Q made these decisions on the grounds that the predominantly young profile of its workforce was unrepresentative of the overall customer base, and that customer feedback pointed to the benefits, in terms of better customer service and knowledge of DIY, of employing an older workforce.

A survey of those two stores, benchmarked against four other B&Q stores, found that:⁵⁹

- 1) Profits were 18% higher;
- 2) Staff turnover was six times lower;
- 3) Absenteeism was 39% lower;
- 4) 'Shrinkage' was 58% lower;
- 5) Customer service was perceived as having improved; and
- 6) The skills base of the staff was considered by customers to be higher.

Thus, employing older workers has been a successful strategy for B&Q, where almost one quarter of the workforce now is more than 50 years old. So far, however, such examples are fairly rare.

That so many companies seem unprepared for the ageing of their workforces points to the scale of the overall, societal, challenge ahead. And at the level of individual companies, too, these challenges are set to be considerable.

A 65-year-old worker has different characteristics from one aged, say, 40. And he or she also has different needs, to which companies will – in their own interests – have to adapt.

Companies will need to address many issues

Strategies that companies are likely to find themselves having to develop and implement could include:

- Adapting to older workers' abilities;
- Implementing training programmes designed specifically for older workers;
- Adapting work schedules to meet a general wish of older workers to have more flexible working options;
- Rethinking compensation schemes; and, in many cases,
- Rethinking the business model, so as to adapt to the quite different age structure of the workforce.

These measures are reviewed below.

⁵⁹ B&Q (2007).

Adapting to older workers' abilities

Although some physically demanding tasks become more difficult with age, fewer jobs today rely on physical strength, which makes at least that effect less important than it once was.

However, a number of cognitive – i.e. mental – abilities do decline with age; and given the potential importance of this phenomenon, particularly for advanced economies that are becoming progressively more service-sector-oriented, surprisingly little compelling research has so far been undertaken on the subject. However, a survey by Skirbekk (2004) does present a helpful selection of a range of micro-level evidence. Examples of areas of important decline in cognitive ability with age include: episodic and working temporal memory; numerical capabilities; and problem solving.

Encouragingly however, from both an individual and a corporate perspective, not all cognitive abilities decline with age, and so-called “crystallized abilities” (in contrast to so-called “fluid abilities”) often improve with experience. Hence, job knowledge and experience may, to some extent at least, counterbalance for waning cognitive ability, even to the extent sometimes of improving productivity for a number of years, even if thereafter cognitive ability once again starts to decline.⁶⁰

Thus, senior employees may remain highly productive in a field that they know well and where procedural knowledge, acquired through experience and used to solve everyday problems, is helpful.⁶¹

Companies will have to adapt to older workers' abilities, to turn them into a real asset

It will therefore become increasingly important for companies to adapt to older workers' abilities so as to turn them into a real asset. The particular strengths of older workers often include maturity, experience, and reliability.

Older workers can also serve usefully as ‘mentors’ for younger, less experienced employees. For example, at Vinci, the world's leading concession and construction group, where workers aged over 50 constitute 21% of the workforce and 5% of all new recruits, a network of mature and experienced workers has been created. These workers, called ‘master builders’, have been chosen for their ability to pass on their know-how to the young newcomers.

More generally, it will increasingly be in companies' interests to implement strategies that, building on the respective strengths of older and younger workers, maximise the overall quality of their labour forces.

Promoting training for older workers

Life-long learning will become increasingly important

Also encouraging, both from an individual and from a corporate perspective, is that the effects of ageing can often be offset, in whole or in part, by appropriate (re)education and (re)training. And to the extent that the pace of change, and in particular technological change, is accelerating, it will become increasingly important that, in their own interests, employers implement policies of life-long learning. Targeted training programmes that exercise speed, reasoning, and memory abilities have been shown to enhance the

⁶⁰ Ilmakunnas, P. et al. (1999).

⁶¹ Colonia-Willner, R. (1998).

functional level of those who undergo training relative to those who do not.⁶² Furthermore, such programmes can apparently slow, halt, or in some cases even reverse age-specific declines in areas such as inductive reasoning and spatial orientation.⁶³

However, employers might be reluctant to institute such policies, in the belief that training older workers is not a profitable investment, whether because older workers are expected to stay fewer years in their job, or because older workers are often seen as slow learners. Such beliefs do not, however, seem to be supported by evidence, in some countries at least. Older workers' shorter expected times in the workforce apparently do not automatically translate into shorter expected tenure with a given employer: on the contrary, evidence from the US, the UK, and Canada shows that job turnover tends to be lower among older workers than among younger workers.⁶⁴

Furthermore, older workers now plan to work longer: according to the AARP (formerly the American Association of Retired Persons), nearly 70% of US workers who have not yet retired plan either to work into their retirement years, or indeed never fully to retire.

Moreover, older workers are not necessarily slow learners: 71% of 774 human resources directors who responded to a Harris poll reported that workers aged 55 and over can do as well as younger ones.⁶⁵ This would seem likely to be even more the case in the future, to the extent that workers' educational level has risen, and will likely rise further.

Thus a major challenge for companies, but also a major potential opportunity, will lie in developing and implementing training schemes that enhance the performance of the older workers who will, inescapably, form an increasing proportion of their workforces.

Increasing flexibility in work schedules

Older workers want more flexible options...

Older workers have different needs, to which employers will, in their own interests, wish to adapt. In particular, older workers – like many younger workers – evidently want to be able to work under more flexible arrangements. In a recent survey by the AARP, which asked older workers about the essential components of the ideal job, 53% of the respondents cited working part-time.⁶⁶

Employers will thus find themselves increasingly having to offer flexible work hours or work-at-home options. Already, flexible arrangements are fairly common in a number of companies: a Conference Board of Canada survey, for example, found that the share of employers making use of teleworking and work-at-home arrangements had risen from 11% in 1989 to 50% in 1999.⁶⁷ However, flexible arrangements tailored expressly for older workers have been comparatively rare: more often they have been constructed to match the needs of other groups, such as those with young children.

⁶² Ball, K. et al. (2002).

⁶³ Schaie, K.W. and Willis, S.L. (1986).

⁶⁴ British-North American Committee (2001).

⁶⁵ Martin, D., "To be Old, Gifted, and Employed is no longer Rare", NY Times, 14 January 2001.

⁶⁶ Manpower (2007b).

⁶⁷ British-North American Committee (2001).

...particularly to avoid the 'cliff edge'
between work and retirement

This expressed wish to work under flexible arrangements largely stems from older workers' desire not to pass abruptly over the 'cliff edge' between work and retirement. There are already cases of companies responding to this expressed wish: Marks and Spencer, for example, abolished its company mandatory retirement age in 2002, and extended its flexible working policies, thereby enabling older workers to reduce working hours rather than to retire outright.

Another element of flexibility that many companies may choose to adopt involves enabling individuals to retire at the age they choose. As noted in *Population Ageing and the Economy*, public policies in many countries are likely to encourage this, even if most maintain an (increasingly notional) official retirement age.

The incentive may well be that workers who elect to work beyond the official retirement age will receive a higher pension when they do finally retire, and may also be offered a lower rate of income tax or equivalent inducement. Companies will thereby likely be faced with the more complex human-resource-management task of forecasting exactly who will retire, and when.

Rethinking compensation schemes

Compensation schemes will have to be
re-thought...

A further consequence of companies finding themselves obliged, in their own interest, to offer more flexible arrangements to older workers is that they will have to develop and implement compensation schemes to match these flexible working arrangements.

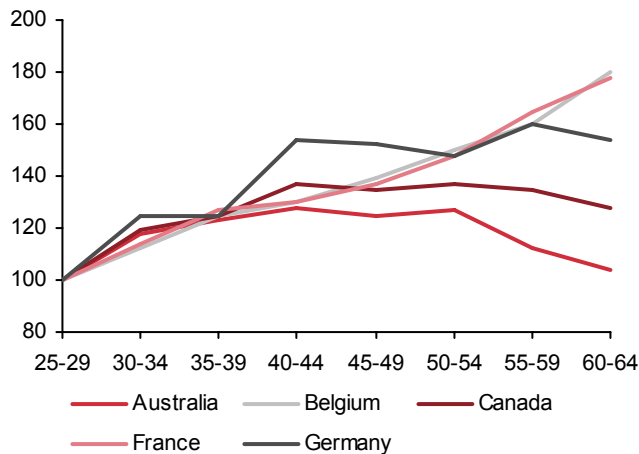
In many cases, the entire compensation curve will have to be re-thought. Even today, there is often a substantial mismatch between compensation and older workers' productivity. In many companies, traditional wage progression, whereby wages are a function more of seniority and experience than of actual productivity, leads to older workers being paid, in their later years, more than the value of what they produce. Indeed, this phenomenon can sometimes be observed even at the entire-economy level, with earnings either rising more steeply with age or at least showing little tendency to fall – France and Belgium, for example (Figures 3 and 4).

Up to a point, this may be rational. Young workers may be willing to receive a wage below their marginal product in exchange for the training and other experience that they acquire. Conversely, it may be necessary to pay older workers more than their marginal product to secure their loyalty and thereby the contribution to the firm that maturity brings. However, with the number of workers aged above 60 surging in many companies, and with this trend set to accelerate, seniority-based compensation systems will almost certainly prove unsustainable. Redesigning compensation schemes to match better the evolving reality of an ageing workforce will involve a fundamental change of thinking.

...by taking account of motivation
issues

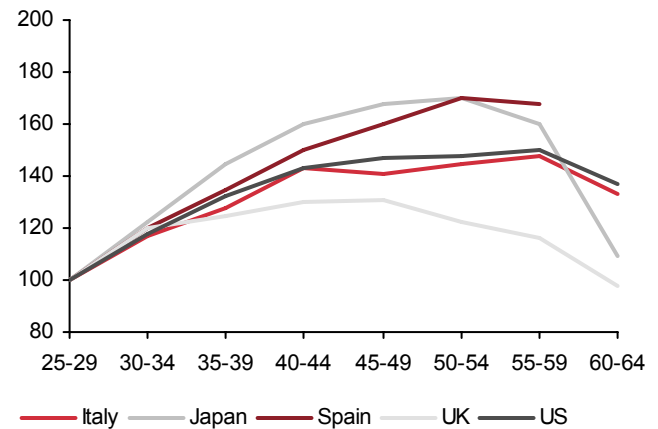
A particular challenge concerns motivation issues: a major reason for companies traditionally paying older workers more than they are worth has been to motivate them in their later years. It will be increasingly necessary to find ways to pay older workers less than they have been used to receiving in their years of peak productivity, while at the same time keeping them willingly and productively engaged. This task will, however, prove easier to the extent that workers receive continuing training or new work challenges through to the end of their careers.

Figure 3. Age-wage profiles of full-time workers (men), index = 100 for earnings for 25-29 year olds



Source: OECD (2006).

Figure 4. Age-wage profiles of full-time workers (men), index = 100 for earnings for 25-29 year olds



Source: OECD (2006).

Conclusion: Rethinking the business model

As shown in *Key Elements of the Ageing of Populations*, populations used to be characterised by the traditional age pyramid, which had a wide base of young people and a narrow top of the oldest people.

But that is no longer characteristic of most developed countries. Age pyramids in these countries have now become *constrictive*, with the greatest number of people in the middle-age groups, and they are set to become yet more rectangular.

Such fundamental changes are inevitably replicated in the age pyramids of companies' workforces. The implications for companies therefore include nothing less than rethinking much of the business model, which will likely involve, at a minimum, reworking:

- training and re-training schemes;
- work schedules;
- responsibilities; and
- compensation schemes.

Without wishing to be more dramatic than the issue warrants, we judge that the age-related workplace changes that lie ahead are among the most significant challenges facing businesses. The pension issue, which receives considerable attention, is undoubtedly important; but it seems likely that responding constructively to an ageing workforce will prove even more so. Companies that adapt successfully to this challenge will find themselves at a comparative advantage. Those that do not stand to suffer.

Population Ageing and Financial Markets

Broad presumptions

It is generally assumed that people run their assets down as they age...

Economic theory presupposes that, when people are in their prime earning phase, they save and build up assets, with a view to running them down progressively in later life when they are no longer earning, thereby smoothing their expenditure over their lifetime.

In turn, therefore, young societies or economies with a large proportion of their population at work can be expected to be building up assets, whereas ageing societies with a greater proportion of their population in retirement can be expected to be running them down.

This might imply that asset prices will, to some extent at least, move in tandem with the (changing) proportion of the population in work, so that:

- real interest rates can be expected to rise in the fastest-ageing societies; and
- valuations of longer-term assets, such as bonds and equities, can be predicted to reflect – inversely – this expected path of real rates.

...and that ageing societies will reflect this behaviour

In popular writings this phenomenon is sometimes referred to as a potential “asset meltdown”.

In addition to these potential effects, the ageing of populations stands to have implications for exchange rates. At the aggregate level, a country’s net saving position is reflected in – indeed is measured by – the current account of its balance of payments. Hence, the current account balance could be expected to be highest in the peak-saving economies and lowest in the oldest economies. And to bring about this pattern of current accounts, exchange rates would have to be low in the asset-accumulation phase and then rise to bring about the requisite asset decumulation.

The following sections consider these issues: the broad conclusion is that such effects may be visible, up to a point, in the data to date. But they have not been, and may not be, as large as implied by words such as “meltdown”.

Population ageing and savings

The “asset meltdown” assumption rests on the life-cycle theory

Most expectations of an “asset meltdown”, driven by the ageing of populations in the developed countries, rest upon the “life-cycle” theory: that individuals tend to consume a broadly constant proportion of (their estimate of) the present value of their lifetime income. Following Ando and Modigliani (1957), it is generally posited that the average propensity to consume out of income tends to be higher in young and old households, whose members are either borrowing against future income or running down life savings. People in middle-age, by contrast, who tend to have higher incomes, would have a lower propensity to consume, i.e. a higher propensity to save.

This implies that as populations age, and particularly as baby boomers start to retire in large numbers, savings in the economy as a whole could be expected to fall, with assets being sold in increasing amounts, leading to a decline in their prices.

Investigating these matters empirically is complicated, however, because in any economy and financial system, many other things are going on at the same time. Hence, to isolate any possible effects of ageing on, for example, asset prices, it is appropriate, ideally, to take into account also the large number of other relationships, including the many feedbacks that are characteristic of any economic and financial system.

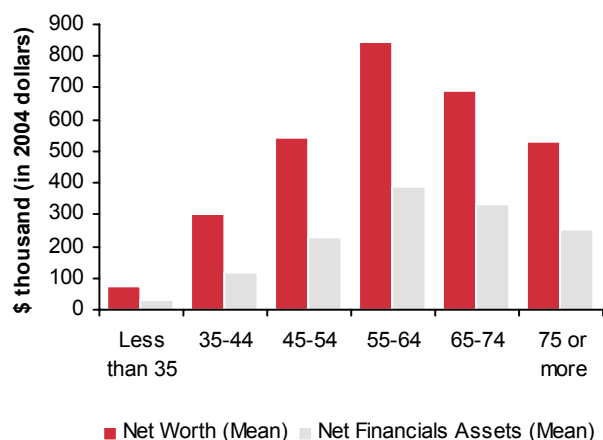
In principle, the matter is perhaps best investigated in the context of so-called general equilibrium models in which many, if not all, of the basic relationships and principal feedbacks are modelled simultaneously. The difficulty with such models, however, is that they can become almost as difficult to understand as the world they have been constructed to illuminate. Accordingly, it often proves instructive to focus on just the principal relationships, although the results should, where possible, be checked against the results of more fully specified, general equilibrium models. That is the practice that we follow below.

Data seem to support the savings run-down part of the theory, but in a muted form

To take just one case, US data support the basic life-cycle notion; Americans do indeed tend to run their assets down after age 55 (Figure 1) – although the drop may be smaller than at least the earlier life-cycle models might predict.

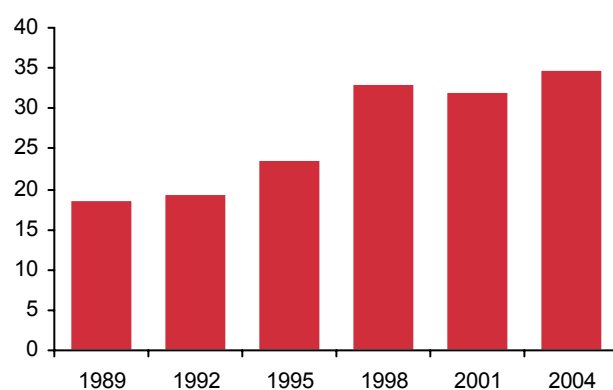
There are various reasons why the data might not fully match the simple life-cycle hypothesis. For example, modern life-cycle theorists argue that the elderly also tend to save, as a precautionary measure, mainly because of uncertainty about their own life expectancy. According to the US Survey of Consumer Finances (2004), since 1998 the main motive for saving has been “retirement”, with one third of all households declaring it the most important reason for saving (Figure 2). Before 1998, the primary reason was “liquidity”.

Figure 1. Savings in the US by age of main breadwinner



Source: US Federal Reserve (2004).

Figure 2. Percentage of households saving mainly for retirement



Source: US Federal Reserve (2004).

Furthermore, people are retiring later than used to be the case, and this trend will likely continue. A survey conducted in 2004 by the AARP (formerly the American Association of Retired Persons) reported that around 79% of baby boomers in the US intend to work past the official, or standard, retirement age. The first reason for this is that they may want to, as a result of living longer and having better health in old age. The second is that they may have to, in part as a result of changes to the incentive structure of public and private pension systems (see *Population Ageing and the Economy*).

Another element, more difficult to capture but with a strong impact on (dis)saving behaviour, is inheritance tax. Regimes differ, often quite fundamentally, across countries. In jurisdictions where there is no inheritance tax, or the rate is low, there is less incentive to reduce assets in old age. This makes it difficult to make valid generalisations across countries about life-cycle savings behaviour.

Overall, however, we judge that, because of the significant changes in retirement behaviour already under way, demographic-based changes in saving behaviour predicted by life-cycle theory will occur in most countries, albeit in a more muted form than previously.

Population ageing and real interest rates

The impact on asset prices is less clear

Given that economic theory suggests, and empirical evidence apparently confirms, that age is a key determinant of individuals' saving behaviour, it follows that a significant shift in aggregate saving behaviour can be expected as the baby boomers reach retirement (even if changes in retirement behaviour mitigate these effects somewhat). This broad conclusion is also reached by Auerbach et al. (1989), using their general equilibrium model. What is less clear, however, is the extent to which these changes in savings behaviour can be expected to influence asset prices.

In standard economic models, increased savings can be expected to decrease expected returns, because investors end up having to choose less productive investments once the more promising ones have been taken up. And conversely. However, other factors, such as forward-looking behaviour (whereby investors might 'arbitrage' the difference in expected returns due to demographics) and the uncertain impact of population ageing on total investment, suggest that the overall effect may be less obvious than simple *a priori* theorising might suggest. Furthermore, even in standard models the changes in returns could be so small as to be scarcely discernible at the aggregate level.

Further complicating any empirical investigation of the potential effects of population ageing on asset prices and returns is the difficulty of separating the effects of a slow-moving phenomenon (demographics) from those caused by higher-frequency events, such as the economic cycle, swings in investor sentiment, and changes in macroeconomic policies. Not surprisingly, empirical studies of this effect have yielded mixed results (e.g. Poterba (2004)).

One method adopted by some empirical investigations has been to focus on the proportion of the total population that is made up of those aged between 35 and 59 – the middle-age, asset-accumulating, years. Figures 3 to 6 summarise for four economies the basic relationship between this demographic grouping, labelled MA, and the real interest rate, measured as the 3-month T-bill yield (or equivalent), minus inflation, both averaged over five years.

There has been a negative correlation between the 'middle-age ratio' and real interest rates...

The charts are broadly suggestive of the expected negative correlation between real interest rates and the MA ratio, albeit with the notable exception of the 1970s when, (apart from Japan) real interest rates were negative over a long period, notwithstanding a low MA ratio. It seems plausible, however, that the prolonged and severe stagflation over that period might account for this anomaly.

Perhaps most important, a simple panel regression confirms that, across countries and over time, there has indeed tended to be a (statistically significant) negative relationship between real interest rates and the proportion of the population that is of maximum asset accumulating age (for details, see *Appendix* at the end of this chapter).

...perhaps implying that real interest rates may be near their lowest point

To the extent that such is the case, one implication is that, given that saving behaviour in many countries is now likely to be at or near its peak, real rates are likely at, or at least fairly close to, what will prove to be their lowest point.

The projected real interest rates shown in Figures 3 to 6 have been derived from the regression results summarised above and detailed in the *Appendix*. They suggest that, although the precise timing of the turning point cannot be certain (later retirement, for example, stands to postpone the transition from net saving to net dissaving, and hence from falling to rising real rates), it is possible that the trend of steadily falling real interest rates (and thereby rising asset values) that has taken place since the 1980s (or earlier for some countries) may now be nearing an end.

This is, in substance, what has been concluded also by the OECD⁶⁸ in its analysis of the past and projection of the future within a general equilibrium framework: "... movements in the real interest rate mirror the evolutions of capital-labour ratios, with a tendency to decline during the first half of the simulation period and to rise afterwards, except in Japan where it declines steadily."

Bond yields

Bond yields too could well be set to increase

Given that bonds can be expected, at least to some extent, to encapsulate expectations of future interest rates, the real interest rate projections summarised above should, in principle, influence the term structure. The simplest way to capture this is to calculate the implied real yield curves that would be consistent with the real interest rate projections described above, assuming no risk premia or convexity effects (i.e. pure expectations theory). Figures 7-10 illustrate yield curves constructed on this basis.

Interestingly, all the constructed curves have a general upward slope, associated with the higher real interest rates in later years as dissaving occurs. The most pronounced calculated effect is for Japan which, as well as undergoing a particularly large demographic transition, has real interest rates that historically have been quite high but currently are, probably largely for conjunctural reasons, near zero. The US case is also interesting: the combination of demographics and historically low real interest rates (possibly the result of high international demand for US assets) means that the US equilibrium real interest rate is close to zero at present.⁶⁹

The general upward slope of the projected real interest rate term structure also suggests that demographics may not have been behind the low long-term interest rates of much of this decade (the so-called interest rate 'conundrum'). It also suggests that downward sloping real yield curves (as in the UK) are particularly puzzling, and must presumably stem from other factors – e.g. policy rules obliging pension funds to hold a hefty proportion of gilts (for more on yield curves, see *Box: Longevity and Bond Yields* at the end of this chapter).

⁶⁸ Oliveira Martins, J. et al. (2005).

⁶⁹ Of course, the imprecision of these estimates precludes reading too much into these results.

Population ageing and equity valuation

It is often said that demographic changes, particularly the entry of the baby boom generation into their prime-earning years, contributed to the rise in asset prices, including equity prices, during the 1990s. This argument can be extended to suggest that, when this generation reaches retirement, many households will seek to sell financial assets to support their consumption, driving asset values back down.

In principle, this could affect assets of all classes. However, equities could perhaps be expected to figure most prominently: while the greatest proportion of many people's wealth is in their house, they need somewhere to live. Reverse mortgages or downsizing can be resorted to for equity release, but this is not as easy as selling equities that have been acquired with the express intent of selling them later.

However, equity prices move for a variety of reasons, including rising over time with the general price level, so in a longer-run study it is probably necessary at least to normalise equity valuations by dividing them by earnings, i.e. to examine the earnings yield.

Similarly, the ageing of the middle-age group could lead to rising equity yields

On this basis there is some evidence – suggestive, but by no means conclusive – of the (expected) negative correlation between the MA ratio – the proportion of people in their asset-accumulating years (aged 35-59) – on the one hand and earnings yields on the other.

