



SIAS
Staple Inn Actuarial Society

Pensions and health care for an ageing population

Alastair Jollans

Presented to the Staple Inn Actuarial Society, 13 December 2011, 6 p.m.

*This paper is dedicated to William Jollans,
great-grandfather, grandfather, father and son*

Acknowledgements

In preparing this paper I have received help from many other people. I would like to acknowledge in particular the help I have had from the Office for National Statistics, the Government Actuary's Department, the Actuarial Profession's Ageing Population Member Interest Group, and from my employer until recently, Zurich Financial Services. Individuals who have been particularly helpful have included Andrew Yeap, Adrian Gallop, Aidan Smith, Andrew Bryans, Carol Brayne, Carol Jagger, Colin Redman, Joynur Rahman, Julie Jefferies, Kenneth Howse, Les Mayhew, Steven Baxter and Tony Salter. The views expressed in the paper however are mine alone, as is the responsibility for any errors and omissions.

Disclaimer

This paper is prepared for the purpose of discussion at the Staple Inn Actuarial Society and should not be relied on for any other purpose

1. Introduction and Background

*“Grow old along with me!
The best is yet to be”*

Robert Browning - ‘Rabbi Ben Ezra’

- 1.1 Almost 15 years ago, I wrote a paper for the Staple Inn Actuarial Society on ‘Pensions and the Ageing Population’¹. There was at that time an extensive debate amongst social scientists and academics about the effects of the ageing population, but it seemed to have attracted little notice amongst actuaries. I was interested particularly in the issues as they affected pensions, but there were, and are, issues too for health care and indeed for almost all the main areas of actuarial interest.
- 1.2 Much has changed since then. Both in the actuarial profession and in society as a whole there is now much more awareness of the potential issues. The book published by the actuarial profession in 2009 to mark 100 years of the state pension², helped to put current concerns within a historical context. Within the pensions area a lot of action has been taken in one way or another to deal with the perceived effects, and radical change is continuing.
- 1.3 Descriptions such as the ‘pensions time-bomb’ have helped to popularise the issues, but inevitably have also sometimes simplified and trivialised them. There is still a good deal of what seems to me to be poorly informed comment on issues around the ageing population. I still feel that there is room for the actuarial profession to contribute to the debate.
- 1.4 This paper aims to take another look at how the UK’s population is ageing, and at whether the measures being taken in response are appropriate and adequate. In comparison with the previous paper, it has more focus on health, rather than just on pensions. In more detail it will review the following areas:
- The latest data on the age structure of the UK population and the factors that are driving it (section 2)
 - The generational effects of the ageing of the ‘baby boom’ generation as distinct from the effects of increasing longevity (section 3)
 - The effects on health of increasing longevity and in particular the effects on age-related illness and care needs (section 4)
 - A possible alternative approach to projections of the older-age population (section 5)

¹ Jollans (1997)

² Salter, Bryans, Redman & Hewitt (2009)

- Whether inequalities in health and life expectancy are an obstacle to extending working lives (section 6)
- Whether the measures already taken to deal with the ageing population, and other developments, particularly in the area of pensions, are appropriate to deal with the issues (section 7)
- How the UK population, and the UK employment market is in practice adapting to the ageing population (section 8).

The final section of the paper attempts to draw some conclusions.

2. An update on how the population is ageing

“This is a very complicated case, Maude. You know, a lotta ins, lotta outs, lotta what-have-yous”

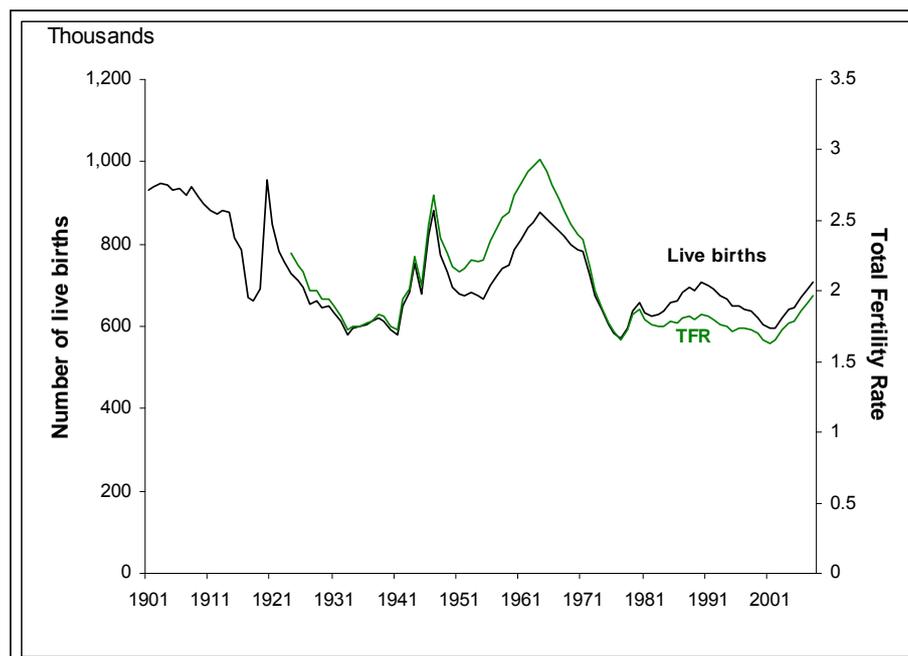
The Big Lebowski

- 2.1 The overall size and age structure of Britain’s population is determined by three factors – births, deaths and migration. Recent years have seen developments in all three factors so that the projections of the future population have changed quite significantly.

Fertility

- 2.2 The most common measure of the fertility of a population is the total period fertility rate. This is an estimate of the average number of births per woman throughout her child-bearing years, calculated by adding the age-specific fertility rates experienced in a single year. As such, it is not affected by changes in the proportions of women at different ages, but it is still sensitive to changes in the timing of births.
- 2.3 After peaking in the mid-1960s, the total period fertility rate for the UK fell rapidly for a period before bouncing a little and then settling into another gradual decline. In 2001 it hit a low point of 1.63. However since then it has increased quite sharply, reaching a 35 year high of 1.96 in 2008 before a modest fall to 1.94 in 2009. The latest figures for 2010 cover only England and Wales, but show an increase to 2.00.

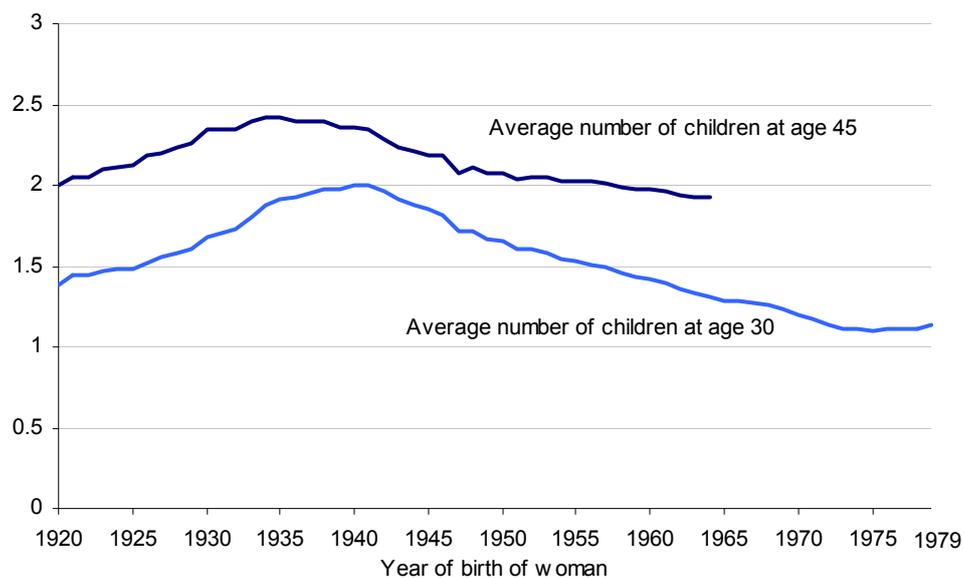
Figure 2.1: Live births and Total Fertility Rate – England and Wales



Data for England and Wales 1901 – 2008 Source: FM1 2008 Tables 1.1a and 1.4

2.4 As the average female age at child-bearing has been gradually increasing for many years, the total period fertility rate does not tell the whole story. The generation born in 1964, which is now assumed to have completed its fertility, has a completed family size of 1.9 children per woman. It is evident from the slope of the lines on the graph below that completed family size has been falling rather less fast than fertility at younger ages might indicate.

Figure 2.2: Average number of live-born children to women by age 30 and by age 45 – England and Wales



Source ONS: Statistical Bulletin 9 December 2010

- 2.5 However the inevitable delay in knowing completed family sizes for each cohort, means that the total period fertility rate is a more immediate guide to the fertility of the population.
- 2.6 Some of the increase in recent years has been caused by the effect of immigration. Mothers born outside the UK have been increasing as a proportion of the overall population of women at child-bearing ages, and as a group they experience higher fertility rates than mothers born within the UK. However this is not the principal reason for the increase³. It is driven by an increasing fertility rate for mothers born within the UK.

³ Tromans, Natamba and Jefferies (2009)

Table 2.3: Estimated Total Fertility Rate for UK born and foreign born women - England & Wales 2004-2010

	2004	2005	2006	2007	2008	2009	2010
UK-born mothers	1.69	1.68	1.76	1.80	1.85	1.85	1.88
Foreign-born mothers	2.50	2.44	2.42	2.54	2.52	2.48	2.45
Total	1.80	1.79	1.87	1.92	1.98	1.97	2.00

Source: <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-223048>

- 2.7 The reasons for this increase are not yet well understood, although there is some evidence from a study by the Institute for Fiscal Studies⁴ that it may be partly related to changes in benefits, particularly the Working Families Tax Credit. This might suggest that other more recent changes to child benefits through the tax system could also have an effect in due course. Even where there is evidence of a link though, it remains possible that the effect is to bring forward births rather than representing a longer term effect on the fertility rate.
- 2.8 It is also possible that there are secondary effects of immigration on the fertility of UK-born mothers, with rates of fertility in immigrant communities taking two or more generations to converge to those of the indigenous population. There are no figures available to demonstrate this in the UK, but evidence from elsewhere suggests that assimilation may be relatively rapid⁵.
- 2.9 If fertility remains at current levels, even with no continuation of the recent upward trend, this would have a significant effect on the rate of population ageing in the UK. The TFR is now not far below the level of 2.1 that is normally considered as the 'replacement rate' required for the population to replace itself in the long run, in the absence of significant net immigration.
- 2.10 In international terms, the UK's Total Fertility Rate is broadly in line with much of Northern Europe, including Ireland, Holland, Belgium, France, Sweden and Norway, but significantly higher than in many other developed countries. Rates in Germany and in Japan and in much of Southern Europe are below 1.5, with Japan's total fertility rate as low as 1.26 in 2005, although it has recovered a bit since. The UK rate is also higher than in China (1.77) and in Brazil (1.88).⁶

⁴ Brewer, Ratcliffe & Smith (2008)

⁵ Sobotka (2008)

⁶ Matheson (2010)

Mortality and longevity

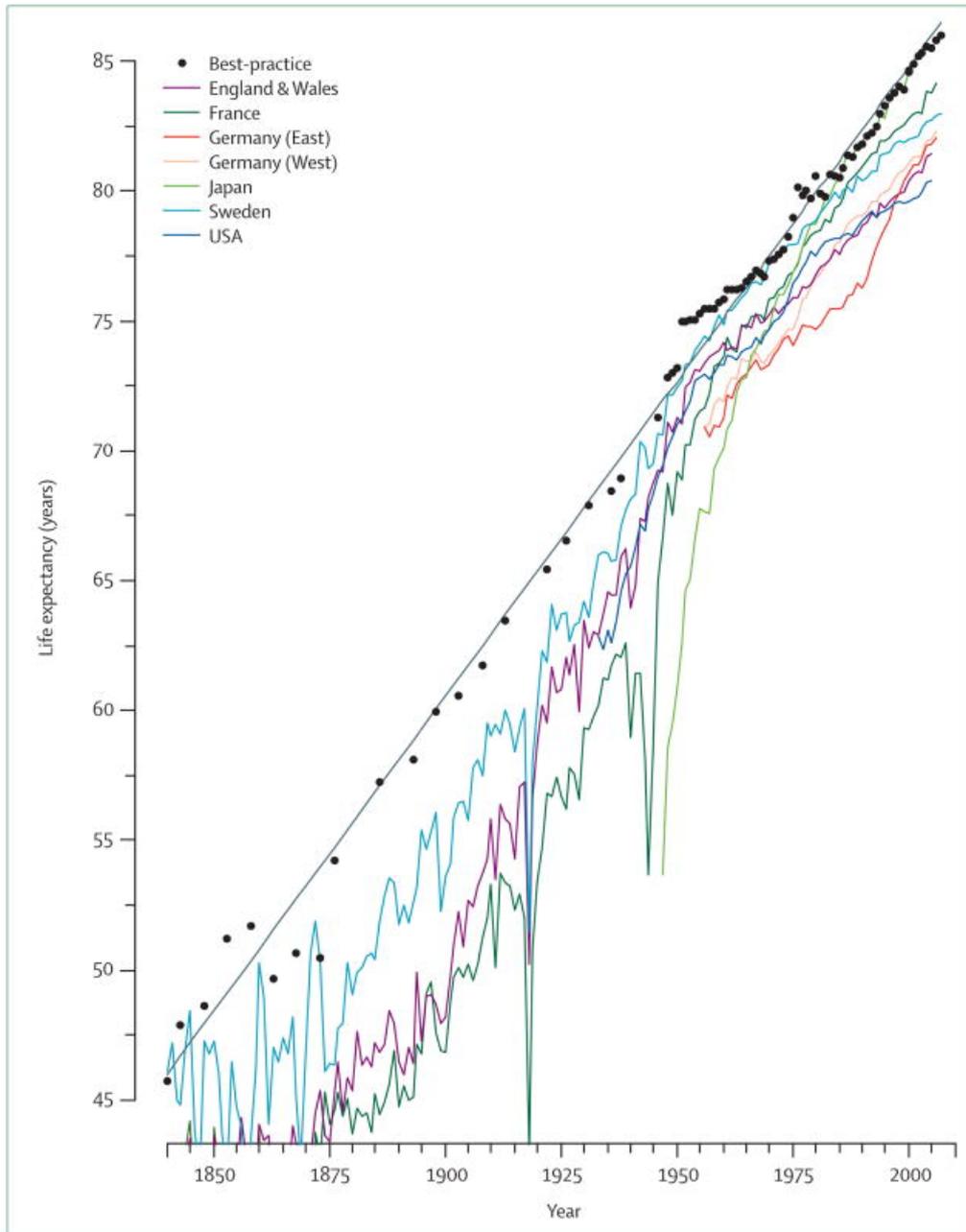
- 2.11 Mortality rates have been falling, at all ages, and for almost as long as any actuary can remember. Anticipated future improvements in mortality have been built into life tables and future life expectancies for almost as long, although in practice these have often underestimated the improvement.
- 2.12 Mortality trends have been analysed in many actuarial papers and the analysis is not repeated here. However it is worth looking more specifically at the effect on life expectancy, as this will drive much of the following analysis.
- 2.13 International studies have looked at how 'best practice' life expectancy has increased, taking in each year the figures from whichever country then had the highest life expectancy⁷. Back in 1840 the highest figure for females was for Swedish women, at a little over 45 years. Later on the running was taken up by New Zealand (non-Maori) women, and the current female record holders are in Japan.
- 2.14 The results in Figure 2.4 show a remarkably constant rate of increase in 'best practice' life expectancy of around 0.24 years every year for females and nearer 0.22 for males. This improvement has continued for a period of 165 years and shows little sign of slowing down. Over that period there have been many forecasts of a slower rate of increase in future and many attempts to establish a natural limit to human life, but they have been repeatedly frustrated as the figures have increased relentlessly.
- 2.15 Quite why this should be so, is difficult to understand. Much of the initial improvement came from reducing infant mortality, while a lot of the recent improvement has come from lower levels of smoking. There have been many other contributory factors in between that seem to share little connection, and yet the overall rate of improvement is strikingly constant.
- 2.16 Without a clear understanding of why the rate of improvement in life expectancy has been so constant, it is dangerous to assume that it will continue. Past experience is not necessarily a reliable guide to the future, and a discontinuity may lurk around the corner. However the dangers of assuming a change in the trend are just as evident, if not more so. There are nevertheless many forecasters who believe that future improvement will be less significant and others who foresee more dramatic improvements, including the possibility of people already born living to over 1,000⁸.

