THE DAVID HUME INSTITUTE

Essays on Demography and Ageing

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Foreword

The David Hume Institute was delighted to hold a seminar on the implications of population ageing in the Autumn of 2008. We have to thank HBOS for their generous sponsorship allowing Prof John Ermisch, a world-renowned expert on this area, to present a paper at the Royal Society of Edinburgh. To bring into greater focus the Scottish data an additional paper was prepared by Prof Robert Wright and Katerina Lisenkova of Strathclyde University and funded by the ESRC.

Prof Ermisch provides an overview of demographic trends including data covering not only declining mortality and fertility rates, but also changes in family formation and composition. His analysis of the impact of an ageing population goes beyond thinking about how a proportionately smaller working age population supports others dependant upon it. Turning to less frequently explored territory he reflects on the implications of a changing age structure on investment in human capital and the housing market.

The proportion of people of working age (20-64) to those aged 65 and over falls from 3.7 'worker' per 'pensioner' in 2006 to 2.5 in 2031. Among those aged 65 and over the percentage aged 80 and over increases from 28% to 34% in the same period. Ermisch suggests that private savings, private pensions and occupational pensions are unlikely to be sufficient to meet the needs of a larger retired population. Consequently state pensions will be an important part of retirement income in the future. To keep state pensions in line with earnings National Insurance Contributions need to be increased by a third, yet the sustainability and equity of increases of this order needs consideration. In terms of sustainability the increased cost burden an older population implies for the state creates a great uncertainly of what will be affordable in the future. In terms of equity, the need to transfer more income from the working population through higher taxation places an increased burden on future generations. Generational accounting suggests that to keep the tax burden the same for future and current generations (adjusting for growth) requires immediate and permanent tax increases of 6 per cent at the very least.

Ermisch's discussion ranges to the impacts of an ageing population on investment in human capital. His conclusion that changing family formation patterns lead to less efficient expenditure on children must raise serious concern, especially when it is that generation which will bear the burden of supporting a larger older population. In the housing market too, Ermisch tackles a less expected consequence of changing demographics. Changes in household formation patterns are likely to increase the rates at which people move home putting upward pressure on house prices. Ermisch's paper takes us beyond the more familiar consequences of population ageing such as the difficulties of adequate pension provision and points out significant impacts in other fields. This helpfully shows the complex and all-encompassing effects of demographic change and indicates how our thinking on the policy impacts of ageing can be usefully broadened out.

Lisenkova and Wright supplement Ermisch's paper with data focusing particularly on Scotland. The data suggest that population decline is further advanced here than south of the border. Their discussion of policy implications notes that while not all effects of population decline are negative, the negative impacts of a declining labour force have clear negative macroeconomic consequences: reducing competitiveness and output while increasing inflation. They suggest increased net migration, increasing women's labour market participation, and increasing productivity as policy responses that could mitigate population ageing and its effects. The paper ends by sketching out the dilemma posed by demographic decline: as populations age costs increase yet the ability of an economy to meet those costs is likely to decline as well.

There is no simple answer but this dilemma needs to be brought further into the debate regarding Scotland's economic future. We hope these papers and the 5th November seminar will help to that end.

I should end by noting that the David Hume Institute has no collective view on the contents of these papers or of the policy implications.

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February 2009

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Population Ageing: Crisis or Opportunity?

John Ermisch

This seminar represents a milestone for me. I published my first book 25 years ago on the topic of this seminar: the political economy of demographic change, particularly the economic implications of changes in the population's age distribution (Ermisch 1983). I welcome the opportunity to return to this subject. But there are, of course, more important milestones in the study of this subject: Keynes' (1937) short pamphlet and Reddaway's book (1939) on the economic consequences of a declining population, followed by the deliberations of the Royal Commission on Population, which was set up in 1944, but did not report until 1949.

In looking forward over the first three to five decades of this century, we should be cautious about the inferences that can be drawn from the prospective demographic changes because the economies and societies that will exist in 2030 and beyond may be very different from today's (independent of the demographic changes). Could any of the experts involved with the Royal Commission have imagined what today's society would be like, or even 1980's society? The National Health Service had only just begun when they reported, and the new welfare system based on Beveridge's ideas had just started. In terms of demographic change itself, the Commission was concerned about the impacts of declining fertility in the 1920s and 1930s, but the fertility rate had already risen during the war, and six years after the Commission reported it was to begin a sustained rise to levels not reached since the beginning of the 20th century.

That is not to say that the exercise in this paper - assessing the implications of demographic changes on the assumption that society does not change dramatically - is pointless; only that it should be strongly qualified by uncertainty. There may be clues to how society will change in the prospective changes in the population, and a starting point for assessing their implication must be today's society and institutions. We should, however, remain sceptical of particular scenarios that may suggest themselves from today's perspective, focussing instead on developing policies and institutions that have the ability to react to events rather than relying on the ability to predict them. Flexibility should be our guiding principle when dealing with the uncertainty that we face.

The paper proceeds as follows. The next section discusses the changes in the distribution of life expectancy over the past 30 years as a consequence of declining mortality. This is followed by a discussion of how the patterns of family formation and dissolution have changed over the same period and their relation to changes in fertility and the composition of families. In the third section, the consequences of past and projected changes in mortality, fertility and migration for key aspects of the age distribution of the population are presented. The fourth section is a core part of the paper. It discusses the economics of supporting an ageing population. The next section discusses the challenges for investment in children produced by changes in family formation and dissolution patterns, and the following section analyses the implications of ageing and family formation patterns for the housing market. The final section presents the main conclusions of the paper.

1. Declining mortality

The most obvious way that the age distribution of the population shifts toward older ages is people living longer. Figure 1 illustrates the decline in mortality in Great Britain for each sex by plotting the number per 100,000 births surviving at each age in two English 'life-tables', one based on mortality rates in 1980-82 and the other based on mortality rates in 2004-2006.

Such life-tables indicate the proportion of people surviving at each age if the age-specific mortality rates in the particular years were experienced by a new born through his or her life. It shows for example that at 2004- 06 mortality rates, 80% of women would survive to their 73rd birthday compared with only 70% for those experiencing the mortality rates of 25 years earlier, or putting it somewhat differently, 80% only make it to their 68th birthday at the mortality rates of 1980-82. It also evident from the overlapping survival curves in Figure 1 that men's 2004-2006 mortality experience only achieves the survival rates of women 25 years earlier.

Figure 1: Proportion Surviving: Comparing 1980-82 and 2004-2006 Lifetables by Sex

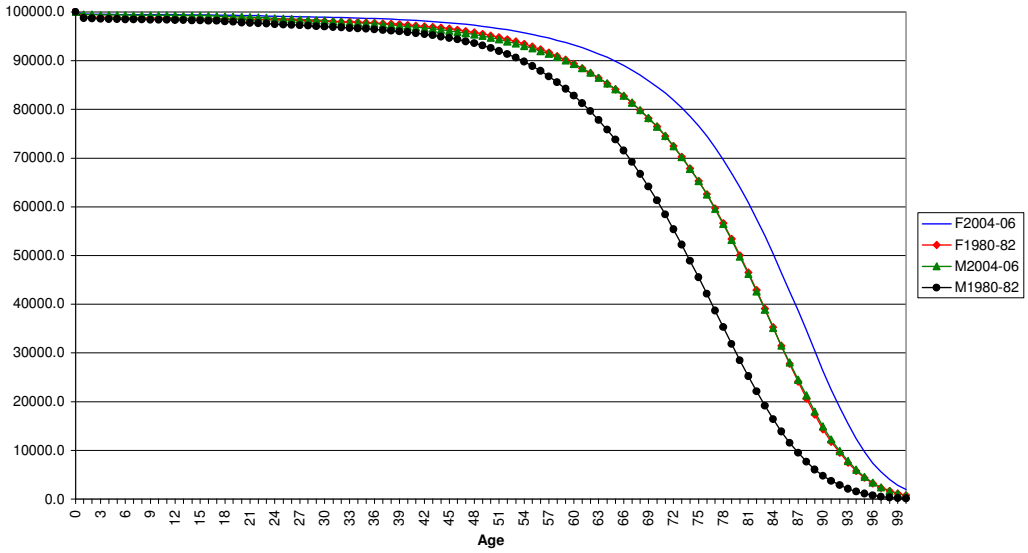
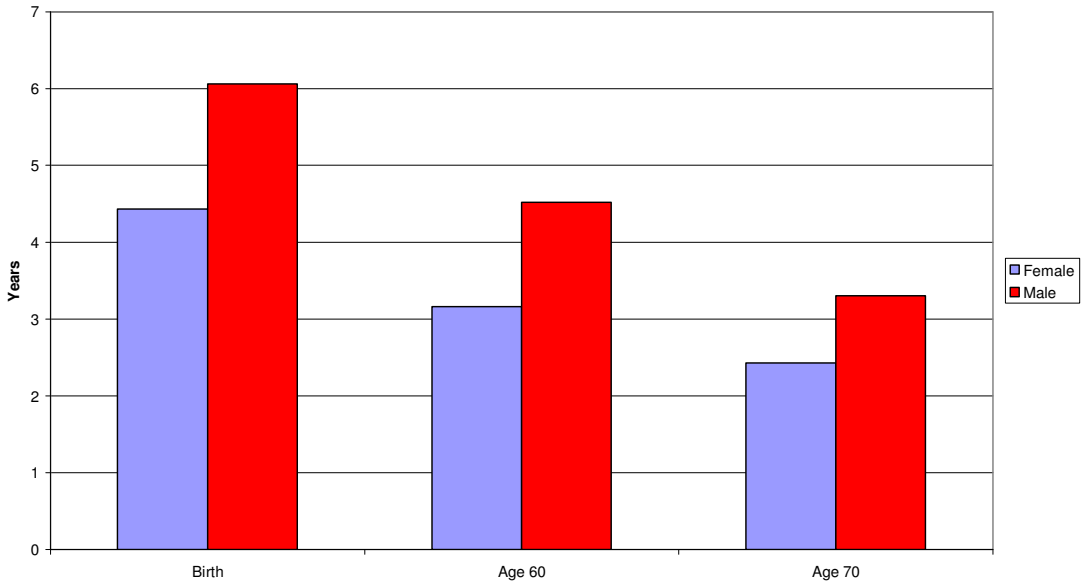


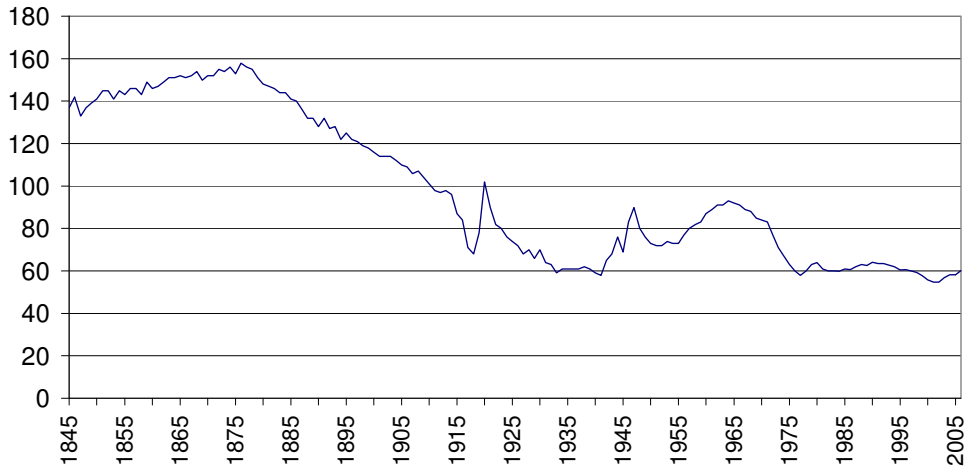
Figure 1 indicates that improvements in the chances of surviving are particularly large at ages above 60. Figure 2 presents these same data in another way. It shows the gains in the expectation of remaining life between these two life-tables at birth, age 60 and age 70 for each sex. Men have clearly made larger gains at each age than women. For example, their remaining life expectancy at age 60 has increased by 4.5 years compared with 3.2 years for women. As Figure 1 showed, women still live much longer on average. According to the 2004-06 life-table, women can expect to live 24 more years at age 60 compared to 21 more years for men. At birth, their respective life expectancies are 81.3 and 76.9 years.