In the United States in the 1980s, for example, the 35-59 age group swelled, the earnings yield slowed, and the P/E ratio rose (Figure 11). In the 1990s, as US baby boomers reached middle-age, yields fell and equity multiples increased.

In Japan, too, the high proportion of the population of asset-accumulating age may have contributed to falling equity yields until the mid-1990s (Figure 12). Similarly, UK equity yields eased in the 1980s and 1990s (Figure 13), as they did in Germany (Figure 14).

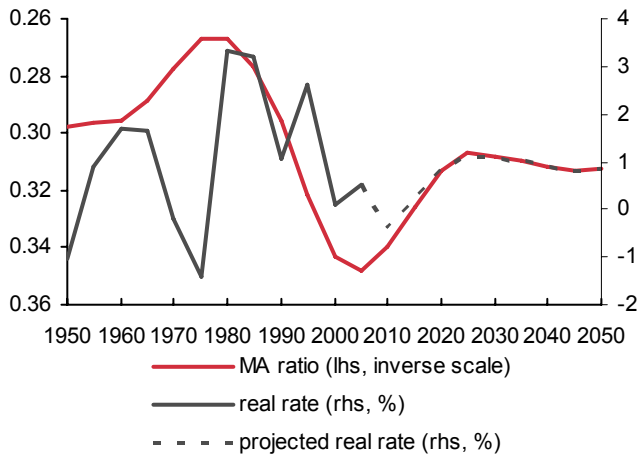
However, the ageing of this group, and hence the rise in the proportion of people in the decumulation phase, can be expected to make savings scarcer as assets are progressively run down, leading to rising (real) interest rates and equity yields.

To some extent, the correlations shown in Figures 11-14 are surprising, given that equities, like bonds, could be expected to be influenced by the whole future path of real interest rates, not just their current level. Perhaps an implication of the evidence presented here, both for the yield curve and for equities, is that market participants are placing undue weight on current real interest rates relative to future ones (a result that has been found in other studies, too) and so are not pricing in the expected future rise in interest rates.

Another impact of population ageing on share prices is through longevity risk. For more, see Box: *Longevity Risk and Share Price Performance*, at the end of this Chapter.

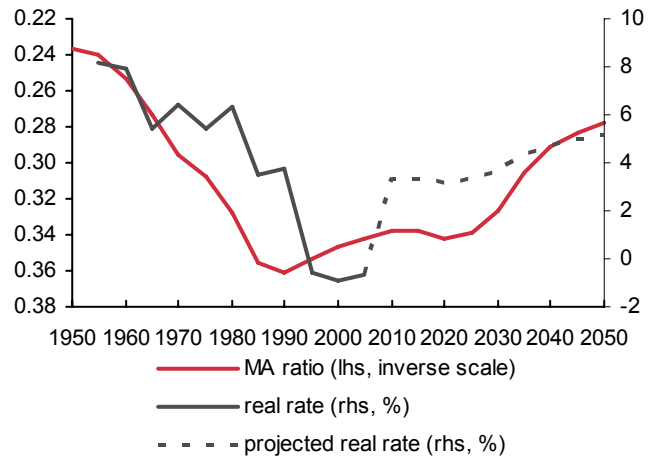
Picture Book: Demographics and Asset Prices

Figure 3. Demographics and real interest rates, US



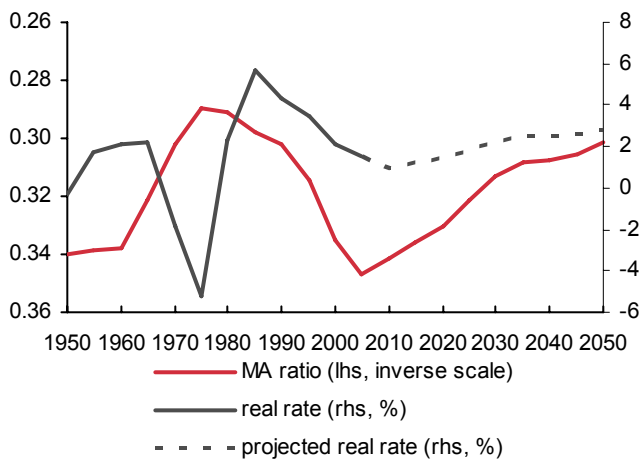
Source: Ecowin and UN World Population Prospects.

Figure 4. Demographics and real interest rates, Japan



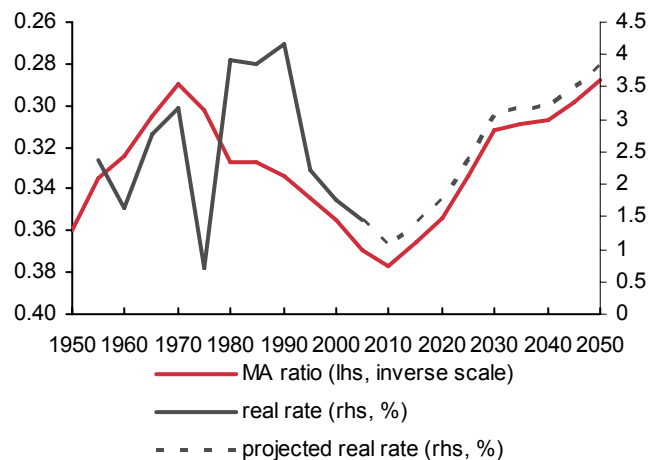
Source: Ecowin and UN World Population Prospects.

Figure 5. Demographics and real interest rates, UK



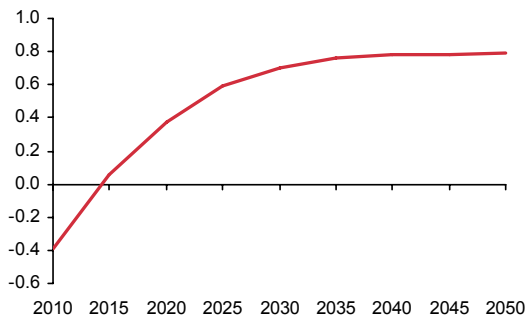
Source: Ecowin and UN World Population Prospects.

Figure 6. Demographics and real interest rates, Germany



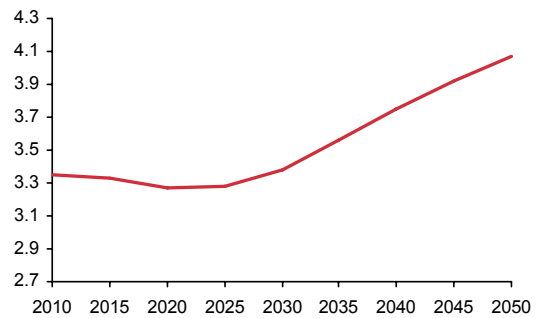
Source: Ecowin and UN World Population Prospects.

Figure 7. Projected real yield curve, US (%)



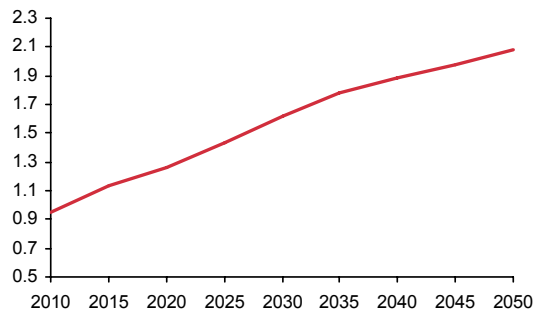
Source: Ecowin and UN World Population Prospects.

Figure 8. Projected real yield curve, Japan (%)



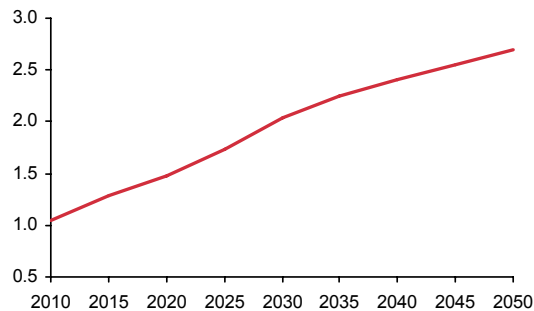
Source: Ecowin and UN World Population Prospects.

Figure 9. Projected real yield curve, UK (%)



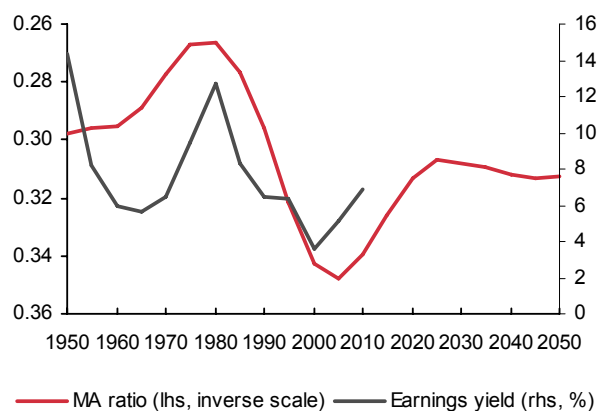
Source: Ecwin and UN World Population Prospects.

Figure 10. Projected real yield curve, Germany (%)



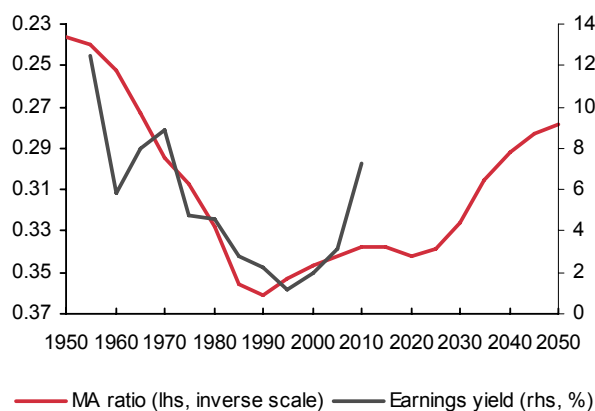
Source: Ecwin and UN World Population Prospects.

Figure 11. Demographics and equity valuation, US



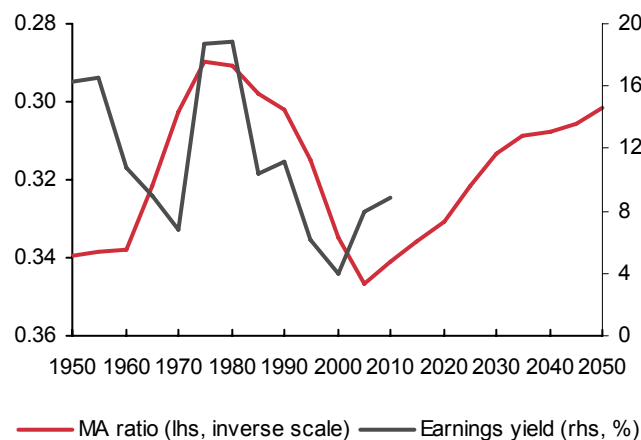
Source: Global Financial Data, S&P, and UN Population Prospects.

Figure 12. Demographics and equity valuation, Japan



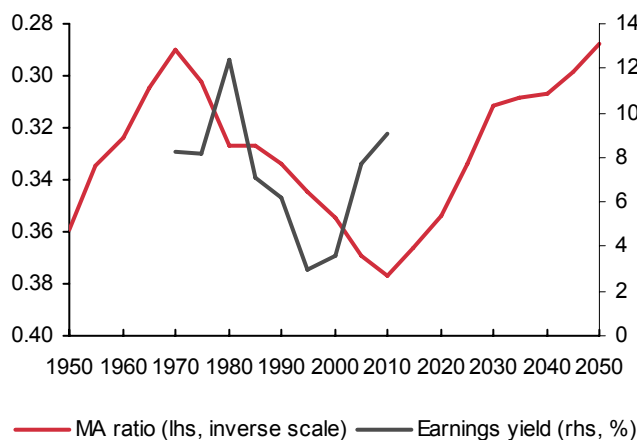
Source: Global Financial Data, S&P, and UN Population Prospects.

Figure 13. Demographics and equity valuation, UK



Source: Global Financial Data, S&P, and UN Population Prospects.

Figure 14. Demographics and equity valuation, Germany



Source: Global Financial Data, S&P, and UN Population Prospects.

Population ageing and exchange rates

Changes in current accounts

Countries that accumulate net assets run current asset surpluses, and conversely

The ageing of populations also has implications for exchange rates. In open economies, the process of asset accumulation and decumulation is likely to involve acquisition, and subsequent sale, of a significant proportion of overseas assets. In turn, this would affect countries' balances of payments and repercuss on exchange rates.

Countries will tend to run current account surpluses, or at least move in the direction of surplus, during the period of asset accumulation, and conversely, these movements towards surplus or deficit being the counterparts of the net capital flows.

The size of the current account movements depends not only on the scale of asset accumulation, but also on how much that accumulation involves overseas assets: to the extent that people who are accumulating assets do not want to expose themselves to exchange rate risk, there will tend to be a 'home bias'. And indeed, empirical studies do suggest that individuals often invest in low-yielding domestic assets rather than overseas, thereby limiting the extent to which demographic shifts affect the balance of payments.

Whatever the size of any home bias, however, exchange rates have to adjust to bring about the desired flows. On the basis of historical estimates, we find that, for the ten most developed countries, on average a one percentage point change in the proportion of the population that is of working age has perhaps a 0.25pp impact on the current account balance as a share of GDP.⁷⁰

Taking these estimates, we have used a global macro-balance model⁷¹ to calculate the order of magnitude of the exchange rate changes that might be required to bring these trends about.

In effect, the model estimates how far exchange rates might need to move to achieve a given current account target. Thus, if demographic shifts imply a move from current account surplus to current account deficit, the model calculates the real exchange appreciation – i.e. the reduction in the country's international competitiveness – that would be needed to bring that shift about.

Before calculating the required exchange rate changes, however, it is necessary to specify the counterparts to these demographic trends. The ten countries analysed account for more than two-thirds of world GDP. It is therefore not clear that they could all, at much the same time, shift into (demographically-induced) current account deficit. We therefore consider two scenarios:

- **Scenario 1: Demographically induced capital flows are absorbed by the developing world.** Developing countries typically have a demographic pattern that is the opposite of that of the developed world, and hence should move to peak saving more or less at the time that the developing world starts to dis-save. However, this scenario does imply huge investments, and then disinvestments, in the developing

⁷⁰ Breedon, F. (2008), *Sustainable Current Accounts*.

⁷¹ Breedon, F. (2007), *Fundamental Valuation and the Scorecard*.

world; and so far that does not seem to have happened – indeed, demographic trends would imply huge net investment from the developed world into the developing, which is certainly not what has taken place so far.

■ **Scenario 2: Demographically induced capital flows are absorbed by the US.**

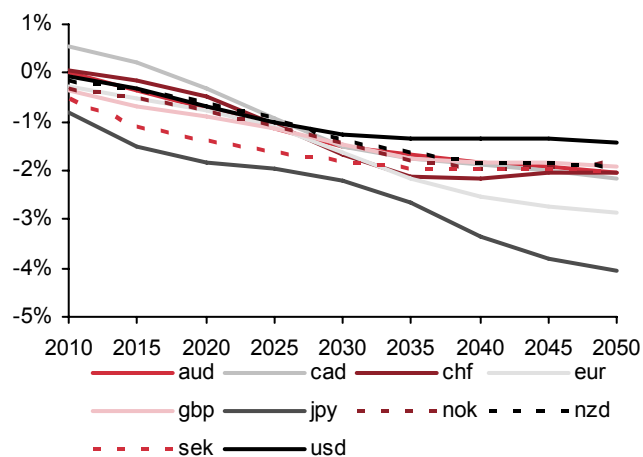
Even though the US has a demographic pattern similar to the rest of the more developed countries – albeit less pronounced – recent flows seem far more consistent with the US serving as the repository of demographically-induced savings. Certainly, it is remarkable that the US is running a significant current account deficit just when its population should be significant net savers.

Figure 15 shows projected changes in current accounts for the ten more developed economies until 2050 for Scenario 1. This would seem likely to be an underestimate of the total impact on current accounts, given that increasing economic openness would seem likely to increase over time the role of overseas assets in the demographic shift.

The most notable feature of Figure 15 is that all 10 countries seem likely to move increasingly into current account deficits as their populations age and the share of the population of working age falls. By implication, the rest of the world – which is projected to experience a rise in the share of the population of working age – would need to move into offsetting surplus.

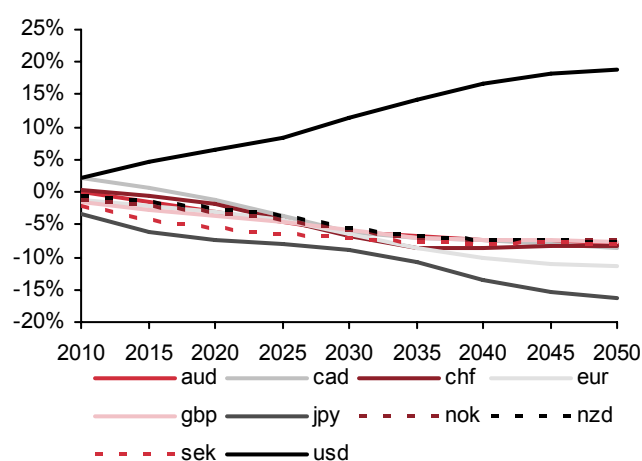
In Scenario 2, the move into deficit of most of the developed world is absorbed by a surplus in the US (Figure 16). In effect, the US surplus is the counterpart of developed countries repatriating their former investments in the US to pay for a larger retired population.

Figure 15. Projected changes in current accounts (% of GDP): scenario 1



Source: Nomura.

Figure 16. Projected changes in current accounts (% of GDP): scenario 2



Source: Nomura.

Required exchange rate changes

Currencies tend to depreciate during asset accumulation, and conversely

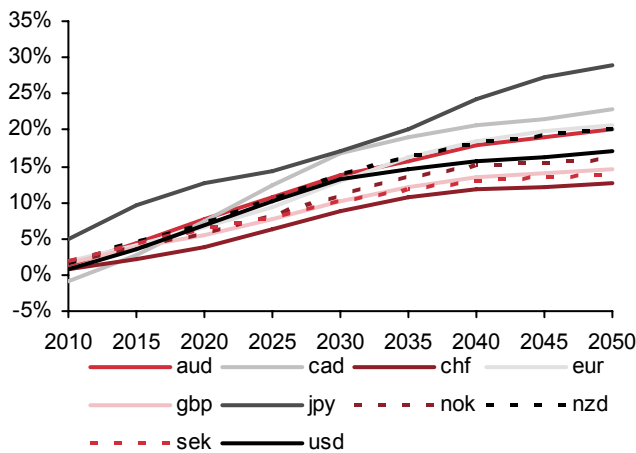
Standard exchange-rate economics predicts that, under a floating exchange rate regime, the exchange rate adjusts to bring about the desired current account balance. Hence, during the period of asset accumulation, there is excess demand for foreign assets relative to domestic assets, which tends to cause the currency to depreciate; and conversely as assets are run down. Using the same global macro-balance model, we have estimated the (trade-weighted) exchange rate movements that could be required to achieve the changes in current account balances shown in Figures 15 and 16.

The projected exchange rate movements broadly mirror the pattern of projected current accounts, with Japan – which is projected to make the sharpest shift from current account surplus to deficit – requiring the greatest appreciation. Once again, it is notable that all the countries analysed are projected to experience (trade-weighted) currency appreciation, thereby imposing a significant adjustment burden on other countries (Figure 17).

In Scenario 2, the appreciation of developed-world currencies has its counterpart in a trend depreciation of the US dollar (Figure 18). A striking feature of this scenario is that the Canadian dollar has to depreciate in real terms to offset movements in its major trading partner (i.e. Canada needs to gain competitiveness to diversify exports away from the US).

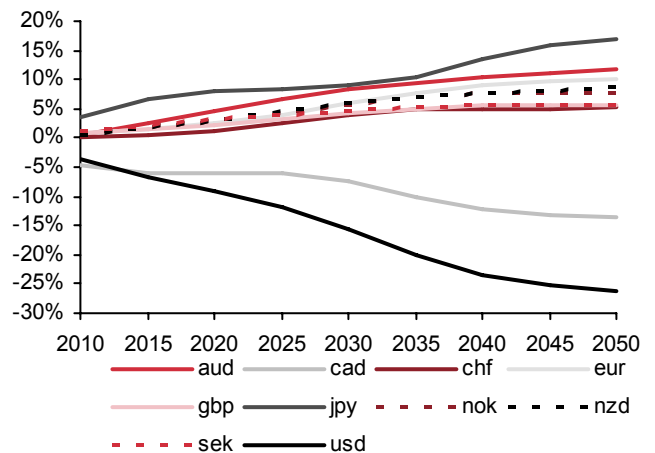
The key difference between the two scenarios is – by construction – the behaviour of the US dollar. The past 15 years or so seem rather more consistent with Scenario 2. However, it is hard to believe that capital flows to developing countries will not become more important in future: in practice it may be that the outcome will lie somewhere between the two scenarios presented here.

Figure 17. Projected exchange rate appreciation (REER): Scenario 1



Source: Nomura.

Figure 18. Projected exchange rate appreciation (REER): Scenario 2



Source: Nomura.

Conclusion

Demographic change is just one of many factors that can be expected to cause asset prices to move. This multi-causality makes it difficult to isolate the consequences of ageing. Not surprisingly, detailed statistical and econometric studies have not been particularly conclusive (see *Appendix* below).

That said, the broad movements of aggregate asset prices in several major economies over the past fifty years or so have been broadly along the lines that would be expected, and it seems unlikely that this is wholly down to chance. Our conclusion, albeit cautious, is that there stand to be further developments in the expected direction in the coming years and decades. As societies age, savings are likely to be lower (and real interest rates and equity yields higher) than they would have been had societies not continued to age.

Appendix

Literature review⁷²

Many studies have investigated the relationship between the age structure of populations and the prices of, or returns on, financial assets. Most of this research has analysed time series data for the US, but several studies have explored other nations.

Results appear to be mixed: some studies find what appear to be large effects of demographic structure, while others fail to reject the null hypothesis that population age structure and returns or asset prices are unrelated.

Here is a selection of some studies (for more, see Poterba (2004)):

- Bakshi and Chen (1994) based their analysis on the presumption that older people are more risk averse than younger ones. All else equal, a rise in the average age of the population would raise the required risk premium in financial markets.
- Yoo (1994) finds that a higher fraction of the population in the prime saving years is associated with a lower real return on Treasury bills. However, large standard errors make it impossible to draw firm inferences about the link between demographic structure and returns on longer-maturity assets. Even for Treasury bills, results are quantitatively small.
- Poterba (2001), based on earlier studies, re-examines the relationship between several measures of population age structure and real returns on Treasury bills, government bonds, and corporate stocks. Econometric results provide very limited support for a link between asset market returns and demographic variables.
- Geanakoplos et al. (2004) find that the real level of share prices is related to the ratio of middle-aged to young individuals in the population. Results suggest a significant link between this ratio and real stock returns.
- Erb et al. (1997) focus on the 1970-1995 period for a sample of developed and developing countries. They find a positive relationship between stock returns and the change in the average age of a country's population. Interpretation of this finding is particularly difficult, however, because of the many sources of variation in population age structure across nations.
- Geanakoplos et al. (2004) also report some international evidence on the association between the middle-aged ratio and real stock returns. They study France, Germany, Japan, and the UK. They find a link between this ratio and the real price of corporate equities in France and Japan, but not in the other countries.