⁷ Oeppen and Vaupel (2002), Christensen *et al* (2009)

⁸ de Grey (2008)

Figure 2.4: 'Best-practice' life expectancy and life expectancy for women in selected countries from 1840 to 2007

Linear regression trend depicted by solid grey line with a slope of 0.24 per year



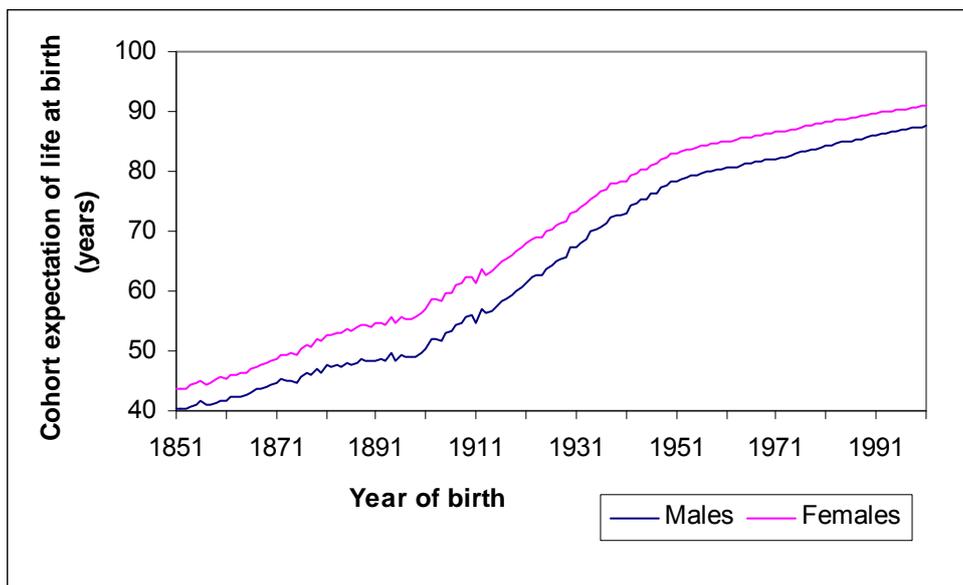
Source: 'Ageing populations: the challenges ahead' Christensen et al (2009)
 'Broken limits to life expectancy', Oeppen and Vaupel (2002)
 Human mortality database, see <http://www.mortality.org/>

2.17 Within the UK, Figure 2.5 gives some historical perspective. For comparison the slope of the graph is considerably steeper than 0.24 in its middle section, but rather less steep at each end. However there is

an important qualification here to do with the way that life expectancies are calculated.

- 2.18 The life expectancies in this chart are based on experienced mortality up to 2006 and on projected mortality from 2006 onwards, so that the levels towards the right of the chart become increasingly based on estimated future levels of mortality. This illustrates one of the key issues with life expectancies, when mortality is changing relatively rapidly. Data is either historic and risks being out of date, or is estimated and risks being wrong.

**Figure 2.5: Cohort expectations of life at birth 1851 – 2001
England & Wales 2006 projection**



Source: ONS – Article in Population Trends 136

- 2.19 In recognition of this, ONS calculate life expectancies on two different bases. Period life expectancies assume that current age-specific mortality rates are experienced in future with no improvement, and cohort life expectancies build in estimated future improvements. Figures quoted in the press, or even in academic articles, often fail to distinguish between these two types of calculation. The earlier figures on best practice life expectancy are period figures with no allowance for future improvement.
- 2.20 In looking at the effect of population ageing however, cohort life expectancies might be expected to give a more realistic picture of the future population. Some caution does need to be exercised.
- 2.21 To take one example, for a male born in 2001, the ONS figures in 2004 showed cohort life expectancy as 85.8 years at birth. By 2008 the new figures for a male born in 2001 showed cohort life expectancy at birth as 87.7. This reflects a change in the assumptions on future mortality improvements rather than a remarkable improvement in the healthy

lifestyles of infants between 2004 and 2008. The period life expectancy for the same generation, assuming no future improvement in mortality, actually went down marginally from 75.8 years to 75.7 between 2004 and 2008.

- 2.22 With that warning, the table below (which is the part of the underlying basis of Figure 2.5) shows the development of cohort life expectancies in England & Wales based on 2006 estimates, for cohorts born over the last 100 years.

Table 2.6: Cohort life expectancies at birth – England & Wales

Year of birth	Male	Female
1911	54.8	61.3
1921	61.3	67.9
1931	67.3	73.2
1941	73.0	78.5
1951	78.5	83.1
1961	80.6	85.0
1971	82.1	86.5
1981	84.2	88.3
1991	86.1	89.7
2001	87.6	91.0
2011	88.9	92.1

Source: ONS - Population Trends 136

- 2.23 For the generations born in the early years of the 20th century there were very rapid increases in life expectancy, partly reflecting large falls in infant mortality, with life expectancy at age 1 significantly higher than at birth. The generations born in particular between 1923 and 1940 continued throughout their lives to show rapid improvements in mortality in comparison with previous generations, and the current assumption of ONS is that they will continue to do so. In effect this represents an element of catching up with 'best-practice' countries.
- 2.24 For subsequent generations, the improvement has been less dramatic, but life expectancy has continued to increase in broad terms by around 2 years per decade. On the ONS assumptions for their principal projection, that is now slowing down to around 1.2 years per decade. However there is also a 'high life expectancy' variant, under which the increase remains at around 2 years per decade (and slightly higher for males than females).
- 2.25 In looking at the effect on the working population and the cost of pensions, it matters whether improvements in longevity come before or after retirement age. The table below shows changes in life expectancy at 65, again on a cohort basis, with actual mortality of the cohort to 2008 and then projected mortality including mortality improvement assumptions.

Table 2.7: Cohort life expectancies at age 65 – England & Wales

Year of birth	Year of age 65	Male	Female
1916	1981	14.0	18.0
1926	1991	16.0	19.4
1936	2001	19.5	22.3
1946	2011	21.4	24.0
1956	2021	22.5	25.1
1966	2031	23.4	26.0
1976	2041	24.4	26.8
1986	2051	25.3	27.7

Source: ONS - 2008-based cohort expectation of life, 1981-2058, Principal Projection, UK

2.26 Much of the improvement in life expectancy for the cohorts born in the early years of the 20th century, came in reducing mortality at younger ages, particularly in infancy, so that the post-65 improvement, while substantial, is much smaller than the overall improvement. With 80% to 90% of the population now surviving to age 65 though, it is inevitable that future improvements in life expectancy are concentrated in the years after 65.

2.27 This is illustrated by the following table, again based on the international 'best practice' life expectancy for women⁹. It shows how the focus of improvement in life expectancy has moved from younger ages to higher ages over the last 150 years.

Table 2.8: Age-specific contributions to the increase in record life expectancy in women from 1850 to 2007

	1850–1900	1900–25	1925–50	1950–75	1975–90	1990–2007
0–14 years	62.13%	54.75%	30.99%	29.72%	11.20%	5.93%
15–49 years	29.09%	31.55%	37.64%	17.70%	6.47%	4.67%
50–64 years	5.34%	9.32%	18.67%	16.27%	24.29%	10.67%
65–79 years	3.17%	4.44%	12.72%	28.24%	40.57%	37.22%
>80 years	0.27%	-0.06%	-0.03%	8.07%	17.47%	41.51%

Source: Christensen *et al* (2009)

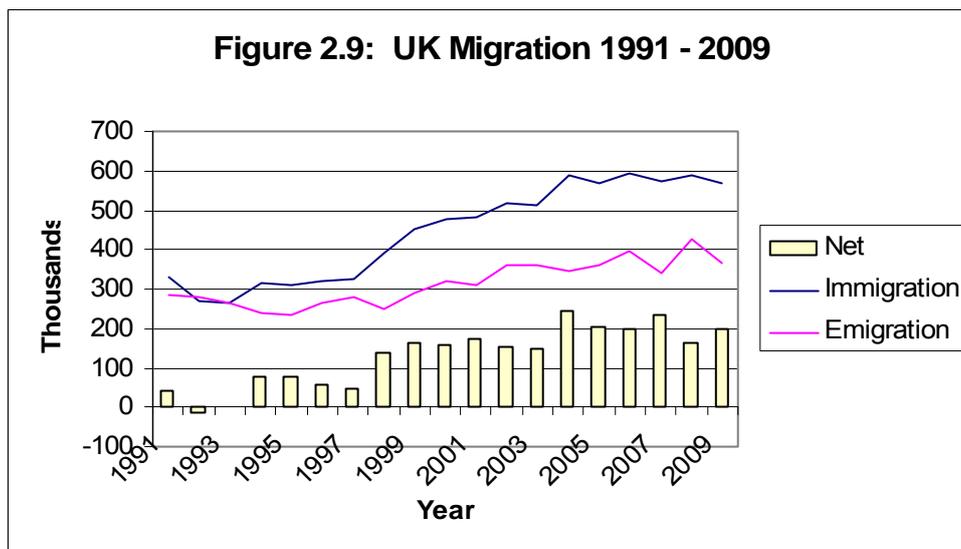
Migration

2.28 Over the last 20 years, net immigration into the UK has increased considerably. From a position in 1992 when immigration and emigration were broadly in balance, we have moved to net immigration of around 200,000 people a year over the last few years. Much of the

⁹ Christensen *et al* (2009)

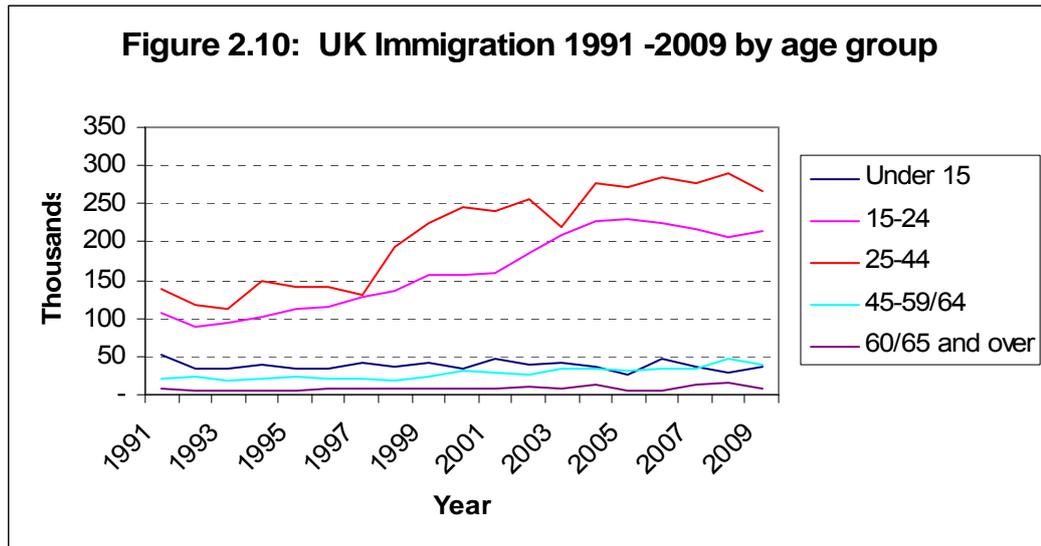
increase has come in the form of increased immigration from the new EU countries. There are now over half a million people of Polish nationality in the UK, representing the largest single group of foreign nationals.

- 2.29 It is not yet clear to what extent this new wave of immigration may differ from earlier ones. Polish nationals remain as a large and distinct group partly because, as with other EU nationals, there is less incentive to take UK nationality than there is for many other immigrants. As a result there may be less indication of whether or not they and their descendants are likely to stay in the UK.

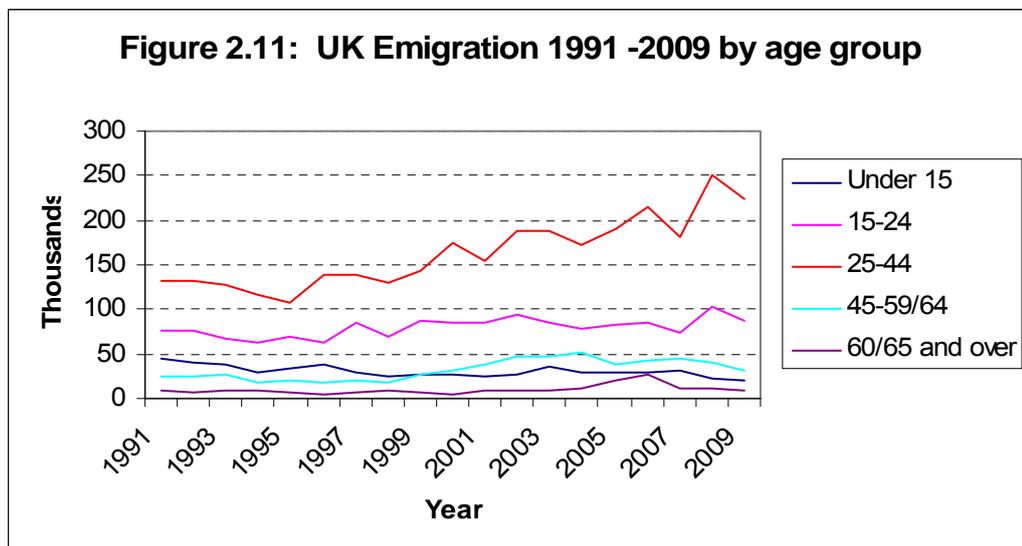


Source: ONS Long-term international migration statistics

- 2.30 Another major influence on immigration has been the growth in foreign students coming to the UK. The estimated numbers have trebled over the last decade, from under 100,000 a year to now well over 200,000. Approximately three quarters of these are from outside the EU, and although many return after their period of study, there are no doubt many who remain and settle.
- 2.31 Partly driven by the high number of students, both immigrants and emigrants are primarily young adults, with around 80% aged between 15 and 44. The movement of older people to spend their retirement in sunnier climes seems to be a relatively minor effect on the statistics. The effect of net immigration at current levels is therefore to add substantial numbers to the working age population, and the figures are large enough to make a significant difference to the age structure of the UK population. This effect is reviewed further in Section 3.



Source: ONS Long-term international migration statistics



Source: ONS Long-term international migration statistics

2.32 The increase in the working age population relative to the retired population as a result of recent migration helps to ease some of the demographic problems of population ageing. To some extent increased immigration may even be a relatively direct result of economic pressures caused by the ageing population, with the country suffering a shortage of healthy adults of working age¹⁰. To that extent it would be a natural balancing factor.

2.33 Certainly the underlying drivers of immigration are likely to be economic. The EU rules on free movement of labour have provided the opportunity for a response to economic pressure, rather than driving it. However immigration does not appear to be operating as a balancing factor to the same extent in other countries with ageing populations, even within the EU. The causes of immigration are

¹⁰ Mayhew (2009)

complex, and to some extent political. For the moment it is enough to note that immigration is currently making a significant contribution to re-balancing the UK population.

The overall population

- 2.34 The combined effect of higher fertility, lower mortality and significant net immigration is, not surprisingly, an increasing population. The UK population has increased from 56.4m in 1984 to 61.8m in 2009, an increase of almost 10% in 25 years, and is projected to continue increasing, to 72.0m in 2034.
- 2.35 This is in stark contrast to the position in a number of other countries that are experiencing population ageing. The population of Germany has been decreasing since 2003. It is projected to decrease from 82.2m in 2008 to 79.2m in 2035¹¹ despite significant net immigration and to fall below that of the UK somewhere around 2050. Japan's population peaked in 2007 and is projected to fall from 127m to around 100m by 2050.
- 2.36 In the UK, the increases in fertility and immigration have slowed down the ageing effect, and the proportion of the population aged over 65 has been increasing relatively slowly, from 15% in 1984 to 16% in 2009. The proportionate increase has been much higher in the over 85 population, which roughly doubled over this period and moved from 1% of the population to 2%. The proportion of the population between 65 and 85 has therefore barely changed in 25 years.
- 2.37 Compare this for instance to South Korea, where the proportion of the population over 65 has increased from 3.6% in 1975 to around 11% in 2010 and is projected to increase to 35% by 2050¹².
- 2.38 In the UK rather more modest, but still substantial increases are expected over the next 25 years, with the over 65 population projected to increase from 16% to 23% by 2034. Within that, the 85+ population is expected to continue increasing rapidly to around 5% of the overall population. The possible implications of these increases are considered in the following sections.