Figure 2: Gains in Expectation of Remaining Life, Comparing 1980-82 and 2004-06 Lifetables



These reductions in mortality at ages above 60 clearly increase the older population relative to the entire population, as we shall illustrate later with projections of the population by age. Over the long term, e.g. 1875-1940, declining fertility made a larger contribution to the ageing of the population than reductions in mortality. But the fertility fluctuations in the past, illustrated in Figure 3, have produced bulges and hollows in the age distribution, and the baby boom of 1955-70 will soon produce a large increase in the population aged 65 and over. The next section examines fertility in the context of the new dynamics of family formation.

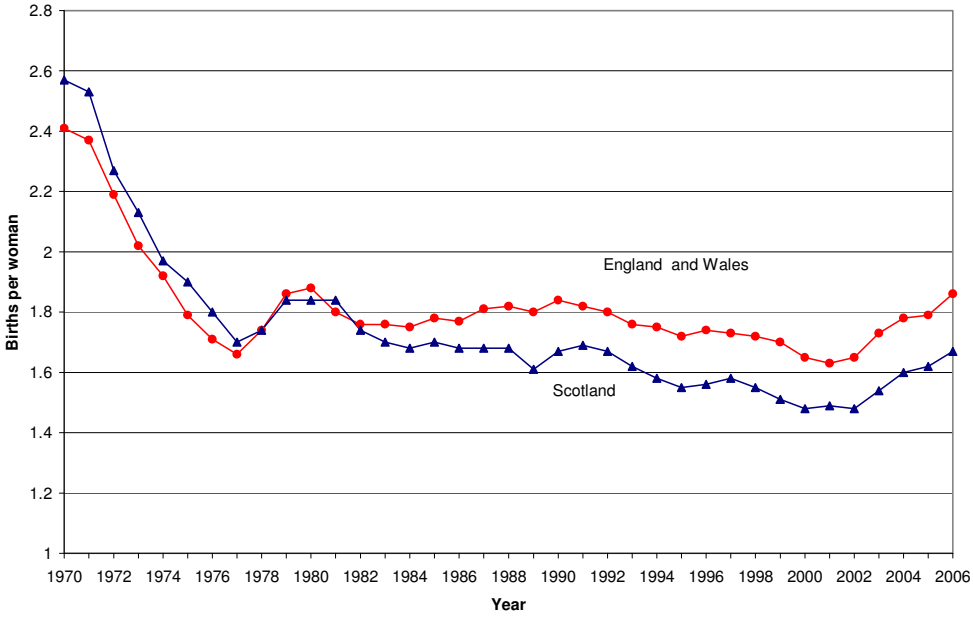
Figure 3: General Fertility Rate (per 1000 women aged 15-44), England and Wales



2. New dynamics of family formation

The 'total fertility rate' (TFR) measures the number of children women would have during their life if they experienced the current year's age-specific fertility rates throughout their childbearing years. Changes in the English and Scottish TFRs over the last 36 years are shown in Figure 4. There was a cross-over point in the early 1980s when Scottish fertility fell below English fertility, but since the late 1980s their TFRs have moved in parallel, including a significant rise since 2002. In what follows I consider Great Britain as a whole, as what I say applies to all three constituent countries. In order to put these fertility changes in the broader context of family formation patterns, I compare women born in the 1950s, 1960s and 1970s.[1] The first group were making their important family formation decisions in the 1970s, and the last in the 1990s.

Figure 4: Total Fertility Rate, England and Scotland



In Britain, live-in partnerships, be they formal marriage or not, have been forming later in people's lives. For instance, comparing women born in the 1950s with those born in the 1970s, the age by which one-half had their first live-in partnership increased from 22 to 25. Another big change over the last quarter of the twentieth century is that in the new millennium the vast majority of partnerships now begin as informal, cohabiting unions. These unions rose as a proportion of first partnerships from about one-quarter for women born in the 1950s to over four-fifths for women born in the 1970s. These two changes lie behind the large postponement of marriage and motherhood in women's lives. Cohabiting unions have a high dissolution rate, and it has increased over time: now one-half of the cohabiting unions eventually dissolve, with the other half turning into marriage. Divorce also became more common for successive cohorts born from 1926 to 1961.

[1] I use fertility and partnership histories derived from the British Household Panel Survey (BHPS) by linking respondents' retrospective histories with their partnership and fertility experience during the panel, 1991-2005. This provides information on a range of post-war birth cohorts. See Ermisch (2006) for further details of the statistics in this section.

Investigation of the social differentiation of family formation patterns, say by education level or family background, improves our understanding of the causes and consequences of changes in these patterns.
Here we compare women whose highest qualification (by 2005 or the last time they were observed in the panel) is at most GCSE/O-level (or its Scottish equivalent), which is usually obtained by the age of 16 or 17, with those with a higher qualification than that, denoting these as 'less' and 'more' educated women, respectively.[2]

There was much greater postponement of first live-in partnership for more educated women. Among the 1970s cohorts, less educated women partner, on average, 2 years earlier than more education women (median age of 24 cf. 26). More educated women also were pioneers in adopting cohabitation as the form of their first union, but by the 1970s cohorts there was little difference by educational attainment.

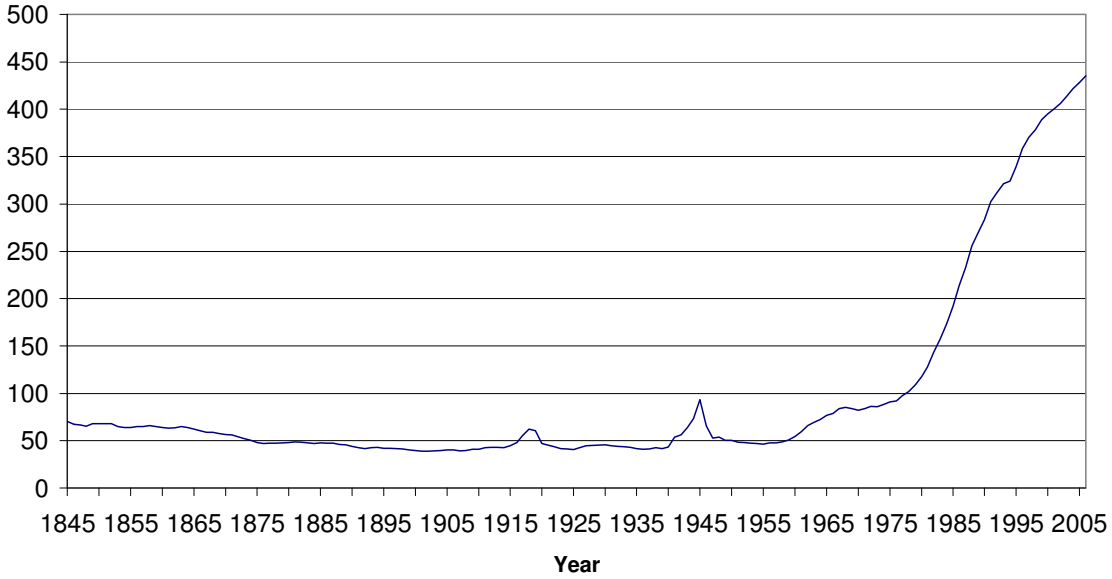
Despite the fact that age at first union is later for more educated women born in the 1970s, their median age at marriage was about the same as that for less educated women. This is because less educated women are more likely to dissolve their first cohabiting union (rather than marry their partner) than more educated women. It takes time to form a new union after dissolution; it will usually be a cohabiting union; and time will elapse before the couple marry, if they do so. All of this lengthens the time to first marriage.

Marriage was postponed more than childbearing for less educated women: among women born in the 1970s, the difference in median ages of marriage (32) and motherhood (26) was 6 years for less educated women.[3] This implies a rise in childbearing outside marriage, and there has indeed been an explosion of non-marital childbearing after at least 130 years of stability, rising from 9% of all births in 1975 to 44% in 2006: Figure 5 shows the figures for England and Wales. Since 1995, the percentage of births outside marriage has risen even faster in Scotland, reaching 48% in 2006. In part this difference reflects a different ethnic composition of births between the two countries: in 2006, 22% of births in England and Wales were to mothers born outside the UK. When we restrict ourselves to women born in the UK, 49% of English/Welsh births in 2006 were outside marriage, similar to Scotland.

[2] There is no presumption that differences in educational attainment 'caused' the family formation differences that we observe; education is only used a convenient grouping variable, reflecting many differences in women's family background and individual orientation and lifestyles. It is also associated with other socio-economic indicators.

[3] For more educated women born in the 1970s, the median age of first birth was slightly larger than the median age at first marriage.