⁷² This literature review is largely inspired by and based on Poterba, J.M. (2004).

Our analysis

While most studies are based on the time-series analysis of a single country, we have undertaken a panel regression, i.e. a cross-country analysis over time. The countries we study are: the US, Japan, Germany, and the United Kingdom, over the period 1950-2005.

The dependent variable is the real interest rate as measured by 3 month T-bill yields (or equivalent) minus inflation over the previous year, averaged over 5 years (to reduce the impact of cyclical effects). The explanatory variable is the so-called "middle-aged ratio" (MA ratio), i.e. the proportion of the total population that is aged between 35 and 59 years old. We have introduced fixed effects for each country.

The panel regression shows a statistically-significant negative relationship between real interest rates and the MA ratio. We have also undertaken the same regression but excluding the 1970s (a highly atypical period) by including dummy variables for the 1970s. Results are as follows:

Figure 19. Estimated impact of demographics on real interest rates (1950-2005)

	Estimated coefficient (t-statistic in brackets)
MA ratio	-31.3 (2.67)
MA ratio (excluding the 1970s)	-46.3 (4.22)

Source: Nomura.

Longevity and Bond Yields

The ways in which bond yields are affected by an ageing society depends, of course, on the way that individuals and society as a whole adapt to the phenomenon. An increasing ratio of those disinvesting relative to those investing could be expected to lead to increasing yields, as the demand for assets, particularly bonds, falls. However, to the extent that the proportion of the population that is economically active does not change significantly – whether as a result of a later retirement age, rising participation rates, or whatever – the impact on the general level of bond yields is likely to be less clear-cut.

It might also be expected that the shape of the yield curve would be affected by population ageing as workers, saving for their retirement, and life insurance companies, managing annuity assets, extend the duration of their asset portfolios. *A priori* reasoning suggests that such a change in asset allocation choices would boost demand for long-dated fixed income assets, put downward pressure on yields, and accentuate the curve inversion observed recently in the euro and sterling markets.

Figure 20 shows the estimated impact of increasing life expectancy on the value of an inflation-linked annuity for a man aged 65. As life expectancy increases, the value of the liability increases, as does the duration of the liability. This implies that increasing life expectancy stands to affect principally very long duration fixed income assets.

Figure 20. Sensitivity of UK pension liabilities to longevity shocks

Increase in life expectancy above expectations (years)	Increase in liability	Duration of liability
0.0	0%	11.7
0.5	2%	11.9
1.0	4%	12.1
1.5	6%	12.3
2.0	8%	12.5

Source: Nomura.

A simple quantification of the impact of changes in life expectancy on the demand for long-dated bonds in the sterling market can shed light on the potential magnitude of such an impact. If, for example, the life expectancy improvement for the UK population above age 65 were to increase from the 1.3 years per decade currently projected to two years per decade,⁷³ as implied by simple trend extrapolation, the resulting increase in longevity would lead, mechanically, to an incremental demand of £24bn for long-duration bonds (duration of 24 years) from pension funds and to a similar amount from life insurance companies. This would be substantial, representing approximately 30% of the current stock of sterling-denominated government bonds of 15-year maturity or more.

Such an incremental demand for long duration could, by itself, lead to a severe imbalance in the market for long-dated Treasury bonds, but it needs to be considered in the context of a potential policy response by debt-management offices: in such a situation, sovereign and corporate issuers could be expected to take advantage of the opportunity to raise cheap, long-dated funding.

Thus, for example, France issued EUR 6bn of a 50-year bond in February 2005 and subsequently increased this to 15bn. The British Debt Management Office (DMO) issued in 2004 a document (*Issuance of Ultra-Long Gilt Instruments*, 2 December 2004) consulting market participants on the possible introduction of additional, ultra-long dated, debt instruments. In the event, issuing undated gilts (such as the 3.5% War Loan) or longevity-linked gilts was deemed inappropriate: but the DMO, recognising the increased demand for ultra-long-dated assets, proceeded to issue 50-year bonds. The thought process of the French and UK Treasuries demonstrates the flexibility of sovereign issuers in responding to investor demand, and this in turn tends to mitigate the market impact of a potential increase in longevity.

Conclusion. An increase in longevity could be expected, *ceteris paribus*, to lead to an increase in the demand for long-dated bonds, driven by asset/liability matching and a more pronounced inversion of the long end of the yield curve. However, any such effect is likely, in most cases, to be modest relative to the macro economic impact of ageing, or changes in pension and insurance regulatory frameworks.

⁷³ Pension Capital Strategies (2007).

Longevity Risk and Share Price Performance

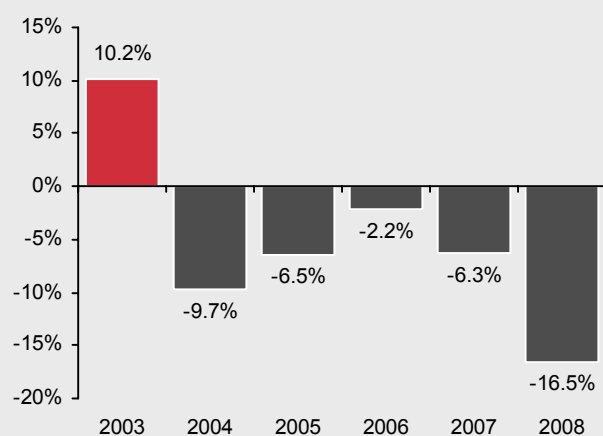
Companies with defined-benefit (DB) pension schemes are exposed to longevity risk and investment risk, the former being currently unhedgeable. Considerable attention and publicity has focused on the size of scheme deficits, but equity markets have also penalised companies with large schemes (in terms of the magnitude of the scheme liability).

A deficit may be regarded as akin to financial leverage. However, when it comes to assessing the longevity risk to which a plan is exposed, regardless of the funding position, the defined-benefit obligation is a more relevant measure. The deficit is a realisation of funding mismatches today, whereas the liability provides an indication of the potential scale of future problems.

Like corporate defined-benefit pension schemes, life insurance companies bear longevity risk through the annuity products that they write. An analysis of insurers' reserving assumptions shows that a 65-year-old British male today is expected to live between 87 and 88 years, 2-3 years above the average used by FTSE100 companies reporting in 2006 under the IAS 19 accounting standard.⁷⁴ Figures 21 and 22 illustrate the underperformance of so-called "longevity-afflicted" stocks. The results suggest that the equity market is penalising those that carry large deficits and those with large obligations relative to market capitalisation.

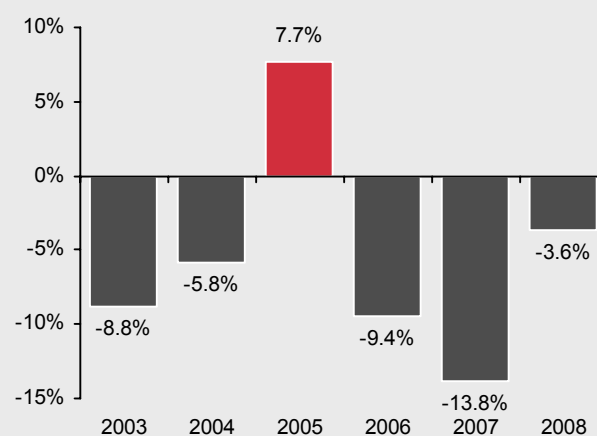
Reinsurance cover has been priced for most insurance risks, but a marketable solution for transferring longevity risk to the capital markets has so far not been developed. Many life insurers and defined-benefit pension plans are longevity-risk constrained and are actively seeking ways to pass on this risk. To date, there have been several attempts to provide such a hedge, the most high profile being the BNP Paribas/European Investment Bank Longevity Bond. But this did not succeed, largely because of its shortcomings with regard to providing an adequate hedge and being marketable to investors. Significant demand exists for a longevity hedge that can be structured; the challenge remains to meet the needs of both issuers and investors at a reasonable cost and in meaningful size. One consequence of this has been the growth of the pension buyout market, where responsibility for the assets and liabilities of a corporate DB scheme are transferred either to a life insurer or to a specialist vehicle, in exchange for a premium. Similarly, some life insurers have transferred longevity risk to those more willing to hold it by selling their annuity books.

Figure 21. Scheme deficit as % of market capitalisation⁷⁵



Source: Nomura.

Figure 22. Scheme liabilities as % of market capitalisation⁷⁶



Source: Nomura.

⁷⁴ Lane Clark & Peacock (2008).

⁷⁵ Data from selected FTSE100 companies each year. 'Top Quartile' refers to the equally-weighted composite of the top quarter of companies each year (with greatest Deficit/Market Cap). 'Bottom Quartile' refers to the equally-weighted composite of the bottom quarter of companies each year (with lowest Deficit (greatest Surplus)/Market Cap). The figure highlights the difference in performance between the top and bottom quartiles, year on year.

⁷⁶ Data from selected FTSE100 companies each year. 'Top Quartile' refers to the equally-weighted composite of the top quarter of companies each year (with greatest Liabilities/Market Cap). 'Bottom Quartile' refers to the equally-weighted composite of the bottom quarter of companies each year (with lowest Liabilities/Market Cap). The figure highlights the difference in performance between the top and bottom quartiles, year on year.

Challenges and Opportunities for Companies

Views from our equity research analysts

Companies are facing a novel situation: the average age of their clientele is rising. In particular, they are confronted with the ageing of the baby-boom generation, who will be:

- **the biggest generation ever** – comprising around a third of the adult population in the United States, France, Germany, the United Kingdom, and other developed countries;
- **about to start reaching the age of 65** – the first will get there in 2011, the last in 2029;
- **the first generation in history to reach that age with income and significant wealth** – US boomers have earned more at every age in real terms than previous generations, and it is projected that, by 2010, most US spending (54%) will be by people over age 50, who will control the bulk of household disposable income (53%) and more than 80% of net worth;⁷⁷ and
- **responsible for a major part of the consumption of a range of goods and services** – in 2004, in the UK, boomers bought 80% of all top-of-the-range cars, 80% of cruises and 50% of skincare products.⁷⁸

As a consequence, and in contrast to previous generations, the baby boomers' influence is not set to fade as they age. Their tastes, needs, and motivations, however, will evolve, leading to different consumption and demand patterns for both goods and services.

Surprisingly, companies are ill prepared for this. Indeed, although baby boomers have been the first generation to be "dissected, analyzed, and pitched to by modern marketers"⁷⁹, it seems that companies have failed to age with their customers.

The following essays, written by Nomura equity analysts, seek to draw out a range of the implications for each of the principal sectors. Some conclusions:

"... research and innovation [in the auto industry] will focus more on older consumers' tastes and needs. The key words will thus be safety, comfort, and ease of use."

"... loans and deposits are no longer expected to be the core products of a consumer relationship, being replaced by integrated products and services combining products for wealth accumulation, longevity insurance, financial advice, and non-financial services."

"Companies are already shifting product focus towards senior needs and senior related products (e.g. nutritional supplements, high end premium spirits)."

"... certain non-communicable diseases disproportionately affect the elderly, and will increase in prevalence as populations age. This will affect the nature and quantity of drugs and services required."

⁷⁷ McKinsey (2008b).

⁷⁸ "Live Fast, Die Old", BBC, 15 September 2004.

⁷⁹ Gillon, S.M. (2004).

"... in general, we expect a shift from the suburbs and commutable locations to the country, and from colder to warmer climes ... Suburbs, which swelled with baby boomers, could ... begin to decline."

"As the average age of the consumer continues to rise, we foresee [an] increasing trend towards convenience shopping."

"Older populations seem to show a significant level of brand loyalty, but only at the right price and quality."

"New trends are likely to be driven by youth-heavy emerging markets rather than traditional developed markets."

Autos

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- Older consumers' wealth, as well as their driving and buying behaviour, might create a challenge for car manufacturers in the future.
- It is likely that seniors will constitute the main car-buying group. As such, research and innovation will likely focus more on older consumers' tastes and needs. The key words will be thus safety, comfort, and ease of use.
- Marketing strategies will change to better respond to all aspects of older car buyers' preferences in terms of product, price, distribution, and advertising.

Introduction

In many countries globally, populations are getting older, and over the next 50 years, the median age of populations will rise in all regions. One of the main reasons for this is the ageing of the baby boomer generation: as this demographic bulge passes through the generations, it skews the age distribution from the younger end to the older end, thereby raising populations' median age.

The baby boomer generation has been extremely important for car manufacturers, and will be in the future. Indeed, baby boomers represent a high proportion of the population: in the US, for example, they account for 28% of the adult population. And more important, they are big car buyers: in the UK, for example, they bought 80% of all top-of-the-range cars in 2004.⁸⁰

The first baby boomer will turn 65 in 2011 and by the time the last boomer turns 65, the population aged 65 and older will have doubled in most OECD countries. In the US today, there are 19m drivers over the age of 70, and by 2024, one in four drivers will be aged 65 or more. These big numbers should push car manufacturers to focus increasingly on older drivers. The ageing of the boomers will bring challenges as well as opportunities.

Challenge for car sales

Ageing populations constitute a challenge for car manufacturers. Indeed, as the population ages, and the growth in total population falls, there are fewer people to buy new cars. Car sales are expected to stagnate in Europe from 2015.

Older consumers tend to drive fewer miles and to keep their cars for longer. As the proportion of older drivers increases, this is likely to push car sales down further.

Furthermore, retirees in the future are likely to have less disposable income than they used to have, because of retirement financing issues. This will put more pressure on older consumers' budgets, thereby causing them to buy less frequently.

⁸⁰ "Live fast, die old", BBC, 16 September 2004.

Adapting to older drivers' tastes and needs

Drivers aged 65 and over will represent an ever increasing proportion of drivers. In the US and in Europe, older drivers should be the biggest group. Older drivers have different tastes and needs to which car manufacturers will have to adapt. The key issues for older drivers are: safety, comfort, and ease of use.

First, older drivers have different purchase criteria: they want safe, comfortable, simple, and very reliable cars. Safety features, such as lane departure warning systems, blind spot detection, and automatic park options, are considered by car manufacturers to have very significant development potential. The first two features may even be mandatory in Europe in 2015.

Older drivers also tend to buy smaller cars – mainly because the main use is for one or two people, and not for a family – but at a higher price. This represents an opportunity for car manufacturers.

Car manufacturers will also have to adapt to older drivers' different needs, health problems, and other ailments. Older drivers need cars that are easy to get in and out of, easy to see out of, easy to operate and manoeuvrable enough to park easily. Some manufacturers have already adapted to the needs of older drivers. The American Auto Association, together with the University of Florida's National Older Driver Research Center have made recommendations for addressing the physical, visual, and cognitive changes that affect senior drivers. For example: thicker steering wheels, wide-angle mirrors, larger dashboard controls, among others.

To respond to the need for higher driving and seating positions, Volkswagen, for example, has developed the Golf Plus, which is like a classic Golf, but with more space, and higher seating. Some luxury cars already sell options to make driving easier for seniors: Cadillac and Lincoln, for example, offer night-vision options that project an infrared image of the road on the windshield. Nissan and Ford have their design engineers wear special outfits that allow them to experience wider waistlines, arthritis, blurry vision, and other changes that come with age. Another example of a car manufacturer that is adapting to an older consumer base is Toyota, which has hired the creator of the Nintendo Brain Age video games to come up with new safety features.

Changing marketing strategies

The challenge for car manufacturers will be to adapt marketing strategies to the evolving age structure of the population. Notably, car manufacturers are reluctant to undertake specific marketing campaigns for older consumers, because the car still has the image of youth, movement and dynamism. Furthermore, ageing baby boomers are unlikely to want to be told that big buttons are there to make it easier for them.

Another challenge for marketing strategy is related to specific characteristics of older drivers. For example, older drivers are potentially less influenced by advertising than younger drivers: cars are bought on word of mouth, more than anything else. Furthermore, older consumers are more brand-loyal than younger ones, making the usual advertising strategy less relevant.

Banks

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Banking comprises a diverse mix of businesses – deposit taking, lending, long-term savings, and capital market operations. Thus, banks tend to have resilient franchises and a stable market share, even over the very long term. An ageing population affects banks through changes in the macro-economy (e.g. changes in economic growth, interest rates and real estate markets), and changes to banks' portfolio composition (including, for example, an increasing share of age-related products, such as pension funds), which are again largely a function of local economic growth. Overall, the impact of an ageing population is likely to put pressure on profitability and encourage (cross-border) consolidation.

Macroeconomic impacts

Population growth is expected to decline in most major economic areas, with the median age increasing. According to the Osterreichische Nationalbank (OeNB)⁸¹, the population in the EU-25 is expected to grow until 2025, as a result of net migration effects, but to fall thereafter given that it has the lowest fertility rates worldwide and a growing elderly population relative to its younger population. The European Commission predicts that the impact from ageing on economic growth will, however, be modest, as decreases in the number of working age individuals stand to be offset, at least in part, by increased participation rates, more and better human capital, more capital-intensive production, and technological progress.

The impact of ageing on real interest rates is, however, expected to be greater than the impact on GDP per capita growth rates. The OECD, for example, projects that real interest rates will tend to decline until 2025, at least in countries such as Germany and France, and rise thereafter. The nearer-term movements are largely the result of increased saving for retirement, which tends to bid down real interest rates. Given the multi-decade duration of funded pension schemes, even a small decrease in real interest rates implies a significant reduction in the value of funded pension schemes.

The likely impact of demographic change on real estate markets is difficult to assess because demand is driven by the number, size, and age structure of households rather than by simple numbers of individuals. The OeNB study concluded that the aggregate level of demand for residential real estate would not be strongly affected by demographic change, but that geographic distribution could change as a result of increasing mobility and more diverse lifestyles and cultural backgrounds.

In particular, larger cities are expected to have younger populations than rural areas, and net migration is expected to lead to a widening gap in housing demand and house prices, which banks will need to factor into their pricing models for mortgages. Related to this, banks may need to rethink their branch distributions. For example, such considerations may have influenced the decision by the rural *Crédit Agricole* to buy the more urban *Crédit Lyonnais*, and driven the move by many UK and German banks to open branches in Spanish and French coastal resorts.

⁸¹ Osterreichische Nationalbank (2007).

Portfolio impacts

The OeNB study found that banks regard the impact of population ageing as an important issue leading to reduced demand for mortgages, consumer credit and basic financial services (demand deposits and payment services). Since the 1980s, the composition of bank portfolios in OECD countries has shifted from bank deposits to investment funds, funded pension provisions and stocks and bonds: a trend that we expect will accelerate. With a decline in real interest rates pressuring yields, the demand for alternative investments should increase, with banks reacting by increasing product innovation and adapting product distribution channels and marketing strategies.

In countries with ageing populations, loans and deposits are not expected to be the core products of a customer relationship. Instead, integrated products and services combining products for wealth accumulation, longevity insurance, financial advice, and even non-financial services, e.g. health and long-term care, should come to the fore. Internationally active banks are also likely to target international remittances to benefit from cross-border migration. A fairly recent example of a new product to tap the real estate wealth of older citizens is the reverse mortgage⁸², which liberates capital invested.

This more advice-based approach implies a shift in distribution resources towards financial advisors rather than transactional clerks or indeed back-office staff, ideally with lower sales staff turnover, which could put upward pressure on personnel costs. The age profile of a bank's own workforce (desirable in terms of matching the customer profile) will add to this, to the extent that more senior workers continue to command higher salaries.

Sales incentives may also need to shift from volume-based metrics towards customer satisfaction scores. The Scandinavian banks are already well advanced in this. The importance of branding, corporate governance, compliance, and risk management are likely to increase, pushing up customer acquisition and retention costs. Banks are likely to face increasing pressure from non-bank financial intermediaries and new market entrants, such as retail chains, putting further emphasis on the need to distinguish on the basis of service quality.

The population ageing phenomenon could increase the importance of international diversification, with banks able to fund asset growth in countries with younger populations (in more traditional products such as mortgages and consumer credit) by means of liabilities in countries with ageing populations. We think this observation has very likely driven the desire of many banks in mature Western European countries to expand into Central and Eastern Europe and, in the case of the largest banks, into China and India, to benefit from rapidly increasing financial intermediation in these high-growth economies.

Taken together, the economies of scale in product manufacture, customer service and international presence could accelerate (cross-border) industry consolidation, especially in Europe as regulatory regimes converge.

⁸² A reverse mortgage (known as lifetime mortgage in the UK) is a loan available to senior citizens, and is used to release the home equity in the property as one lump sum or multiple payments. The homeowner's obligation to repay the loan is deferred until the owner dies, the home is sold, or the owner leaves (e.g. into aged care). A reverse mortgage is analogous to an annuity where the principal and interest are paid with homeowner's equity.

Profitability impacts

An ageing population seems likely to put downward pressure on banks' profitability. Lower growth rates in the markets for more traditional banks products are likely to increase competitive pressure. The shift away from traditional savings accounts to investment products is likely to increase the cost of funds for banks. More tailored customer service is also likely to push up the cost base. The decrease in long-term real interest rates will likely contribute to a flatter yield curve, reducing revenues from maturity and liquidity transformation. Lower profitability makes banks more vulnerable to economic shocks, so banks may need to operate with a higher level of capital to sustain a target rating.

Under Basel II, this is intensified as innovative product development and cross-border expansion will add to operational risk requirements. Therefore, banks with international, diversification, economies of scale, a strong balance sheet and a proven track record in acquisitions would seem well prepared to benefit from an ageing population – the emerging markets focus of HSBC is an example. At the other end of the scale, we might highlight the challenges facing the (often rural) franchises of many Western European domestic savings banks. Their small scale and already high cost/income ratios could be further pressured by demographics, thus accelerating domestic consolidation.

Consumer

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- Some consumer companies might experience increased demand from a growing senior population.
- Companies are already shifting their product focus towards senior needs and senior-related products (e.g. nutritional supplements, high-end premium spirits).
- Certain industries (beer, confectionary, traditional soft drinks) may face challenges as the average consumer gets older.
- Older populations seem to show a significant level of brand loyalty, which favours companies with established brands.

Introduction

The inexorable change in the population structures of developed economies has the potential to affect the consumer goods sector in a multitude of ways. Consumer industries could come under pressure if future populations comprise a significantly higher proportion of seniors and retired people as they tend to be more careful purchasers. However, the consequence of such a demographic shift does not have to be entirely negative; there is a distinct possibility that a higher population of senior citizens will benefit certain industries such as nutritional products, over-the-counter medicines, and 'luxury products', such as older Scotch whiskies. In addition, pack sizes may need to be reduced to satisfy the 'smaller' appetites of older consumers. Moreover, youth-oriented products might be pushed out of production and sale in favour of products more geared towards seniors. This also raises the question of how consumer companies will market to the older consumer, when older consumers still think of themselves as young consumers.

Direct effects of demographic changes

With various population estimates forecasting that as much as 50% of the population will be over the age of 50 in developed nations by 2050, it seems very likely that the consumer sector might be altered simply as a result of the demographic shift. This could spur higher sales of such products as over-the-counter medications, senior-friendly foods, nutritional supplements and premium spirits. Demand for sugar substitutes could also rise, given that diabetes is more common in older people. Furthermore, it is also possible that seniors might simply demand more goods not specifically tailored for them. For example, many seniors tend to have reduced mobility, so there might be an increase in retail food sales (as opposed to wholesale food sales via restaurants).

Furthermore, the issue of limited mobility also has the potential to increase the sales of food and consumer retailers that offer delivery, e.g. Tesco or Sainsbury. This would also support producers with significant sales through such retailers, e.g. Parmalat, Danone, and Nestlé. Personal care and cosmetics could also be heavily affected by an ageing population. L'Oréal has estimated that cosmetics customers between the ages of 50 and 59 spend on average 48% more than the base group (30-39) and those above the age of 60 spend 69% more than the base group. With these two age brackets estimated to swell to 42% of the population by 2025, we believe the potential market for L'Oréal looks reasonably favourable.