¹¹ Giannakouris (2008)

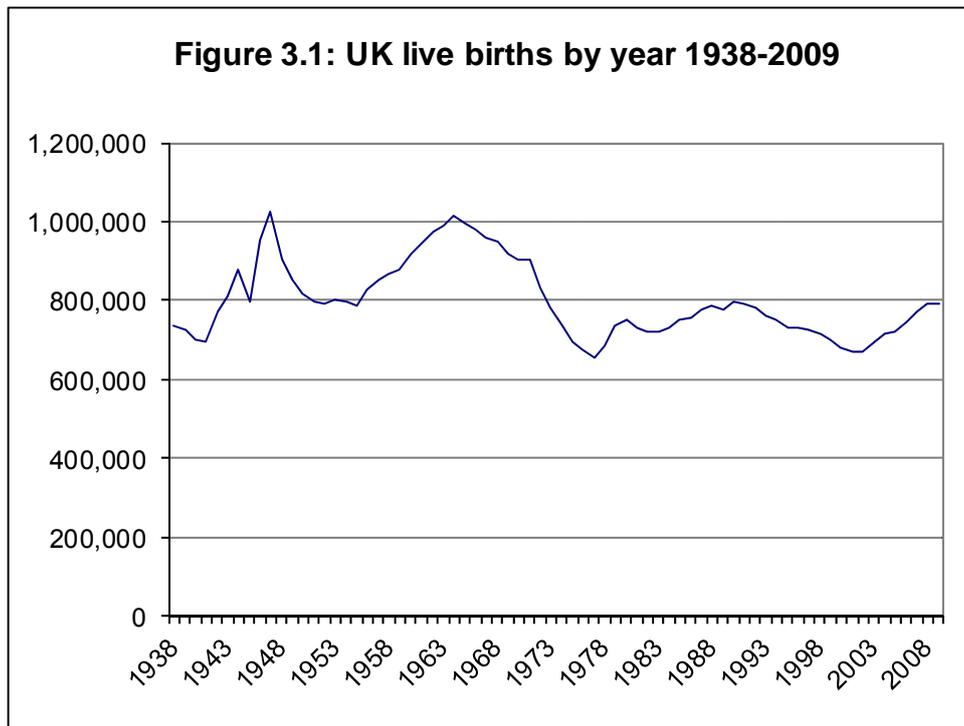
¹² Hayutin (2009)

3. How significant is the Baby Boom in the ageing population?

*Somehow the season always brings a picture of you
Baby boom baby
Holding on for everything you figured you're due.*

James Taylor – 'Baby boom baby'

- 3.1 There is much talk of the baby boom generation and its effects on the ageing population, but much less clarity about what we mean by the baby boom and what those effects will be. Definitions on the internet seem to reflect principally US usage and refer to the baby boom as being from the last years of World War II until the early 1960s. This makes little sense in looking at the UK population. There was a brief spike of births following shortly after the end of the war, broadly from 1946 to 1948, but this was not sustained. Births fell back again after 1948 and the broader 'baby boom' did not seem to get under way until the mid to late 1950s, peaked in the mid 60s and ended in the early 1970s. For practical purposes we can think of the baby boom generation in the UK as being the cohorts born from 1956 to 1972 inclusive.



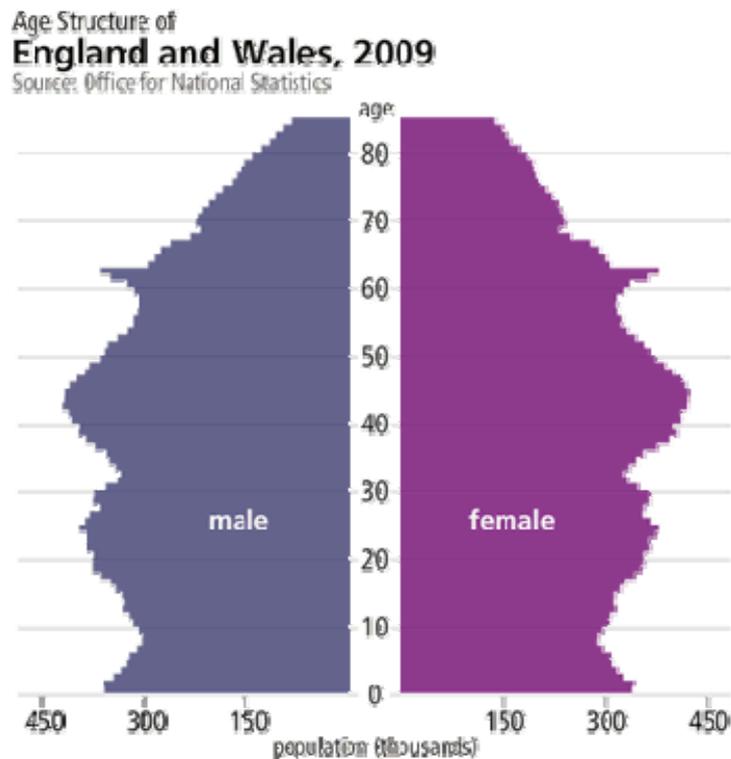
Source: ONS

- 3.2 Over this period, births rose from around 800,000 a year in the mid 50s to a peak of just over a million in 1964, falling back again to under 800k a year by 1973. Over the last 30 years or so the number of births has fluctuated between around 650k and 800k per year, averaging somewhere just below 750k p.a. It is currently above this level. If 750k

births a year is taken as a rough 'natural' level for the UK, then the number of 'excess' births over the 1956-1972 period was of the order of 3 million. The post-war spike contributed around a further 700k excess births on a similar basis.

- 3.3 In today's population pyramid for the UK (Figure 3.2 below is for England and Wales only), the baby boom is still clearly visible as a sort of middle aged spread (or perhaps more appropriately a pregnancy bump), although it is by no means the only bulge. There is a similar bulge of population currently in their 20s, born from around 1980 to 1992, and a smaller bulge of babies born in the last few years. The original 'baby boom' does not perhaps look as pronounced as popular myth would have it.

Figure 3.2: Population pyramid for England and Wales

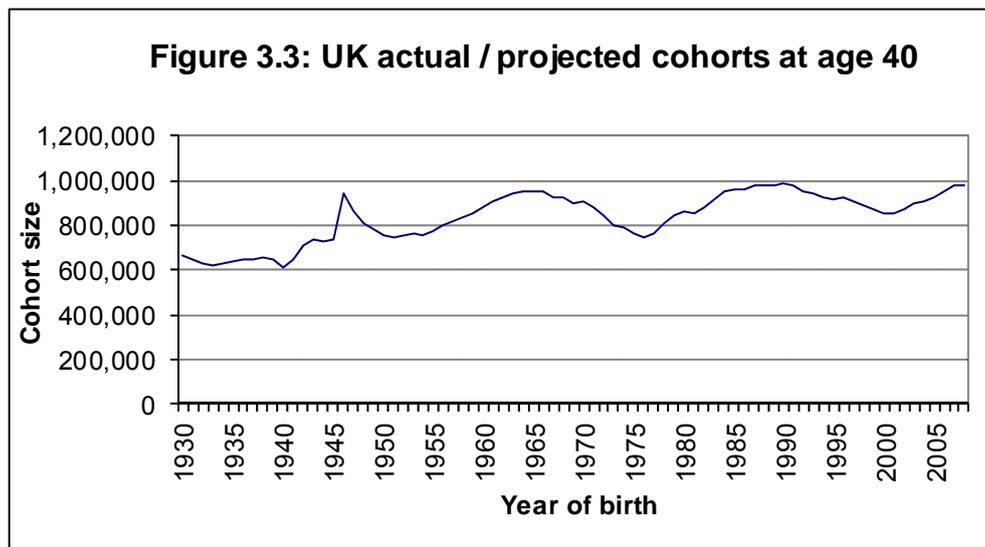


Source: ONS

- 3.4 To some extent these subsequent bulges are the natural 'echo' effect of the first baby boom. As a result of the high birth rate in the 1960s, there were more women of childbearing age in the 1980s and 1990s, so that even with lower rates of fertility, the actual numbers of births went up. However it is also the result of immigration in recent years, which has swollen the numbers of subsequent generations.
- 3.5 To take a single year as an example, there were around 730,000 births in the UK in 1984 and around 750,000 in 1985. These numbers are already rather higher than those for most of the previous ten years, probably reflecting the echo effect. But the number of people in the UK aged 25 in 2010 (i.e. born in 1984-85) was just over 900,000, with the

increase accounted for by immigration. This generation is projected by ONS to continue growing to over 950,000 by age 40, which would make it broadly comparable to the size of the peak baby boom generation. What was originally a fainter echo of the 1960s boom has been amplified by immigration, so that it is now of a similar size to the original.

- 3.6 The effects do not stop there. The increase in births in the early years of this century looks at first glance like a second echo effect, resulting from an increase in the number of women of child-bearing age. However this effect is complicated by the move to later child-bearing and the more significant factor is the gradual increase in the fertility rate since 2001, as reviewed in section 2.
- 3.7 The latest bulge in the population pyramid is currently smaller than the two previous bulges, but it too is projected to grow in future as a result of immigration. The cohort of around 780,000 people born in 2009 is projected by ONS¹³ to grow to over 950,000 by 2050, although that depends on future immigration trends. These are difficult to forecast and are influenced by political and economic pressures. On the ONS 'low migration' projection, the figure would be around 50,000 lower, although the declared intention of the current government is to reduce net immigration even below this level.
- 3.8 However on the basis of the principal projection, the current bulge in the pyramid would also in due course grow to be larger than the bulge represented by the baby boom. This is illustrated by Figure 3.3, which shows the actual or projected size of each successive cohort at age 40.



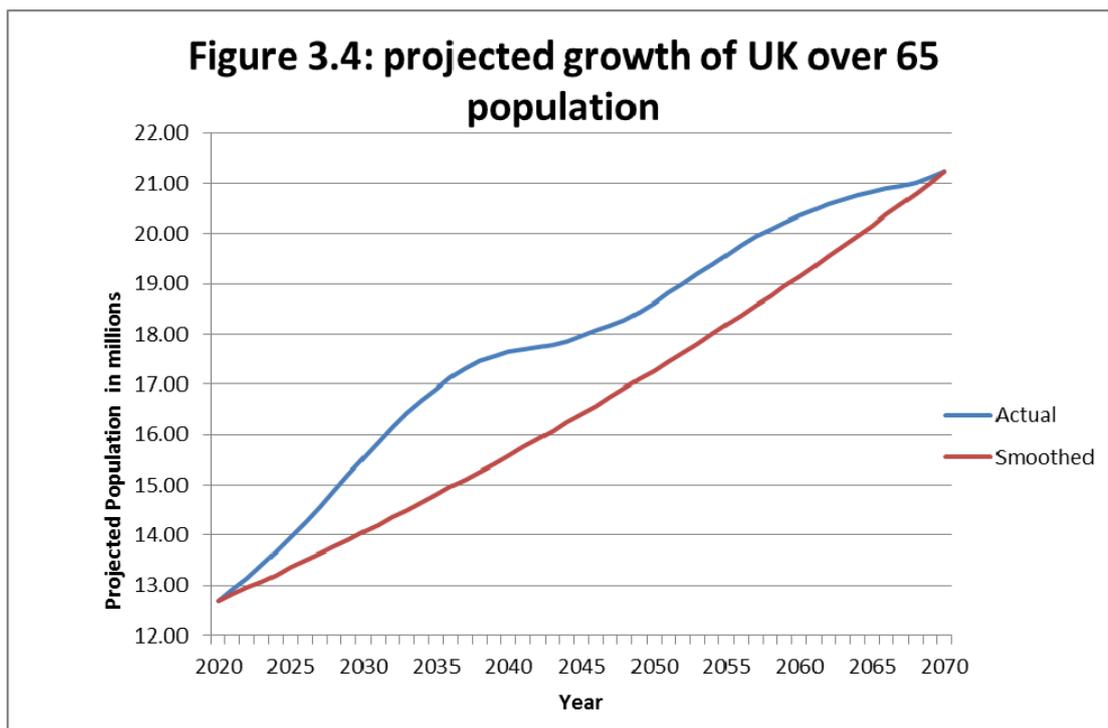
Source: ONS 2008-based principal projection, UK

- 3.9 Although some of the same features are recognisable, this chart tells a very different story from the earlier chart of live births over the

¹³ Using the ONS 2008-based principal projection for the UK population

corresponding period. It now looks as if we no longer have a single baby boom generation, but rather a series of waves, as part of a general upward trend. The post-war spike and the 1960s baby boom are still clearly visible, but no longer look like the peaks that they once represented.

- 3.10 In terms of how easily the country can support the retirement of the baby boom generation, this looks like good news. In general terms there will be more people of 'working age' to contribute to the support of the retired generation. Section 8 of the paper looks at what we might mean by 'working age' in this context.
- 3.11 The 1960s baby boom generation remains significantly larger than preceding generations, and indeed larger than the immediately following generation born in the mid 70s, which is why it is still visible in the population pyramid. It is only in comparison to later generations that it is starting to look less significant.
- 3.12 It's worth noting though that a population pattern like the one above, where later generations are in broad terms higher than earlier ones, would not generally lead to population ageing at all, in the absence of longevity changes. If there was no increase in longevity, we might no longer be talking about an ageing population or about the problems of financing retirement. The age structure as projected above is the easiest of all age structures in terms of financing future retirements.
- 3.13 In practice we do have an increase in longevity and it is also by no means certain that net immigration will remain at the levels implicit in the projection above. So while this helps to put the baby boom into context, it doesn't remove the problems of the ageing population or of financing future retirements.
- 3.14 Despite increases in pension ages, the baby boomers on our definition will start to draw state pensions in around ten years time. In practice many baby boomers are already economically inactive, and may be drawing other state benefits, and those born in the immediate post-war births 'spike' are also already reaching state pension age. So the first financial effects of the greying of the baby boom generation are already being felt.
- 3.15 Between 2020 and 2070, when the last baby boomers are approaching 100, they will constitute a temporary bulge in the numbers of people over age 65. It's not easy to put a firm figure on the size of this bulge, but at its peak in about 2037, it may represent around an additional 2.2m people over 65 (not necessarily an additional 2.2m pensioners, as this depends on the pension age). Figure 3.4 compares the projected over-65 population with a smoothed projection in which the population grows at just over 1% p.a.



Source: calculations based on ONS 2008-based principal projection, UK.

- 3.16 Whatever the precise effects of the baby boom, it is clear that they are dwarfed by the overall projected increase in the over-65 population from around 12.7m in 2020 to around 21.2m in 2070, an increase of over 8.5m, or almost 70%. The principal cause of the expected increase in the older population is not the ageing of the baby-boom generation, but the increase in longevity. The over-65 population is expected to increase by something like 1% a year for many years to come as a result of increasing longevity, whereas the baby-boom generation will cause a temporary increase that will peak at around 10-15% before reducing back to zero again.
- 3.17 This conclusion is not entirely in line with public perceptions. It is common to see analyses of the effects of the ageing population that emphasise the effects of the baby boom rather than the effects of increasing longevity, both in the press and in official reports. The more important point though is that the conclusion has significant implications for the nature of the ageing population and in particular its state of health. A population that is ageing because of increased longevity may be in significantly better health than one that is ageing because of a temporary boom in births. To understand whether this is the case or not, we need to look at the trends in healthy life expectancy rather than just life expectancy.