Figure 5: Births Outside Marriage per 1000 Live Births, England and Wales



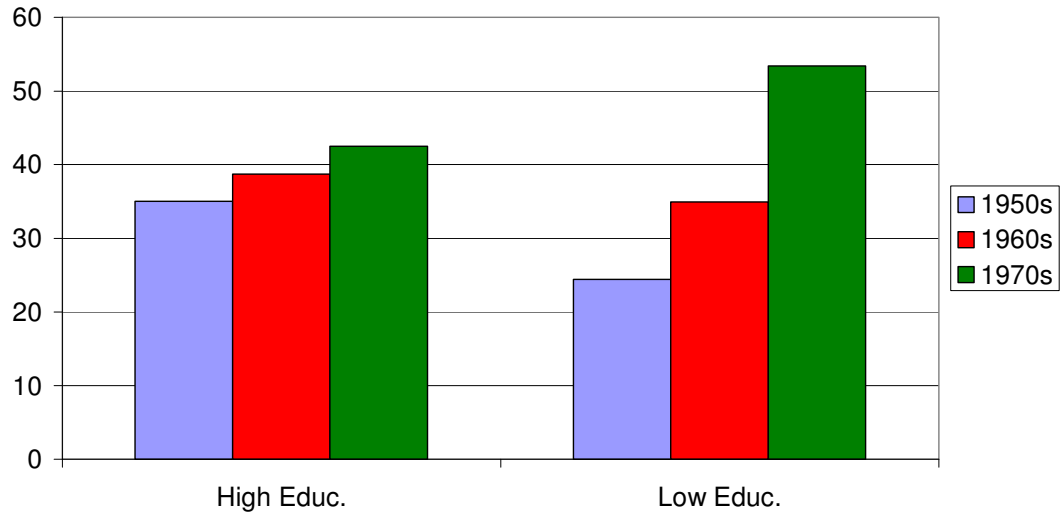
How many of these births outside marriage are to cohabiting couples? We can use the birth registration data to estimate the proportion. Births to cohabiting couples are identified as those in which the parents jointly register the birth and the parents live at the same address, and the remaining births outside marriage are assumed to be to women on their own.[4] Between 1983 and 2005 in England and Wales, there was a relatively steady upward trend in the percentage of all births to cohabiting couples according to this definition: it rose from 7% to 27%. Expressed as a percentage of births outside marriage, births to cohabiting couples rose from 48% in 1983 to 64% in 2002, since which time it has stabilised. As the earlier comparison of median ages of marriage and motherhood suggest, birth rates outside marriage, either in a cohabiting union or outside a live-in partnership altogether, have risen more for less educated women.[5]

Cohabiting unions have a high dissolution rate, and, as Figure 6 shows, it has increased over time, with increase being larger for less educated women. In contrast to earlier cohorts, among women born in 1970s, less educated women are more likely to dissolve their unions than more educated ones. Also, among those born since 1960 less educated women have a divorce rate 30% higher than that of more educated women.

[4] That is, those registered only by the mother or by both parents, but who give different addresses.

[5] Among women born in the 1950s, less educated women had a cohabiting union first birth rate 1.8 times higher than that of more educated women, and this rose to 2.8 times higher among born in the 1970s. The corresponding ratios for the birth rate outside a live-in partnership were 2.2 and 4.8.

Figure 6: Percentage Dissolving their First Cohabiting Union by Educational Attainment and Cohort



Thus, fertility decisions are now made in an environment of considerable partnership instability. While the majority of births outside marriage are born to parents living together, these unions are not very stable (about one-half dissolve), and also in excess of 40% of marriages eventually dissolve. Focussing on unions with children, I estimate that 30% of children born within marriage will *not* live their entire childhood (to their 16th birthday) with both natural parents, and this percentage rises to 65% of children born into a cohabiting union. Furthermore, over one-third of births outside marriage are to parents who did not live together, at least at the time of birth registration.

While divorce remains the primary way that lone parent families are formed, the sharp rise in childbearing within cohabiting unions also made an important contribution to the increase in lone parenthood, because of the high dissolution rate of cohabiting unions and because the 'conversion to marriage' rate is *lower* for mothers than childless women in cohabiting unions. The patterns discussed above imply 'social selection' into lone parenthood: less educated women are more likely to (1) have a child outside of a live-in partnership; (2) have a child within a cohabiting union; (3) dissolve a cohabiting union; and (4) dissolve a marriage. Thus, lone mothers are disproportionately among less educated women.

Later in the paper we shall discuss implications of these family formation and dissolution patterns for investment in children's human capital and for the composition of households. The next section discusses projections of the population over the next two decades, which primarily reflect past changes in fertility and projections about future improvements in life expectancy, but also net immigration to the UK.

3. Population projections to 2031

In discussing these projections, I focus on people aged 20 and over because, at least up to 2028, these people have already been born, although they may not be currently in this country—see below. As Figure 3 showed, there have been considerable fluctuations in fertility in the past, and recent years have seen a significant rise in fertility.

Since 2001, the fertility rate (births per 1000 women) in England and Wales has risen in every five-year age group but teenagers, reflecting a rise in both the inside-marriage (per 1000 married women) and outside marriage rates (per 1000 unmarried women) for every age group other than teenagers. Because the proportions that are unmarried have also risen in every age group, continuing an upward trend since the early 1970s, there has been an upward trend in the percentage of births outside marriage in every age group, particularly among women aged under 30, but also for those aged 30-39. It is, therefore, possible that we may experience higher fertility than assumed in the projections, with more of it occurring outside marriage.

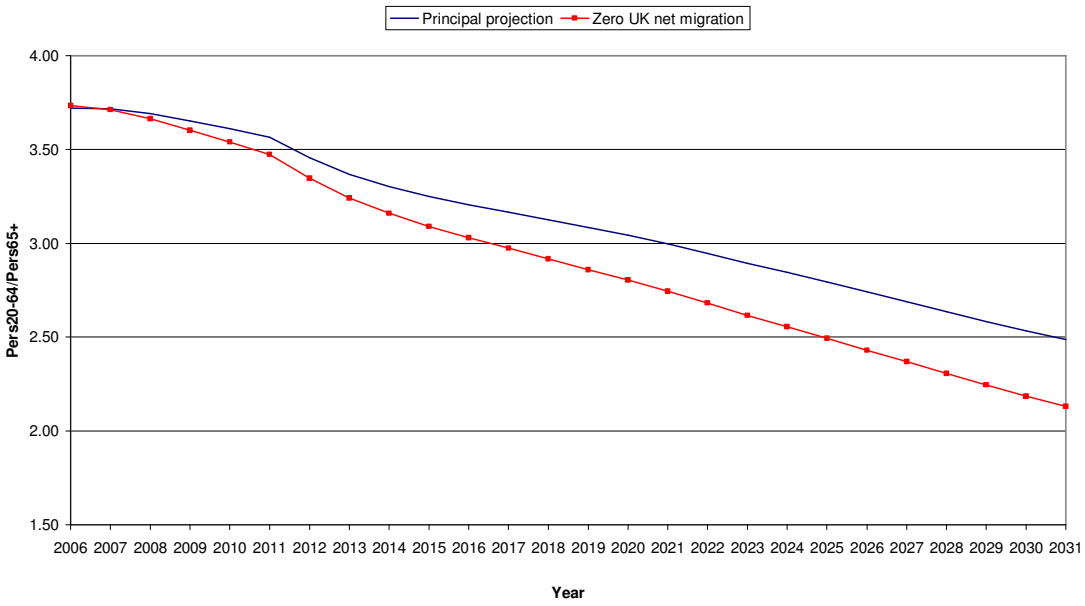
The Government Actuary Department's (GAD) 2006-based principal projection assumes that, for England and Wales, the long-term average completed family size will be 1.85 children per woman (cf. 1.86 in 2006). A lower level of 1.65 is assumed for Scotland. In the shorter-term, the projections assume that the total fertility continues to increase until 2010 and then to fall slightly; that is, total fertility rates in the first few years of the projections are above those assumed for the long term. Assumed improvements in mortality rates after 2006-07 are based on trends.

International migration is even more difficult to forecast accurately than fertility, depending on economic and political developments abroad as well as in the UK. The GAD assumes that net migration into the UK will be 190,000 per annum from 2014 onwards. Over the period 2007-12, there is an allowance for additional net migration to the UK from the accession countries which joined the European Union in May 2004 and January 2007. The average annual level of total net immigration to the United Kingdom assumed for this period is around 215,000. This is similar to that actually experienced during 2004-06, the two years following the enlargement of the EU in May 2004, but a little above the assumption of 195,000 for 2006-07.

These assumptions produce a projected increase in what I shall call the 'working population'—persons aged 20-64—of 3 million between 2006 and 2031, with one-half of that being between 2006 and 2012, reflecting the short-term international migration assumptions (these assumptions particularly affect the working population because of the age distribution of migrants). Dividing the working population by the number of people aged 65 and over gives what I call the 'aged support ratio'. Figure 7 shows that it falls from 3.7 'workers' per 'pensioner' in 2006 to 2.5 in 2031.[6] The assumptions about migration play an important role in these calculations. Taking the extreme of zero net migration into the UK, the UK working population would fall by 2 million between 2006 and 2031, and as Figure 7 shows, the aged support ratio falls to 2.1 by 2031.

[6] It is projected to fall further in the 25 subsequent years, to 2.1, under the long-term fertility and migration assumptions.

Figure 7: Aged Support Ratio, Great Brtain



Future developments in the population age structure like those in Figure 7 are common across Europe; indeed, Britain is a relatively 'good case'. The implications of low fertility and improvement in mortality for the age structure of European populations are examined using the 2005-based UN 'medium' population projection (2006 Revision). Because it assumes a recovery in European fertility, converging to 1.85 children per woman by 2050, this projection may be considered relatively optimistic in terms of population ageing and decline. Despite this, the aged support ratio declines throughout Europe, reflecting the dramatic increase in the retired population (65 and over) everywhere. Figure 8 illustrates the decline for some major developed countries. By 2030, this ratio is around 2 workers per pensioner in Germany and Italy, below 2 in Japan.