Furthermore, it is likely that older consumers, usually living in smaller households, will require smaller pack sizes for many consumer goods. This has already been the case in several beer markets, where the traditional larger bottle size (often a pint or 50cl) has been replaced by 33cl/12 oz packs, with a move now visible to even smaller pack sizes (25cl).

In the alcohol industry, it is well established that beer consumption skews more towards the younger consumer, with spirits having a better skew towards older consumers. Given its high-volume characteristic, beer, in particular, could be challenged by an older population.

Changes in product portfolios

It is not sufficient simply to discuss *where* and *how much* seniors will spend their income in the consumer and retail industries. It may be more important to consider *what* these future generations of seniors will purchase. The effects of living longer will require a range of products designed not only to assist in seniors' health and well-being, but also to enhance their living standards.

Furthermore, shifts in product portfolios towards seniors will most likely shift attention away from products mostly marketed towards younger age groups. These changes in product portfolios might also require a significant amount of research & development to bring these products to fruition. Such areas might include advanced medical nutrition that could aid in treating dementia, swallowing disorders, and diabetes. Danone and Nestlé have already begun to enter the business of adult medical nutrition. With the acquisition of Numico, Danone entered the medical nutrition industry to tap what it believes to be a growing market amid population ageing and an increase in lifestyle-related disorders (such as sedentary lifestyle). The acquisition of Numico also gives Danone exposure to the disease-targeted nutrition market, which could be expanded to include the treatment of disorders that particularly affect seniors, such as osteoporosis and hypertension. Nestlé has also taken the initiative to enter the adult medical nutrition industry through the acquisition of Novartis Medical. This acquisition gave Nestlé a significant foothold in what both Nestlé and Danone believe to be a growing and profitable industry. The soft drinks industry has undergone a revolution in recent years, shifting from 'unhealthy' carbonated products towards healthier, non-carbonated products, increasingly with healthy benefits e.g. vitamin-enhanced water.

Conversely, the rising proportion of senior citizens might seem more of an obstacle to some industries (e.g. confectionary, beer and traditional soft drinks) than an opportunity. Confectionary companies, like Cadbury Schweppes and Hershey, might face the problem of a growing percentage of the population diagnosed with Type II diabetes or other conditions related to old age or a sedentary lifestyle, meaning that a significant sector of the market would be unlikely to purchase their products. However, inroads have been made in recent decades to develop confectionary that does not rely on conventional sweeteners. Sugar replacements and artificial sweeteners may allow confectionary companies to develop products acceptable to those with Type II diabetes. So the rising age of the population could pose a difficulty to confectionary manufacturers and distributors, but if managed correctly, could open up opportunities for these producers.

Other industries will also need to adapt their product lines to maximize exposure to the growing senior citizens market. L'Oréal, seeing that its most reliable age demographic (those over 50 years old) is growing, could change its product portfolios so as to provide more products tailored to older generations. These products could include specialised anti-ageing or age-concealing cosmetics that would be particularly attractive to those over 50 years old. L'Oréal is already currently estimating that by 2050 its potential market of those over 60 could be 20% of the global population, estimated to be around 2 billion people. In particular, it sees nearly 37% of the population of Europe (an integral market for L'Oréal) will be above 60 as well. This exemplifies the sort of opportunities that exist for companies that are facing an ageing population.

Possibility of brand switching

With an ageing population, there is also opportunity for this enlarged consumer group to modify their preferences, either to suit their own ageing-condition or out of personal circumstances. However, most consumer companies would admit that older consumers tend to be more set in their ways, so getting them to change brands is a real challenge. There will also need to be a change in the way companies market to the older consumer, i.e. with a few exceptions (such as pharmaceutical advertising in the USA), pitching explicitly to the older consumer can backfire, as many older consumers today still think of themselves as young (as in '60 is the new 50, or 40').

In the spirits industry, some companies have sought to capitalise on this by creating brand extensions that allow customers to stay with the same mother brand while trading up through a range of extensions. Diageo's Johnnie Walker Scotch brand has added several other 'colours' to its Red and Black versions, such as Gold, Blue and Green, at higher price points, allowing consumers to trade up within the same brand identity.

The issue of brand switching has been particularly important to tobacco companies in recent years. To keep brand switching within its own selection, British American Tobacco (BAT) has paid particular attention to how and to what effect brand switching takes place among age groups. Its assessment suggests that the oldest age group (45-64 years old) switch brands the least by volume, but switching by that age group has the largest impact on BAT's profit margin, when they switch down to cheaper brands. This is particularly troubling for BAT since its Global Drive Brands (GDB) are more expensive than Imperial's main brands. This seems to suggest that the older one gets, the less one switches brands. But when older consumers do switch, this has a larger impact on a company's profit margin. This supports the idea that seniors tend to hold significant brand loyalty, but that financial strain does have the ability to shake that loyalty.

With regard to food and health products, the issue of brand loyalty is equally important and can also be integral to a company's desire to attract seniors as customers. Studies show that seniors on fixed incomes show strong brand loyalty but also a willingness to change if price becomes an issue. This seems to reinforce the earlier notions concerning these points. In the case of health and food products, seniors who rely on certain medical nutrition products, like those from Danone and Nestlé, and feel satisfied with those products, might develop a certain level of company loyalty to producers and might in turn shift their food purchases to those manufacturers on grounds of perceived quality. Moreover, if prices are competitive, this might strengthen the effect of senior brand loyalty.

Conclusion

An ageing population will present the consumer sector with many challenges and opportunities, ranging from lifestyle habits to brand loyalty. A growing senior population will have the ability to influence the sales of companies that assist people with a less mobile lifestyle via, for example, home delivery. Furthermore, an ageing population can offer companies significant opportunities to enter relatively new markets, such as adult medical nutrition, anti-ageing cosmetics, and premium alcoholic beverages. However, other industries, including confectionary, beer and traditional soft drinks, might face serious impediments to making inroads into such markets. Lastly, issues of brand loyalty and switching could become significant obstacles for consumer companies since seniors appear to exhibit serious brand loyalty unless faced with excessive prices or inadequate quality.

Healthcare and Pharmaceuticals

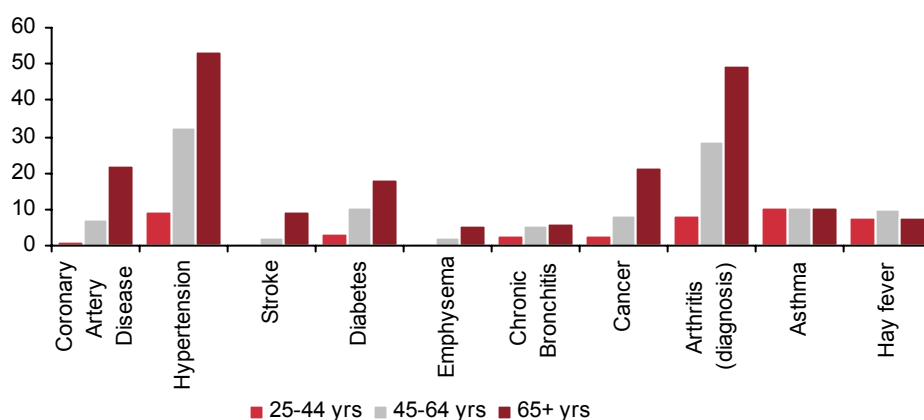
Introduction

We believe that ageing populations are likely to affect the pharmaceutical/healthcare space more than most sectors, a fact recognised in the published strategies of most health companies. In this section, we present our views on the likely driving forces, the potential outcomes and, in particular, a range of opportunities as we see them. Much of the quantitative analysis is derived from our Nomura database of more than 3,000 products from 70 companies.

Summary of key trends

- Changing burden of disease:** Besides cancer, certain non-communicable diseases disproportionately affect the elderly and will thus increase in prevalence as populations age (Figure 1). This will affect the nature and quantity of drugs and services required. Some pharmaceutical companies are already better positioned than others by virtue of having pipeline drugs that treat diseases that predominantly affect the elderly.

Figure 1. Prevalence of certain diseases (%) rises with age



Source: US Centers for Disease Control, Nomura Analysis.

- Trend towards more cost-effective medicines, but new drugs will still command a premium:**
 - 1) Increased use of generics – more substitution for brands in a therapeutic category, with increasing awareness by managed care, physicians, and patients of relative costs of drugs (vs. generics).
 - 2) Impact on R&D “novel” drugs that offer a medical advantage and cannot be substituted will still be highly valuable. Increasing recognition of evidence-based medicine will affect clinical trial design and the hurdles for the approval of drugs by regulatory bodies (FDA, EMEA) and formulary acceptance by managed care.
- Greater utilisation of preventive healthcare and diagnostics:** Primary and secondary prevention measures will be encouraged as a more cost-effective way of distributing the dwindling healthcare budget as potential demand for healthcare increases.

- **Evolution of two-tier healthcare systems:** There is likely to be a convergence in healthcare provision in all OECD countries to a model of government funding of basic healthcare services for the elderly, with an option to self-purchase additional services. In Europe, patients will also become payers for the first time, and hence will have a greater role in decision-making, leading in turn to more consumer-directed health care. There will likely be increasing cost-consciousness in all aspects of healthcare but, paradoxically, the use of lifestyle drugs may increase as individuals take more responsibility for their “discretionary” health spend.
- **A changing business model for pharmaceutical companies:** Many chronic diseases of the elderly are treated in the primary care setting (by general practitioners (GP)/primary care physicians (PCP)). The increasing use of generics and a shift in the balance of power from doctors towards payers and consumers could give the industry an opportunity to redirect and reduce marketing costs. In terms of drug development, we believe that the hurdle for clinical trials will be raised, particularly in respect of diseases for which cheaper generic treatments already exist; the need to show superiority to existing treatments will require large trials, representing high risk but potentially high reward – we envisage this size and risk of investment will be possible only by large pharmaceutical companies.
- **A shrinking labour force will affect healthcare systems’ manpower:** At a time when there is likely to be increased demand for labour-intensive services, e.g. long-term nursing care in or outside the home, a dearth of healthcare providers emphasises the need for patient self-care (drugs rather than hospitalization, self-monitoring devices and systems).
- **Specific impact on medtech sector:** More demand for devices, implants, stents, dialysis, and hips/knees while increased pressure of private out-of-pocket spend on healthcare means that discretionary products such as aesthetics and laser treatment for vision correction or expensive hearing aids may slow.

Summary of opportunities

Principal opportunities include the following:

- Drugs for diseases that disproportionately afflict the elderly.
- Cost-effective drugs, including importantly generics businesses.
- Differentiated (‘novel’) drugs that cannot easily be substituted by alternatives (whether generics or other brands).
- Lifestyle drugs (especially outside the US).
- Private healthcare providers and, outside the US, the expansion of managed care.
- Home-care services and self-monitoring devices.
- Essential medtech: orthopaedics, implants, and dialysis, rather than discretionary/cosmetic procedures.
- Preventive/early healthcare – e.g. diagnostics and vaccines (especially non-paediatric for zoster, pneumonia, and influenza).

Some Interesting Quotes from Companies

"The trends in healthcare are in our favor. An age wave is sweeping the world." (Pfizer Annual Report 2007)

"(...)The demand for healthcare is growing, driven by increasing and ageing populations, alongside a greater expectation of better health than ever before (...) In most major markets, ageing populations are leading to increased incidence of chronic diseases, such as a cancer and diabetes, which require long-term management." (AstraZeneca Annual Report 2007)

"An increasing ageing population means that there is an increasing demand for new medicines to treat chronic and degenerative diseases. While this presents an opportunity for GSK and other pharmaceutical companies, it is also placing a financial burden on governments and healthcare purchasers that is growing faster than their ability to support it." (Interview with Jean-Pierre Garnier, then-CEO of GSK 2004)

"The dialysis markets are continuing to grow on account of demographic factors, including the aging population and the increasing incidence of diabetes and hypertension." (Fresenius Medical Care Annual Report 2007)

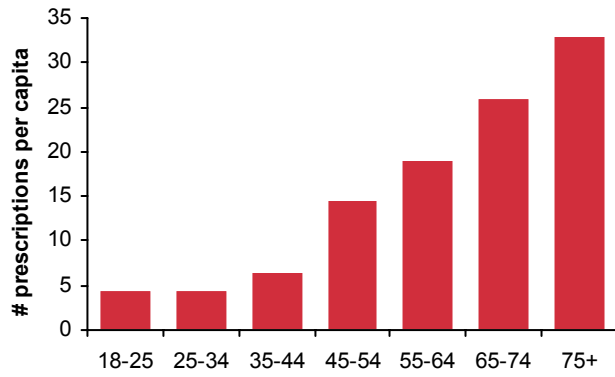
"Smith & Nephew operates in high growth markets, driven by ageing demographics and technology's ability to enable patients to live longer and enjoy more active lives." (Smith & Nephew website 2008)

Changing pattern of drug usage with more "elderly" diseases

Drug use varies by age – both in quantity and type

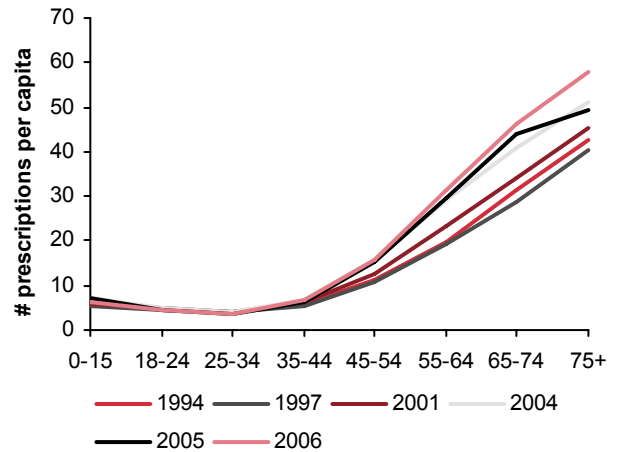
- **The elderly use more medication:** For example, in the UK, which is a publicly funded market not atypical of Europe, more than 55% of all drug prescriptions (scripts) are dispensed to the over-60s. In the US, the over-65s take nearly three times as many prescriptions per capita as do the 19-64 year-old group (Caremark 2005). In Germany, this ratio is around four times (Figures 2 and 3). It is, however, interesting to note the *decrease* in usage by the very old (Figure 5), a constant finding in the few years of data where the very old cohorts are split out. This could reflect a recent cohort of individuals who are inherently healthy, long-lived "survivors". Whether this pattern continues when the current 70+ group rolls over is unknown.
- **The elderly suffer from different disease conditions** (e.g. hypertension/angina, diabetes, COPD) and hence take more medication for those illnesses vs. younger age groups (Figures 5 and 6).
- **Per capita use of drugs by the elderly has increased:** German data show a trend towards increased per capita drug use by the over 50s since 1994 that is not being matched in the younger age cohorts (Figure 3). We assume that this is largely because of increased availability of medicines and increased expectations of the population as well as increases in the underlying prevalence of diseases. The German healthcare system is largely government-funded but, importantly, is essentially free at the point of delivery, with very limited co-payments for the elderly, and hence few curbs on demand. We have more limited data for other markets, but see similar trends.

Figure 2. Use of medication increases with age – US, 2005



Source: Caremark (2005).

Figure 3. Use of medication increases with age – Germany, 1994-2006

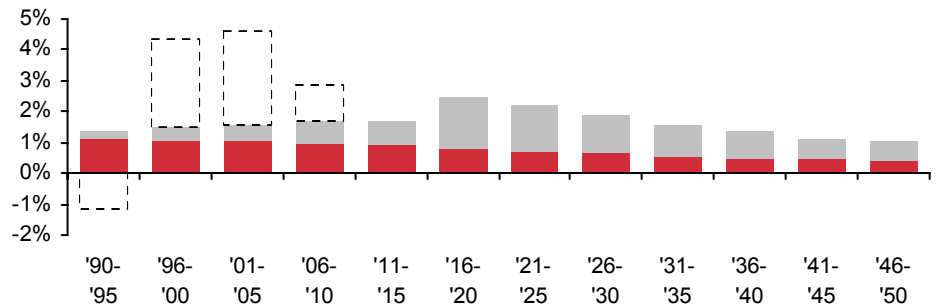


Source: Arzneiverordnungs Report.

Potential rise in demand for drugs as the population ages

By applying the historical German data for per capita drug usage by age to US population data forecasts, it is possible to simulate the impact of both the change in age cohort sizes and in overall population on potential demand in the US (Figure 4). This suggests a higher impact on demand growth owing to age cohort changes (light bars) over the period 2016-35, which thereafter gradually lessens.

Figure 4. Nomura calculation of potential growth in prescriptions related to demographic changes



■ % due to overall growth in US pop'n
■ % due to age cohort changes (US pop'n projections)
 % due to changing per capita drug usage (historic German data)

Source: Arzneiverordnungs Report, UN Population Estimates, Nomura research.

Interestingly, an estimate of demand growth attributable to changing per capita consumption of drugs by the elderly (dotted bars), rather than purely by change in age cohort size, suggests significant additional growth in 1996-2010, when per capita use increased, but negative growth in 1990-94 when per capita use appeared lower. For the purposes of these projections we do not assume any (future) variation in per capita use.

Which therapeutic categories?

Comprehensive data from Germany illustrate that some drug categories are more heavily used by older age groups (Figure 5). For example, older people take more medication per capita for conditions such as hypertension and heart failure, urologic problems, diabetes, psychosis, and high cholesterol. We have combined this per capita data with population data to identify drug categories that are heavily or moderately used by the over-65s (>60% of overall scripts, or 30-60% of overall scripts respectively) – shown in Figure 6.

Examples of companies that have focused on drugs for elderly

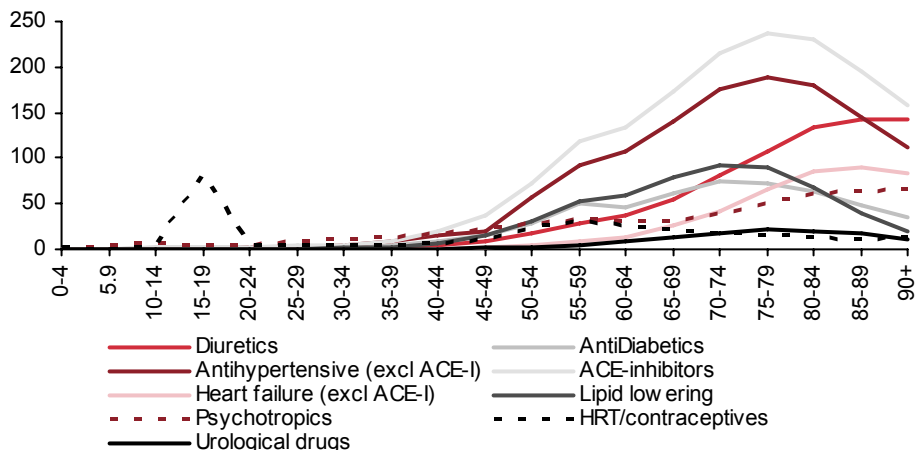
We expect an increase in the sales of drugs that are 'over-used' by the over-65s, in line with the demographic shift. Some pharmaceutical companies are favourably positioned today by virtue of having product portfolios that treat diseases of the elderly. Using our database, we are able to assess the contribution to a company's NPV of drugs that are moderately or heavily used by the elderly. Companies that overall have a high contribution from such drugs include Novartis (with drugs for hypertension, incontinence, and Parkinson's, among others) and Eli Lilly (osteoporosis and schizophrenia).

However, drugs on the market today that are high NPV contributors may not be so relevant 5-10 years hence. For example, Aricept for Alzheimer's disease, launched in 1996, contributes around 30% of Eisai's total NPV, but will contribute significantly less beyond its expected global patent expiry in 2011/12. In contrast, Phase 2 and Phase 3 pipeline drugs may take 10-15 years to reach peak sales. Therefore it may be more relevant to limit our analysis to the NPV contribution from relevant pipeline drugs.

On average, the big pharmaceutical companies have around 12% of *today's* estimated NPV contributed by drugs that are heavily used by the elderly, and 67% by moderately-used drugs. Companies with a high pipeline contribution from drugs used by seniors include Merck & Co (with drugs for osteoporosis, atherosclerosis, congestive heart failure, and Alzheimer's), Eli Lilly (Alzheimer's, osteoporosis, insomnia, and schizophrenia) and SanofiAventis (with a broad cardiovascular pipeline including drugs for arrhythmia and a trial fibrillation).

However, even with perfect disclosure by the companies, we have only limited visibility of the pipeline that will come to fruition in 10-15 years. And beyond that we have almost zero visibility – although by then we would expect innovation to have begun to change the range of and degree to which diseases are treated.

Figure 5. Drug usage by age and drug category, Germany (2006)



Source: German Arzneiverordnungs Report 2007, Nomura research.

Figure 6. Nomura stratification of drug usage by therapeutic category

Drug category	Usage by seniors (>65 yrs)	Drug category	Usage by seniors (>65 yrs)
Lipid lowering	moderate	Contraception	Minimal
Thrombosis prevention	moderate	Labour induction drugs	Minimal
Arrhythmia	heavy	Osteoporosis/HRT	Heavy
Congestive heart failure	heavy	Male HRT	Heavy
Hypertension/Angina	heavy	Infertility drugs	Minimal
Haematology drugs	moderate	Arthritis/inflammation	Moderate
Antibiotics	Minimal	Muscle relaxants	Minimal
Anti-virals	Minimal	Anaesthesia	Minimal
Anti-fungal drugs	Minimal	Pain	Moderate
HIV drugs	Minimal	Anxiety drugs	Moderate
Anti-viral interferon	Minimal	Depression drugs	Moderate
Acid disorder/anti-ulcer drugs	Moderate	Epilepsy	Minimal
Inflammatory bowel, Crohns disease	Moderate	Sleep disorders	Moderate
Functional bowel disease	Moderate	Alzheimer's dementia	Heavy
Diabetes drugs	Moderate	Schizophrenia	Moderate
Obesity drugs	Minimal	Parkinson's	Heavy
Metabolism/Endocrinology drugs	Minimal	Attention deficit disorder	Minimal
Allergy (antihistamines)	Minimal	Neurodegeneration/multiple sclerosis	Minimal
Asthma	Moderate	Emesis	Heavy
Chronic obstructive pulmonary disease	Heavy	Migraine	Moderate
Cough/cold medicines	Minimal	Substance abuse	Minimal
Respiratory distress syndrome (RDS)	Minimal	Stroke	Heavy
Anti-cancer drugs	Moderate	Benign Prostatic Hypertrophy (BPH)	Heavy
Cancer (adjunct therapies)	Moderate	Incontinence	Heavy
Dermatology	Minimal	Sexual dysfunction drugs	Moderate
Psoriasis	Minimal	Ophthalmic drugs	Moderate

Source: German Arzneiverordnungs Report 2004, US Census data, Nomura.

Note: Heavy use is defined as more than 60% of scripts attributed to the over-65yrs; Moderate use is where 30-60% of scripts are used by over-65yrs; Minimal use is <30% of scripts for over-65 yrs.

Patent expiries accelerate increased use of generic drugs

As public and private healthcare spend is stretched by increased demand from an ageing population, we expect an acceleration of the trend to using generic alternatives to branded drugs as the most cost-effective option for purchasing medicines. The coming wave of patent expiries faced by the industry will only exacerbate this in the near term (<2014). Longer term, the industry may find itself in a 'post-brand era' in many major therapeutic categories, with only truly 'novel' products able to command a premium.