4. Healthy and unhealthy life expectancy

“Happiness is nothing more than good health and a bad memory”

– Albert Schweitzer

- 4.1 Figures for mortality and hence for life expectancy are easier to produce than figures for healthy life expectancy, if only because of the difficulty in deciding whether someone is healthy or not. As a result figures for life expectancy are more widely available and potentially more reliable than those for healthy life expectancy.
- 4.2 Healthy life expectancy figures produced by the ONS are based on self-reported health as covered in the General Household Survey and in the Census. Respondents are asked to assess their own state of health over the last 12 months as being on the whole ‘good’, ‘fairly good’, or ‘not good’. There is also a more specific question on any ‘limiting long-standing illness, disability or infirmity’, where long-standing is defined as meaning anything that has troubled you over a period of time or that is likely to affect you over a period of time.
- 4.3 The answers to these two questions are used to produce two separate measures, one of healthy life expectancy and one of disability-free life expectancy. The methodology used to produce these measures, and some of the difficulties in obtaining reliable data, are beyond the scope of this paper, but are covered in various editions of the Health Statistics Quarterly¹⁴. It should be noted though that they are all ‘period’ life expectancies, with no allowance for future improvement.
- 4.4 The results are not surprisingly quite dependent on the particular questions and how they are asked, and the question on general health was changed in 2007 to bring it into line with EU standards. This produced a marked discontinuity in the figures, with healthy life expectancy reducing significantly in comparison with the previous question. On the new question there is relatively little difference between the figures for healthy life expectancy and disability-free life expectancy but no clear consistent relationship between the two. Some people see themselves as disabled but healthy and others as unhealthy but not disabled.
- 4.5 In terms of discussing the trend in the figures it is easier to concentrate on disability-free life expectancy (DFLE), for which a consistent series of figures is available going back to 1981¹⁵. In broad terms however the conclusions from looking at either set of figures look to me to be relatively similar.

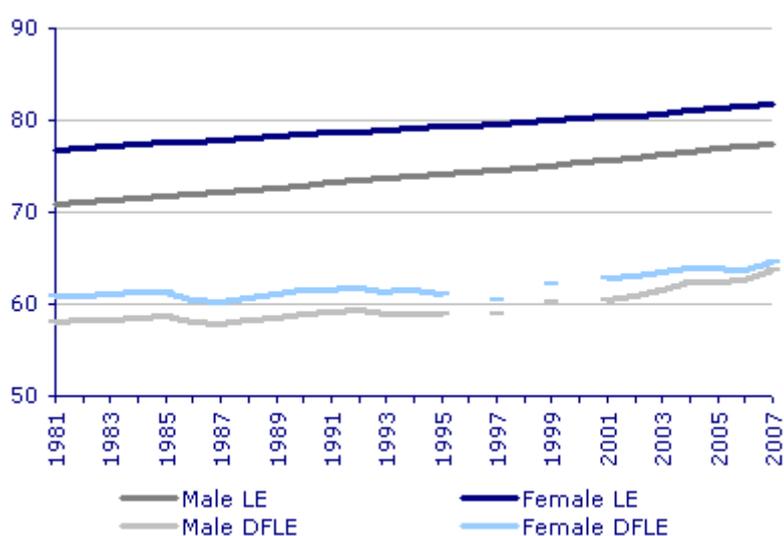
¹⁴ See for example Breakwell & Bajekal (2005), Olatunde, Smith & White (2010)

¹⁵ Both sets of figures (DFLE and HLE) experience some disruption around 2001 arising from the incorporation of figures for Northern Ireland and also figures from the 2001 census. There are also gaps where the General Household Survey was not undertaken in 1997 and 1999.

Disability-free life expectancy (DFLE)

- 4.6 The latest figures for Great Britain are for 2008 (based on the period 2007-09) and show DFLE for males at birth as 63.7 years compared to overall life expectancy on an equivalent basis of 77.7 years. The average male can expect to spend around 14 years of his life with a self-assessed 'limiting long-standing illness, disability or infirmity'. For females the equivalent figure is nearer to 17 years.
- 4.7 These years of poor health do not necessarily come at the end of life, so we cannot conclude that by the age of 63.7 the average male will be in poor health. Periods of poor health may come at any time. At age 65, the average male still has a DFLE of 10.3 years in comparison with an overall life expectancy of 17.6 years, so in broad terms can expect to spend 7 years of his retirement in poor health. For females the equivalent figure is nearer 9 years of poor health after age 65.

Figure 4.1: Life expectancy and DFLE Great Britain 1981 – 2006

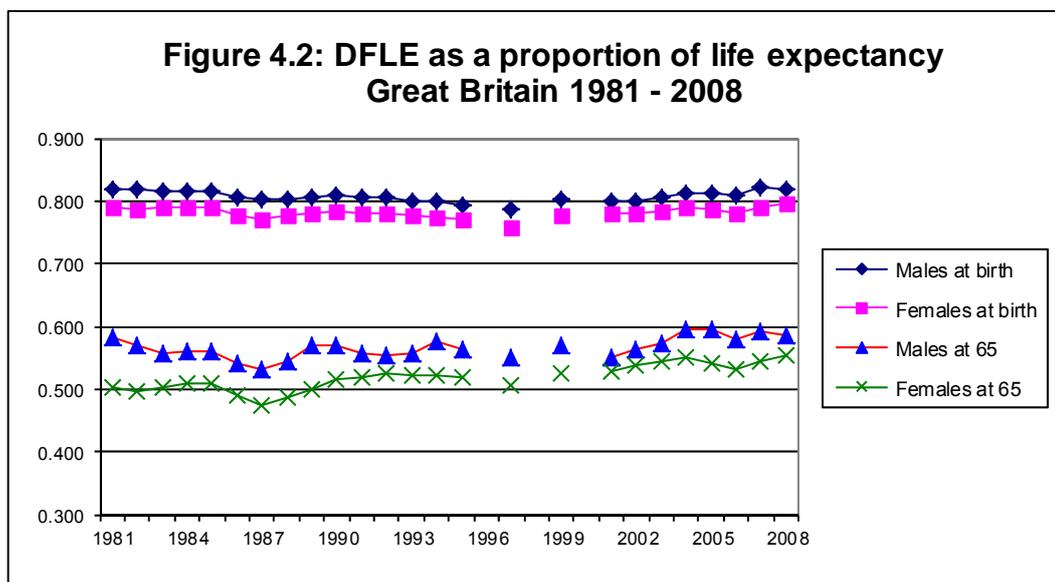


Source: ONS website

- 4.8 The changes in healthy life expectancy and DFLE have been less consistently upwards than the changes in overall life expectancy. This probably reflects in part the subjective element of self-assessment in calculating them, but it may also indicate progress in improving health that has been less consistent than mortality improvements. It is clear from Figure 4.1 above that some care is needed in assessing the trend, and that assessments at different times might have produced different results. A review in 1995 might arguably have concluded that there was no upward trend at all.
- 4.9 Looking at the figures now though, there seems to be a fairly clear upward trend over an extended period. DFLE for males in Great Britain at birth in 1981 was 58.1 years in comparison with overall life

expectancy of 70.9. An increase of 6.8 years in overall life expectancy since then has been accompanied by an increase of 5.6 years in disability-free life expectancy. For females the equivalent figures are an increase of 5.1 years in overall life expectancy and 4.6 years disability-free. So for both males and females there has been some increase in the average period spent with a limiting long-standing illness, but most of the gains in life expectancy have been disability-free.

- 4.10 Although the figures vary from year to year, around 80% of the increase in life expectancy over the last 25 to 30 years has been an increase in healthy or disability-free life. This is roughly the same proportion as DFLE is of overall life expectancy, so the proportion has shown little change. Broadly we can expect to spend 80% of our life in good health and the other 20% with some limiting illness.
- 4.11 In fact the ratio of disability-free life expectancy to overall life expectancy looks to have stayed remarkably stable over the 27 year period of the statistics. In 1981 the ratio was 0.820 for males and 0.791 for females. In 2008 it was 0.820 for males and 0.799 for females. In more detail, this essentially unchanged position appears to be made up of a gentle downward trend from 1981 to 1997 and a gentle upward trend since then.



Source: calculations based on ONS data

- 4.12 There may be a risk that definitions of ill-health or disability are assessed relatively, rather like definitions of poverty. Anyone who is in the worst 20% of the population by health might assess themselves as in poor health, regardless of their objective state of health. However it should be noted that if longevity is increasing and disability rates increase gradually with age, then a constant ratio of DFLE to life expectancy would imply falling age specific disability rates. This may

make it less likely that the constant ratio is the result of gradually realigning definitions.

- 4.13 Nevertheless self-assessments of health are likely to depend on a range of social and economic influences and will not be unbiased or unchanging measures. A review of the literature on this subject in 2006 noted a paradox ‘that objective indicators demonstrate that population health appears to be improving, whereas measures based on self-reporting show it to be worsening’¹⁶.
- 4.14 There is no right answer in this area. Even seemingly more objective measures such as the numbers with a particular disability may be affected by improved diagnosis or better reporting. The overall numbers assessed as disabled are likely to be influenced by entitlements to benefit and by economic conditions. There are clear correlations between rates of disability and rates of unemployment in particular areas. All we can say with confidence from the evidence above is that the ratio of DFLE to LE appears to have been remarkably stable over the last 25 years.
- 4.15 Even this statement may be controversial. There is much academic debate about whether we are seeing ‘compression of morbidity’ or ‘expansion of morbidity’ – i.e. a smaller or greater proportion of our lives spent in ill health¹⁷. If the drivers of increased life expectancy come more from improving ability to keep people with serious chronic diseases alive for longer, then we might expect expansion of morbidity. If they come more from lower age-specific rates of incidence of disease, we might expect compression of morbidity. At any one time progress on different diseases may be more rapid on one aspect than the other, but a constant ratio of DFLE to LE suggests a ‘dynamic equilibrium’ between the two forces for improvement¹⁸.
- 4.16 From an actuarial viewpoint though, a stable proportion of DFLE to LE is a striking result, just as it is striking how stable the rates of increase in life expectancy have been, despite coming from a wide range of different causes. It is tempting to conclude that we can expect the proportion disability-free to stay stable in future, but we have to be conscious of the limitations of actuarial methodology. If all we are doing is looking at past experience, we must always be aware of the discontinuity that may be about to arise. If we don’t understand why the proportion has remained stable in the past, we certainly can’t be confident that it will do so in future.
- 4.17 There is no obvious reason why healthy life expectancy (or disability-free life expectancy) should remain in proportion to overall life expectancy. The reasons for improvements in one may be related or unrelated to the reasons for improvements in the other. Over time we

¹⁶ Macnicol (2006) p. 190

¹⁷ Howse (2007)

¹⁸ Manton (1982)

might expect improvements in one to show up to some extent in the other, but not necessarily in direct proportion. We don't know whether any future improvements in longevity will come from reducing the incidence of disease or improving the treatment of disease, from changes in diet, increased exercise or lower rates of smoking, or from some new, as yet unknown factor. Each of these could have differing effects on healthy life expectancy.

- 4.18 Having said that, a stable future ratio of disability-free life expectancy to overall life expectancy still looks to me as if it might be a better base assumption for planning and forecasting than the common alternative of assuming no change in future age-specific disability rates.
- 4.19 To a medical layman, a stable ratio suggests that the effect of increasing longevity, at least in recent years, has been more like a stretching out of our lives than the adding of additional years of old age. In broad terms, if life expectancy has increased by 5% over the last 20 years or so, then the health of an average 42 year old today is comparable, not with a 42 year old of 20 years ago, but with a 40 year old. Of course no such simple relationship exists, but the overall effect on the nation's health seems to be much as if it did. It is as if we are generally ageing more slowly, although again that is a layman's interpretation rather than a medical or genetic assessment of what is happening.

Disability at older ages and long-term care

- 4.20 At age 65, the relationship between life expectancy and disability-free life expectancy is more variable as shown in Figure 4.2, and the ratios of DFLE to LE are lower, reflecting higher rates of disability at older ages. In 1981 the ratios were 0.584 for males and 0.502 for females. In 2008 they were 0.585 for males and 0.554 for females. The variability makes it hard to draw clear conclusions, but the ratio appears to be broadly stable for males, with a gentle upward trend for females.
- 4.21 On the face of it, an increasing proportion of life disability-free post-65 together with a broadly stable proportion of life disability-free overall, is a rather surprising result. However the evidence is not conclusive and it could also be affected by the use of a fixed cut-off age of 65, rather than an age that increases with increasing life expectancy. In theory with a fixed cut-off age and increasing life expectancy, there could be increasing proportions disability-free both pre-65 and post-65, even with a stable proportion over the whole of life. The more significant conclusion here may be that there is no evidence of the opposite effect – i.e. of increases in disability being concentrated in the post-65 period.
- 4.22 It is of particular interest to know what is happening to disability rates at the oldest ages, as this will affect the demand for long term care. Unfortunately the ONS statistics don't tell us much about this age

group, and in fact are probably less reliable for this group than for others. Institutions such as care homes are not covered by the General Household Survey, and firm figures covering this population are available only from the census once every ten years, with an adjustment being applied to the interim figures. Changes such as those resulting from the NHS and Community Care Act (1990) may have made this adjustment particularly difficult.

- 4.23 There are though a number of separate studies into the elderly population, including in the UK, the English Longitudinal Study of Ageing¹⁹, the Medical Research Council's CFAS study²⁰, the Newcastle 85+ cohort study²¹ and the New Dynamics of Ageing programme²² set up as a collaboration between 5 UK Research Councils. Internationally there are now many such studies, but it remains difficult to draw firm conclusions.
- 4.24 The need for long term care is driven to a large extent by two factors – on the one hand cognitive impairment and dementia, and on the other hand, functional limitations and disability. There have been many academic studies looking at cognitive impairment, some seeming to show an improving trend and others a worsening one. A recent 'Lancet' article²³ reviewing the range of studies, concludes only that 'little is known about trends in cognitive function and dementia'.
- 4.25 Functional limitations are usually measured in terms of the ability to carry out various 'activities of daily living' or ADLs, and there have again been many international studies of these, showing differing trends. The same Lancet article appears to show the weight of evidence in favour of some quite significant reductions over time in age-related rates of disability affecting ADLs, although the UK-specific evidence for this is currently limited.
- 4.26 Despite this evidence, there does appear to be a prevailing pessimism in terms of future assumptions on rates of disability at older ages and future need for long term care. This is perhaps driven more by medical and social developments than by review of past experience. The most common assumption in projections is of no change in future age and sex specific disability rates. Other studies though look more specifically at trends and treatments in multiple diseases and chronic conditions, as well as factors such as obesity and increasing number of elderly people from ethnic minorities, to build an overall picture of possible future trends in disability²⁴. The conclusions again are

¹⁹ <http://www.ifs.org.uk/elsa/>

²⁰ <http://www.cfas.ac.uk/>

²¹ <http://www.ncl.ac.uk/iah/research/programmes/85plus.htm>

²² <http://www.newdynamics.group.shef.ac.uk/>

²³ Christensen *et al* (2009)

²⁴ Jagger *et al* (2011)

relatively pessimistic in terms of future numbers requiring long-term care²⁵.

- 4.27 There are though some studies that give cause for optimism that the average period of time, or the average proportion of our lives, spent in need of long-term care, may not increase significantly. One study, based on CFAS research²⁶, looked at three different dimensions of ill-health (physical, functional and cognitive), calculating life expectancies in the various combinations of these states of ill-health. It came up with the remarkable result that life expectancy with two or more of these dimensions affected (for example both cognitive impairment and functional limitations in ADLs), is almost independent of age, over the period from 65 to 95. This suggests that once we fall into high dependency, age is no longer a significant factor.
- 4.28 Another study followed the entire Danish population born in 1905 over a period of years from 1998 to 2005²⁷ and found that the proportion of this population that remained independent barely changed as the individuals aged. Some individuals lost their independence, but this was balanced by higher mortality amongst those who were already dependent.
- 4.29 Both of these studies are longitudinal studies that follow a single cohort over a period of time, and so they give us no firm evidence of how rates of ill-health at a particular age may change over time. However they both suggest that the amount of time we spend in high states of dependence does not necessarily increase as we live for longer. In very general terms, it seems that increased longevity may be pushing back the average age at which we fall into high dependency, but not necessarily increasing the length of time we spend in it.
- 4.30 That could change in future. It may be that the next medical breakthrough (or perhaps technological breakthrough) will have the effect of prolonging life for those who are in high dependency states, rather than being preventative. We simply don't know.