Figure 8: Aged Support Ratio
Ratio of Population Aged 20-64 to 65 and over

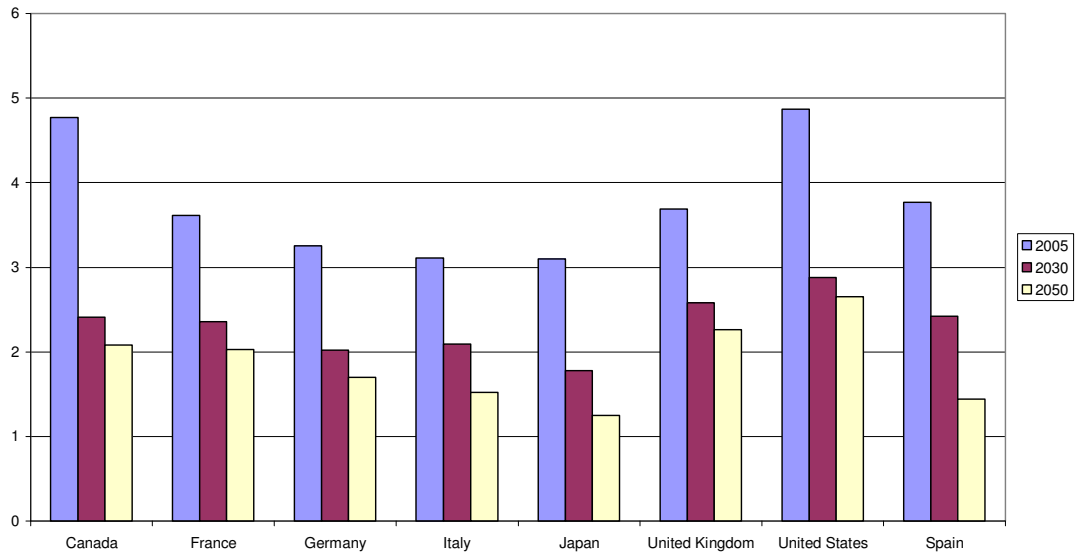
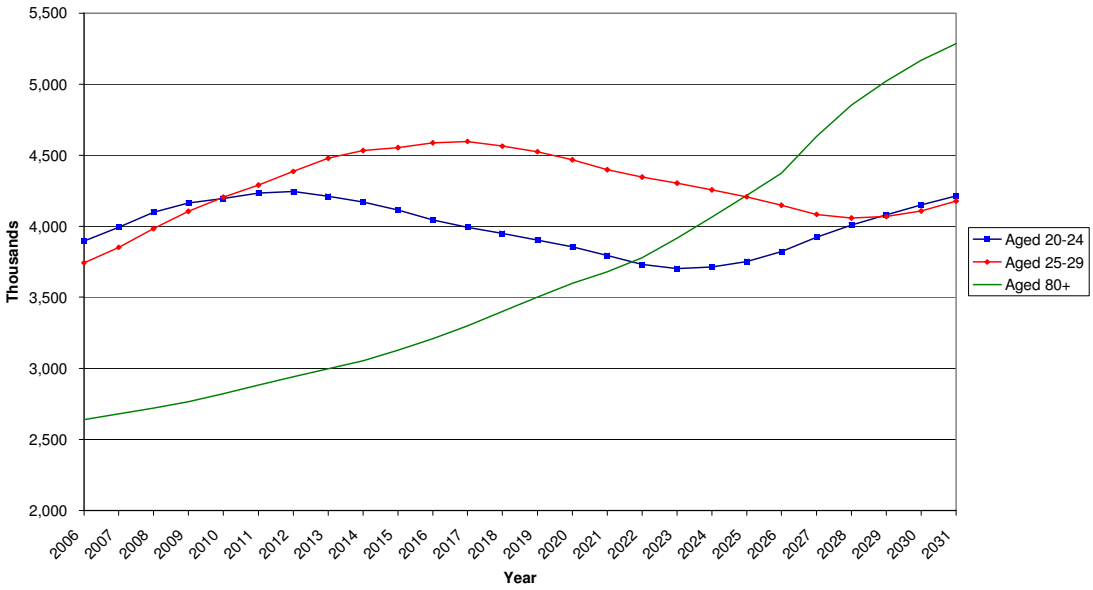


Figure 9 shows the number of British people in three key age ranges. Persons aged 20-24 are important for new household formation (as well as new labour force entry of graduates), and those aged 25-29 are important for first house purchase. In both of these series you see the echo of earlier fertility waves (and assumed immigration), with the number of 20-24 year olds rising, peaking in 2012 and then declining, and the rise is prolonged for 5 years for 25-29 year olds (peaking in 2017). The number of 'very old' (aged 80 and over) rises at an increasing rate, the increase totalling 2.6 million over the projection period to 2031. As a proportion of the population aged 65 and over, the very old increase from 28% (2006) to 34% in 2031.

Figure 9: Persons of Key Ages, Great Brtain



The remaining sections explore the economic implications of these projected changes. I will focus on supporting a retired population, investment in children and housing market impacts, ignoring implications for the labour market except through the effect of fiscal pressures arising from an ageing population.

4. Supporting an ageing population

Somehow output must be transferred from those producing it to the retired population, who are only consuming it: either through transfers within the family, retirees' private claims to the production of others (returns on capital, including funded pensions) or through government transfers paid by current taxes (unfunded pensions). The decline in the aged support ratio shown in Figure 7 means that there are fewer producers to make these transfers in the coming years. To what extent does that matter?

Family transfers

Affection, love and altruism toward parents could motivate transfers from adult children to parents, thereby internalising support for retirees within the family. But Richard Smith (1996) suggests that there is not compelling evidence from English history, going back to Medieval times, that people assumed automatic responsibility for their elderly parents.

He believes that it:

> 'seems possible to argue with conviction that reciprocal exchange on the basis of mutual advantage is the essence of support between kin, making the family a group whose relationships are founded on material considerations and not solely glued together by what Janet Finch calls "moral imperatives and ties of affection" (p.44).

In the spirit of David Hume's 'human conventions', there might, however, be a 'social contract' involving reciprocal intergenerational exchange over the life cycle that is motivated by selfish material considerations, such that everyone is better off by obeying it. In particular, there could be an extended family network of transfers of money and 'services' covering three generations at different stages of life (Cigno 1993, 2000). Such a 'family constitution' arranges transfers to its young members (children) from its middle-aged ones and enforces 'repayment' later when the young 'borrowers' have become middle-aged and the middle-aged have become old. It specifies the minimum amount of money and services that each middle-aged adult transfers to her children and the minimum amounts she must transfer to her parent, subject to the provision that a person will receive nothing when she is old if she did not transfer the prescribed amounts to her parents when she was middle-aged. It is a *self-enforcing* family constitution in the sense that it is in the best interests of every family member to obey it and to have it obeyed.[7] The self-enforcing family constitution is therefore a type of social contract which, using David Hume's metaphor, holds together like a dry stone wall.

Extra-family institutions that support elderly parents, like the old Poor Laws or the current welfare state, discourage intra-family financial transfers but may promote substitution by adult children of non-financial support (i.e. help) for financial support. This may account for the fact that in the 17th-18th centuries it was not uncommon for elderly parents to be receiving Poor Law support while their children lived in the same parish (Smith 1996), and it may account for the low level of financial transfers from adult children to parents in modern British society: only about 5% of parents receive regular or frequent financial help from children (Ermisch 2008).

Private saving

In the absence of an important role for the family in supporting transfers of resources to retired people, it is left to the market and the state to adjust these intergenerational transfers to a new demographic situation. Starting from a theoretical standpoint, compare two closed steady-state economies with different population growth rates, each made up of forward-looking people who maximize their lifetime well-being.[8] People would save more in the one in which population growth is slower and the aged support ratio is lower, thereby providing more capital (including human capital) to each member of the working population, which increases their real wages. They would have higher discounted lifetime consumption, made possible by more capital per worker and a lesser need to equip new workers with capital. A lower aged support ratio (slower population growth) presents no problems in this world, only opportunities.

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[7] Binmore (2005, p.87) suggests a similar intergenerational contract that can be sustained by selfish people. The minimum transfer to parents could be interpreted as adult children's 'moral duty', which is fulfilled because the constitution is self-enforcing

[8] In comparing the two economies, we can assume that the interest rate in the respective economics are at the 'golden rule' rate that maximises steady-state lifetime well being (equal to the population growth rate), because Samuelson (1975) shows that there is always a combination pay-as-you-go, funded pension scheme that can achieve the 'golden rule' interest rate.

This is a steady-state comparison for an economy with forward-looking consumers. In reality, Britain and other countries have experienced large past fluctuations in fertility (Figure 3) and a downward trend in mortality, and not all (or even most) people are so farsighted. In light of the latter, you could view the UK and other countries' pay-as-you-go (PAYG) pension systems as helping to offset the effect of some people's life cycle planning myopia on their income in retirement. Within the PAYG system, real pension benefits can be maintained in the face of the decline in the aged support ratio (working population per pensioner) without increasing the national insurance (NI) contribution rate if there is compensating growth in the real wages of the working population. For instance, in Figure 7, the aged support ratio falls by one-third between 2006 and 2031; if real wages grow by one-third in this 25-year period, which is likely, then real pension benefits can be maintained without changing the contribution rate. This is consistent with the Government Actuary's Quinquennial Review Update (GAD 2005), which projects a fall in the (employer +employee) NI contribution rate from 19.3% in 2004-05 to 17.7% in 2030-31 when there is price up-rating of flat rate benefit rates and earnings limits and real earnings grow at 2% per annum.

But price up-rating entails that pensioners do not share in the increase in the working population's standard of living. With 2% per annum real earnings growth, the ratio of pensions to wages falls by nearly 40% in 25 years. For example, the UK basic (flat-rate) pension would fall from 19% of median weekly earnings of full-time workers in 2007 to 12% in 2031.

It is possible that today's older workers are anticipating lower state pensions relative to earnings and are saving more to compensate. There is, however, little evidence of this yet. For example, the 2002 English Longitudinal Study of Ageing (ELSA) measures the net financial wealth (financial assets less debts other than mortgages) of the family unit in which a person lived (before the more recent rise in household indebtedness). Focussing on people aged 55-59 (on the brink of retirement), three-fourths off them had net financial wealth less than £57,300 (Marmot et al (2003), Table 3A.7). One-half had less than £17,000 and one quarter had less than £1,500, with nearly one-fifth having no net wealth. These amounts are hardly the nest-eggs needed for retirement. Furthermore, recent events in financial markets have underlined the uncertain value of financial wealth around the time of a person's retirement.[9]

What about occupational or private pensions? While most men have been members of an employer's pension scheme sometime during their working, this is not true of women (e.g. in 2002, about 35% of women aged 55-59 have never contributed to a private pension scheme compared to 11% of men of that age (Marmot et al (2003), Table 4A.16). Even those who contributed may have limited entitlements because of changes in their employers over their working life. Just after retirement, only about 30% of family income came from private pensions in 2002 (e.g. for people aged 65-69; Marmot et al (2003), Table 3A.1). Even with a good contribution record, funded Defined Contribution pension schemes present uncertainty about the value of assets at the time of retirement similar to direct private saving, as recent events have shown. Defined Benefit ('final salary') pension schemes are not risk-free for pensioners either, and they are challenged by population ageing as well, as the number of recipients rises relative to contributors and recipients live longer.

Statistics from the Pension Protection Fund (PPF) indicate that, in aggregate, these schemes currently have a large deficit (discounted future pension liabilities exceed assets), with four fifths of schemes being in deficit at the end of September 2008.

[9] Of course, this ignores net housing wealth (house value less mortgage debt). Adding this to net financial wealth, three-fourths of people aged 55-59 have less than £203,900 in net wealth including housing (one-half less than £100,000; one-quarter less than £37,500; (Marmot et al, Table 3A.10).
These are amounts do not provide for very large annuities for retirement from equity release schemes.

Such deficits put upward pressure on contribution rates, both directly and indirectly through a higher risk-based levy to the PPF, and create major problems if the scheme is wound up or fails. Taxpayers may have to foot the bill if the PPF runs out of money through the failure of schemes, and members who have not yet retired would also suffer because the PPF only pays 90% of promised pensions and there is a pension ceiling. In sum, private solutions to supporting a larger retired population may not be robust.