A wave of patent expiries is expected to hit the branded industry

We estimate that the global pharmaceuticals industry will lose 2-5% of branded sales per year (ca. \$140bn in total value) over the coming five years as a sizeable wave of drugs is expected to go off patent in 2009-14. The timing and size of this patent wave is particularly critical, as it coincides with increased demand for medicines from an ageing population and the need for both private and public healthcare budgets to stretch further.

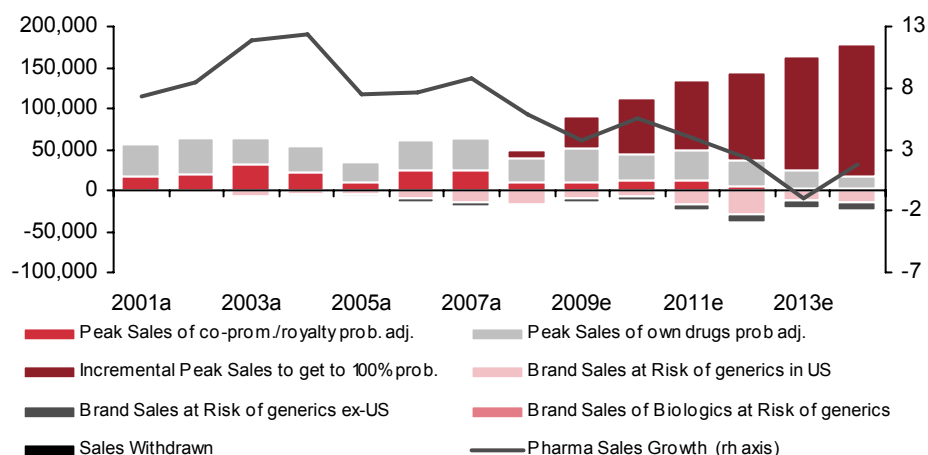
This will create a wide opportunity for generics to increase their market share, particularly in therapeutic categories with the highest demand and most pressure to keep prices low. Our estimate of the direct loss caused by patent expiries does not include any indirect impact of therapeutic substitution (and loss of market share) of competing brands.

In the near term – i.e. up to 2014 – this concentrated patent wave stands to benefit healthcare providers, payors, and patients, as it should reduce spend on drugs. Paradoxically, it may also mean that the longer-term impact on branded pharma is mitigated: major pharma will have absorbed its big losses attributable to generic erosion of its brands well before the 10-15yr+ timeframe when demand from the ageing population encourages greater use of generics.

Figure 7 shows our expectations of both patent expiries and the potential for new product launches. The negative bars highlight the absolute level of patent expiries on the left-hand axis, and the percentage of global sales at risk of patent expiries in each year on the right-hand axis. This shows the split between US and ex-US generics, with the US clearly contributing the greatest part of the medium-term patent expiry risk. Positive bars show the peak sales estimates for drug launches in each year, with a split between own products and partnered drugs.

Our estimates for new drugs are probability-weighted and reflect the low probability of launch for early-stage pipeline drugs. The dotted bars show the theoretical peak sales estimates if all of the drugs in the pipeline were to reach the market (i.e. applying 100% probability). The line across the chart represents our forecast for branded pharma market growth from 2001 to 2014.

Figure 7. Global impact of patent expiries vs. peak sales of new drug launches



Source: Company data, Nomura estimates.

Our current best estimate of the balance between patent expiries, new product launches, and sales for existing drugs forecasts revenue growth to dip into negative territory in 2013, before rebounding. Clearly, the future performance of the industry will depend heavily on the successful development of new drugs.

Generic usage is already on the rise

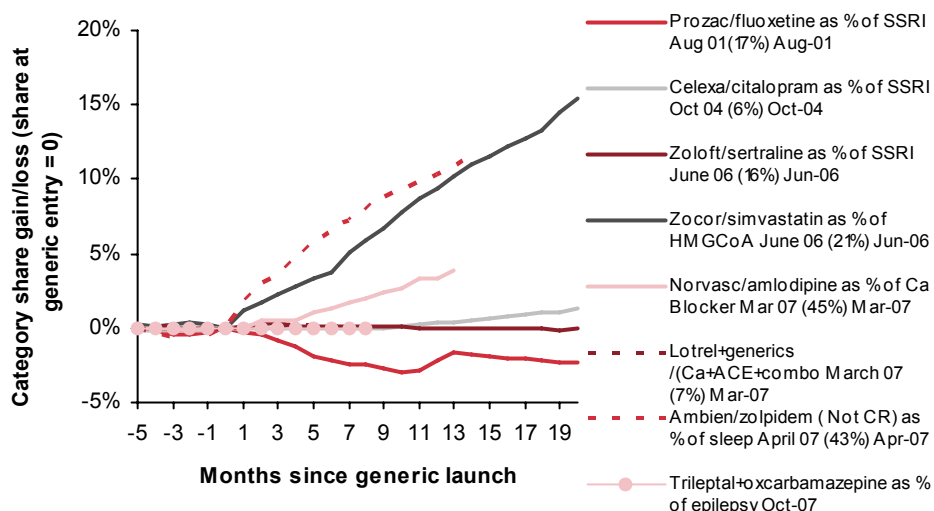
In the US in 2007, 65% of all prescriptions dispensed were for generic medicine (35% for brands), up from 45% in 2000. This generic uptake rate is likely to rise, driven by a widening gap between the patient's co-payment for a brand relative to a generic. In certain European markets (e.g. Germany and the UK), generic penetration typically is high, though it is noticeably lower in markets where there is a low price differential between brand and generic, or little incentive to prescribe/dispense generics as yet (e.g. Italy and Spain).

Therapeutic substitution – now rearing its head in the US

Therapeutic substitution – whereby doctors and patients switch to generic alternatives following the patent expiry of a key brand, rather than choosing to use competing brands in the same class – is more likely to occur in therapeutic categories where there is limited clinical differentiation between products (e.g. the statin drug category for lipid lowering).

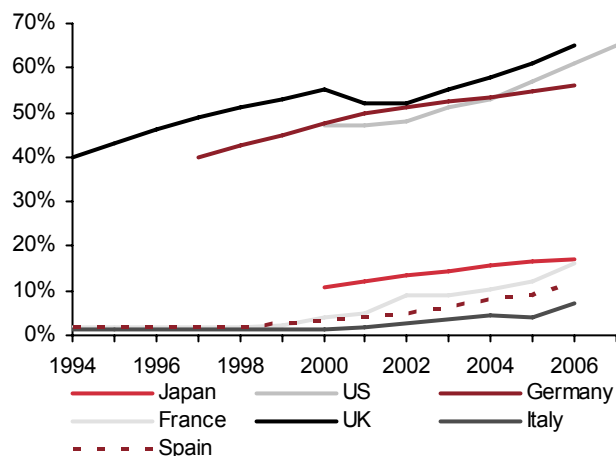
Therapeutic substitution has been a fact of life in parts of Europe for many years. In the US, it is a more recent phenomenon, and is being driven by managed care and the more aggressive marketing tactics of generic companies. In the recent case of Zocor, the patent for which expired in 2006, doctors have increased their use of the generic (simvastatin) and the combined market share of Zocor/simvastatin has increased post-patent expiry. This is in sharp contrast to the earlier example of Prozac (expired August 2001), where combined sales of the fluoxetine molecule lost share following the cessation of promotion by the brand company (Figure 8).

Figure 8. Example of generics growing market share following patent expiry



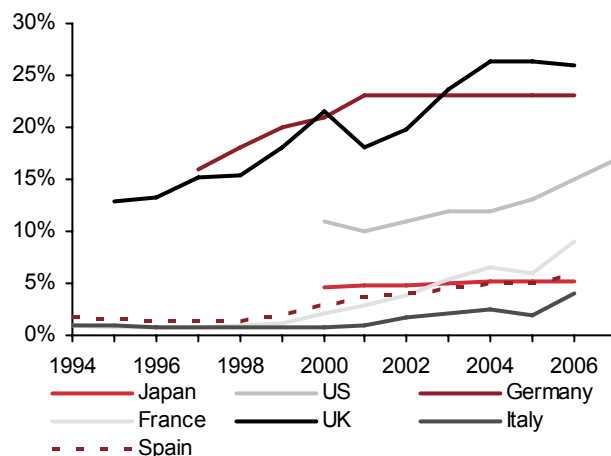
Source: IMS, Nomura.

Figure 9. Generic drugs market share by country – Volume (%)



Source: IMS Health, MoHLW, PPR, EGA, Nomura.

Figure 10. Generic drugs market share by country – Value (%)



Source: IMS Health, MoHLW, PPR, EGA, Nomura.

We have identified key categories of drugs used by the elderly that have major patent expiries in the medium term. These could subsequently come under pressure from therapeutic substitution if doctors switch or formularies limit choice to curb their drug bills. They include:

- **Hypertension (ARB class)** – Cozaar (Merck) goes off patent in February 2010, raising a threat to Diovan (Novartis – its own patent goes in 2012) and Benicar (Forest) in the same category.
- **Osteoporosis** – Fosamax (Merck) went off patent in February 2008, raising a threat to Actonel (Sanofi – which itself goes off patent in 2014) and Boniva (Roche/GSK).

- **Schizophrenia** – The patent for Risperdal (JNJ) expired in June 2008. This could affect Zyprexa (Eli Lilly – patent also goes in 2011), Seroquel (AZN – patent 2012), or Geodon (PFE – patent 2012).
- **Alzheimer's** – Aricept (Eisai/Pfizer) goes off patent in 2011, which could affect Namenda (Forest/Lundbeck) and Exelon (Novartis).
- **Lipid-lowering** – Zocor has already gone generic, but the category could be pressured further by the genericisation of Pfizer's Lipitor at the end of 2011, which could threaten Crestor (AZN).
- **Type 2 diabetes** – We note that Takeda's Actos goes off patent in 2011 but, aside from GSK's Avandia, the remaining brands in this category are sufficiently differentiated as to be unlikely to be substituted (e.g. Januvia from Merck, Byetta from Amylin/Lilly and liraglutide from Novo/JNJ).

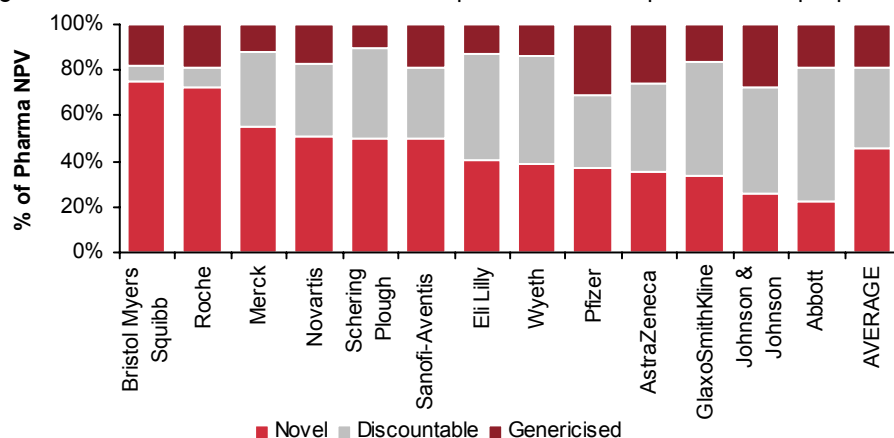
Protection from 'novel' drugs?

We judge that drugs with a differentiated mechanism of action, or with few direct competitors, are less likely to be subject to pressure from managed care to offer discounts to remain on formularies. A company that derives a high proportion of its value from such therapeutically novel products may be relatively protected both from the genericisation of competing brands in a category and from price controls. We define 'novel' products as: those with two or fewer competitors; those that are clinically difficult to substitute with therapeutic alternatives, e.g. cancer products; or drugs that cannot be excluded from formularies for clinical reasons (e.g. HIV drugs, and certain CNS drugs where the prescriber needs a range from which to choose).

For example, Bristol Myers-Squibb (with value from Plavix, a relatively unique drug for thrombosis), Roche (with its biologics/cancer franchise), and Merck (which has several drugs with differentiated mechanisms of action, including its diabetes drug Januvia, Singulair for asthma, and Gardasil, the HPV vaccine) have a relatively high contribution from 'novel' products. Biotech companies such as Genentech (with its focus on cancer/biologics) and Gilead (HIV portfolio) would also fall into this category (Figure 11).

We stress that this is only a medium-term conclusion, given that our 'view' of novelty can only extend out about five years, and that many currently novel drugs will experience patent expiry 5-10 years from now and thereby no longer be novel.

Figure 11. NPV contribution from 'novel' products – examples from major pharma

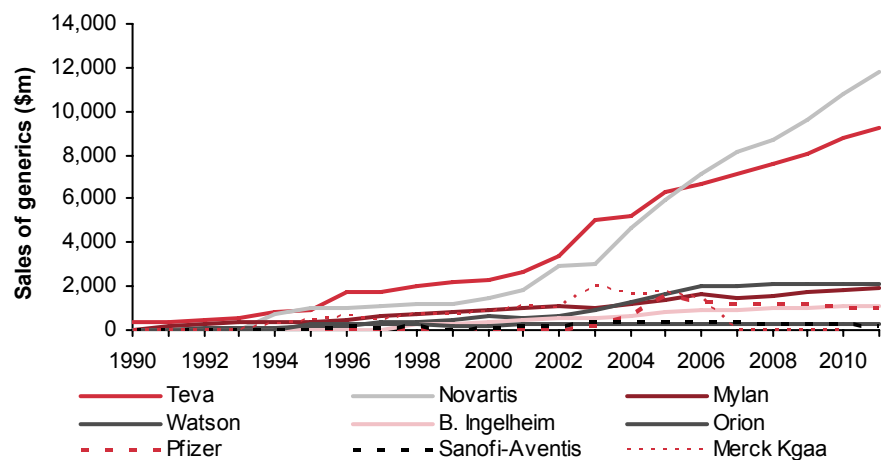


Source: Nomura analysis.

On the flipside, pharma companies with generics businesses may be insulated to some extent from the price controls that we expect to affect the branded drug business. Teva and Novartis, for example, have become increasingly dominant in the generics market (Figure 12). The strategy of the pure pharma model diversifying into generics is illustrated by the recent proposed acquisition of Ranbaxy by Daiichi-Sankyo. Most other branded pharma companies see a potential conflict of interest between branded and generic operations, and recognise the different skill sets required, with the result that there has been little sustained investment in this space.

We also expect the more pure-play generic companies, such as Barr Laboratories and Mylan Inc., to benefit from the increasingly cost-sensitive drug purchasing decisions.

Figure 12. Generic drug sales of companies with branded pharma involvement



Source: Company data, Nomura.

Structural changes in healthcare systems

Governments have been the predominant funders of healthcare in Europe and Japan for many years, and government funding of pharmaceuticals has increased in the US since the introduction of Medicare part D in 2006. There is likely to be downward pressure on per capita spending on healthcare by governments as public budgets become more stretched, although we expect some relief from the wave of generics in the near term.

To curb demand and control government costs, we envisage a shift within Europe towards a two-tier system, rather than the present “free for all” system. A first tier would be a publicly funded, and provide a ‘no-frills’ healthcare service, while the second tier would be privately funded, and grow in importance.

However, the legacy of centrally controlled budgets for different “silos” of healthcare (e.g. in-patient facilities and outpatient drugs), which is a feature of many European systems, may be difficult to break. It does not encourage the rational (re)allocation of resources that can be undertaken when healthcare is provided via a more holistic, insurance-based, approach such as has grown up in the US.

The downside for governments in asking for a greater personal contribution to healthcare funding is the need to enable information flow for drugs, devices, and services – such as direct-to-consumer advertising, which was introduced in the US in the mid-1990s.

Current cost-containment measures

A constant challenge facing the pharmaceutical industry is drug cost containment by public and private healthcare providers. Various measures are already being used worldwide, and we expect these to intensify, especially where there is government funding of pharmaceutical purchases. This has been the case in the US with the advent of the Part D drug benefit available since January 2006. Price control policies include the following:

US

- Use of restricted formularies to influence prescribing choices.
- Use of higher differential co-pays or step-therapy as incentives for patients to accept more generics.
- Manufacturer discounts and supplemental rebates to bulk purchasers, and to price-match cheaper drugs, to avoid exclusion from formularies.
- An increasing role for pharmaco-economics, with growing publicity for therapeutic reviews from the Agency for Healthcare Research and Quality.

Europe

- Aggressive reference pricing (e.g. Jumbo reference groups from 2005 in Germany).
- Active encouragement of generics and spread of generic substitution.
- Active consideration of pharmaco-economics – e.g. the National Institute For Health and Clinical Excellence (NICE) in the UK, and the new Institute for Quality and Efficiency in Health Care (IQWiG) in Germany.
- Restrictions on the use of innovative new products (e.g. biologics for rheumatoid arthritis).

Japan

- Biennial price cuts and a change in reimbursement rules have separated prescribing from dispensing functions.

Greater utilisation of preventive healthcare and diagnostics

Reflecting the drive towards more cost-effective spending by governments and out-of-pocket spend, we envisage a trend towards greater use of:

- Diagnostics – to catch treatable conditions earlier and thus reduce morbidity.
- Technology – to reduce hospital stays and the degree of surgical intervention, and to enable self-care at home.
- Drugs that reduce hospital stay or other interventions.
- Vaccines – disease prevention in both the young and the elderly.
- Forward-looking healthcare – a greater incentive for ‘health MOTs’ by payors (government or insurers) with more group accountability, driven by the philosophy that every individual will be a patient in 20 years, if not necessarily theirs.

Prevention can be more cost-effective than treatment

Disease prevention measures can be categorised as:

- **primary** (better nutrition, avoidance of tobacco use, oral health, and vaccination e.g. shingles, influenza);
- **secondary** (earlier detection of chronic disease, use of statins to reduce high cholesterol); or
- **tertiary** (clinical management of disease to reduce further morbidity).

It can be difficult to assess precisely the likely cost savings from disease prevention (after all, death ultimately saves a lot of cost elsewhere in the system). That said, it has been estimated that \$1 spent on encouraging moderate exercise can save \$3.2 in medical costs later (US Centers for Disease Control, 1999). Similarly, each \$1 spent on vaccinating older adults against influenza saves an estimated \$30-60 in medical costs (US Department of Health and Human Services, 1999).

Vaccines already a growing business

Vaccination is an area that has considerable acceptance from the public and from health payors. The global market for vaccines has been growing steadily, at around 24% p.a. since 2002, and is worth around \$17bn today. We estimate that by 2012 it could exceed \$30bn, driven by new products, better combinations, and improved delivery methods in all areas (paediatric, traveller, and adult vaccines).

In general, developing and manufacturing vaccines requires specific biologics expertise, and has higher barriers to entry than is the case for small-molecule drugs. For this reason we do not expect new entrants to the field other than via acquisition, which has been a recent trend (e.g. Novartis of Chiron, AZN of Medimmune). Examples of companies with established skills in vaccines are set out in Figure 13.

Figure 13. Companies with significant Pharma value from vaccines

Company	% NPV from vaccines
Acambis	100%
AstraZeneca	5%
Crucell	57%
GlaxoSmithKline	25%
Human Genome Sciences	19%
Intercell	91%
Merck	32%
Novartis	8%
Sanofi-Aventis	16%
Solvay	6%
Wyeth	21%

Source: Nomura analysis.

Influenza vaccines are a key category used by the elderly, and many companies are already heavily involved in this area (e.g. Novartis, AZN, Sanofi, Crucell, Intercell, Solvay, GSK). Other vaccines targeted at the elderly include those for shingles (e.g. Merck, GSK), hospital/community-acquired infections (e.g., Intercell and Merck are developing one for *Staphylococcus aureus*, Acambis is developing one for *C. difficile*) and pneumonia (GSK has one in development).

Diagnostics

Examples of companies with diagnostics businesses that could benefit from increased demand are shown in Figure 14.

Figure 14. Significant players in the global diagnostics market

	2003A	2004A	2005A	2006A	2007A
Global diagnostics market (\$m)	26,882	28,495	31,345	33,539	35,551
% growth	8.7%	6.0%	10.0%	7.0%	6.0%
Global molecular Dx market (\$m)	1,693	1,953	2,237	2,544	2,695
% growth		15.4%	14.5%	13.7%	5.9%
In vitro diagnostics US\$ mkt share					
Roche Diagnostics	20%	21%	20%	20%	21%
bioMerieux	4%	4%	4%	4%	4%
Abbott	11%	12%	12%	12%	9%
J&J	10%	10%	11%	11%	11%
Beckman Coulter	6%	7%	6%	6%	6%
Siemens	5%	5%	5%	5%	5%
Becton Dickinson	5%	5%	5%	5%	5%
Other (includes GE and 3M)	40%	35%	37%	37%	38%
Molecular diagnostics US\$ mkt share					
Roche Diagnostics	45%	46%	42%	38%	36%
bioMerieux	1%	2%	1%	2%	2%
Qiagen	5%	5%	6%	12%	14%
Chiron Diagnostics	13%	14%	14%	13%	15%
Gen-Probe	7%	6%	6%	7%	7%
Other	29%	27%	31%	29%	26%

Source: Company data, Nomura.

Changes to the pharma company business model

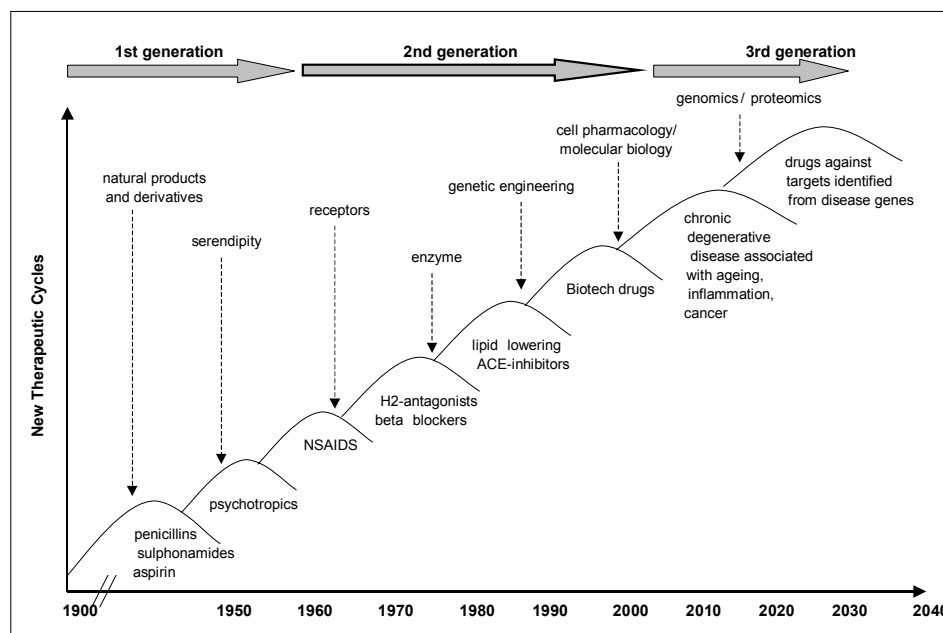
As the structure of healthcare provision moves towards increasing involvement of the patient as payer (particularly in Europe, where traditionally this has not been the case), there will likely be a shift in power from the doctor to the patient. This is already evident in the US where, particularly over the past five years, consumers have been incentivised to be cost-conscious by increasing differential co-payments. A move to a two-tier system in Europe could reduce waste, but seems unlikely to trigger a further change to generics in our opinion, given their already high levels.