Demand for long term care

- 4.31 Unfortunately none of this is enough to draw firm conclusions about likely future rates of demand for long-term care. It's worth looking though at past rates of demand. We have after all already seen very significant increases in the 85+ population in the UK as a result of increasing longevity.
- 4.32 Perhaps slightly oddly, evidence of past rates of demand for long-term care seems to be less easily available than projections of future

²⁵ Comas-Herrera *et al* (2011)

²⁶ Brayne *et al* (2001)

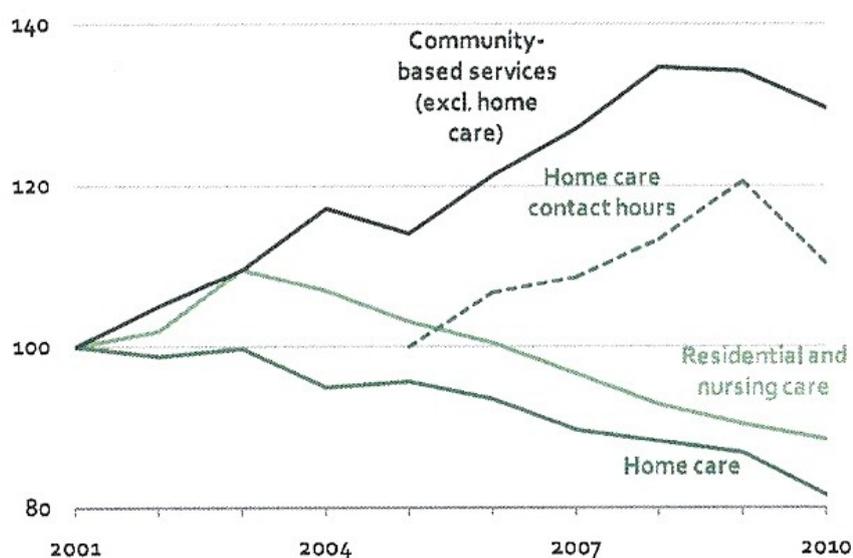
²⁷ Christensen *et al* (2008)

demand. Various partial elements are available, but I can find no comprehensive source.

- 4.33 Data from the NHS Information Centre²⁸ shows declining numbers supported in residential care in recent years, as well as declining numbers receiving home care, but a rise in the numbers receiving other community based services. The following chart summarising these trends is taken from the Dilnot Commission report²⁹.

Figure 4.3: Use of care services, England 2001 – 2010

Number of service users, by service type (index 2001 = 100)³⁰



Source: *Community Care Statistics, Social Care Activity, England, 2009-10 (further release)*, The Information Centre.

- 4.34 These figures relate only to those people whose care is supported by local councils with care responsibilities, so do not tell the whole story. The number of people supported may also in part reflect cost pressures or funding availability, rather than underlying demand. There may be significant levels of unmet need and a move to more care provided by families. However, it is worth noting that they cover a period in which health and social care spending rose markedly in real terms. This may explain the rising numbers receiving lower levels of care at a time when the numbers receiving the highest levels of care seem to be declining.
- 4.35 Other indicators seem in general terms to corroborate the figures on residential care. An OECD Working Paper in 2007³¹ reported that the

²⁸ NHS Community Care Statistics 2009-10: Social Services Activity Report, England

²⁹ 'Fairer care funding. The report of the Commission on funding of care and support' (2011)

³⁰ The chart, taken from the Dilnot report, shows number of service users at 31 March. Home care contact hours are indexed to 2005, when the data series starts.

³¹ Lafortune & Balestat (2007)

proportion of the over-65 population in the UK living in institutions declined from 5.0% in 1996 to 4.5% in 2001. Separate figures for Scotland³² show a gradual reduction in the number of residents in care homes from 2000 to 2006. For the UK as a whole, a recent market survey on the care of elderly people³³ reported that numbers of care home residents remained stable over the 5 years to 2010, following a decade of declining numbers.

- 4.36 These figures make much more sense of the news in recent months of care-home providers running into financial difficulties. The public perception of care homes as an industry experiencing steeply rising demand, does not seem to be supported by the data.
- 4.37 Overall spending on social care for older people has certainly increased significantly in recent years. However in the 15 years from 1994/5 to 2009/10, expenditure on older people increased at a lower rate than on younger adults and also at a lower rate than overall NHS spending³⁴. The increases therefore seem to reflect general increases in health spending rather than the effects of the ageing population.
- 4.38 The overall picture seems to be that, despite rapid rises in the population over 85, there has been no significant increase in the number of people in residential long-term care, even in terms of absolute numbers. As a proportion of the population at older ages, they have fallen significantly. This is entirely consistent with the data above for disability-free life expectancy and with the implied fall in age-specific disability rates. It is less easy to reconcile with the generally more pessimistic assumptions commonly made about future demand.
- 4.39 An assumption of age-specific disability rates that remain constant in future may look like a neutral no-change assumption. The analysis above suggests that it in fact implies a very significant reversal in the trends of healthy ageing that we have seen in recent years. It feels like an assumption that needs clear and positive justification rather than being a neutral assumption.
- 4.40 The number of people over age 85 in the UK has roughly doubled in the last 25 years. It is projected to double again in the next 20 years. If the first doubling has not been accompanied by a corresponding increase in the demand for long term care, the question needs to be asked whether we can expect the next doubling to be so.

³² available at <http://www.scotland.gov.uk/Topics/Statistics/Browse/Health/Data/DataCHBeds>

³³ 'Care of elderly people UK market survey 2010/11' - Laing & Buisson (2010)

³⁴ 'Personal Social Services expenditure and unit costs: England 2009-10' NHS Information Centre, as quoted in Dilnot (2011)

5. An alternative approach

Q. Why did the theoretical physicist cross the road?

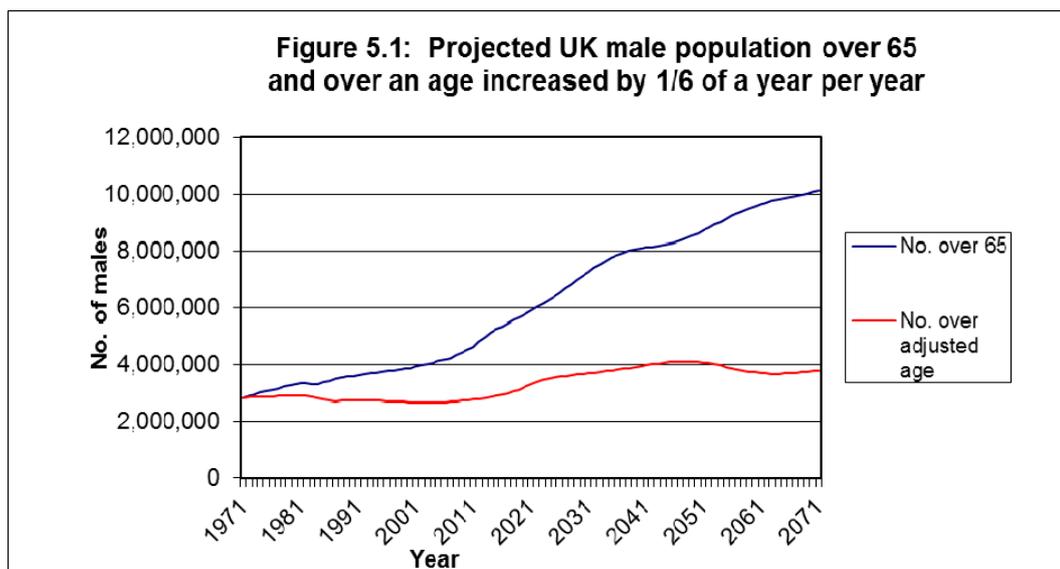
A: Who can say whether the physicist crossed the road or the road crossed the physicist. It depends on your frame of reference.

- 5.1 The analysis in the preceding sections has demonstrated that the expected increase in the size of the elderly population in the UK over the next 50 years or so is driven principally by increasing longevity, rather than by the ageing of the baby boom generation. It has also shown that this increased longevity is coming largely in terms of increases in healthy life rather than longer periods spent suffering from the diseases of old age.
- 5.2 It was suggested in Section 4 that what appears to be happening is a sort of stretching out of our lives, with a 42 year old now being more comparable in health terms to the 40 year olds of 20 years ago, rather than to the 42 year-olds.
- 5.3 If this is indeed what is happening, then our frame of reference needs to be constantly updated, and projections based on a fixed cut-off age are likely to be misleading
- 5.4 It is clear that there will be increased numbers of people over age 65 in future. There will also be higher numbers over 80, and over 100. The higher the cut-off age, the greater the increase in percentage terms in the numbers of people over it. This is just a mathematical effect of increasing longevity, but in itself it says nothing about the numbers of people likely to be in poor health, the numbers in need of long-term care, or the numbers likely to be in employment.
- 5.5 Yet it is common to see conclusions about these factors drawn from a casual airing of the projections. That the numbers of over-85s is likely to increase even faster than the number of over-65s is taken as evidence of a looming crisis in long-term care needs. The figures for the projected numbers of people over 100 have been used to particularly dramatic effect³⁵.
- 5.6 But any use of these figures needs to be in the context that people over 100 in future are not likely to be comparable with people over 100 today, particularly when it comes to questions of health. On the basis suggested above of a 5% stretching of our lives over a 20 year period,

³⁵ See for example the main headline in The Times of 4 August 2011 – ‘Welfare in chaos as thousands live to 100. Ageing population creates budget time bomb.’

the more useful comparison might look at people over 100 today in comparison with people over 105 in 20 years time.

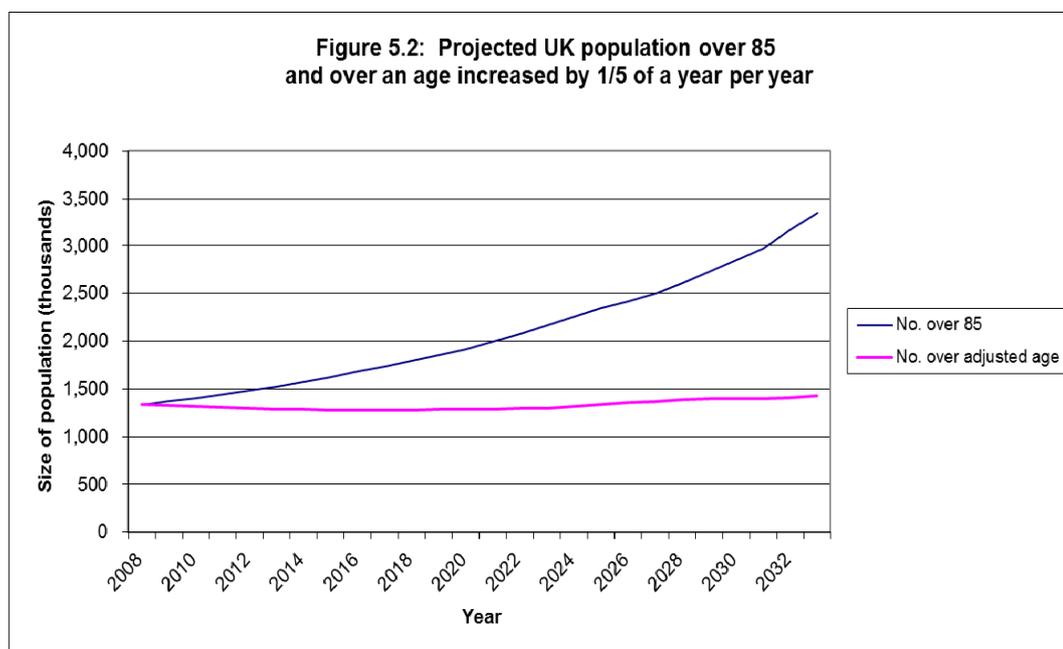
- 5.7 Figure 5.1 gives some idea of the difference that such an approach might make. It shows the UK population of males aged over 65 in 1971, first projected with the same fixed cut-off age, but then against a cut-off age that is increased by 1/6 of a year per year, roughly consistent with a 5% stretching of our lives over 20 years. So the lower line shows the number of males over 65 and 1/6 in 1972, over 66 in 1977 and so on until by 2061 it is showing the number of males over 80.



Source: figures adjusted from the ONS 2008-based principal projection for the UK population

- 5.8 Instead of showing a dramatic and relentless increase, the adjusted figures show a small reduction over the last 40 years, to be followed by a relatively gentle increase for the next 40 years, broadly corresponding to the remaining effect of the baby boom.
- 5.9 These figures are illustrative, and do not pretend to be a realistic projection of what might happen. The assumption of a fixed longevity adjustment each year is probably not realistic and is certainly not entirely consistent with the basis on which the underlying population projections were constructed. Nevertheless, if the intention is to forecast the elderly population in terms of its health, the lower line may be a more appropriate guide than the upper one.
- 5.10 The even steeper rise in the over 85 population can similarly be put into perspective. Figure 5.2 shows the projected population over 85 in comparison with the population over an age increased by 1/5 of a year each year, again broadly consistent with a 5% 'stretching' over 20 years.

- 5.11 Again the rapid increase in the population at these older ages largely disappears once we start to think in longevity adjusted terms. The numbers over the adjusted age fall gradually over the next few years before starting to increase, again very gradually. By 2033 the numbers (by this stage over age 90) have increased by under 7% over the 2008 numbers for over 85 year-olds. In comparison the unadjusted numbers of over-85 year olds have increased by 150%.



Source: figures adjusted from the ONS 2008-based principal projection for the UK population

- 5.12 It seems to me that much of the evidence suggests that figures on this kind of basis would offer a better guide to what is likely to happen than the more usual approaches. The common assumption of unchanging age-specific disability rates, together with projections of the numbers of people over unchanging cut-off ages, leads clearly to the conclusion of future health problems, if not disasters. I am far from convinced myself though that such problems are in store for us.
- 5.13 Using fixed cut-off ages also creates a need for other adjustments. For instance rising longevity means that the proportion of widows or widowers over a fixed age, such as 80, is likely to fall. More people will have a surviving partner at this age and if the proportion needing long-term care remains unaltered, more will be cared for by their partner. If both rates of disability and definitions of working age are assumed to remain unaltered as longevity increases, as is often the case, then many older disabled people will even have children who are retired.
- 5.14 Some studies do attempt to allow for factors such as these. A recent OECD study³⁶ on the likely future supply and demand for long-term care was a particularly sophisticated example. If however all cut-off

³⁶ Colombo *et al* (2011)

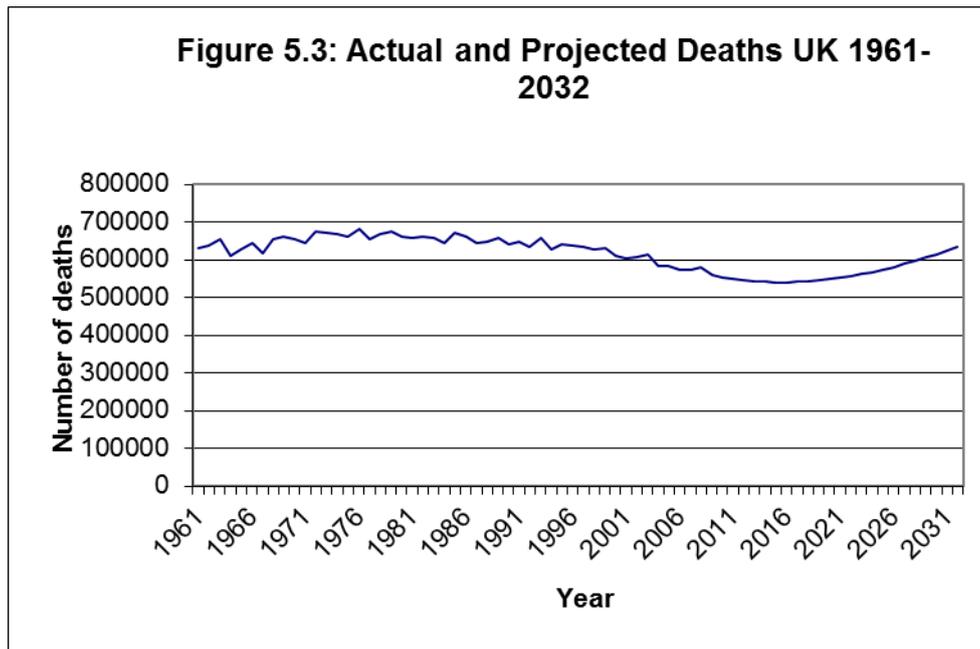
ages, including retirement ages, are effectively indexed to future longevity, then the process becomes much simpler, and more clarity may be achieved.