State pensions

The analysis of the previous section suggests that for a large proportion of British people retiring in the coming decades the state pension will be an important part of their retirement income. Suppose, therefore, that state pensions are increased proportionately with earnings (i.e. pensioners' relative income is held constant) so that pensioners can share in increases in the population's standard of living. Then the NI contribution rate would need to rise by one-third. This simple calculation is very close to that of the Government Actuary's when there is earnings up-rating of flat rate benefit rates and earnings limits. He projects that the NI contribution rate would need to rise to 25.4% in 2030-31 compared with 19.3% in 2004-05, an increase of 32% (GAD 2005). Two considerations need to be taken into account in assessing policy options regarding state pensions.

First, it is important to consider the uncertainty surrounding future demographic developments as well as the broad tendencies suggested by population projections. Lee and Anderson (2004) address this issue in the context of the U.S. Social Security pension scheme. They characterise the uncertainty in terms of the probability distribution of the hypothetical immediate and permanent tax increase needed to balance the system over the very long run. For instance, they estimate this tax increase to be between 1.3% and 10.5% (of the present value of payroll) with 95% probability—a wide range.[10] As they stress, this understates the uncertainty involved because they incorporate into the forecasts 'only uncertainty that arises within the context of assumed structural continuity and homogeneity.' Random variations about expected values (e.g. wage growth and fertility) occur, but the expected values themselves are assumed to be constant. Their main conclusion from their stochastic simulations is the importance of formulating adaptable or self-correcting policies for addressing the long run imbalance.

Second, we need to consider whether future rises in state pension contribution rates can be sustained, as well as the equity of such rises. In doing so we must recognise that future pension liabilities under the state pension system represent just part of the future generations' fiscal liabilities. There is, for example, the existing national debt, although this is dwarfed by future pension liabilities and also, but less easy to quantify, other future government expenditure, for example on health care, which is likely to grow substantially because of the large increase in the population aged over 80 (Figure 9). It is hard to quantify what the implicit promises of the National Health Service are for the future, but whatever they are they need to be paid by the working population at that time.

Generational accounting

'Generational accounting' is a way to addresses these issues associated with the government's inter-temporal budget constraint. Generational accounts are defined as the present value of taxes paid minus transfer payments received (net taxes) that individuals of different age cohorts are expected, under current policy, to pay over their remaining lifetimes. Cardarelli et al (2000) have constructed generational accounts looking forward from 1996.

[10] They also show how finite horizons in pension finance forecasts can be misleading, and use a 500-year stochastic projection, effectively infinite with discounting, to mimic an infinite horizon forecast.

Their 'baseline policy' assumes that all transfer payments (including pensions) are price indexed, while all other receipts and expenditures per beneficiary are assumed to grow with productivity (real wages) at 1.75% per annum. Clearly, many other assumptions must be made in order to look well into the future, but indexing is an important policy parameter. Under the baseline scenario, government spending on personal transfers declines dramatically as a percentage of GDP, despite the ageing of the population. An alternative scenario indexes pensions and other social benefits with wages, and allows for an increase in health care expenditure to rise to the European average (as a percentage of GDP) by 2005—a rise which was in fact achieved.[11]

They calculate that under the baseline policy an immediate and permanent increase in income taxes of 6% (equivalent to a 2p in the basic tax rate) is needed to achieve inter-temporal budget balance, and a slightly larger income tax increase (8%) is needed to produce 'generational balance'—'a situation in which future generations face the same fiscal burden, as do current generations when adjusted for growth (i.e. when measured as a proportion of their lifetime earnings)' (Cardarelli et al 2000; p. F548). Should, however, all benefits increase with earnings and there is the additional health care expenditure per beneficiary assumed above, inter-temporal budget (and generational) balance would require an immediate and permanent increase in income taxes of 32% and NI contributions would also have to increase by 46% to cover the cost of the increase in contributory benefits.[12] Failure to increase income taxes today puts a considerable burden on future generations, experienced through either higher taxes, smaller transfer receipts or less expenditure on these generations. By affecting net incomes, higher taxes and NI contributions are likely to influence people's saving behaviour and therefore the economy's capital accumulation.

Fiscal effects on the real economy

In the most recent of a series of papers, Fehr et al (2005) bring demography (including immigration as well as fertility and mortality), fiscal policies (including pensions and their financing) and the economy (saving and labour supply decisions by forward looking consumers) together in a general equilibrium model incorporating the USA, the EU, Japan and China. While the foundation of this model rests on many assumptions, it indicates some of the most important channels of interaction that need to be considered when assessing the implications of population ageing, whatever one thinks about its particular assumptions. Their simulations illustrate the potentially important role of international capital markets in moderating the impacts of ageing. Without high-saving China in the model, capital accumulation in the three other developed economies is much slower and there is virtually no increase in real wages up to 2030. Looking beyond 2030, there tends to be capital 'shallowing' (rather than deepening) and a small decline in real wages due to the high tax burden to finance the elderly population. When China is included in their model, even a China which gradually adopts Western spending habits, it is such a source of capital that capital deepening and real wage growth occurs over the next 25 years in all four regions, despite the rising burden of taxation to pay for pensions and health care. While only suggestive, these simulations underline the fact that population ageing and reactions to it are a world phenomenon, albeit with variation among countries in changes in the age distribution and in other parameters affecting economic decisions.

Policies related to human capital formation cannot be addressed in the framework of Fehr et al (2005) because it assumes exogenous changes in productivity of people's time—there is no explicit link between government investment in education or parents' investment in their children and these children's wages when they become part of the working population.

[11] After 2005 it is assume to increase with productivity growth, like other expenditure per beneficiary.

[12] Of the 32% increase in income taxes, a 21% rise is needed to cover the increase in non-contributory benefits and 11% to cover the increase in health care spending.

The next section suggests that the young adults coming of age now and in future years may have less invested in their human capital than in the past because of the instability of families. Larger transfers of resources from today's working population to investment in children could facilitate the future payment of these workers' pensions by expanding the resource base for paying them. It is analogous to an increase in current taxes to help fund future expenditure, with the investment being in human rather than physical capital.

5. Investing in children

The number of children over the coming years depends very much on the evolution of fertility over these years, and the projected numbers reflect assumptions about it.[13] The focus of my discussion is not on the numbers but on how the changes in the dynamics of family formation and dissolution discussed earlier affect children.

The key aspect of these dynamics is partnership dissolution. Parents are likely to continue to care about the welfare of their children after they split up, and so expenditure on children, such as investment in their human capital, is a 'public good' to the parents. When living together, they tend to choose the efficient level of this public good, because of repeated interaction between parents within the same household. But after breaking up, the mother usually obtains custody of the children and she decides the level of expenditure on children (Weiss and Willis, 1985). The father can only influence it by making transfers to the mother, because the father cannot usually monitor the division of his transfer between expenditure on children and the mother's consumption, particularly expenditure on young children. The father must transfer more than £1 to obtain £1 more expenditure on children, because the mother spends part of the transfer on herself. This higher effective price for child expenditure when divorced encourages him to spend less on children after divorce (perhaps nothing), resulting in a lower, inefficient level of expenditure on children overall. The inefficiency arises because the mother does not take into account the effect of her choices on the welfare of the father. The probability that a couple divorces is itself inversely related to this efficiency loss from divorce, and so parents with low education and incomes, who are expected to spend less on their children, suffer a smaller efficiency loss and so should be more likely to divorce (dissolve their cohabiting union), consistent with the evidence presented above in section 2.

The lower expenditure of money and parental time on children in families in which the parents have split is likely to mean lower investment in the children's human capital when they are young, which affects children's development and achievements. This suggests that children who have experienced a family break-up may have lower achievements than children brought up in an intact family. The impact is difficult to identify because children of the type of parents who break-up are likely to have lower achievements anyway. For example, as we have seen with regard to mother's education, single motherhood is more common among low educated mothers, who are likely to invest less in their children in any case. But, at least in the UK, there also seems to be a direct impact of single parenthood on children. Ermisch and Francesconi (2001) and Ermisch, Francesconi and Pevalin (2004) find, using comparisons of siblings (i.e. they have the same mother), that young adults who experience single parenthood as children, particularly during the pre-school years, have significantly lower educational attainments (e.g. less likely to achieve at least one A-level), with likely knock-on effects for future earnings and income.

[13] The principal projection has the number of children aged 0-14 rising until 2024 and then levelling off for a decade

The lone parenthood experience is also associated with a number of other disadvantageous outcomes for young adults, including a higher risk of unemployment, a higher risk of having a child before a woman's 21st birthday, a higher chance of being a heavy smoker and higher likelihood of experiencing psychological distress in early adulthood.

Thus, the changes in family formation and dissolution patterns that have accompanied the changes in fertility and the ageing of British society have been unfavourable for children born in recent years. Yet it is these children who increasingly will be called upon to support a growing retired population.

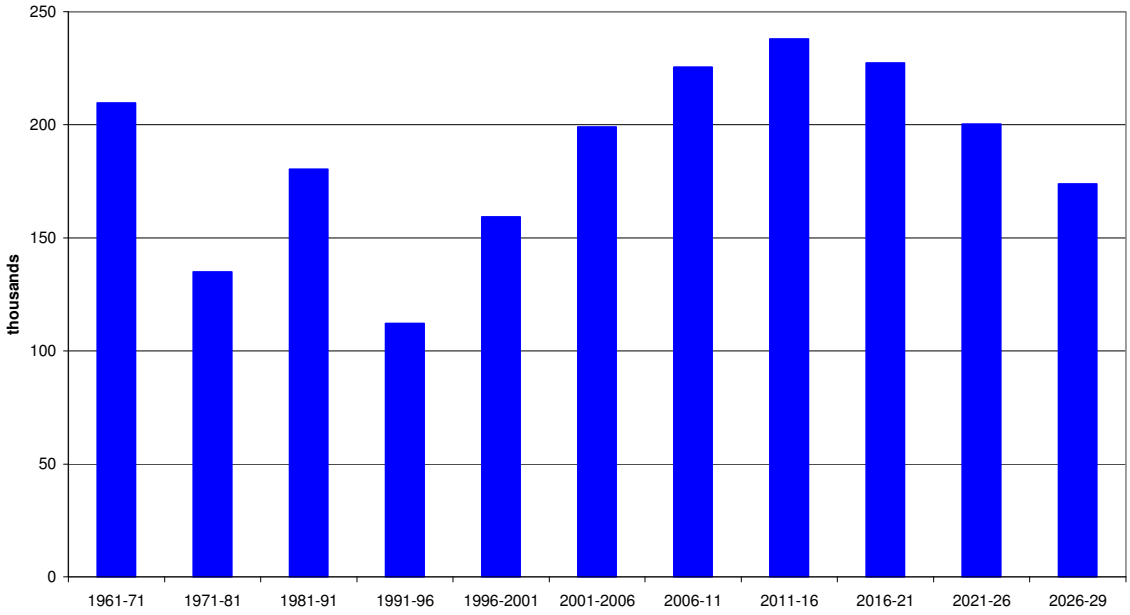
6. Ageing, family formation and housing markets

The most readily apparent impact of changes in the age distribution on housing markets is through household formation. Just over one-half of young women leave their parental home by their 21st birthday to form their own household (with or without a partner) or one with other unrelated adults.[14] We have also seen that one half of women had formed a partnership by their 25th birthday. Figure 9 above shows the changes in the number of people moving through these key ages for household formation (20-24). On this basis we may expect a decline in household formation after 2012 because of age distribution changes, although the increase in the elderly population fuels growth in the number of households because there are more households per member of the older population (smaller household size), owing to the death of spouses and previous divorces.