We believe that this could fundamentally change the business strategies of pharmaceutical and medtech device companies, in two ways:

- Research & Development.** We envisage demand for comparative clinical trials against generic alternatives, and a need to demonstrate the cost-effectiveness of medicine vs. hospitalisation costs. It may be necessary to do more extensive studies in older populations. The requirement to show superiority to existing treatments will require large trials and represent high risk but potentially high reward – and the undertaking of this size and risk of investment may be possible only by large pharmaceutical companies.

The hurdle rate for 'me-too' drugs will be higher, and there will be greater pressure on innovation to be highly clinically differentiated – again, this points to our analysis of contribution from 'novel' drugs (see above). We judge that, in the future, patients may choose not to pay for new, expensive drugs without real proven benefit. This could affect classes of cancer drugs that are costly, yet extend life by only a few months.

Figure 15. Evolution of the R&D model

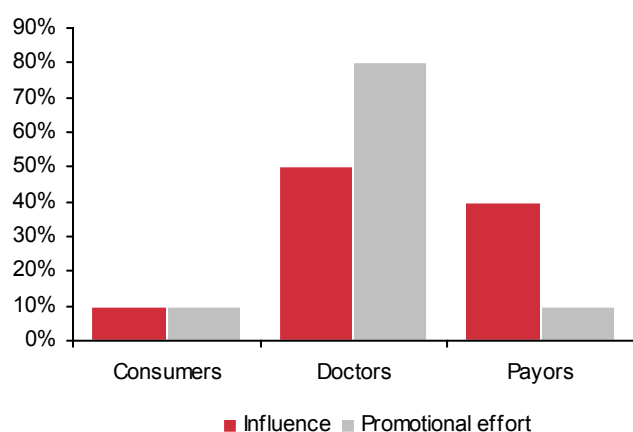


Source: Nomura.

- Marketing.** Diseases of the elderly are commonly treated in the primary care setting, which historically has required more promotional effort (and cost) than secondary care. However, increased use of generics and a change in the balance of power from doctors towards payers and consumers could provide the industry with an opportunity to redirect and reduce marketing expenditure.

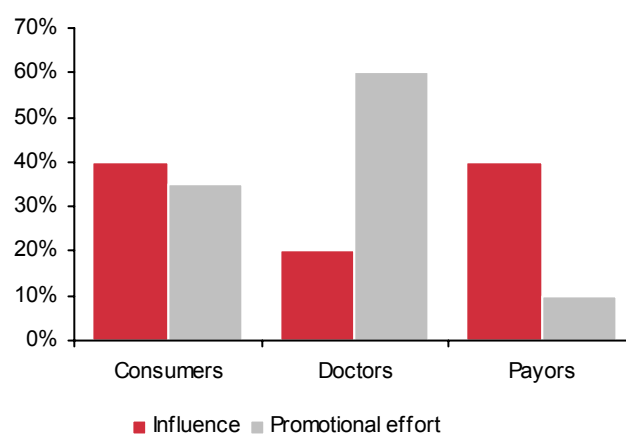
Figure 16 highlights our estimate of the split between influence and promotional spending for the industry. In 2006, around 25% of global sales were spent on promotion (out of \$518bn, according to IMS). We expect that, by 2016, both the influence of doctors in prescribing, and the marketing spend directed towards them, will have been reduced. Given the limited numbers of payers and the limited ability to influence them via traditional marketing and education campaigns, we assume that promotional spending towards them will not expand proportionately with global sales. Unless EU governments decided to allow widespread DTC advertising campaigns (logical, in our view, if patients are to carry more of the health funding burden but likely to be resisted by governments worried about exploding demand), we see a real opportunity for promotional spending to be reduced as a proportion of sales, while still allowing for a more than 10% per annum rise in DTC communications.

Figure 16A. Change in the balance of power in drug prescribing decisions (Nomura model) – 2006



Source: Nomura.

Figure 16B. Change in the balance of power in drug prescribing decisions (Nomura model) – 2016



Source: Nomura.

Figure 16C. Change in the balance of power in drug prescribing decisions

	2006e			2016e		
	Influence	Promotional effort	U\$m spend	Influence	Promotional effort	U\$m spend
Sales U\$bn		518			1162	
% of sales spent on promotion		25%			15%	
==> promotion spend U\$m			130			174
Consumers	10%	10%	13	40%	35%	61
Doctors	50%	80%	104	20%	60%	105
Payors	40%	10%	13	40%	10%	17

Source: Nomura.

Increased demand for “elder-care” – but who will do it?

The provision of care for the elderly outside the family setting ranges from adult day services, home health, and community services, to senior housing, assisted living, continuing care retirement communities, and nursing homes. It is a highly labour-intensive service, and a key issue already identified in this field is the general lack of a sufficiently large long-term, well-trained, professional workforce.

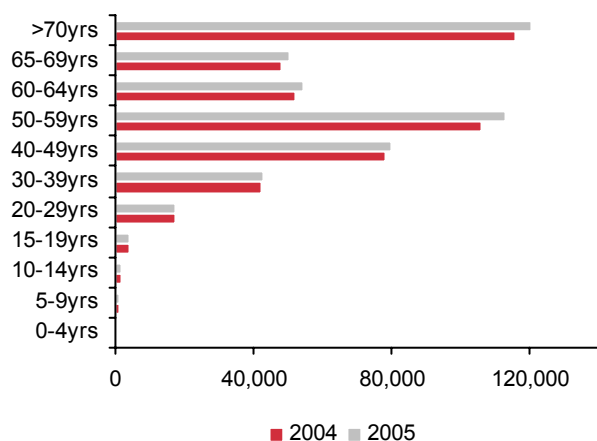
“The growing demand for long-term care, resulting from ageing baby boomers and a much smaller pool of traditional caregivers, means the future will be immeasurably worse without decisive action by both public and private sectors”, said Dr. Robyn I. Stone, Executive Director of the Institute for the Future of Aging Services, in April 2008

Senior care is a business model where we do not currently see many barriers to entry and as such the number of participants is likely to expand, in our opinion. Companies that look well positioned at present include Genesis Health, Kindred, ManorCare and Skilled Healthcare Group.

Trends in the Medtech/Healthcare services sectors

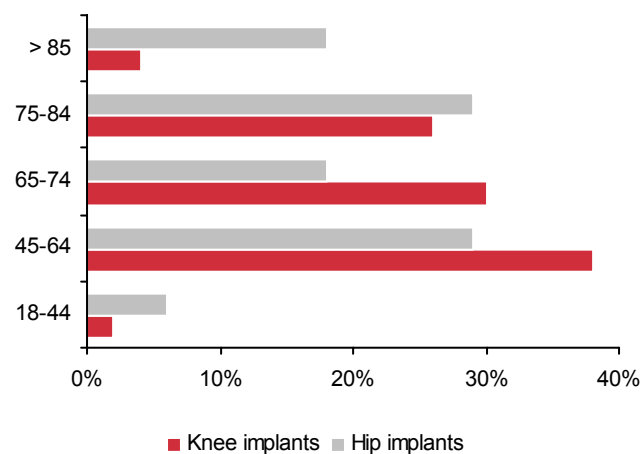
Of the established Medical Device sub-sectors, we believe that dialysis providers (e.g. DVA, FME) and pure-play orthopaedic manufacturers (e.g. ZMH, SNN, SYK, SYST) are well placed to benefit from inherent demands associated with an ageing population.

Figure 17. Point prevalence of ESRD (by age group)



Source: United States Renal Data System (2007).

Figure 18. Hip and knee implants (2005E)



Source: Company data, Nomura estimates.

A secondary theme worth highlighting is the trend towards alternative sources of funding and the importance of cost savings. In addition to the shift in power from doctor to patient, we expect a greater role for managed care providers. We consider that e-health solutions providers (e.g. COPGR, MDRX) are well placed to help the shift towards leaner, more efficient, operating structures. In contrast, we expect areas of healthcare that are more discretionary (e.g. cosmetic procedures, dental implants, laser surgery, etc.) to see slowing growth rates.

Increase in prevalence of obesity and diabetes

Supported by a growing obesity epidemic, the prevalence of diabetes, among other conditions (e.g. heart disease), in an ageing population (more than 50% of the 16m US citizens with diabetes are older than 65) is expected to rise significantly. End Stage Renal Disease (ESRD) is marked by irreversible damage to the kidneys, and can develop in the latter stages of diabetes.

Treatment options are limited to transplantation and dialysis, with the former dependent on the availability of transplantable organs, and with older recipients often unable or unwilling to undergo the surgery. Consequently, we expect dialysis providers, such as Fresenius Medical Care and Davita, to experience growing demand as these trends develop.

Core orthopaedic volumes supported by growing need in an ageing population

As industry participants have flagged, the core (reconstitution and trauma) orthopaedic market is likely to remain a steady grower (mid-to-high single digit), in our view. With age-related osteoporosis, and increasing life expectancies, we judge that hip/knee and trauma procedure volumes will stabilise, if not increase, over the longer term.

With surgical volumes increasing, however, we would expect increasing pricing pressure on manufacturers: most likely this will be in areas with limited product differentiation and IP (e.g. spine, dental), as (i) payors (e.g. governments, managed care, GPOs, etc) look to extract incremental cost savings; and (ii) low-cost competitive products start to enter the market.

Increasing importance of managed care

In parallel with tighter government spending, and with future returns over pensions becoming increasingly uncertain, we consider that consumers may become more pro-active in investing in their own future healthcare (for example, through a managed care provider) to help mitigate future health costs.

We expect private insurers and (already a US phenomenon) managed care providers (e.g. Aetna, Wellpoint) to assume an increasingly central and influential role in the healthcare landscape, given what we consider to be their indispensable role as a mediator between healthcare providers and end-users.

Aesthetic (cosmetic) procedures to slow

As individuals become obliged to pay for a greater portion of their medical care, we judge that volumes of elective procedures (e.g. dental implants, cosmetic procedures, and high-end orthopaedic procedures – i.e. in younger patients) that are by nature more “discretionary” may slow.

Greater emphasis on e-health

In an environment in which governments find themselves under increasing pressure to reduce unnecessary spending, we believe e-health companies (e.g. COP GR, MDRX) can flourish. Aside from the obvious cost-savings potential and efficiency benefits (e.g. doctors and hospitals can share data, thereby avoiding the need to repeat tests at different sites), IT solutions also offer the opportunity to greatly reduce potential fatal adverse drug interactions (see Figure 19).

Figure 19. Example from US practice of potential Electronic Medical Record cost saves

Patient type	Amount	Base case Est savings
Payer independent		
Chart pulls	\$5 (per chart)	600 charts
Transcription	\$9,600	28%
Capitated patients		
ADRs ⁸³	\$6,500	34%
Drug utilisation	\$109,000	15%
Laboratory utilisation	\$27,600	8.8%
Radiology	\$59,100	14%
Fee-for-service patients		
Charge capture	\$383,100	2% (incr)
Billing errors	\$9,700	78%

Source: A cost benefit analysis of Electronic Medical Records, Partners healthcare System, Boston. Published in American Journal of Medicine (2003).

⁸³ Adverse Drug Reactions.

Insurance

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- Ageing populations will put additional pressure on the already stretched welfare resources of global economies. For insurance companies, however, this presents a significant opportunity to grow retirement products, although there are also various threats and potential constraints on their ability to do this.
- We expect the beneficiaries of ageing populations to be mainly the large, well-diversified life insurers and specialist reinsurers with strong balance sheets, as well as some niche providers.

The main opportunity: Greater need for retirement savings and benefits

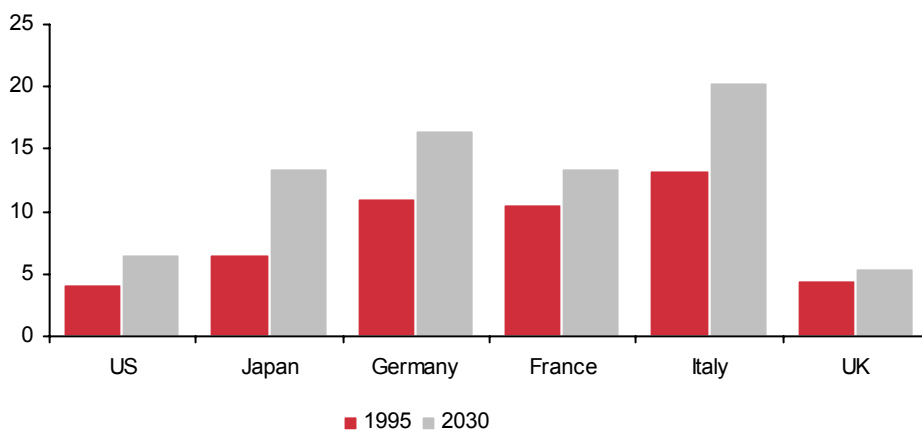
There is widespread agreement that the ageing of populations in the developed world will cause a pension funding crisis over the next two decades. State pensions cannot be maintained at current levels for the post-Second World War 'baby boomers' because of the rising proportion of pensioners to tax-paying workers. The 'pension gap', by which we mean the additional pension funding required to provide today's level of pension benefits to the increased number of pensioners, together with the loss of tax contributions from a reduced number of workers, is shown by country in Figure 1, measured as a percentage of GDP. The size of the gap varies greatly among countries, with Germany, France and Italy among the worst affected.

There are essentially only two ways to fill the pension gap: 1) people working longer and retiring later; and 2) people saving more for their retirement. As the first remedy might not provide the full solution at the individual level, a significant increase in retirement savings will likely be necessary, providing insurance companies and other savings product providers with a major growth opportunity.

But saving for retirement is not popular

Before the much-needed growth in retirement savings products can really develop, governments need to overcome a politically very unpopular obstacle in the form of compulsion. The simple reality is that saving for retirement is not a popular activity for anyone, particularly for those on lower incomes, whose need to save is probably greatest. This has not been solved by government-regulated incentives to make saving more attractive by offering consumers better value for money, such as charge capping. The solution favoured by many pension experts is to make retirement saving compulsory, as was done in Australia in 1992.

Figure 1. Public pension payments as % of GDP



Source: OECD, Nomura research

However, compulsion is so politically unpopular that it has so far been avoided by all the major European countries. We expect this to change as the burden of providing state pension benefits increases. In our view, most European governments are likely to take more forceful measures to encourage retirement savings over the next 10 years. One way of doing this will be to cut state pension benefits, although this, too, would be politically unpopular.

Large, well diversified insurers are well placed to benefit

Assuming that there is a growing demand for retirement savings and benefits, a key challenge for the insurance industry will be to manage two of the main risks:

- Investment risk during the accumulation and pay-out phase
- Longevity risk during the pay-out phase

We believe that large, well diversified insurers are well placed to benefit since they have scale and diversification benefits that give them a competitive advantage over many smaller providers (although niche players are also likely to survive and prosper). A good example of this is the strong growth of the US variable annuity market, which is now dominated by a handful of large providers:

- The growth in popularity in the US of variable annuity products is largely based on offering both 'open architecture' asset management combined with investment risk protection during the accumulation and pay-out phases of an annuity. AXA and Prudential, for example, which have strong positions in the US market, could be well positioned to benefit from growth in these products.
- We see scale as an advantage in offering this product because: 1) scale is required to attract the best asset managers onto the providers' panels; 2) product innovation can be accelerated by exporting product features from one country to another (i.e. we believe these US products have great potential in Europe); 3) the larger the book of business, the more cost effective the hedging of investment guarantees.

With regard to longevity risk, those life insurers with large longevity and mortality exposure have a natural hedge since the risk of living longer (longevity) can be mitigated by death benefit exposure (mortality).

Advice-based distribution and corporate pension buy-outs look set to rise

We see the need for increased advice-based distribution to help consumers to navigate their way through the complex range of options involved in retirement saving and provision. We think retirement products will increasingly be sold through advice-based distribution channels, favouring companies whose distribution strategy is skewed towards multi-tied agents and brokers over bank and single-provider, tied-agent channels.

We also expect growth in the corporate pension buy-out market (called 'bulk purchase annuities' in the UK) as corporates increasingly look for ways to remove their growing pension liabilities. Some niche pension buy-out specialists, in addition to the larger insurance and reinsurance companies, are likely to benefit from this.

Risks: Mispricing, government intervention and threats to industry reputation

- **Mispricing of risk:** One of the main threats to the industry is the mispricing of risk, whether through government intervention in pricing, lack of data, or poor risk management discipline.
- Historically, **government intervention in pricing**, such as with, for example, stakeholder pensions in the UK, has led to low profitability and the consequent unwillingness of insurers to provide these products. Governments may look to win votes by supporting the consumer against the insurance industry but in so doing may risk undermining the very savings industry it is attempting to promote.
- The insurance industry relies on **statistical data** to predict the size and frequency of losses and provide economically viable cover. With continuous advances in healthcare, it is becoming more difficult to model longevity and long-term care products effectively.
- **Insurers' reputations** as financially strong and transparent providers of long-term savings products are important to attract business. However, these reputations are vulnerable to mis-selling scandals (as occurred in the UK in the early to mid-1990s) and financial crises (such as in the early 2000s and currently with the credit crunch).

Leisure

The leisure sector should benefit from the ageing of the population, given that more people with higher disposable income and increased leisure time are likely to spend more money on having fun.

All areas of the industry should perform well – although we think that domestic holidays and gambling will be the main areas to benefit. In general, the more time people have, the more likely they are to want to meet and socialise. We believe that companies offering facilities for this will benefit – i.e. bingo, betting shops, pubs and restaurants. Thus, we judge that companies offering such opportunities, including Carnival Cruises, Royal Caribbean, Rank Group, Ladbrokes, William Hill TUI Travel and Thomas Cook Group, stand to benefit from the ageing population.

The UK family expenditure survey

The main source of our data is the UK family expenditure survey, which dissects consumer spending in UK households by age group. We believe that the UK, which provides the most comprehensive data available, is a reasonable proxy for the rest of the developed world. The survey covers 6,650 households comprising 15,850 people (an average of 2.36 per household).

Figure 1 shows the survey split by age. Not surprisingly, households with older people tend to have fewer persons per household. This is important from a consumer perspective as the cost of running a household is not materially different whether there is one person or more and can affect potential household spend. However, as all parts of the population age, we would expect this ratio to rise for the over 75s (from 1.44 at present).

Figure 1. Household sample

	<30	30-49	50-64	65-74	75+	All
Weighted number of households (thousands)	2,450	9,610	6,430	3,190	3,100	24,790
Total number of households in sample	610	2,580	1,710	940	810	6,650
Total number of persons in sample	1,440	7,910	3,720	1,600	1,180	15,850
Total number of adults in sample	1,050	4,840	3,350	1,580	1,180	12,000
Weighted average number persons/household	2.35	2.97	2.24	1.71	1.44	2.36

Source: Family Expenditure Survey

To put the leisure sector into context, we look at the main consumer spending categories in the survey to show how patterns change as people get older. Figure 2 shows spending per person in the UK by expenditure category.

In terms of total spending, the group that spends most is the 50-64-year-olds, at £221 per week – followed by the 64-74 year olds. This is a key area of focus for leisure companies and an obvious area of growth from the baby boomers. This drops to just £147 for the 75+ category – but we would expect this to rise with an ageing population with better health.

Figure 2. Average weekly spend per capita in the UK (£)

	<30	30-49	50-64	65-74	75+	All
Food and non-alcoholic drinks	14.89	17.64	23.31	24.92	22.75	19.83
Alcoholic drinks, tobacco and narcotics	4.57	4.37	5.66	5.28	3.21	4.70
Clothing and footwear	11.27	10.20	10.42	8.67	5.12	9.83
Housing (net), fuel and power	32.18	17.41	19.28	20.89	23.67	20.12
Household goods and services	12.21	11.83	14.54	13.95	12.75	12.80
Health	0.88	1.64	3.91	3.13	4.51	2.48
Transport	22.57	26.63	31.36	26.37	11.71	26.24
Communication	5.92	4.82	5.29	4.50	4.26	4.97
Recreation and culture	20.20	22.93	30.25	29.97	17.85	24.73
Education	2.71	3.36	4.05	0.00	0.00	3.05
Restaurants and hotels	17.09	15.82	19	14.10	8.70	16.02
Miscellaneous goods and services	14.31	14.57	16.95	15.65	14.55	15.23
All expenditure groups	158.80	151.22	184.03	168.63	129.65	160.01
Other expenditure items	27.51	35.45	37.62	24.34	17.68	32.89
Total expenditure	186.31	186.66	221.65	192.97	147.32	192.82

Source: Family Expenditure Survey.

Another way to look at the data is to show the percentage of income that each age profile spends in each category (Figure 3). There are some obvious figures here – for example, older age groups spend little on education, but considerably more on health.

Figure 3. Average weekly spend per capita in the UK (%)

	<30	30-49	50-64	65-74	75+	All
Food and non-alcoholic drinks	8.0	9.4	10.5	12.9	15.4	10.3
Alcoholic drinks, tobacco and narcotics	2.5	2.3	2.6	2.7	2.2	2.4
Clothing and footwear	6.0	5.5	4.7	4.5	3.5	5.1
Housing (net), fuel and power	17.3	9.3	8.7	10.8	16.1	10.4
Household goods and services	6.6	6.3	6.6	7.2	8.7	6.6
Health	0.5	0.9	1.8	1.6	3.1	1.3
Transport	12.1	14.3	14.2	13.7	7.9	13.6
Communication	3.2	2.6	2.4	2.3	2.9	2.6
Recreation and culture	10.8	12.3	13.6	15.5	12.1	12.8
Education	1.5	1.8	1.8	0.0	0.0	1.6
Restaurants and hotels	9.2	8.5	8.6	7.3	5.9	8.3
Miscellaneous goods and services	7.7	7.8	7.6	8.1	9.9	7.9
All expenditure groups	85.2	81.0	83.0	87.4	88.0	83.0
Other expenditure items	14.8	19.0	17.0	12.6	12.0	17.0
Total expenditure	100.0	100.0	100.0	100.0	100.0	100.0

Source: Family Expenditure Survey and Nomura research.

In figure 4 the data have been indexed such that the higher the figure, the higher the spending on each category. In the 50-74 age groups, food and drink, health and recreation are the categories that perform well.

Figure 4. Average weekly spend per capita in the UK (indexed)

	<30	30-49	50-64	65-74	75+	All
Food and non-alcoholic drinks	78	92	102	126	150	100
Alcoholic drinks, tobacco and narcotics	101	96	105	112	89	100
Clothing and footwear	119	107	92	88	68	100
Housing (net), fuel and power	166	89	83	104	154	100
Household goods and services	99	95	99	109	130	100
Health	37	68	137	126	238	100
Transport	89	105	104	100	58	100
Communication	123	100	93	91	112	100
Recreation and culture	85	96	106	121	94	100
Education	92	114	115	0	0	100
Restaurants and hotels	110	102	103	88	71	100
Miscellaneous goods and services	97	99	97	103	125	100
All expenditure groups	103	98	100	105	106	100
Other expenditure items	87	112	100	74	71	100
Total expenditure	100	100	100	100	100	100

Source: Family Expenditure Survey and Nomura research.

The leisure sector

Splitting the leisure sector down further, we show the percentage of revenue from each of the different components of the leisure sector. Restaurants, package holidays and gambling payments are the largest areas of spend.