- 5.15 Simpler does not of course imply more accurate. It's just a different assumption about what might happen in future. But the finding in section 4 that the ratio of DFLE to life expectancy seems to be remaining stable, does suggest that for the UK it might be at least as good a base assumption as the alternative assumption of unchanging age-specific disability rates. Considering the effect of possible variances to the base assumption would of course remain necessary.
- 5.16 There are a number of academic studies that have attempted to produce projections of the number of older people and old-age dependency ratios on a longevity-adjusted basis. A recent article in 'Science', the journal of the American Association for the Advancement of Science, reviewed these and also extended the concept to disability-adjusted ageing measures³⁷. Three different dependency ratios are compared for a number of countries. The first is a traditional old age dependency ratio using a fixed cut-off age of 65. The second uses a gradually increasing cut-off age to maintain a remaining life expectancy of 15 years. The third then compares the forecast number of adults with disabilities to those without disabilities. For the UK the first measure shows a rapidly worsening position, the second a much more gentle increase, and the third shows no increase at all up to 2050. The results for other Western countries show similar patterns.

Numbers of deaths

- 5.17 Another way of thinking about what might happen in future is to look at the expected numbers of deaths. The number of people in the last two or three years before death may be a more reliable guide to the numbers likely to be in need of high levels of care than the numbers over any particular age. The chart below shows the actual numbers of deaths in the UK over the last 50 years together with projections for the next 20 years or so.

³⁷ Sanderson & Scherbov (2010)



Source: ONS

- 5.18 The picture here is not dissimilar to the previous charts, showing falling numbers of deaths over the last 40 years to be followed by a rise over the next 20 years. Although figures for individual years are only available up to 2032-3 and projections beyond this have limited validity, it seems reasonable to assume a longer term continuing rise in the numbers of deaths. A population structure in which many individual annual cohorts consist of over 800,000 or 900,000 people is not consistent in the longer term with fewer than 700,000 deaths a year.
- 5.19 In a way the most interesting feature of the above chart is the 40 year decline in the number of deaths. This seems consistent with the earlier figures on declining numbers of people in long term care. It does however suggest that the pattern may be about to reverse, although perhaps not to the extent that other studies have suggested. The number of deaths is projected to reach a low in around 2016, which might suggest rising demand for long term care starting some two or three years earlier. From 2012 to 2032 the projected increase in the number of deaths is around 16%. This provides another useful comparison with the unadjusted increase in the number of over-85 year olds of 150% over much the same period.

6. Life and health inequalities

Q. Why did the actuary cross the road?

A. Because life expectancy was higher on the other side.

- 6.1 Most actuaries are well aware that there are large differences in mortality and life expectancy between different groups of people according to a range of factors, even if there has been some reluctance in life assurance to take this fully into account. Most annuity providers however now price by postcode, which in practice is probably an approximation to pricing by some combination of income level and wealth.
- 6.2 There is an increasing amount of research on mortality differences by various factors and the underlying reasons for these. Differences in life expectancy by geographical area (and implicitly by social class) are not only large, but appear to have been increasing in recent years³⁸. There is though some evidence that after many years of increase, the gap may have narrowed in the data for 2002-2005.
- 6.3 For the population as a whole, there is a wealth of data on not only mortality and life expectancy, but also health, at the level of small areas or wards, with an average population of around 5,000. The picture that comes out of this is not a pretty one.
- 6.4 Wards can be classified by a standard measure of deprivation (Carstairs scores³⁹, based on a variety of indicators) and then split into twentieths with equal population in each, according to the deprivation level. The results in Figure 6.1 show male life expectancy at birth (on a period basis) increasing with each move to a higher twentieth, from 71.5 years in the most deprived twentieth to 79.1 years in the least deprived⁴⁰, a difference of 7.6 years. For females there is a lower difference of 4.8 years.
- 6.5 An even more striking result however comes from looking at disability-free life expectancies, which for males at birth vary from just 53.8 years in the most deprived twentieth to 67.9 years in the least deprived, a difference of over 14 years. As these figures are based on wards that are large enough to contain a variety of housing types and income levels, the extent of variation at postcode level may be even higher.
- 6.6 The position was researched in some detail in the Marmot review of health inequalities⁴¹, which recommended a wide range of actions to deal with them. The report also highlighted an important issue of

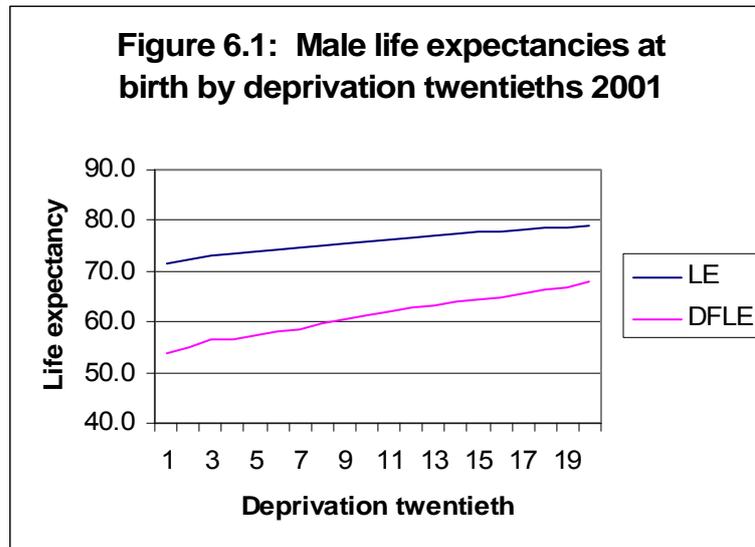
³⁸ Harper, Howse & Baxter (2011)

³⁹ Morgan & Baker (2006)

⁴⁰ Rasulo, Bajekal & Yar (2006)

⁴¹ Marmot (2010)

fairness in raising pension ages and encouraging people to work longer. If disability-free life expectancy is just 53.8 years in some areas, how fair is it to increase the state pension age to 68?



Figures for England and Wales - from ONS HSQ34 (2006)

- 6.7 This is outside the normal range of experience of many actuaries. It may seem obvious to us that the natural response to increased longevity is to work for longer, and the increases in healthy life expectancy for the average person suggest that we are well able to do so. Most of us need only look around at friends and family, to see that that many people in their 50s, 60s and 70s are well capable of working on.
- 6.8 But when we look at the figures split into smaller areas, the conclusion is by no means as self-evident. We cannot be concerned only with issues of generational equity and ignore issues of social equity. Where overall life expectancy for males at birth is not much above 70, then an increase in the state pension age from 65 to 68 is a major reduction in the value of the benefit. Where healthy life expectancy is under 55, working for longer may be simply impractical, although self-assessed poor health is not necessarily a barrier to working. It should also be remembered that the gap between healthy life expectancy and overall life expectancy is distributed over the whole of life and does not all come at the end.
- 6.9 There is no easy answer to these questions and the measures advocated by Professor Marmot are too wide-ranging to review or to summarise here. The State Pension Age is certainly an important factor, but it also has to be seen in the context of other benefits, particularly Incapacity Benefit / Employment and Support Allowance, which in practice ease the transition from work to pension for many people.

- 6.10 An increase in the SPA has a limited effect on someone in poor health who is already on incapacity benefit or ESA. The more relevant factor is the comparison between the respective levels of payment, the conditions attached to them, and the incentives that are created to work or not to work.
- 6.11 The analysis in this paper suggests that there is no strong demographic need for us as a society to be putting heavy financial pressure on elderly people in poor health to extend their working lives. If population ageing were the result of generational factors such as the baby boom, that might be one consequence. But if population ageing comes predominantly from increasing longevity, accompanied by proportional increases in healthy life, then the effects are very different. If all aspects, including state pension ages stretch out in proportion, there need be no increase in employment in poor health and no proportionate change in health or pension inequalities.
- 6.12 That is not to say that health or pension inequalities are not in practice increasing, or that this is not an important area for action. I am sure that it is. But I still believe that increasing pension ages in general, and the state pension age in particular, is the right response, and that those in good health should be encouraged to extend their working lives.
- 6.13 There are undoubtedly strong economic forces that are tending to favour the haves rather than the have-nots in a wide range of areas. Compensating for these forces requires some activist government. Recent changes and proposals for changes to both the Basic State Pension and the State Second Pension are more positive for those in the greatest need and those who spend significant periods of time out of employment as a result of poor health or other reasons.

7. The response to increased longevity

“The question isn’t at what age I want to retire, it’s at what income.”

George Foreman

- 7.1 If increased longevity is coming largely in terms of increases in healthy life rather than longer periods spent suffering from the diseases of old age, then the natural conclusion is to work for longer. We are living for longer, we are remaining in good health for longer, so we are physically able to work for longer, and there is an economic need for us to do so.
- 7.2 The only real alternative for the UK would be to accept that a reduced proportion of the population will work and that our standard of living would reduce, not necessarily in absolute terms, but in relation to that enjoyed by societies where a higher proportion of the population are employed. By working for longer we can maintain the proportion of the population that is employed, and we can stabilise the real support ratio, rather than an artificial ratio based on a fixed age. This aspect is reviewed further in section 8.
- 7.3 From the point of view of society as a whole therefore, we would hope to see an increase in the average length of working lives. Anything that encourages individuals to work for longer is in that sense a good thing. This section reviews a number of recent developments in that light.

Increasing state pension age

- 7.4 There have been a series of increases planned in the state pension age for both men and women that are gradually taking place over the next 10 years and beyond. These may have been driven as much by a need to contain the costs of the state pension, as by a need to encourage longer working lives, but those are really just two sides of the same coin.
- 7.5 For some people an increased state pension age will have little effect on the age at which they stop working. This may be determined more by the retirement age of their company pension scheme, by the age at which their partner retires, by the age at which they are made redundant, or because they are unable to work for health reasons.
- 7.6 Few people nowadays stop working precisely at the state pension age. Indeed quite a significant proportion of people are already drawing state benefits in one form or another, often as Incapacity Benefit or Employment and Support Allowance well before State Pension Age (SPA). For these people, a change in the SPA simply changes the date at which they move from one benefit to another.

- 7.7 Nevertheless there must be a significant proportion of people for whom a year's delay in the age at which they can start to draw the state pension is quite important enough to cause them to delay retirement for a year or so. It is difficult to quantify this effect, but this is one factor encouraging people to continue working for longer.

The decline of defined benefit pension schemes

- 7.8 Defined Benefit (DB) pension schemes with a fixed pension age have been a deterrent to working for longer, as they protect members from the economic consequences of increased longevity. To that extent the decline of defined benefit schemes will in itself encourage longer working.
- 7.9 DB Schemes have for the most part been replaced by defined contribution (DC) schemes with lower contribution rates, which put the emphasis on the individual to decide at which point they are financially able to retire. As there is no guaranteed rate at which funds can be converted into a pension, this will depend, not only on interest rates at the time, but also on the latest estimates of life expectancy in retirement. The full consequences of increased longevity therefore fall directly on the employee up until the point at which he or she retires and buys an annuity.
- 7.10 Many pension commentators have regretted this change and have called on the government, or employers, or pension funds, or the capital markets, in one way or another, to take longevity risk away from the individual. I believe these calls are misguided and that it is entirely right that longevity risk up until the point of retirement should be borne by the individual.
- 7.11 The key point is that the right response to increased longevity is to work for longer, and it is the individual who has the power to make this response. If longevity risk is transferred somewhere else, it then needs to be managed and often parcelled-up and transferred on again. An entire industry has been created to do this, in large part by actuaries, but it is in some ways a completely unnecessary industry. If longevity risk is left where it should be, with the individual, then none of it is necessary, at least pre-retirement. Post-retirement longevity risk should be a natural fit for insurance companies.
- 7.12 From the point of view of the individual scheme member, increased longevity is not a risk at all. It is an unalloyed benefit, particularly if it comes as increases in healthy life expectancy. The increased life expectancy only needs to be split roughly in proportion between working life and retirement, and there is no proportionate increase in pension costs, and no longevity risk to manage.
- 7.13 Taking a slightly broader view, increased life expectancy may in practice be split three ways, between education, working life, and

retirement. The average person now spends rather longer in education than 30 years ago, so that later retirement must first compensate for this extension before contributing anything to a longer working life.

- 7.14 Defined contribution schemes encourage individuals to take a realistic approach to extension of working lives, whereas defined benefit schemes with a fixed retirement age, do not.
- 7.15 There is a separate debate about whether defined contribution schemes transfer too much investment risk to the individual. It has sometimes seemed to me that DB schemes get investment risk in the right place but longevity risk in the wrong place, whereas DC schemes do the exact opposite. Could we not have a pension scheme design that protected employees from too much investment risk, while putting longevity risk firmly with the individual? Something like a cash balance scheme, with conversion to annuity on open market terms, seems to meet this requirement, although few such schemes have been created.

The Hutton report

- 7.16 The Hutton report into public sector pension schemes did seem to recognise in principle that longevity risk should be left with the individual. Unfortunately Hutton failed to carry through on the consequences of this and ended up recommending CARE schemes that retain a fixed retirement age, with only a vague commitment to linking retirement ages in future to the State Pension Age (SPA).
- 7.17 This fails to recognise that the approach to increasing retirement ages is completely different between PAYG schemes such as the state pension scheme, and the more typical approach for funded schemes. When the SPA is increased, there is no question of protecting past service accruals, as would normally have to be done in a funded scheme. Instead there is advance notice of the change and an extended transition period.
- 7.18 The same approach could in principle be used for public sector schemes that are also PAYG, but Hutton explicitly rejected this approach and instead proposed a rapid increase in pension ages for future service, with protection of past service accruals. This is entirely reasonable, but does mean that linking future changes to the State Pension Age is not really appropriate. It is likely to end up with both continued protection of past service accruals and a delayed timetable for any future increases in pension age. This leaves a large part of future longevity risk with the employer and shields employees from the natural economic consequences of increasing longevity.
- 7.19 Despite this missed opportunity, it should be recognised that the proposed short term increases in pension age in public sector schemes, for future service at least, will play their part in encouraging an extension of working lives.

Distributed decision-making

- 7.20 In comparison with some other countries, one quite significant advantage in the UK is that there has been no single big decision to be made on extending working lives. Big decisions tend to be political decisions and delayed decisions. We are seeing this now with the decisions to be made on public sector schemes, but many smaller decisions have already been made on individual company schemes.
- 7.21 The increases in the state pension age have been important, but are just one element in many people's retirement decisions, either because of company schemes, or because of other state benefits. They have been announced in stages and are being implemented over extended periods. In the end, whether or not working lives are extended will come down to millions of decisions by individuals on whether to retire or continue in employment and by employers on whether or not to employ older people.
- 7.22 In comparison where pension arrangements are on a national basis, relatively modest changes can quickly become a source of political strife. At the time of writing it is unclear how difficult it will be to change public sector pension schemes, but in other areas some quite significant changes have already been introduced, almost without us realising their importance.

Other measures

- 7.23 There have been a range of other developments and measures that have gradually made it easier for individuals to extend their working lives. From the Government these have included measures to outlaw age discrimination, to end the practice of default retirement ages, to encourage flexible working and to allow pensions to be taken without fully retiring.
- 7.24 From employers there has been increased recognition that older employees have particular skills to offer. Reduced numbers of younger employees, whether because of demographic changes, or because of longer periods spent studying, have increased the pressure on employers to employ older workers. Increases in healthy life expectancy should also be leading to an increase in the average age of ill-health retirements and the average age at which incapacity benefit / ESA is claimed.