There are, of course, other developments affecting household formation, including partnership break-up and re-partnering. Household projections must, therefore take into account projections of the marital status as well as the age distribution of the population, and also trends in the propensity of members of particular age/marital status groups to form separate households. Figure 10 shows past actual changes and official projected changes in the number of households per annum for England. Consistent with changes in the number of persons aged 20-24, these projections show the annual net increase in the number of household peaking around 2012 (i.e. during 2011-2016), but staying above the rate of growth in the number of households experienced during the 1990s. Within the total, single person households are projected to increase in importance, from 31% in 2006 to 38% in 2029. It should, however, be noted that actual household formation is affected by housing market conditions (e.g. house prices and rents, mortgage terms), and so the evolution of the number of households can deviate substantially from the projections.

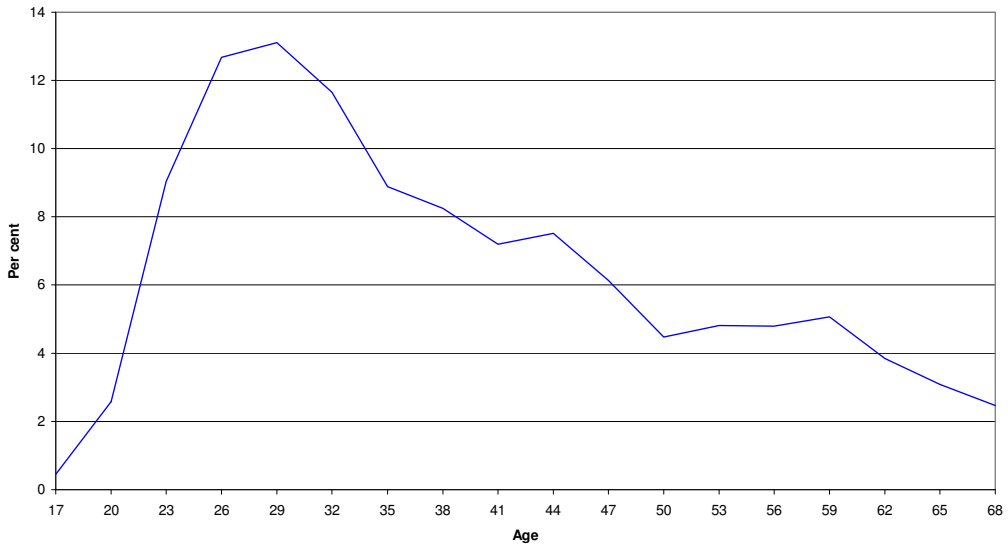
[14] Estimates based on analysis using the BHPS and the 1958 birth cohort (NCDS).

Figure 10: Annual Average Change in Number of Households, Actual and Projected, England



The market for owner-occupied housing is influenced by when people buy their first home. Figure 11 shows the percentage of women (in a couple or single) who are not already homeowners who become homeowners at each age—the 'hazard rate' of entering owner-occupation (e.g. 13% of women who are not homeowners when aged 28 become homeowner when they are 29). This entry rate rises steeply up to the age of 29 and then declines.[15] Changes in the number of people aged 25-29 should, therefore, be indicative of the changing volume of first-time homebuyers. Figure 9 shows that this age group increases in size up to 2017, putting upward pressure on demand in the first-time buyers' segment of the housing market.

Figure 11: Per cent of Women who Become Homeowners by Age, Great Britain (BHPS), 1992-2006



[15] As a consequence of this pattern, 73% of British women aged 34-36 were homeowners during 2004-2006 (according to the BHPS), rising to 81% for those aged 43-45 and levelling off after that.

The housing market is not only affected by scale (the number of households) but by 'turnover' in household 'types'. Turnover is influenced by family formation (e.g. fertility) and dissolution (e.g. divorce) as well as by changes in households' economic circumstances (e.g. changes in household income). A helpful framework for analysing how these might affect the housing market is provided by a model in which imperfect information makes it necessary for households to search for a dwelling that meets their needs. For example, assume that there are two types of household (e.g. couples and families), and two types of house (e.g. small and large). Households are 'matched' when they reside in the appropriate type of house (e.g. couples in a small house). When children arrive, a couple becomes a family and when the leave they revert to a couple. These family formation and dissolution events can be viewed as causing changes in household type and the need to search for a new dwelling of the appropriate type. More generally, changes in a household's economic circumstances also affect the 'type' of housing demanded.

Such a search model can be used here to explore how the rate at which such changes in household type occur (call it β) can be expected to affect key housing market variables like house prices, the proportion of households searching and expected time to sell. Comparing steady-states with different values of β, a higher β means that there are more people searching relative to vacancies, which increases the rate at which vacant houses sell and shortens the expected time to sell. But there are also smaller gains to search, because it is more likely that a household returns to the matched state (e.g. because of a change in household income) when β is higher. This lowers search effort, which in turn reduces the rate at which households are matched to appropriate houses, and this operates to reduce the probability of sale (increase the expected time to sell). Wheaton (1990) shows that under plausible assumptions, the former effect is more powerful, so that a higher β increases the rate at which houses sell.

How does this affect house prices? In this matching model, it is plausible to assume that buyers and sellers have equal bargaining power and will split the gain from each transaction, and this split determines the price of a house. For a given probability of sale, a higher β tends to lower house prices by reducing the buyer's gain from purchase, because it is more likely that things will change in the future so that he can give up searching. But a higher probability of sale raises house prices by increasing the net gains to a house purchaser. Wheaton (1990) shows that although higher β reduces house prices for a given rate of sale, the increase in the latter associated with a higher β dominates under plausible assumptions, and so house prices tend to rise with β. This suggests that, by increasing the rate of change in the demand for different types of house, a higher rate of family formation/dissolution could raise house prices, and Wheaton's simulations suggest that this effect could be substantial.

I use the BHPS to examine the extent to which the arrival of a child affects a person's demand for housing. First, we study whether this event stimulates a residential move, and whether it encourages a change in housing tenure. Then, among owners, we investigate the effect of childbirth on the change in housing consumption, as measured by the change in the real value of the house in which they live.

Focussing on women aged under 45, 21% moved house if they had a child during the year compared with 14.8% if they did not have a child. Among women who were not homeowners in the previous year, 11.2% became an owner if they had a child compared with 7.8% if they did not. These comparisons do not control for other factors influencing the odds of residential movement and entry to owner-occupation, such as age and education.

When we control for household income, age, whether or not the woman is a homeowner, whether or not she lives with parents, her educational qualifications, the presence of a partner, the numbers of children of different ages, length of time in her current residence and the real house price in the region in which she lived, having a child increases the odds of moving house in the coming year by 18%.[16] With the same controls other than residential tenure and restricting the sample to women who were not owners in the previous year, the odds of becoming a homeowner increase by30% in the year a child is born. Among women who were owners before and after a residential move, those having a child increase their real house value by 14%, controlling for age, changes in the real house price index and changes in real household income.

This evidence suggests a strong impact of fertility on residential movement, entry to owner-occupation and the demand for housing among homeowners. The rise in fertility since 2002 is, therefore, likely to have played some part in the rise in UK house prices in recent years, albeit a small part relative to the impact of expectations of future house price increases. Furthermore, sustained higher fertility raises house prices by promoting turnover in the housing market.

Partnership formation also promotes housing market turnover. Focussing on women aged under 45 with a partner in the previous year, analogous multivariate analysis indicates that forming a partnership (marriage or cohabiting union) increases the odds of moving house by a multiple of 6, and among those who were not homeowners in the previous year, it increases the odds of becoming one by a factor of nearly 13. Thus, it appears that the formation of first partnerships, encouraged by the increase over the next decade in persons in their 20s, and re-partnering after partnership dissolution puts upward pressure on house prices.

7. Conclusions

Population ageing reduces the working population relative to the number of pensions by one-third over next 30 years. The challenge presented by this development is how best to support pensioners' incomes without suppressing the net incomes of the working population and capital accumulation too much. The ability of private savings and occupational pensions to meet this challenge is doubtful. There is a related issue of inter-generational equity: how do we share the burden of population ageing between generations, rather than passing it on to future generations. Given the uncertainty about future demographic and economic developments, it is important to have adaptable or self-correcting policies to address population ageing.

In contrast to exploring the economic effects of the steady fall in the aged support ratio, the previous section has demonstrated the more complicated effects of demographic changes on the housing market arising from fluctuations in the numbers in key ages and in family formation. Here we have seen the importance of the level of contemporary demographic rates, such as fertility, partnership formation and divorce, on turnover in the housing market, with consequences for the level of house prices. This is in addition to the 'scale effects' of age distribution changes on the number of households.

[16] The real house price is the Halifax (existing home) house price index relative to the RPI the region the person lived in the previous year (i.e. before any move). If we do not control for the potentially endogenous residential tenure, a childbirth increases the odds of a move by 28%.