Figure 5. Average weekly spend on leisure activities (%)

	<30	30-49	50-64	65-74	75+	All
Cinema, theatre and museums etc	0.20	0.15	0.21	0.23	0.24	0.19
Gambling payments	0.16	0.18	0.48	0.70	1.05	0.33
Package holidays – UK	0.00	0.04	0.08	0.32	0.41	0.09
Package holidays – abroad	0.94	0.88	1.37	2.62	1.95	1.22
Restaurant and café meals	1.16	0.87	1.30	1.97	2.23	1.18
Holiday in the UK	0.07	0.18	0.29	0.50	0.47	0.24
Holiday abroad	0.22	0.26	0.39	0.41	0.00	0.32
Total spend	100	100	100	100	100	100

Source: Family Expenditure Survey and Nomura research.

Figure 6 shows this as an index. All of these areas show a high level of spend from the older generations. This is particularly the case for UK package tours, which spike materially for the over-65s. Domestic entertainment should thus perform well.

Figure 6. Average weekly spend on leisure activities (indexed)

	<30	30-49	50-64	65-74	75+	All
Cinema, theatre and museums etc	108	81	110	121	128	100
Gambling payments	48	53	144	209	317	100
Package holidays – UK	0	50	97	370	478	100
Package holidays – abroad	77	72	113	214	159	100
Restaurant and café meals	98	74	110	167	188	100
Holiday in the UK	29	74	122	211	196	100
Holiday abroad	71	83	122	129	0	100
Total spend	100	100	100	100	100	100

Source: Family Expenditure Survey and Nomura research.

Cinemas, theatre, and amusements

Cinema, theatre and amusements are a high-spending category for the older generations. They tend to be targeted by the companies with cheap offers in off-peak periods. Clearly, retired people can be more flexible about when they can go to the cinema. We believe that social group meeting places with relatively low costs will continue to grow as populations age.

Gambling payments

Gambling payments as a percentage of the cost also see a very material increase in spend from the over-65s. Again this is relatively cheap social spending and an important part of social life. We have split this further using a different survey – the UK prevalence study as undertaken by the gambling commission.

Figure 7 shows the mix of gambling activity by age profile. This suggests that lottery and bingo are the main betting activities of the elderly population

Figure 7. UK gambling activity, by age (%)

	16-24	25-34	35-44	45-54	55-64	65-74	75+	Total
National Lottery Draw	39	59	65	63	62	58	47	57
Another lottery	8	12	12	12	13	12	12	12
Scratch cards	26	30	22	19	13	12	10	20
Football pools	5	3	2	4	3	3	4	3
Bingo	7	7	7	7	7	7	7	7
Slot machines	26	26	16	12	6	4	2	14
Horse races	12	22	21	19	16	13	10	17
Dog races	6	9	6	4	4	2	1	5
Betting with a bookmaker (others)	7	11	8	7	3	2	1	6
Fixed odds betting terminals	7	5	2	1	1	0	0	3
Online betting with a bookmaker on any event or sport	5	8	5	3	2	1	1	4
Online gambling	6	5	3	1	1	0	0	3
Table games in a casino	7	8	4	3	1	1	0	4
Betting exchange	2	2	1	1	0	0	0	1
Spread betting	1	2	1	0	0	0	0	1
Private betting (e.g. with friends, colleagues)	21	17	10	8	5	5	3	10
Another gambling activity	1	0	1	1	0	0	0	0
Any gambling activity in 2007	58	71	73	71	70	68	57	68
Any gambling activity in 1999	66	78	77	78	74	66	52	72

Source: Gambling Commission.

Figure 8 shows the number of times people bet per week, by age profile. Those over 55 tend to bet just once or twice a week, according to the data.

Figure 8. Number of people betting per week by age group (%)

	16-24	25-34	35-44	45-54	55-64	65-74	75+	Total
None	42	29	27	29	30	32	43	32
One	16	18	27	28	33	37	31	26
Two	12	18	17	18	19	19	16	17
Three	10	12	12	12	10	6	6	10
Four	6	9	7	6	4	3	2	6
Five	4	5	4	3	1	2	0	3
Six+	9	10	5	4	2	1	1	5

Source: Gambling Commission.

We believe that gambling is an important source of entertainment for the ageing population because it tends to take place in clubs (i.e., bingo) and betting shops – where the premises are used as a place to socialise.

Package holidays UK

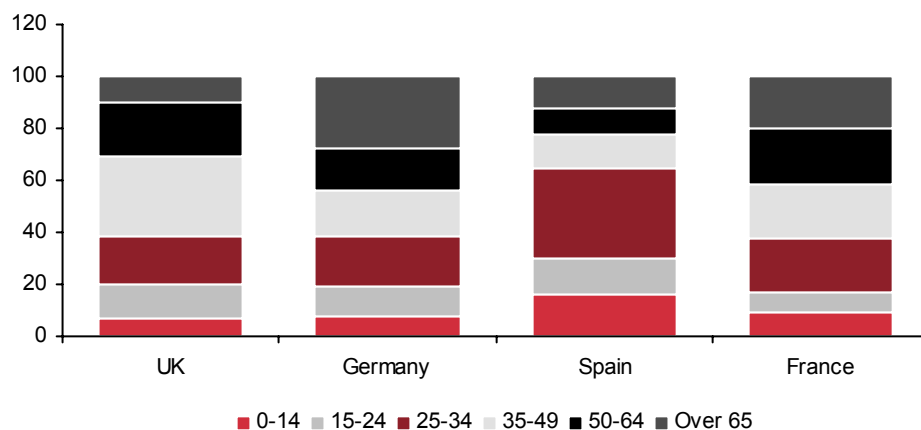
Package holidays in the UK – or domestic-based holidays – are an important area for ageing populations. This includes such areas as coach tours – mainly to city centres and cultural areas. This area is over-represented by the ageing population and should be a good growth area. Most of these groups are owned by private equity or private individuals.

Package holidays abroad

The overseas package tour holiday is another area that will likely perform well in the long term. The flexibility on holiday timing makes the ageing population an important area for tour operators. While most groups are highly profitable in the school holiday seasons – especially July and August, the “shoulder” months (especially January-May, May, October and November) tend to be loss-making months.

Targeting these customers is key for the industry. There are some geographical differences among European countries in terms of how much older people travel overseas: a Euromonitor survey revealed differing international trends. Germany had the highest level of international travellers in the older age profile. The UK lagged France, with older Spaniards showing the least desire to travel overseas.

Figure 9. Percentage of travellers by age profile (%)



Source: Euromonitor.

Notably, the cruise industry attracts an elderly market. Companies including Carnival Cruises and Royal Caribbean could benefit from this. Figures 10 and 11 show the main US and UK brands of Carnival and the high percentage from the elderly age group. Certain of the group's brands are focused on the elderly population. This is particularly true of Holland America, which has an average guest age of 59, with 43% of passengers over 65. Such brands could perform even better with an ageing population.

Figure 10. US Carnival brands

%	Carnival	Princess	Holland America
<45	57	29	18
45-64	33	44	39
65+	10	27	43
Average age	38	52	59

Source: Carnival.

The same is true of Carnival's UK operations – with both P&O and Cunard having a high percentage of older guests.

Figure 11. UK Carnival brands

%	Ocean Village	P&O	Cunard
<45	40	15	16
45-64	47	44	44
65+	13	37	40
Average age	48	58	59

Source: Carnival.

Restaurant and café meals

We believe that restaurants, cafes and pubs will also benefit from their social aspects. Figure 12 shows the result of a YouGov poll for the BBPA on why people go to the pub. Meeting friends topped the list, at 59%, and should hold the sector in good stead in the long term.

Figure 12. Reasons for going to the pub

Reason	More frequent answers (%)
Meeting friends	59
Drink alcohol	49
Have an evening meal	36
Have lunch	30
Watch sport	18
Meet with colleagues	17
Compete in pub quizzes	14
Have a soft drink	13
Listen to live music	12
Meet new people	7
Have a tea or coffee	6
Have breakfast	3

Source: YouGov for BBPA, November 2007.

Media

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- The ageing population is likely to shift its funding away from education towards healthcare, to the detriment of educational publishers, such as Pearson, but to the benefit of healthcare publishers, such as Reed Elsevier and Thomson Reuters.
- Media companies, comprising television broadcasters, newspaper and magazine publishers (including online versions), generate revenue by selling audiences to advertisers. An ageing population has the potential to change the value of specific demographics. Older audiences with high disposable income and longer periods of economic activity will become more attractive relative to the traditionally popular 16-25 age bracket. Changing the demographic profile of any one media brand is difficult, however, introducing risk to the brand, in our view.
- Advertising agencies act as middlemen between the traditional media companies and the advertiser. Ultimately, they depend on corporates' need to promote their products and services. Changing demographics are likely to require advertising agencies to become more creative about how they address their audiences, but we think the basic intermediary model should be broadly unaffected.

Professional publishers

The impact of an ageing population on the professional publishing sector is more profound than might be immediately apparent. The two components of the sector that are most obviously affected are the educational and healthcare publishers.

Education and healthcare receive a substantial proportion of their funding from public finances and, despite good intentions, as opinion formers and policy makers age, they may be more likely to be interested in living a little longer than in educating other people's children, skewing expenditure away from education towards healthcare.

Changing expenditure patterns in Japan corroborate this. Since 1955, the proportion of the national budget spent on education has decreased steadily from 14.5% to 9.3% in 2005. By contrast, expenditure on healthcare has increased from 3% of the national budget in 1955 to 9% in 2005. This swing seems to indicate that as the population ages, more and more of the budget will be dedicated to healthcare, at the expense of education.

Educational publishers: Educational materials, which include textbooks, account for around 2% of the educational budget in the US, but this still makes it a \$6bn business.

As overall funding comes under pressure, educational institutions are likely to focus on cost-saving, potentially moving towards online learning solutions in place of books and even teachers. Publishers such as Pearson, which are at the forefront of these developments, should be able to protect revenue by taking a larger share of the shrinking market, although margins may come under pressure from investment in new formats.

One solution for publishers could lie in a shift of their target from schools to higher education and adult education. As older people seek career extensions, adult training or re-training courses, this could become an increasingly important component of the educational industry. We believe that the direct value derived by end users would be high and thus give the training providers strong pricing power.

The incumbent publishers are best placed to exploit this opportunity, as they already have the necessary content sets that would be needed to develop adult learning programmes. Pearson is already established in this market and is expanding its presence with the \$477m acquisition in July 2007 of eCollege, which is involved in professional development programmes.

Another option is to move to developing markets, where the demographic trends are different. In theory, it should be possible to exploit the content generated for developed markets around the world, and some publishers are already seeking to do this. Again, in education, Pearson is increasingly investing in emerging markets, with particular emphasis on its English-language programmes and on investments. Its investment in a chain of private schools in China reflects its aspirations in the developing markets.

We believe that moving to non-domestic markets carries risk, however, with political and cultural differences potentially limiting the extent to which content synergies can be exploited, and the more fragmented nature of the market limiting economies of scale. In our opinion, therefore, internationalisation is something of a necessary evil for educational publishers, which will typically attract greater risk at a lower margin.

Healthcare publishers: Just as the absolute amount of funding in the education segment should fall as the population ages, so the amount directed towards healthcare should rise, even with per head spending remaining static in real terms. According to Reed Elsevier where the health sciences sector contributes 20% of revenues, the outlook for the market as a whole looks very promising, with 22% of the US population set to be eligible for Medicare by 2030 vs. the current 14%. This is coupled with the expectation that US health spending should be on a CAGR of 7% to 2009, rising to 15-19% by 2014.

In theory, this should benefit providers of data and information to the healthcare industry. The risk, however, is that funding does not keep up with demand, in which case it is likely to become increasingly focused on front-line activities.

Media companies

Media companies sell audience to advertisers on the basis of the demographic profile of their readers/viewers/listeners. Advertisers will select the most appropriate medium to address their target market, and most media companies attempt to differentiate their product offering to present a clear demographic proposition to the advertiser. In the UK, for example, the ITV television network has a strong position in the 35-49 year old demographic, whereas Channel 4 is aimed more closely at 16-34-year-olds. Another example of this is the TVE1 channel in Spain, which is a state-run business. This channel provides generalist news and entertainment but its audience is older and more rural than that of its commercial rivals, Antena3, Telecinco and Cuatro. Despite a decrease in its audience share (which once exceeded 20%) resulting from commercial rivals taking over popular sitcoms, series, and sporting rights, it seems to have stabilised around 16%, probably because of a core, and loyal older audience.

Changing the demographic profile of a medium is difficult, as any shift, either up or down the age range, will inevitably alienate some existing consumers, and so carries risk, in our view. In theory, therefore, media companies that already address older demographics should see their audience expand. However, this will create more value only if advertisers have adapted their marketing strategies accordingly.

That said, media habits established in mid life are likely to be carried into old age to some extent. For example, media consumers in the last years of employment are likely to be heavy users of online products and so should respond well to 'older' brands that can be accessed online.

The opportunity, therefore, lies with those media companies that have brands that already appeal to a more mature audience, the challenge being to deliver those brands in a way that reflects the media consumption habits of that generation.

Advertising agencies

We see no reason why an ageing population should adversely affect the proportion of GDP spent on advertising and promotional activity. Although the types of products and services being offered to consumers may have to be adapted to take an ageing population into account, the providers of those goods and services will still need to communicate with their customers, regardless of their age. Agencies will, however, have to become more creative in terms of finding ways to address the target demographics in an increasingly fragmented media universe, and, having done so, to establish brand loyalty.

Advertising strategies towards different age groups have been differentiated as follows:

- Although the teenage group has limited purchasing power, it is still attractive to advertisers wishing to establish brand awareness and loyalty.
- Traditionally, the most valuable age group has been the 20-35 year-olds, as they tend to have the highest disposable incomes and the greatest propensity to spend. They are also relatively less loyal when it comes to brands, making it worthwhile to address this age group with new product ideas.
- Middle-aged (36-55) consumers are also attractive, as they tend to have relatively high disposable incomes, although willingness to try new brands tends to be more limited.
- The ROI on advertising to post-retirement consumers is likely to be lower for many products and services because, even where notional disposable income remains high, brand loyalty is well established, and propensity to spend tends to diminish.

None of this should have an adverse impact on the advertising agency segment of the sector, however, as long as the overall spend is maintained. Media companies, on the other hand, are much less able to adapt to change, making them more vulnerable, in our view.

Real Estate

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- The residential property market looks set for a long period of transition, with the youngest baby boomers not reaching retirement age until 2029. We expect a shift from suburbs to the country and from colder to warmer climes, with a general selling down given that retirees tend to sell more homes than they buy.
- Demand for commercial real estate will also change to meet the needs of older consumers. An older working population will affect demand for and supply of office space. Consumer spending on non-essential items will likely drop, affecting space requirements in the retail sector. Conversely, the leisure sector may see increased patronage from a 'greying' population seeking some excitement in retirement.
- Demand will increase in the healthcare sector but could see important demographic changes, with a profound shift over the past few decades in how society cares for the elderly. Once-strong demand for nursing home care has dropped away steadily over the past two decades, while demand for home health care has burgeoned. Moreover, nursing home care itself is undergoing a transformation in many countries.

The real estate market will feel the effects of population ageing in various ways. Supply and demand will be greatly affected by population ageing in terms of location and type of property. The industry will need to respond to the diverse needs of the older group. There is no such thing as the 'average' senior citizen. The equity bulge in the housing market has been driven by baby boomers for three generations. This has brought about a push for bigger and better homes, as well as for second homes, creating greater pricing pressure for prime residences in urban areas with a (secondary) impact on rural areas (with the hidden social cost of pricing out local workers, notably in agricultural areas, from their traditional locations). In 2011, the 'leading edge' of the baby boomers will start turning 65 and the nature of the residential market is likely to start changing, possibly quite sharply.

There are likely to be regional variations, but in general we expect a shift from the suburbs and commutable locations to the countryside, and from colder to warmer climes. The US REITs Camden Property Trust and Post Properties develop, own and operate multifamily rental property throughout the Sun Belt, an area stretching across the US South and Southwest that has seen substantial population growth in recent decades, partly fuelled by a surge in retirees migrating domestically. In our view, there was always going to a tipping point of a generational shift in demand impacts. We expect a general selling down, as retirees tend to sell more homes than they buy, and as accumulated equity is recycled into income-producing investments that could include real estate directly (buy-to-let markets) and indirectly (REIT shares) by way of pension top-up investments.

Residential markets may also be affected indirectly by retirees recycling residential equity to their offspring to establish them on the lower rung of the housing ladder, where young adults make up the bulk of new demand, with most buying homes at age 30-35. The perception of a continued flow of big asset sales could suppress prices for many years.

Suburbs, which swelled with the baby boomers, could therefore begin to decline. If the building industry contracts, home prices may remain more stable or developers may switch to serving the old, building more compact housing near amenities. Post Properties, for example, is differentiated by its focus on development in urban infill Sun Belt locations, concentrating on providing high-density urban apartments and resort-style garden apartments, with an emphasis on resident service. Towns may make new efforts to attract immigrants, who accounted for 40% of the growth in homeownership between 2000 and 2006 in the US. Among these unknowns, one thing is more certain: the housing market is about to enter a long period of transition and the youngest baby-boomers will not turn 65 until 2029.

The ageing population in many first- and second-world countries around the globe will have a marked impact on the demand for, and supply of, commercial real estate. Space demand for offices, retail, industrial, warehousing, hotels, restaurants and medical facilities will change to meet the needs of an older population. Ultimately, consumer spending levels will drop on non-essential items and, as a result, industrial production, warehousing, retail stores, service providers and office space requirements could be negatively affected. Conversely, affordable restaurants, hotels, casinos, recreation, sporting and entertainment facilities may see increased patronage from a "greying" population seeking some excitement in retirement.

Medical and health care facilities should require an increase in space requirements, as will elderly care establishments and service providers. Young skilled, and unskilled, immigrant workers could prove to be the long-term benefit for the commercial real estate industry worldwide. Real estate is a long-term investment and, as a result, this 'greying trend' should be considered, and factored into, medium- to long-term decision making in commercial real estate investments.

The past century has seen a shift from an agrarian/industrial economy to a service economy and most of the working population is now employed in offices. The ageing working population will affect future demand for and supply of office space, for example as people may choose to increasingly work from home. Falling demand will transform the office market from a saturated market to a contracting market. However, there will still be significant differences between market segments, with growing demand for prime locations and special provision being made for seniors in such areas as parking, internal mobility and workplace design.

The seemingly intuitive increased demand for nursing homes may be offset by several factors. A profound shift has occurred over the past few decades in how society cares for the elderly. Just a generation or two ago, adult children cared for the majority of the elderly in their own homes. As more women entered the workforce, families turned more to nursing home care for the elderly. But the once-strong demand for nursing home care has dropped steadily over the past two decades in countries like the UK and the US. Conversely, demand for home health care has grown sharply. In addition, nursing home care itself is undergoing a transformation in many countries: from hospital-style settings to retirement

village 'campuses'. For example, Helical Bar is currently working on a project of this type. Healthier living habits, technological and service innovations, cost considerations and deep-seated preferences of the elderly to live at home rather than in institutional care have guided the growth of home health care and assisted-living facilities over that of nursing homes. Home health care costs much less than nursing home or hospital care, and technological and medical advances have made it as effective as hospital care for many treatments. The continued rise in the elderly population will cause demand for home-based health care to increase at an even faster rate in the future. Healthcare trends now emerging in the US, which may be imported into other countries to help address the problems of population ageing, include setting up healthcare centres in non-traditional locations, such as shopping malls, and incorporating restaurants, shops, office space and apartments into hospital projects.

The ageing population will have a significant effect on real estate beyond the economics of supply and demand. In the real estate market, technology can help property developers devise creative and productive solutions for the ageing population, for example by upgrading public and private spaces, amenities and infrastructure to meet their needs. Healthcare institutions will increasingly take account of the demands of (mostly affluent) seniors in terms of lifestyle and privacy while keeping them fit and active. Retailers will have to redesign their stores and tailor their product ranges to accommodate the older consumer. In the housing market, demand will grow for suitable senior housing, both rented and owned, which provides appropriate security (guards, alarms) and medical support (teledoctor, telemedicine). There are indications that seniors will be increasingly willing and able (by cashing in their home equity) to pay for this.

Food Retail

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- Trend towards convenience shopping as the age of the average consumer increases.
- Older populations show significant brand loyalty, but only at the right price and quality, leading to a big opportunity for food retailers.
- Change in product mix as the tastes and preferences of the more mature shopper begin to dominate.

Introduction

Over the coming few years the populations of developed countries is expected to age. The Office for National Statistics expects the UK population aged over 45 to grow by 15% between 2006 and 2016, and by 31% by 2031, relative to an overall population increase of 17%.

In OECD countries, life expectancy has risen by an average of three months per year since 1950. By 2050, all developed countries are expected to have median ages above 40 years, according to the UN World Population Database. In most countries, the population aged 80 and over is growing faster than any other age group.

Public commentary frequently reveals pessimism about population ageing. But we think this fundamental phenomenon presents an opportunity for those who act quickest and most effectively to benefit and gain a strategic advantage over the competition.

All stakeholders in companies in the Food Retail sector will feel the impact of the increase in the proportion of seniors and retired people in the population. Below, we consider some of the more pertinent likely outcomes.

Trend towards convenience shopping as consumers age

In recent years, food retailers have shifted to cater to growing demand for convenience items, largely fuelled by busy lifestyles. However, the same convenience foods that appeal to busy 20-somethings also attract older people who no longer need to cook for a family.

As the average age of the consumer continues to rise, we expect the convenience-shopping trend to increase. As shoppers become less mobile and less inclined to travel to out-of-town shopping centres and retail parks, the decline of the hypermarket format across Europe will likely continue. Comments in the report *Aspects of the Economics of an Ageing Population*, by the Select Committee on Economic Affairs (House of Lords), acknowledges that a “particular problem that confronts some older people is the location of shops” and “to the extent that shops are concentrated in places that require access by motor cars, this will produce difficulties for those who can no longer drive.”

As has been seen over recent months, this trend has been accentuated by continual increases in the price of fuel and reductions in discretionary spending on non-food items (typically 30-40% of a hypermarket’s product offering). Moreover, pensioners are less likely to drive as they get older, which further suggests that the popularity of hypermarkets will diminish as the population continues to age.

During a recent conference call, Carrefour's Luis Jose Duran made specific reference to the decrease in customers' propensity to travel to out-of-town hypermarkets as a result of rising petrol prices. We would therefore favour value-conscious convenience retailers such as Tesco, to take advantage of this trend.

Older populations show strong brand loyalty (at the right price and quality)

Brand loyalty is particularly important in food and drug retailing, and can also be integral to a company's desire to attract older customers. Evidence suggests that seniors on a fixed income exhibit strong brand loyalty, but also a willingness to change provider should the price become uncompetitive (Figure 1). This is particularly pertinent in the current economic downturn, when customers in general are even more focused on value.

Establishing brand loyalty with those customers in the 'middle age' categories should help to ensure that, as the customer demographic evolves, food retailers are well placed to capitalise on the loyalty of the maturing customer base.

However, as pension provisions become increasingly limited and the fixed income of pensioners declines (on a relative, if not, an absolute basis) value will become ever more important as ageing consumers become increasingly cost conscious.