Generational equity – an alternative view

- 7.25 In an article written at the start of 2011 by the economist James K. Galbraith, as part of a series called 'Unconventional Wisdom'⁴², he suggested that the idea that we should work for longer as a result of an older population was not just wrong, but dangerous. He proposed instead that older workers, many in poor health as a result of health inequalities, should be financially encouraged to retire to make room for younger workers. The problem, he suggested (in the US, but presumably in the UK as well), is not a shortage of workers, but a shortage of jobs.
- 7.26 I suspect that this is a short term issue as Western economies emerge from recession. The more general issue of the employment effects of the ageing population is considered in section 8. In previous recessions though it is clear that early retirement of older workers has taken much of the strain, with a lot of the cost being borne by pension scheme surpluses, that are no longer available. The recent recession has been different and there is some evidence that gains in employment amongst older workers have been balanced by rising youth unemployment. There may be a case for short-term action in this area, but in the longer term extending working lives remains a priority.

Increasing levels of retirement saving

- 7.27 It will seem strange to some people that this analysis has focused on whether people are being encouraged to work for longer and has largely ignored what may seem like the obvious answer. If we are expecting to live for longer, then we need to save more in order to fund our retirement. One key test of whether we are adapting successfully then would be whether or not levels of retirement saving are increasing.
- 7.28 Increasing retirement saving may well be the right answer for some individuals, and will enable them to retire at an earlier age than they would otherwise be able to. It may also be true that levels of both saving and investment in the UK are too low and it would be a good thing for them to increase. The general reduction in levels of pension contribution that has accompanied the switch from DB to DC pension schemes is a real cause for concern.
- 7.29 However major increases in the levels of retirement saving are not the answer to the ageing population for the economy as a whole. The reasons for this were considered in more detail in my previous paper⁴³ and are not repeated here. If we don't maintain the level of output in the country by working for longer, then increased saving at the level of

⁴² See http://www.foreignpolicy.com/articles/2011/01/02/unconventional_wisdom?page=0,7

⁴³ Jollans (1997)

the whole economy will lead to macro-economic effects, but probably do little to achieve real increases in retirement income.

8. Employment and retirement behaviour

“The quality, not the longevity, of one’s life is what is important.”

Martin Luther King, Jr.

The use of support ratios

- 8.1 Many of the analyses illustrating the effect of the ageing population rely heavily on projections of support ratios. These typically compare the number of people aged over 65 to the number of people aged 18-64 to calculate a ratio illustrating the number of ‘workers’ available to support each ‘pensioner’. Projections over the next 40 years show a rapidly reducing ratio of workers to pensioners and this can be a useful way of illustrating the scale of the problem ahead of us.
- 8.2 Support ratios are however no more than a useful tool and they suffer from a number of drawbacks.
- If the pension age (however defined) increases, then the cut-off age should change in the projections
 - However the cut-off age is defined, many people over it will still be in employment, and others below it will not.
 - Even if not in employment, many older people are doing valuable work in the community and often as carers. They may resent the idea that they are being ‘supported’ by the working population.
 - The lower age limit is also variable, affected by changes to the length of time spent in education
 - Changes in the proportion of children in the population may also affect the support ratio for the population as a whole.
- 8.3 Some of these drawbacks can be addressed by modifications to the basis on which figures are calculated, and there have been various attempts to produce more meaningful ratios.
- 8.4 The aim of this section is to bypass some of the drawbacks of support ratios, by looking more directly at the proportion of the population employed, or more generally the proportion that is economically active, and how it is changing. It is these proportions, rather than the proportion of the population that is theoretically of working age, that will determine how well we can cope with an ageing population.

Are measures already taken having an effect?

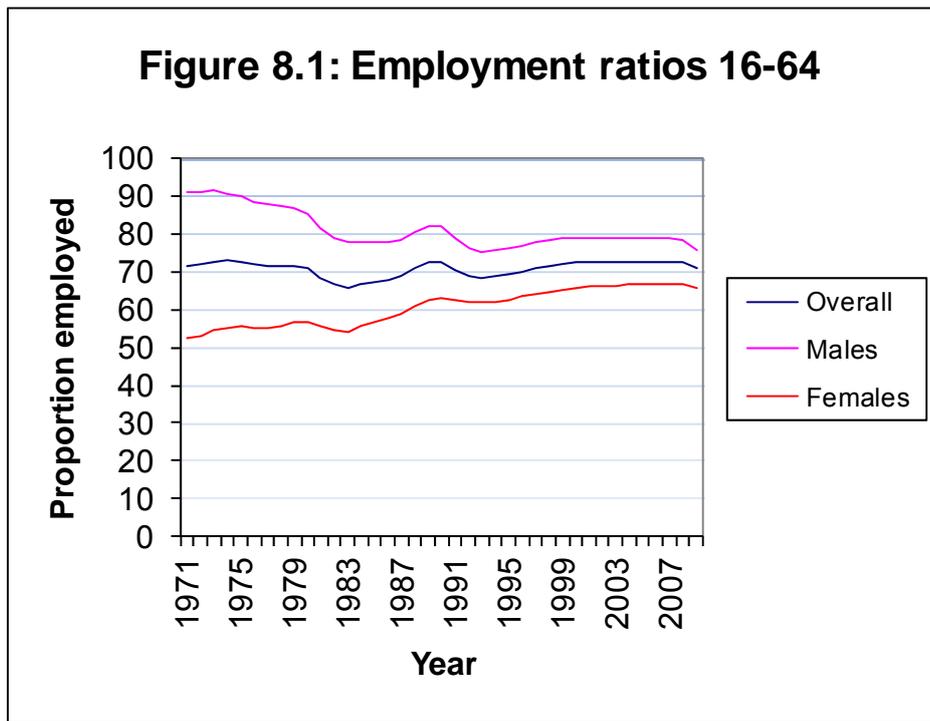
- 8.5 In particular it is important to know whether increases in longevity and increases in nominal retirement ages are leading, and will lead, to people working for longer or not. If the increases in longevity are being taken simply as additional years of retirement, then we are likely to face a long-term problem. If they are being split between additional

years of work and of retirement we can be more optimistic about the future.

- 8.6 Some of the factors encouraging people to work for longer have been considered in the previous section, including rises in the State Pension Age, the decline of defined benefit pension arrangements, and changes to employment law. How effective these will be in achieving longer working lives, is however open to question. Any effect they do have may also take some considerable time to be felt. Most of the changes to the SPA have not yet taken effect, and changes to occupational pension schemes are often applied over a long period to protect the position of existing members.
- 8.7 It's not difficult though to gather informal evidence that people may now be working for longer. Many of us need only look around our office or workplace to see older workers, who might once have been eased into early retirement by DB pension scheme surpluses. We may know others who have moved to part-time work, or have 'retired' from one job, only to return to the employment market in another guise.
- 8.8 This illustrates the point that retirement is often now not a simple move from being in full-time employment to being fully retired. Even where it is, it often happens neither at the State Pension Age, nor at the Normal Retirement Age of company pension schemes. The process is much more fluid than that. Measuring the age at which people 'retire' is therefore fraught with difficulties.

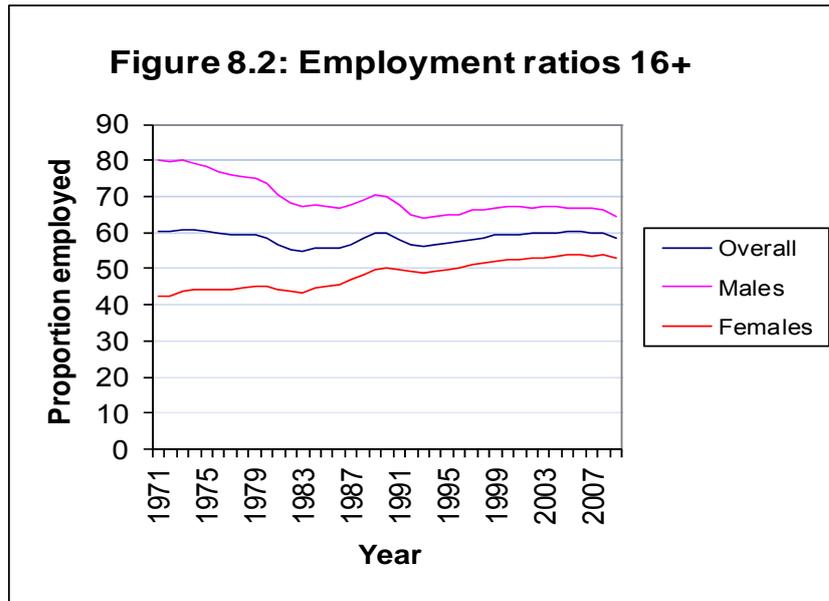
Evidence on proportions employed

- 8.9 Before looking at this in more detail it is interesting to look at some more basic data on the proportion of the population that is employed. This is available as part of the ONS Labour Force survey, going back for up to 40 years in some cases, so we can get a good idea of how the workforce is changing. There are many different factors affecting participation in the workforce, but over the last 40 years one dominant trend has been the increase in the proportion of women working.
- 8.10 Interestingly though, the rise in female participation has been very largely balanced by a fall in male participation. In 1971, 71.8% of people aged from 16 to 64 were employed, made up of 53% of females and 91% of males. In 2009 the overall proportion employed was virtually unchanged at 70.9%, but the proportion of females had risen to 66%, while the figure for males had fallen to 76%.



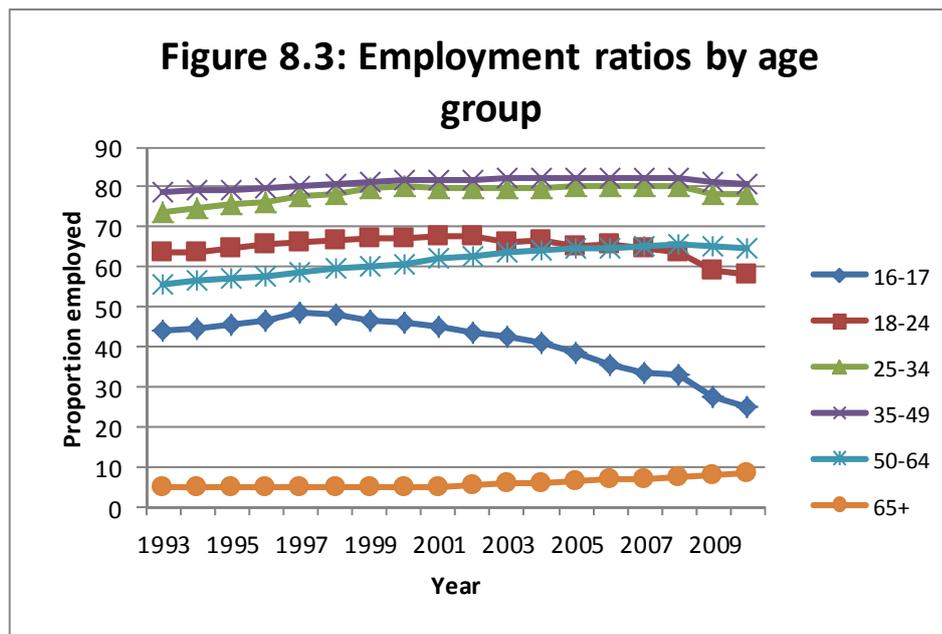
Source: ONS

- 8.11 It is not clear from this whether falling male employment rates are a driving force or an involuntary reaction to rising female employment. One consequence though has almost inevitably been a rise in the proportion of households with two earners and a balancing rise in the number with nobody in employment. This must have significant social consequences (and the analysis in section 6 might suggest health consequences as well), but they're beyond the scope of this review.
- 8.12 The data does suggest though that there are some automatic balancing factors operating, with gains in employment by one group likely to be balanced by losses elsewhere, within an overall proportion of the population working that appears to move broadly in line with the economic cycle, but otherwise change relatively little.
- 8.13 This may in itself be positive for the chances of adapting to an ageing population. However one obvious drawback of the chart above is that it looks only at ages 16 to 64 and so ignores changes in both the population and the employment rates at older ages.
- 8.14 Fortunately the data is available for employment at 65+ as well, and this gives us the possibility of adapting the chart to show employment ratios for the population including all adults from 16 upwards. The picture does not change enormously, but the overall employment ratio becomes even more stable when the 65+ population is included. There are clear dips in the recessionary periods of the early 80s and early 90s, and the first signs of a dip for the latest recession, but at all other periods the ratio remains with a narrow range from 58% to 61%.



Source: ONS

8.15 The reason why it is more stable when data at 65+ is included, becomes clear when we look at the individual ratios for each age group, although here the relevant data is only available since 1993. Just as rising female employment ratios balanced falling male ratios for many years, now rising employment ratios at older ages are balancing falling ratios for younger age groups. Employment in the 50-64 age group has increased from 55.7% in 1993 to 64.9% in 2010, and in the 65+ age group from 4.9% in 1993 to 8.5% in 2010. But in the 16-17 age group, after increasing a little in the early 1990s, employment rates have fallen steadily since 1997. 18-24 year-olds show a similar although less pronounced pattern.



Source: ONS

- 8.16 Again it is not immediately clear which are the driving factors. Have the higher proportions of young people going on to further education created room in the job market for older people to continue working? Or is it the increasing reluctance of the older generation to retire that has caused higher youth unemployment, or encouraged younger people to continue longer in education? Or are these factors not linked at all, with employment proportions for older people able to rise without necessarily being balanced by lower proportions elsewhere?
- 8.17 One striking element is that the trend to higher employment rates amongst the older age groups has continued almost unabated through the recent recession. There appear to have been fewer redundancies than in previous recessions, with employers choosing to retain older existing workers, but cut back on recruitment of new, younger workers. The result has been rising youth unemployment, while the proportion employed at 65+ has continued to rise. As the economy emerges from recession (and the financial attractions of higher education reduce?), it would not be surprising to see some rebound in employment in the 18-24 age group. At older ages though the trend to higher employment rates now looks well established.

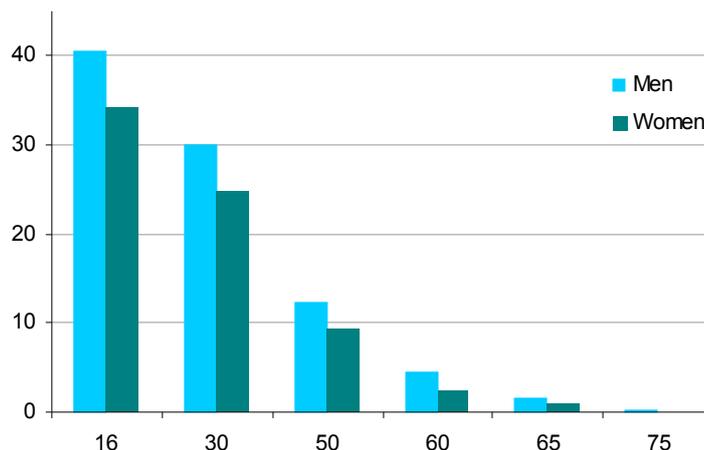
Changes to the proportion of children in the population

- 8.18 The apparent stability in the level of employment amongst adults age 16+ is perhaps surprising when we consider that there have been some quite significant changes in the proportion of the population below age 16 over that period. This seems to imply more volatility in the proportion employed for the entire population than there is for the adult population only. Indeed from 1995 to 2008 the proportion of the population under 16 declined steadily, with a corresponding rise in the proportion of the overall population in employment.
- 8.19 One possible explanation for this is that reduced childcare responsibilities have made more people available for work. Changes to benefit entitlements and work incentives may have increased this effect. This is largely speculation. There is after all no evidence of the opposite effect, with the increasing number of over 65s leading to more care responsibilities for under-65s and so fewer of them available to work.
- 8.20 That is consistent with the earlier data on the health of older people, but does suggest that there may be a real difference between support for the older population and support for children, at least where we are using fixed cut-off ages. This cautions against combining support ratios for children and for older people in an attempt to create an overall support ratio, as a number of studies have tried to do.