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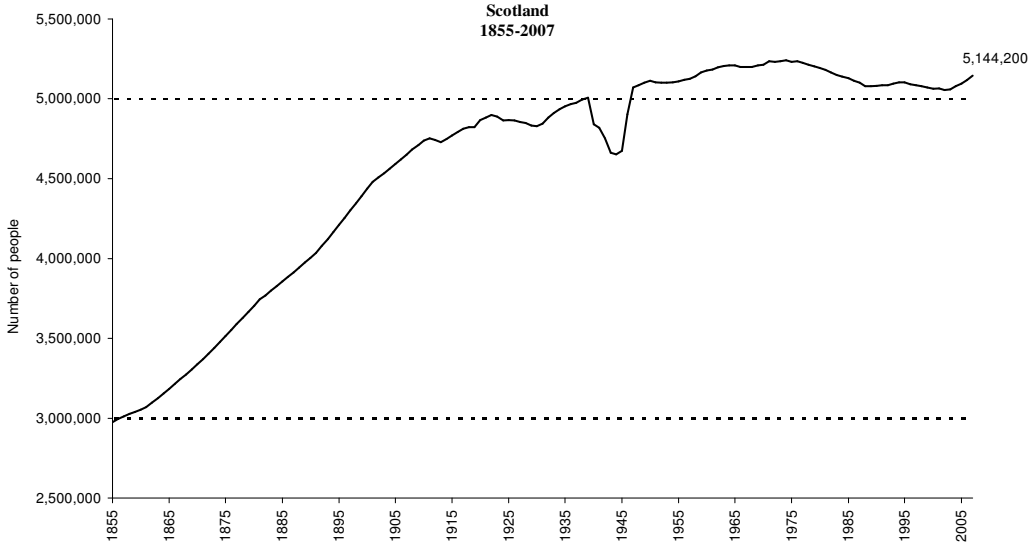
Scotland's Demographic Dilemma[1]

Katerina Lisenkova and Robert E. Wright

1. Introduction

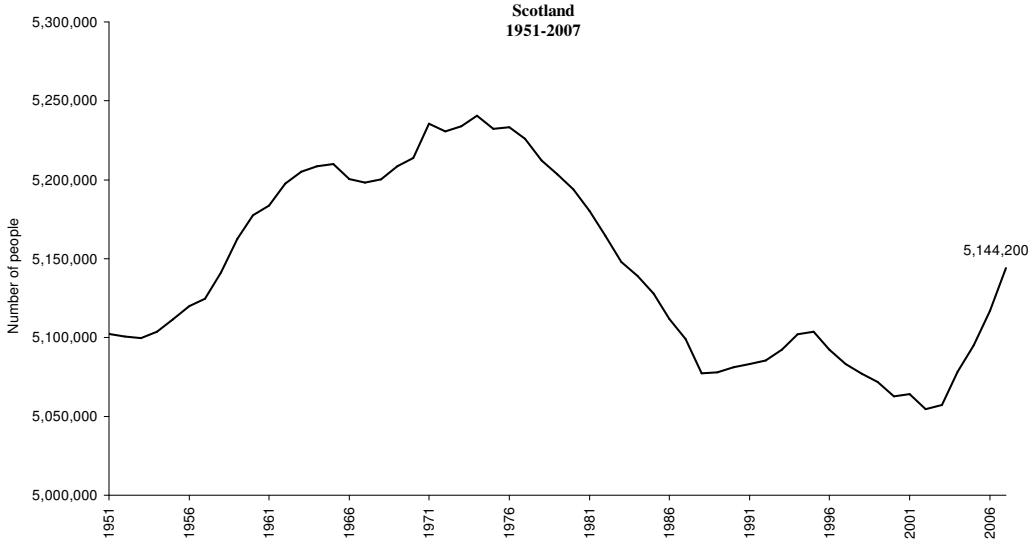
In terms of population size, Scotland is a small "country" when compared to most other countries in Europe (see Lisenkova and Wright, 2005). According to the most recent estimate, the population of Scotland numbered just over 5.14 million in 2007. This represents about 8.5 per cent of the total population of the United Kingdom. Where Scotland differs to most high-income countries is in the shape of the time path followed to reach this total. This is shown in Figure 1. The figure shows the size of the Scottish population beginning in the mid-1800s. The population of Scotland grew steadily in most of the first 100 years of this period. However after the Second World War, the size of the population has changed little and has hovered around the five million mark (see Figure 2).

Figure 1
Population Size
Scotland
1855-2007



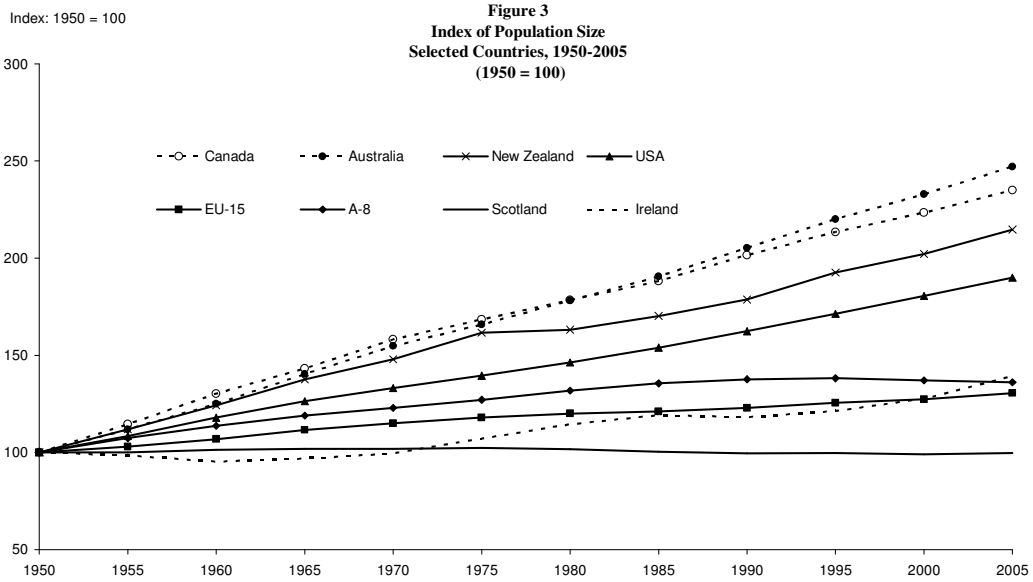
[1] Some of the research included in this report has been carried out with Cher Li, Peter McGregor, Irene Mosca, Nikos Pappas, Kim Swales and Karen Turner. However, the author takes full responsibility for all errors, omissions and shortcomings associated with the way in which this research has been used.

Figure 2
Population Size
Scotland
1951-2007



This pattern of "demographic stagnation" is not typical of other high-income countries. To put the Scottish experience in a more comparative perspective, Figure 3 shows the change in population size for selected countries/groups of countries on a comparative basis since 1950. This is achieved by indexing population size to the common standard of 100 in 1950. The comparators include the "high immigration" countries of Australia, Canada, New Zealand and USA; the 15 countries that were member-states of the European Union (EU-15) prior to enlargement in 2004; the eight central and eastern European countries (A-8) that joined in the European Union in 2004; and Ireland, a country to which Scotland (rightly or wrongly) is often compared. As the figure suggests, most of these countries experienced what can be termed "steady" population growth in this period. The possible exception to this is Ireland, where the population growth was concentrated in the second half of this period.

Figure 3
Index of Population Size
Selected Countries, 1950-2005
(1950 = 100)



One issue that is of increasing concern in many high-income countries (including Scotland) is that population growth in the future is expected to be negative, which will lead to population decline. In fact (as discussed below) there are numerous countries whose populations are already declining. The populations of these countries are also expected to "age" rapidly in the future. Population ageing is the process by which an increasing share of the total population is concentrated in the older age groups. It is the decrease in the number and share of "younger" people coupled with the increase in the number and share of "older" people in the population. It is often measured by the change in the average or median age of the population. It is important to note that population ageing is a global issue. According to the United Nations (2005), there are only 18 "outlier" countries, where currently population ageing is not occurring. However, this being said, there is considerable cross-country variation in the speed at which population ageing is expected to proceed in the future.

2. Should We Be Concerned With Population Decline and Population Ageing?

In our view, the answer is clearly "yes". There is a well established and growing literature concerned with the negative economic consequences of population decline and population ageing (see for example, Clark et al, 2004 and Weil, 1997 for excellent reviews). For example, research has considered the impact of population ageing and population growth on key labour market variables such as productivity, earnings, employment, unemployment, mobility, migration, retirement and educational participation. Likewise, serious attention has been directed towards evaluating the effects on savings, consumption, investment, housing and intergenerational transfers (the exchange of resources in terms of money and between children, parents and grandparents). There is also agreement that demographic change of this type will impinge on the labour market (see Borsch-Supan, 2003; Wright, 2004b; Wright, R.E. and K. Lisenkova, 2007; Wright, 2002b, 2004b). Although it would be incorrect to conclude that all aspects of population decline and population ageing are negative, there are ultimately going to be some sizeable economic costs.

With population aging there will be an increase in the number of people of "pension age" (say for example, age 65 and older). This could be coupled with a decrease in the number of people of working age. As the aged 65+ group grows, the demand for state-supplied health and personal care, residential services, housing, pensions and other services consumed by this group increases. Unfortunately at the same time, the base expected to pay for this increase—essentially people of working age who are employed—may become progressively smaller in both absolute numbers and in relative population share. In Scotland, for example, about 95 per cent of total employment is concentrated in the 20 to 64 age range. It is not difficult to conclude that such a situation of increasing imbalance is not sustainable indefinitely into the future (see Wright, 2002a, 2004a).

On a positive note, a smaller population (given a constant level of consumption per head) should put less pressure on the environment. With the population ageing, the number of people in the younger age groups declines. Part of this decline will be a reduction in the number of children of school age. If government expenditure per head remains constant, total expenditure on primary and secondary schooling should decline. The same will be the case for tertiary education if participation rates do not increase. Older workers are an important source of volunteer labour and the rate of volunteering is on the rise in many countries (including Scotland, see Findlay and Findlay, 2005).

As the population ages, and if past trends in participation continue, the amount of volunteer labour contributed to the economy will increase sharply. Finally, population ageing and a declining labour force provide incentives for governments and employers to invest more seriously in the education and training of the work force which should increase labour productivity.

Arithmetic suggests that if labour force participation rates do not increase, then the numbers in employment will decline as the labour force gets smaller. What is required to increase labour force participation? Simple economics suggests that it is the interaction between labour demand (potential employers) and labour supply (potential employees) that determines the level of employment and wages paid. If the potential supply of labour decreases, this will lead to increased competition in the labour market (especially for younger workers) and upwards pressure on wages. It is important to note that this "wage effect" may also provide an incentive for individuals of "older" labour force age to enter, re-enter or stay in the labour market.

However, there is little evidence to suggest that this is happening in most high income countries. For example, the trend in labour force participation rates of men and women aged 55-64 has been downwards in most of these countries (see OECD, 2008). It is our view that it is unlikely that increases in the labour force participation rate of older individuals will compensate for the expected overall decrease of individuals of working age. One reason for this is that workers of different ages may not be necessarily good (no matter perfect) substitutes.

If in the end producers are forced to pay higher wages because of fewer available workers, they will become less competitive in both domestic and international markets, which in turn will lead to lower rates of economic growth. For any given tax rate, lower rates of economic growth imply lower tax revenues. If tax revenues decline, governments will quickly find themselves without the necessary resources to provide the public services expected by their ageing electorates. However, raising taxes will exacerbate the problem of capital flight and the emigration of quality labour to lower tax regions, leading to even lower rates of economic growth.

In many respects the demographic situation in Scotland is similar to many other high-income countries. Fertility has been below the replacement level for several decades. Mortality has declined steadily in the past century, with increasing life expectancy across the age range. However, in most of the post-war period Scotland was a "net exporter" of people with the flow of emigrants being considerably larger than the flow of immigrants. These trends in fertility mortality and net-migration have caused the population to "age" considerably since the peak of the baby boom in the mid-1960s. This longer term process of population ageing will accelerate in the future. These trends have established the conditions that have caused the population to stagnate in size in the past and have built-in the momentum for decline in both the population and the labour force in the future.