Product mix changes to reflect the preferences of the older shoppers

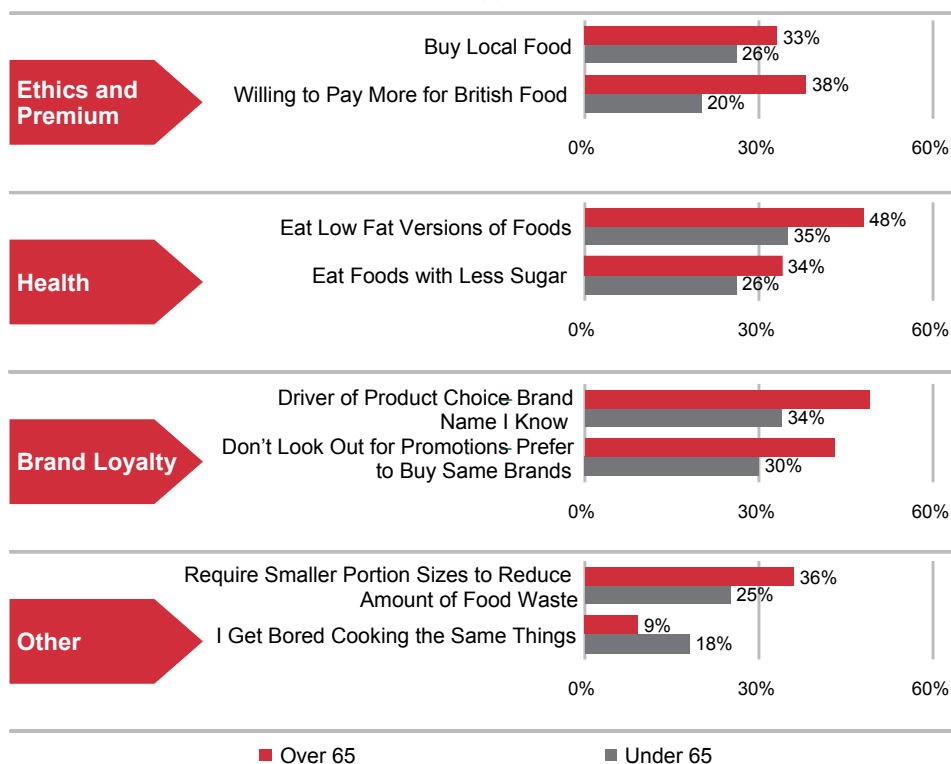
The effects of living longer will require a range of products designed not only to aid seniors' health and well-being, but also to enhance their living standards and accommodate their tastes.

The result is likely to be a significant, but gradual, shift in the product offering towards the older consumer, while maintaining a level of product and service innovation to attract younger customers (who will become the 'brand loyal' pensioners of the future).

Although the impact on sales and margins (as a result of mix differences) is extremely difficult to predict, convenience goods tend to be sold at higher margins, and food retailers are therefore likely to benefit as a result of the shift in product mix.

This change in consumer preferences will also require a fundamental shift in management thinking on buying, marketing, etc. to ensure that those changing tastes and requirements are met. The Government Actuary department (IGD) has conducted extensive research into the characteristics of ageing shoppers, and we consider that this provides valuable insight into the likely future shift in product mix (Figure 1).

Figure 1. Characteristics of the older shopper



Source: Government Actuary Department, IGD Consumer Unit, 2007.

Today's older shoppers have specific requirements to which the food industry must adapt. IGD research shows that they are likely to be traditional in their outlook and less likely to get bored cooking the same thing (9% compared with 18% of under-65s). They are more likely to be brand loyal (43%), avoiding promotions, and are more concerned with purchasing brands that they know (49% compared with 34% of under 65 years old).

Any delay in adapting to this shift in demand could result in a loss of market share; and likewise, first-mover advantage could be a key differentiator in the market.

Besides the required shift in the product offering, Food Retailers must also be mindful of store layout and service offering as the reduced mobility of seniors could drive their decision to choose one retailer over another. As Figure 1 shows, those retailers most effective in meeting the changing needs of the older consumer are set to benefit the most.

Older customers' reduced mobility and increased inclination to avoid leaving their homes could also lead to other behavioural shifts, including buying premium products as an alternative to eating out, or increased use of on-line shopping and home delivery services. Tesco acknowledges the importance of adapting its services to the needs of the ageing consumer and its online business already has an area dedicated to 'healthy living' aimed at the 'older adult'.

The business of ageing for food retailers in the US

We expect the ageing population to have a similar impact on US Food Retailers as that which we predict for those in the UK and Europe, although the population growth rate remains higher in the US than in many other developed countries, leading to a younger population on average. Nonetheless, we agree that convenience of stores, especially size, ease of shopping and location will be very important to the older shopper.

We also believe that having an extensive health and wellness section within the store, including a pharmacy, will be important in attracting the senior who wants one-stop shopping. When Medicare Part D (a government sponsored program that offers drug coverage for seniors) was introduced in 2006, many grocery stores advertised the fact that they accepted insurance to appeal to this attractive demographic.

In the US, store size is even greater than in the UK or Europe, and discounters operating extremely large stores have been quite successful. However, elderly people, with small households and limited needs are likely to prefer shopping at smaller stores. Kroger, for example, has been expanding a hybrid format that provides a very high quality food offering as well as a healthy assortment of home-related general merchandise. Unlike discounters, it does not sell apparel or electronics. These locations are large but easier to navigate than supercenters, and they provide one-stop shopping convenience in neighbourhood locations. US food retailers have built only a few small, convenient locations, except in dense urban areas where they serve time-starved and relatively affluent customers. We do not expect that to change in the near term, although Tesco's expansion into the US could lead to a greater focus on small stores.

The largest public grocery chains in the US generally have unionized workforces, and most union contracts provide for a defined-benefit pension plan, though the obligation is shared with other food retailers in a region. This feature, combined with relatively generous health care benefits, provides workers with a more attractive benefit package than is the norm in the US. In recent years, retailers have been working to scale back the pension benefit modestly, especially as an offset if workers want a wage increase. Some pension funds are underfunded right now, though meaningful penalties are levied on retailers if funding falls below a certain level. We expect more efforts to reform pensions in the next 10 years, but we think that the ageing population will put pressure on the unionized Food Retailers.

It is important to recall that many of the individuals who will be part of the older age group are now coming to the time when their finances are at their peak. Most baby boomers have seen their children finish their education and leave home, yet most have not yet retired and often have dual incomes. This should benefit Food Retailers with a high-quality offering, though the current economic situation will likely mask that trend.

Drug retailers should benefit significantly from the ageing population, since a great deal of data indicates that people take more medications as they age. In addition, drug retailers have always served an older population and have some of the most convenient retail locations in the US. Stores are generally about one-fifth the size of the average

supermarket, and most are located on convenient corners near residential areas. The workforce is generally not unionized and, though there is a shortage of pharmacists today, a problem could persist as demand for pharmacy services rises.

Conclusion

The ageing population will have a profound effect on how food retailers operate in the developed world. And although public commentary frequently reveals a pessimistic view about the phenomenon, those retailers who factor it into their medium/long-term plans should find themselves at a strategic advantage, in our opinion.

As a result of the ageing population in the developed world, we favour value-conscious convenience formats in the Food Retail space. Retailers will require sufficient operational flexibility to adapt product mix and service offering to accommodate a more mature customer, while simultaneously having sufficient balance sheet and cash-flow flexibility to enable them to fund growing pension deficits.

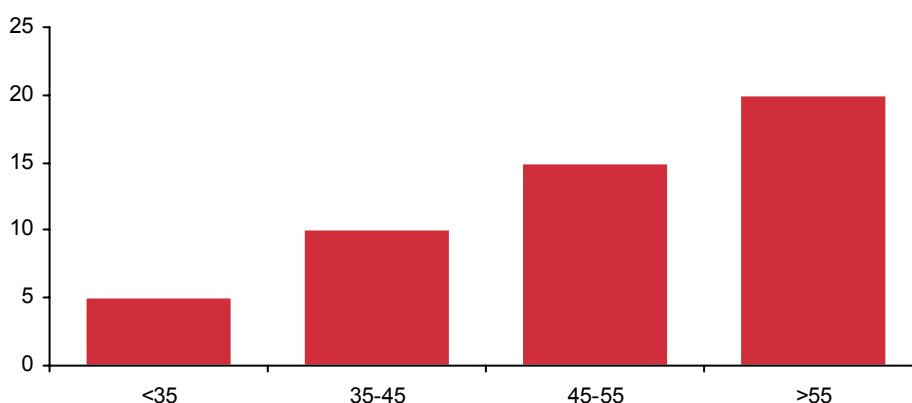
General Retail

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In the clothing retail space, an ageing population is considered a disadvantage. Take, for example, M&S. The group is the largest retailer of clothing and footwear in the UK, with an 11.1% market share (source: TNS). However, its market share in clothing & footwear is heavily skewed towards older customers, with a greater than 20% market share in the over 55s.

Figure 1. M&S clothing market share by age group

% market share



Source: Nomura research estimates.

In fashion retail, this is considered a problem. Very few young people aspire to dress like the older generation. Older adults may wish to dress appropriately for their age, but few wish to be labelled as old by the brand name on their shopping bag.

However, the UK population is ageing. According to the Office for National Statistics, the UK population aged over 45 will grow by 15% between 2006 and 2016 and by 31% by 2031, compared with an overall population increase of 17%.

Figure 2. UK population by age, 2006-2031

Ages	2006	2016	2031	CAGR %
0-14 (thousand)	10737	11428	11974	0.5%
12-29 (thousand)	11876	12458	12706	0.3%
30-44 (thousand)	13302	12691	13975	0.2%
45-59 (thousand)	11744	13094	12420	0.2%
60-74 (thousand)	8269	9824	11802	1.7%
75 and over (thousand)	4659	5480	8223	3.1%
All ages (thousand)	60587	64974	71100	0.7%
Mean age (yrs)	39.6	40.6	42.6	0.3%
Working age (thousand)	37706	40385	43392	0.6%
Pensionable age (thousand)	11344	12493	14927	1.3%
Support ratio	3.3	3.2	2.9	-0.5%

Source: Office for National Statistics.

This analysis might suggest that retailers catering to an older customer demographic should fare well as the UK population ages. However, retailers are only as relevant as their product offer and the location in which they sell it. In 10 years, the 35-year old shopper of

today may not wish to shop in the same stores for the same products as her mother did. Ensuring that this will be the case is, in retail parlance, a function of product, service and environment to “bring new shoppers into the brand”.

This makes the retail landscape ever changing. Efforts to bring new, younger shoppers into a brand are vital if a group is to remain relevant over time. Most retailers therefore segment their customer offer between value, mid point and upper price points and between staple, contemporary and fashionable product to appeal to a broad customer base.

Over the past year, the effect of the consumption slowdown on various brands has been notable. At present, expenditure at retailers catering to the young fashion market is holding up well, while those catering to the family and older market are under some strain. This is contrary to initial perceptions of the market, which had expected the older customer to remain robust in the face of primarily mortgage-related cost pressures. In fact, as cost pressures have spread to utility and motoring, this has taken its toll on the older demographic that is perhaps still driving legacy family cars and heating increasingly empty family homes.

Analysis of the UK Family Expenditure survey suggests why this customer has also cut back on clothing spending. Essentially, clothing spend declines with age (especially for men, while women over 50 simply substitute spend on kids clothing for spend on themselves). But while mortgage costs fall sharply for those over 50, by c.5% of weekly expenditure, the vast majority of this is diverted to spending on holidays, restaurants and recreation. Utility costs per person rise as empty nesters continue to heat the empty family home. The price of overseas holidays and restaurant meals has been subject to significant inflationary pressure (currency, energy, food) over the past year leaving little for “fripperies” – a term used by M&S Chairman Sir Stuart Rose at its 3Q results update.

Figure 3. % weekly expenditure of household reference person 2006-07

Category	Less than					All
	30	30 to 49	50 to 64	65 to 74	75 or over	
Food and non alcoholic drink	8%	9%	11%	13%	15%	10%
Alcohol and narcotics	2%	2%	3%	3%	2%	2%
Clothing and footwear	6%	5%	5%	4%	3%	5%
Rents	12%	4%	2%	2%	3%	4%
Utilities inc. Mntnce	5%	6%	7%	9%	13%	7%
Household goods and services	7%	6%	7%	7%	9%	7%
Health	0%	1%	2%	2%	3%	1%
Transport	12%	14%	14%	14%	8%	14%
Communication	3%	3%	2%	2%	3%	3%
Recreation and culture	11%	12%	14%	16%	12%	13%
Education	1%	2%	2%	-1%	0%	2%
Restaurants and hotels	9%	8%	9%	7%	6%	8%
Misc goods and services	8%	8%	8%	8%	10%	8%
Mortgage and council tax	11%	14%	9%	7%	7%	11%
Holiday spending	2%	2%	5%	2%	-1%	3%
Other	2%	3%	3%	4%	6%	3%
Mortgage, food, utilities and transport	37%	44%	41%	42%	43%	42%
Holidays, restaurants, recreation	22%	23%	27%	25%	17%	24%

Source: ONS.

While this suggests a fairly gloomy outlook for the older customer, the data show that they have grown their expenditure by rather more than the under 50s over the past five years. Within the retail space, food, recreation and culture have been the greatest beneficiaries.

Figure 4. % expenditure growth CAGR 2006/7 vs. 2001/02

Category	Less than					All
	30	30 to 49	50 to 64	65 to 74	75 or over	
Food and non alcoholic drink	0.4%	1.6%	3.2%	2.8%	4.7%	2.4%
Alcohol and narcotics	-1.0%	-1.2%	-0.9%	4.1%	2.0%	-0.6%
Clothing and footwear	-0.5%	-0.5%	1.4%	2.7%	1.3%	0.2%
Rents	2.4%	8.5%	9.8%	-0.5%	3.3%	5.8%
Utilities inc. Mntnce	5.6%	6.2%	7.8%	6.2%	9.6%	6.9%
Household goods and services	-0.3%	-1.8%	0.7%	3.3%	2.5%	-0.2%
Health	-2.5%	5.9%	4.3%	3.3%	28.8%	6.1%
Transport	-4.2%	1.4%	2.0%	6.7%	2.8%	1.4%
Communication	-1.7%	2.5%	3.8%	3.5%	6.2%	2.4%
Recreation and culture	-0.6%	-0.2%	2.9%	5.6%	7.8%	1.5%
Education	17.7%	3.0%	6.6%	Na	Na	5.6%
Restaurants and hotels	-2.4%	2.1%	4.5%	6.5%	7.7%	2.6%
Misc goods and services	0.6%	2.4%	5.1%	5.9%	4.5%	3.4%
Mortgage and council tax	4.1%	6.5%	5.9%	8.9%	9.3%	6.4%
Holiday spending	18.0%	3.3%	42.8%	36.6%	7.3%	18.3%
Other	-5.1%	-2.4%	0.6%	1.7%	17.3%	-0.7%
Total	0.0%	1.9%	4.1%	5.4%	6.1%	2.8%

Source: ONS.

For retailers to benefit from the tide of an ageing population, in our view, they need to focus on product that is relevant (price, fashion content) for tomorrow's consumer, sold in an environment convenient for that customer (e.g., edge of town stores with parking, internet delivery) with an appropriate level of customer service (depending on the complexity of the product). For example, M&S is positioning itself for a future ageing population via its investment in price (30% of sales at opening price point), improved fashionability, which is bringing under 35s to the brand, and convenience foods (for empty nesters no longer cooking for a family).

Technology

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- The ageing of populations in developed countries is likely to drive an evolution in user interface design.
- The ageing of the workforce and the special needs of older workers could bring new opportunities in terms of home working and flexible working.
- New trends are likely to be driven by youth-heavy emerging markets rather than by traditional developed markets.
- All in all, we expect the ageing population in developed markets to drive opportunities and challenges in the technology sector. On balance, we see changes resulting primarily in opportunities for companies to take share, resulting in a slight change in the status quo.

User Interface evolution

An ageing population in developed markets is likely to drive an evolution in user interface design for many consumer electronics products. Greater visibility for weakening eyesight and easier data entry for less dextrous hands are the most obvious requirements. These demands are likely to prove most acute in devices with necessarily small screens, such as mobile phones.

Recent moves toward better touch sensitive screens may indicate the likely direction of user interface design. Touch screens can take up the whole footprint of a phone, allowing for more data to be shown or for any imagery to be magnified. Widgets (e.g. a weather button that when pressed instantly shows the forecast for several pre-set cities) are likely to make it easier to view frequently accessed content. Apple has been at the forefront of this move recently, but Nokia, Samsung, LG Electronics, HTC, Research in Motion and others are following quickly.

Speech to text and text to speech technologies are likely to figure more prominently, allowing users to speak commands directly into their devices rather than fumble with small buttons or the lack of tactility inherent with a touch screen. The first applications to assist visually impaired users in everyday life are also emerging. For example, software solutions such as Talksoftware and KNFB, allow users to take a photo of a newspaper, for example, with an in-built mobile phone camera – the software then converts this text into a computer generated voice, allowing users to hear the paper or listen to a book. Screen magnifying software like Jaws and Zoomtext provides a similar service for computers.

As the global workforce ages, we also expect software companies to address opportunity through innovation. Microsoft, for example, has been leading the charge for many years. Flagship products, such as Windows, which powers more than 90% of all PCs worldwide, have built-in capabilities that make it easier for users with physical limitations or disabilities to access their PCs and the applications that run on them. Windows Vista has “An Ease of Access Center” that can be used by consumers to adjust their computer settings to improve

accessibility. Among the embedded features are built-in speech recognition and voice-enabled commands, a "magnifier" that can enlarge a portion of a screen for easier visuals, text captioning, and an on-screen keyboard. Like Windows, Microsoft Office also has embedded speech recognition, which enables users to compose documents with little need to use a mouse or keyboard. Through the Microsoft Assistive Technology Vendor Program, more than 100 third-party products have been developed to improve accessibility to computers for individuals with physical limitations.

Home/flexible working

It seems likely that people in developed markets will have to (or choose to) work longer as life expectancy rises and pension savings prove tight. The nature of this work may change, though, with an increased focus on part-time and remote working. We expect this to drive increased demand for high-speed broadband access, voice over IP, virtualisation software, and web-hosted applications (e.g. software as a service that might extend to all Microsoft Office applications being accessed on-line rather than on a hard disk, for example). These solutions allow people to work remotely while still having access to the full complexity of an office IT environment without any of the associated maintenance costs. Companies such as Google, Citrix, VMWare, SAP and others are all already launching applications of this sort. Web hosting and online meeting service providers, such as Cisco, will likely penetrate the developed world further as the environmental and financial cost of commuting continues to rise.

Emerging markets set to drive innovation

The young (under 35) tend to dominate the early-adopters market for new technology. Moreover, this group tends to develop and drive new trends into the mass market. Developed markets are ageing, but emerging markets are both young (demographically) and their spending power is rising. Thus, emerging markets seem increasingly likely to contribute to the emergence of new global trends.

Mobile commerce might be one area to be heavily influenced by emerging markets. In many of these countries, fixed broadband networks are neither available, nor cost effective to build. Mobile networks are thus the main way to provide access to the bulk of the population. Emerging markets have already embraced voice but data are likely to come through as well. With few broadband-connected PCs to access, the increasingly affluent youth are likely to access the internet primarily via their mobile phones. Thus, innovation in mobile service development could also originate in emerging markets.

This trend might boost opportunities for companies based in emerging markets but as long as established companies set up local design or development offices, the net change in the industry could prove modest. Companies such as Nokia are already setting up local offices in markets such as Brazil, with a focus on design and anthropology, looking in particular at how usage patterns and fashions are developing locally.

Key terms⁸⁴

Age pyramid. Normally two back-to-back bar charts, one showing the number of males per (usually five-year) age group, the other the number of females. Males are conventionally shown on the left and females on the right. The youngest age group is at the base; the oldest at the top:

- 1) An expansive age pyramid, with a broad base and a narrow top, indicating a high proportion of children, and a low proportion of older people, characterises a growing population;
- 2) A stationary age pyramid, with somewhat similar numbers for almost all age groups, characterises an unchanging population; and
- 3) A constrictive age pyramid, with a narrow base and more and more people at the top, characterises a greying population.

Baby boom. See **Post-World War II baby boom**.

Baby bust. The rapid decline in fertility rates to record-low levels, that followed the baby boom.

Baby boomer. Someone born between 1946 and 1964 (see **Post-World War II baby boom**).

Birth rate. The number of live births per 1,000 head of population per year.

Cohort. A group of people sharing a common temporal demographic characteristic.

Death rate. The number of deaths per 1,000 head of population per year.

Defined-benefit pension scheme. An arrangement whereby the benefits payable to the members are determined by the scheme rules: usually, the level of benefit depends on the employee's length of service and salary.

Defined-contribution pension scheme. A scheme in which it is the contribution that is paid in that is the given; the amount paid out is a function of the performance of the fund in which the contributions were invested.

Demography. The scientific study of human populations.

Dependency ratio. The ratio of those supported to those supporting – typically, the number of people aged below 15 and above 65 per 100 people aged 15 to 64.

Disability-free life expectancy. The average number of years a person is expected to live, free of disability, on the assumption that current patterns of mortality and disability continue.

Fecundity. The physiological capacity of a woman to produce a child.

Fertility rate. See **Total fertility rate**.

Healthy life expectancy. The average number of years that a person can expect to live in 'full health' by taking into account years lived in less than full health due to disease and/or injury.

(Income) replacement rate. The ratio of an individual's pension in a given period to the average income in a given period.

Life-cycle theory. Theory that follows Ando and Modigliani (1957). It assumes that individuals tend to consume a constant proportion of the present value of their (expected) lifetime income. According to this theory, the average propensity to consume tends to be higher in young and old households, whose members are either borrowing against future income, or running down life savings. Middle-aged people, who tend to have higher incomes, would have a lower propensity to consume, i.e. a higher propensity to save.

⁸⁴ These terms have been compiled from a range of sources. Responsibility for any errors therefore rests with us.

Life expectancy at a specific age. The average number of additional years that an individual of a given age is expected to live if current mortality levels observed for ages above that continue for the rest of that person's life. In particular, **life expectancy at birth** is the average number of years a newborn would live if current age-specific mortality rates were to continue.

Life table. A tabular display of life expectancy and the probability of dying at each age for a given population, according to the prevailing age-specific death rates.

Lowest-low fertility rate. Generally taken to be a fertility rate below 1.3.

Old-age dependency ratio. The number of people aged 65 or more per 100 people aged between 15 and 64.

Median age. The age that divides the age distribution into two equal parts, so that half the total population is younger than this age, and the other half older.

Morbidity. The state of being diseased.

Morbidity rate. Either the *incidence* of a disease (i.e. the number of people suffering from a particular condition within a given period) or the *prevalence* (i.e. the number of people suffering from a specific condition at any one time). There are three theories concerning the evolution of morbidity rate compared with improvements in life expectancy:

1) **Compression of morbidity.** A shortening in the period of ill health and disability before death, i.e. healthy life expectancy increases faster than does life expectancy;

2) **Expansion of morbidity.** A lengthening of the period of ill health and disability before death, i.e. life expectancy increases faster than does healthy life expectancy; and

3) **Dynamic equilibrium.** The condition whereby the prevalence of severe disability decreases, while the prevalence of light to moderate disability increases.

Official retirement age. The age at which an individual becomes eligible for a full old-age (state) pension.

Participation rate. The economically active population in a particular age group expressed as a percentage of the total population of that same age group.

Population ageing. An increase in a population's median age.

Post-World War II baby boom. The sudden surge in the birth rate that occurred in most developed countries following the Second World War – usually considered to have dated from 1946 to 1964.

Replacement fertility rate. The total fertility rate that exactly balances births and deaths, so that the population growth rate is zero. For most developed countries, the replacement fertility rate is around 2.1 births per woman. It is higher in developing countries (between 2.5 and 3.3) because of higher mortality rates.

Survival rate (to a specific age X). The proportion of newborns in a given year who would be expected to survive at age X if current mortality trends were to continue for at least the next X years.

Total fertility rate. The number of children an average woman would have, assuming that she lives her full reproductive lifetime.

Working-age population. Usually defined as the population aged between 15 and 64 years-old.

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