Age of withdrawal from the labour market

- 8.21 An alternative way of looking at whether we are seeing any extension of working lives is to consider the average age of withdrawal from the labour market. This is the subject of an EU target set at the 2002 European Council in Barcelona. The council agreed that 'A progressive increase of about 5 years in the effective average age at which people stop working in the European Union should be sought by 2010'. On the face of it this was an extremely ambitious target in an area where change is almost inevitably incremental. It did have the advantage however of making the development of appropriate statistics a priority.
- 8.22 Early attempts at measuring age of withdrawal used comparisons of the proportions economically active at each age to develop age-specific rates of withdrawal. These suffered from a number of disadvantages, including that they failed to allow for the fluidity of employment patterns, with many people leaving the employment market, but later returning, sometimes more than once.
- 8.23 More recent work has adopted a life-table approach, using the proportions economically active to calculate an 'expected duration of working life' at each age. This is effectively a working life expectancy comparable to the normal life expectancy and the healthy life expectancies discussed in section 4. At each age our overall life expectancy can be split into a working life expectancy and a non-working life expectancy. The methodology is explained in an ONS paper published in 2010⁴⁴, from which the following chart of sample values is taken.

Figure 8.4: Duration of working life for selected ages: by gender, 2008



Source ONS analysis based on Annual Population Survey and interim life table data

- 8.24 The periods of future working life may occur at any time and even at high ages, working life expectancy does not fall to zero. However for

⁴⁴ Mitchell & Guled (2010)

the specific purpose of calculating an average age of withdrawal from the labour market on the basis of these figures, the periods of economic activity are assumed to run together until final withdrawal from the labour market takes place.

- 8.25 The figures are based on the proportion of people who are 'economically active' rather than the proportion actually employed. The definition of economically active includes those who are unemployed but available for and actively seeking work.
- 8.26 Figures for the average age of withdrawal from the labour market on this basis are shown below and confirm the trend suggested by the earlier figures for the proportion employed in each age group. We are indeed already seeing an extension of working lives to older ages.

Table 8.5: Estimates of average age of withdrawal from the labour market

	Men	Women
2004	63.8	61.2
2005	63.8	61.4
2006	64.1	61.7
2007	64.3	61.8
2008	64.4	61.9

Source ONS analysis based on Annual Population Survey and interim life table data

- 8.27 In comparison with the EU Council target of an increase of 5 years over an 8 year timescale, these increases look relatively modest. Nevertheless they correspond to an increase of between 1.5 and 2 years per decade, and in the context of longevity increasing at perhaps around 2 years per decade, they appear to be sufficient to maintain the relative proportions of time spent in work and time spent in retirement.
- 8.28 It would be ambitious to expect anything more than this. It should also be noted that these increases are in a period before any of the planned increases in State Pension Age come into effect. In practice these planned increases, which are now starting to take effect for women, may be the most powerful driver of employment and retirement decisions.

Who is working for longer?

- 8.29 A report on wave 4 of the English Longitudinal Study of Ageing⁴⁵ confirms the pattern outlined above that employment at older ages has been increasing in recent years. It is also able to analyse the data by a number of factors to show in more detail what influences decisions to continue working or not.

⁴⁵ Crawford & Tetlow (2010)

- 8.30 It is perhaps not surprising that the study found some strong correlations between employment status and levels of education and levels of wealth. Those with high levels of education, those who are in good health and those whose partner is working (if applicable) are significantly more likely to be in work after their state pension age. The proportion of individuals aged between 55 and 69 who are not in employment has decreased and for men the decline in inactivity seems largely to reflect a decline in the proportion reporting themselves to be sick or disabled.

Unpaid employment

- 8.31 All the figures reviewed in the first part of this section are based on employment in a formal paid sense. I am not aware of any equivalent measures that take into account unpaid employment after withdrawal from the labour market, and there would be major difficulties in creating such measures. Nevertheless unpaid work makes a significant contribution to the wellbeing of our society, and this contribution could potentially be put at risk by efforts to lengthen our formal working lives. Unpaid work includes volunteering and charitable work of various kinds, but it may also include care responsibilities, either for grandchildren or for a disabled partner.
- 8.32 A lack of formal measures or firm evidence makes it difficult to draw conclusions in this area, but the analysis in this paper does not suggest that this should be an area of major concern. If both healthy life expectancy and working life expectancy stretch out broadly in proportion to overall life expectancy, then by extension the period of healthy life in retirement should similarly stretch out. It will never happen as neatly as that, but there seem to be a number of indicators that suggest that this is not too far from the picture that we are seeing in practice.
- 8.33 This optimistic picture could yet be spoiled, perhaps particularly if there were to be a significant increase in either the incidence or the duration of periods of high dependency at the end of our lives. In this scenario, older people could find their period of retirement squeezed between the demands of a longer working life, more time spent caring for elderly parents or partners and longer periods of their own ill health. There is no shortage of forecasters prepared to project just such a pessimistic position, but I can find little clear evidence that it is happening at present.

9. Conclusions

*“If you live to be a hundred, I want to live to be a hundred minus one day,
so I never have to live without you.”*

A.A. Milne ‘Pooh’s little instruction book’

- 9.1 The narrative of the preceding sections is a profoundly optimistic one.
- 9.2 The UK population is ageing principally as a result of increasing longevity, not because of low fertility or the ageing of the baby boom generation (section 3). Past years of lower fertility are at present being offset by immigration. Although net immigration at current levels may not continue, some of the same demographic effects may in any case be produced by increasing levels of fertility (section 2).
- 9.3 Increasing longevity is coming very largely as additional years of healthy life. Broadly the proportion of our lives that are in good health is staying the same (section 4). These two elements combined, mean that population ageing is not leading to major increases in the proportion of people in ill-health or disabled. In particular there may be no increase in the proportion of people needing long term care. Indeed there is some evidence to suggest that the period at the end of our lives, when many people are in high states of dependence, may not be increasing at all (end of section 4).
- 9.4 As our healthy lives are increasing in line with increasing overall longevity, it is natural that we should work for longer, keeping the proportion of our lives that we spend in employment broadly constant. Although high rates of health inequality are a potential obstacle to this, they do not invalidate the conclusion (section 6). A number of measures have already been taken that nudge us towards extending our working lives (section 7) and they seem to be having the right effect.
- 9.5 Rates of employment at older ages are gradually increasing. This is having the effect of keeping the overall proportion of the adult population that is in employment, broadly stable (section 8), although subject to the economic cycle. The average age of withdrawal from the labour market appears to be increasing at a rate that is consistent with maintaining a stable relationship between the proportion of our lives spent in work and in retirement.
- 9.6 It should be recognised that much of the description in this paper refers to what is happening, rather than necessarily what will happen in future. Forecasting is a much more difficult occupation. Levels of immigration and fertility are difficult to forecast and require the skills of sociologists and politicians. Levels of health and disability are very

difficult to predict even for medical professionals, and rates of employment in the economy are perhaps best left to economists.

- 9.7 Nevertheless, as a mere actuary (and barely even that now), I see many reasons to be optimistic in the combination of factors reviewed in this paper. This paper is certainly a lot more optimistic than many others. There is a widespread perception that rapidly increasing numbers of people over some fixed cut-off age, such as 85, must mean a rapid increase in the illnesses and infirmities of old-age. I don't think that there is anything inevitable about that.
- 9.8 The use of fixed cut-off ages is a particular problem that can too easily lead to sensationalist language and sensationalist conclusions. A move to longevity-adjusted cut-off ages for many purposes, as reviewed in section 5, would be a start. Using longevity-adjusted projections of disability rates as a base assumption, rather than assuming unchanged age-specific rates, could also change both attitudes and conclusions.
- 9.9 In particular I would challenge some of the following conclusions that are often seen in the press as well as in academic papers, and are in danger of becoming accepted wisdom:
- That the retirement of the baby-boom generation will put great strain on our pension systems and create a heavy burden for younger generations (see section 3)
 - That the rapidly increasing numbers of over-65s is already putting our health services under great strain and will inevitably do so to a much greater extent in future (see section 2 – *not only has the proportion of over-65s barely increased, but their health is improving*).
 - That the very large projected increases in over-85s in future will inevitably lead to much higher need for long-term care (see section 4)
 - That individuals need to be protected from the effects of longevity risk and increasing retirement ages, while in employment (see section 7)
 - That the need to fund for much longer retirements is creating a massive 'savings gap' in the provision for future generations (see section 7)
 - That the proportion of the population of 'working age' is set to fall (*our definitions of 'working age' need to be adjusted for longevity*)

International comparisons

- 9.10 It is important to underline that most of the analysis in this paper has been based on the UK, with occasional references to the position in other countries. While many aspects of the analysis would be relevant elsewhere, the conclusions would not necessarily be the same in other countries. The UK benefits in particular from the combination of a

number of factors that do not always apply elsewhere and that are generally favourable in this context.

- 9.11 In a country such as Japan, which has much lower fertility than the UK and has had lower net immigration, it is likely that a much more significant element of population ageing is the result of cohort or generational aspects, rather than just increasing longevity. This is potentially much more difficult to deal with. Countries such as Poland, which are seeing significant net emigration of people of working age, are also in a more difficult position, although they may benefit from substantial remittances from their emigrant population.
- 9.12 Developments in health in other countries may also be different, the labour markets are certainly very different, and the social context varies widely. As an example of the social context, some recent work by the OECD⁴⁶ suggests a possible correlation between the fertility rate in different countries and the proportion of births outside marriage. The social context will also affect the levels of health inequalities, which are one of the less positive aspects of the position in the UK. Factors such as these make it very difficult to draw general conclusions and I would not suggest that any conclusions I have drawn above are of wider application outside the UK.

Youthful vigour

- 9.13 To the extent though that I am optimistic about the position in the UK and possibly rather less optimistic about the position in other countries, there may be a positive message to be drawn about the UK's future international competitiveness. Providing that we work for longer as longevity increases, there seems to be no reason why the proportion of the population in employment should not be maintained. In doing so, the average age of the workforce will increase, but the average state of health of the workforce will not necessarily reduce.
- 9.14 It is possible, but not inevitable that there will be some loss of youthful vigour and hence of entrepreneurship and innovation, but on the other hand there are likely to be some gains in experience. It is certainly not impossible to imagine a position with the best of both worlds, where the gains in experience are not offset by any loss of vigour. That may be more difficult for countries where the generational aspects are more significant.

⁴⁶ OECD family database SF2.4 share of births outside marriage and teenage births

Bibliography

Alder, J. *et al.*: 'The chronic disease burden – An analysis of health risks and health care usage' Cass Business School (2005)

Brayne, C., Matthews, F., McGee, M. and Jagger, C.: 'Health and ill-health in the older population in England and Wales' Age and Ageing (2001)

Breakwell, C. and Bajekal, M.: 'Review of sources and methods to monitor Healthy Life Expectancy' ONS Health Statistics Quarterly No. 26 (2005)

Brewer, M., Ratcliffe, A. and Smith, S.: 'Does welfare reform affect fertility? Evidence from the UK' Institute for Fiscal Studies (2008)

Christensen, K., Doblhammer, G., Rau, R. and Vaupel, J.W.: 'Ageing populations: the challenges ahead' The Lancet (2009)

Christensen, K., McGue, M., Petersen, I., Jeune, B. and Vaupel, J.W.: 'Exceptional longevity does not result in excessive levels of disability' Proceedings of the National Academy of Sciences (2008)

Colombo, F., Llana-Nozal, A., Mercier, J. and Tiadens, F.: 'Help wanted?: Providing and paying for long-term care' OECD (2011)

Comas-Herrera, A., Malley, J., Wittenberg, R., Hu, B. and Jagger, C.: 'Disability, dementia and the future costs of long term care' Eurohealth vol. 17 No. 2-3 (2011)

Crawford, R. & Tetlow, G.: chapter 2 of 'Financial circumstances, health and well-being of the older population in England' – The 2008 English Longitudinal Study of Ageing (wave 4). The Institute for Fiscal Studies (2010)

de Grey, A.: 'Ending Aging' St. Martin's Griffin (2008)

Dilnot, A *et al.*: 'Fairer care funding. The report of the Commission on Funding of Care and Support.' The Dilnot Commission Report (2011)

Giannakouris, K: 'Ageing characterises the demographic perspectives of the European societies' Eurostat (2008)

Harper, S., Howse, K. & Baxter, S.: 'Living longer and prospering?' The Oxford Institute of Ageing & Club Vita (2011)

Hayutin, A.: 'Critical demographics: rapid aging and the shape of the future in China, South Korea and Japan' Stanford Center on Longevity (2009)

Howse, K.: 'Increasing life expectancy and the compression of morbidity: a critical review of the debate' Oxford Institute of Ageing – Working Paper No. 206 (2006)

- Jagger, C., Christensen, K. and Murphy M.: 'Cohort differences in mortality and morbidity' *British Actuarial Journal* vol. 15 supplement (2009)
- Jagger, C., Matthews, R., Lindesay, J. and Brayne, C.: 'The impact of changing patterns of disease on disability and the need for long-term care' *Eurohealth* vol. 17 No. 2-3 (2011)
- Jollans, A.: 'Pensions and the Ageing Population' *Staple Inn Actuarial Society* (1997)
- Lafortune, G. & Balestat, G.: 'Trends in Severe Disability Among Elderly People: Assessing the Evidence in 12 OECD Countries and the Future Implications', *OECD Health Working Papers*, No. 26 (2007)
- Laing & Buisson: 'Care of elderly people. UK market survey 2010/11.' (2010)
- Macnicol, J.: 'Age discrimination. An historical and contemporary analysis.' *Cambridge University Press* (2006)
- Manton, K.G.: 'Changing concepts of morbidity and mortality in the elderly population.' *Milbank Memorial Fund Quarterly / Health and Society* (1982)
- Marmot, M.: 'Fair society, healthy lives. Strategic review of health inequalities in England post 2010' *The Marmot review* (2010)
- Matheson, J.: 'The UK Population: how does it compare?' *ONS Population Trends* No. 142 (2010)
- Mayhew, L.: 'Increasing longevity and the economic value of healthy ageing and working longer' *Cass Business School* (2009)
- Mitchell, H. & Guled, G.: 'Average age of withdrawal from the labour market. A methodology update.' *ONS* (2010)
- Morgan, O and Baker, A.: 'Measuring deprivation in England and Wales using 2001 Carstairs scores' *ONS Health Statistics Quarterly* No. 31 (2006)
- NHS: 'Personal Social Services Expenditure and Unit Costs England, 2009-10' *The NHS Information Centre* (2011)
- NHS: 'Community Care Statistics 2009-10: Social Services Activity Report, England' *The NHS Information Centre* (2011)
- Oeppen, J. and Vaupel, J.W.: 'Broken limits to life expectancy' *Science* (2002)
- Olatunde, O., Smith, M. and White, C.: 'Update to the methodology used to calculate health expectancies for the UK and constituent countries' *ONS Health Statistics Quarterly* No. 45 (2010)

ONS: 'Report: Decennial Life tables (2000-02)' Population Trends No. 136 (2009)

ONS: 'Cohort fertility 2009' - ONS Statistical Bulletin - 9 December 2010

Rasulo, D., Bajekal, M. and Yar, M.: 'Inequalities in health expectancies in England and Wales – small area analysis from the 2001 census' ONS Health Statistics Quarterly No. 34 (2007)

Salter, T., Bryans, A., Redman, C. & Hewitt M.: '100 years of state pension. Learning from the past.' Faculty of Actuaries and Institute of Actuaries (2009)

Sanderson, W.C. and Scherbov S.: 'Remeasuring Aging' Science vol. 329 (2010)

Sobotka, T.: 'The rising importance of migrants for childbearing in Europe'. Demographic Research (2008)

Tromans, N., Natamba, E, and Jefferies, J.: 'Have women born outside the UK driven the rise in UK births since 2001' ONS Population Trends No.136 (2009).

Abbreviations used in the paper

ADL	Activity of daily living
CARE	Career Average Revalued Earnings (pension scheme)
CFAS	Cognitive Function and Ageing study
DB	Defined benefit (pension scheme)
DC	Defined contribution (pension scheme)
DFLE	Disability-free life expectancy
ESA	Employment and Support Allowance
LE	Life expectancy
NHS	National Health Service
ONS	Office for National Statistics
PAYG	Pay as you go (pension scheme)
SPA	State Pension Age
TFR	Total Fertility Ratio