Research by Lisenkova et al (2008) for Scotland, based on a mathematical simulation model of the economy, suggests adverse economic effects of labour force decline. These simulations indicate that output growth will be lower, employment will be lower, inflation will increase and competitiveness will decrease. That is, labour force decline has clear negative macroeconomics consequences that are by no means small in magnitude.

In this context, it is also worth noting that in Scotland the total population and population of working age has not grown much in the last five decades. One important question that this paper does not attempt to answer concerns whether the economic growth experience of Scotland over the last half century has been negatively affected by a lack of sustained population and labour force growth?

The purpose of this paper is to compare past, current and possible future demographic trends in Scotland. In Section 2, past changes in the three main demographic variables—fertility, mortality and net-migration—are reviewed. In Section 3, population projections are carried out based on different assumptions relating to future levels of net-migration. These projections provide a quantitative description of future changes in population size and share of different age/sex groups. This is followed in Section 4 by a discussion of what can be done to lessen the negative consequences associated with population and labour force decline. Conclusions are presented in Section 5.

3 Demographic Past

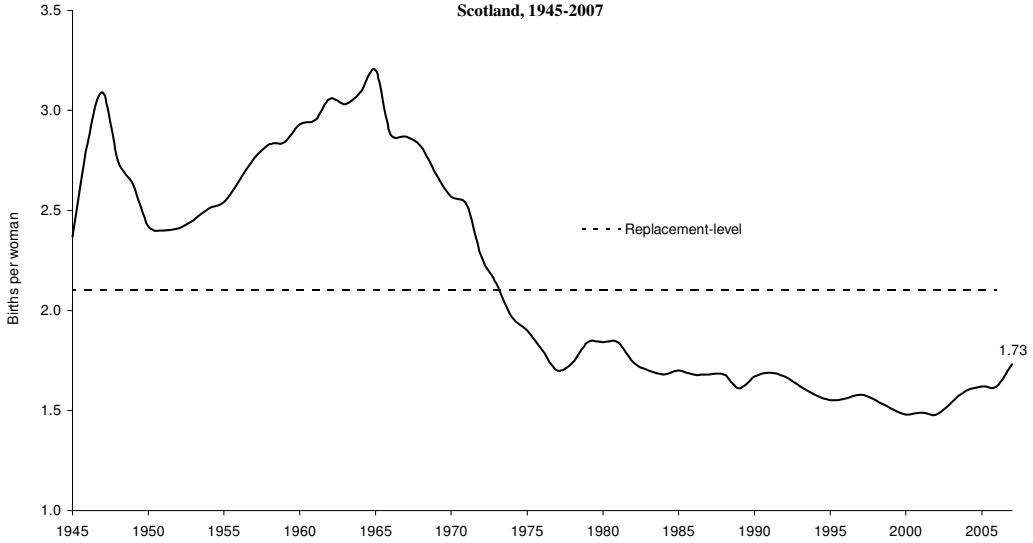
It is worth describing briefly the mechanisms that cause a population to change in size. Below is what demographers usually refer to as the "population growth identity": $\Delta N = B - D + I - E$ where: *"ΔN"* is change in population size (*N*); *"B"* is the number of births; *"D"* is the number of deaths; *"I"* is the number of immigrants and *"E"* is the number of emigrants. From this identity there are two ways a population can grow or decline. The first is by "natural increase" (*B-D*), which is the difference between the number of births and deaths. The second is by "net-migration" (*I - E*), which is the difference between the number of immigrants and emigrants. Therefore, it is necessary to examine past trends in fertility, mortality and net-migration in order to understand the current demographic situation.

3.1 Fertility

Figure 4 shows the total fertility rate (TFR) for Scotland for the period 1945 to 2007. This "period" measure of fertility summarises the number of children that a woman would be expected to have if she moved through the child-bearing ages of 15 to 49 bearing children at the rates that prevail in any particular year. Also shown in this figure is the so-called "replacement level" of fertility, which is approximately 2.1 live births per woman. This is the level of fertility required so that the number of births equals the number of deaths and population size will remain constant.

In keeping with most other high-income countries, Scotland experienced a sharp increase in fertility in the 1950s and 1960s. In these so-called "baby boom' years, fertility was well above the replacement level, with the TFR peaking at around 3.2 births per woman in 1965.

Figure 4
Total Fertility Rate
Scotland, 1945-2007



However, since then the trend has been downwards with periodic short-lived upturns. More importantly, since 1975, fertility has been below the replacement level. The most recent (2007) estimate of the TFR is 1.74 births, which is about 20 per cent below the replacement level. It is also worth noting that over the past two decades the TFR in Scotland has been below that for the United Kingdom as a whole and is currently the lowest of the four countries that make up the United Kingdom (see GROS, 2008). As is shown in Table 1, however a TFR of 1.74 is relative high by European standard. For example, the average TFR for the 27 member-states that make up the European Union is 1.51 births per woman.

Fertility is now below the so-called replacement-level of 2.1 births per woman in all European countries (see Table 1). In many of these countries fertility has been below the replacement-level for up to four decades (see Table 2). According to these estimates, Croatia was the first European country to reach replacement level fertility in 1967 and Albania was the last to reach it in 2004. Therefore, the "duration" of below replacement-level fertility varies considerably across European countries and this variation impacts on the "rates" at which these countries have aged in the past and will age in the future.

Table.1 **Total Fertility Rate European Countries, c. 2006**	
Country	
Iceland	2.07
France	1.98
Norway	1.90
Ireland	1.88
Denmark	1.85
Sweden	1.85
United Kingdom	1.85
Finland	1.84
Albania	1.73
Belgium	1.73
Netherlands	1.71
Luxembourg	1.70
Montenegro	1.64
Estonia	1.55
Macedonia	1.45
Switzerland	1.44
Serbia	1.43
Channel Islands	1.42
Austria	1.41
Malta	1.40
Bulgaria	1.38
Croatia	1.38
Greece	1.38
Latvia	1.36
Portugal	1.36
Spain	1.36
Hungary	1.35
Italy	1.35
Germany	1.34
Czech Republic	1.33
Slovenia	1.32
Romania	1.31
Lithuania	1.30
Russian Federation	1.30
Belarus	1.29
Poland	1.27
Ukraine	1.25
Slovakia	1.24
Moldova	1.22
Bosnia/Herzegovina	1.18
Europe Average	1.51

Source: World Bank (2008)

Table.2
Year Reached and Duration of Below Replacement-level Fertility European Countries

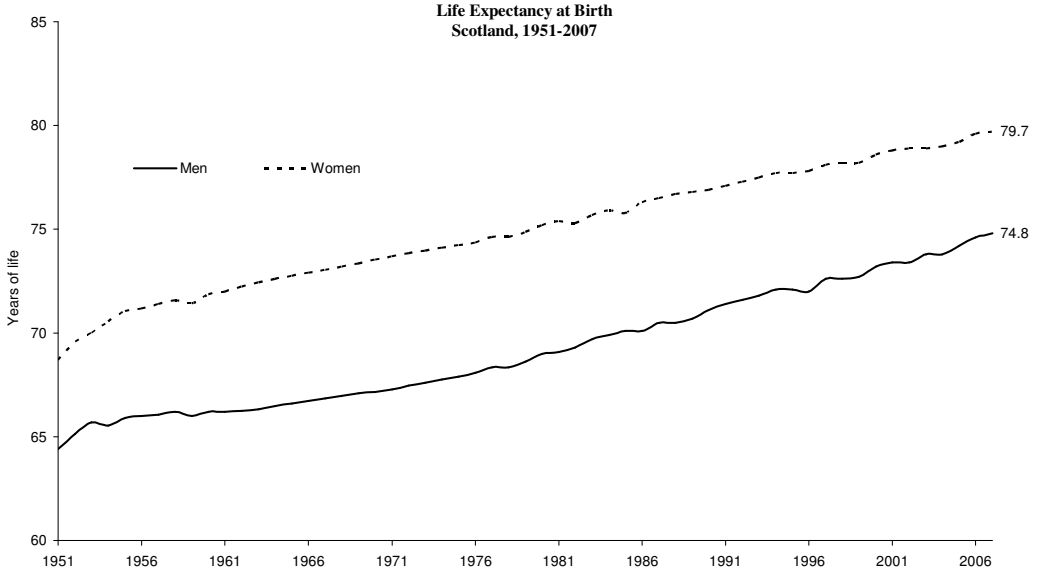
Country	Year replacement level fertility reached	Number of years fertility below replacement level
Croatia	1967	41
Finland	1968	40
Channel Islands	1969	39
Denmark	1969	39
Luxembourg	1969	39
Germany	1970	38
Switzerland	1970	38
Belgium	1972	36
Ukraine	1972	36
Austria	1973	35
Netherlands	1973	35
United Kingdom	1973	35
France	1975	33
Norway	1975	33
Italy	1977	31
Hungary	1978	30
Slovenia	1979	29
Bosnia/Herzegovina	1980	28
Bulgaria	1980	28
Czech Republic	1980	28
Greece	1981	27
Spain	1981	27
Portugal	1983	25
Belarus	1985	23
Macedonia	1986	22
Lithuania	1988	20
Latvia	1989	19
Montenegro	1989	19
Poland	1989	19
Russian Federation	1989	19
Slovakia	1989	19
Estonia	1990	18
Romania	1990	18
Ireland	1991	17
Sweden	1992	16
Moldova	1993	15
Iceland	1997	11
Malta	1997	11
Albania	2004	4
Serbia	N/A	N/A

Source: World Bank (2008)

3.2 Mortality

Figure 5 shows life-expectancy at birth for women and men in the period 1951 to 2007. In 1951, life expectancy at birth was 68.7 years for women and 64.4 years for men. By 2007, it had risen to 79.7 years for women and 74.8 years for men, which is lower than in England, Wales and Northern Ireland. Despite this apparent progress, Scotland has not done well when compared to other high income countries. When compared to other European countries, Scotland is a mortality laggard.

Figure 5
Life Expectancy at Birth
Scotland, 1951-2007



The current level of female life-expectancy is about the same as in the Czech Republic (see Table 3). Likewise, the current level of male life-expectancy is similar to Slovenia. It is important to stress that Scotland's mortality is excessively high. That is, it should be much lower given levels of income, education, public services, etc. One view is that this is caused by poor "life style" choices, reflected in high levels of alcohol consumption, smoking behaviour and drug use coupled with a bad diet. In addition, Scotland does not compare well when it comes to death due to violence and accidents (particularly amongst young men). It is also safe to conclude that closing the mortality gap with other countries will be a major public health challenge.

Table 3
Life Expectancy at Birth
European Countries, c. 2006

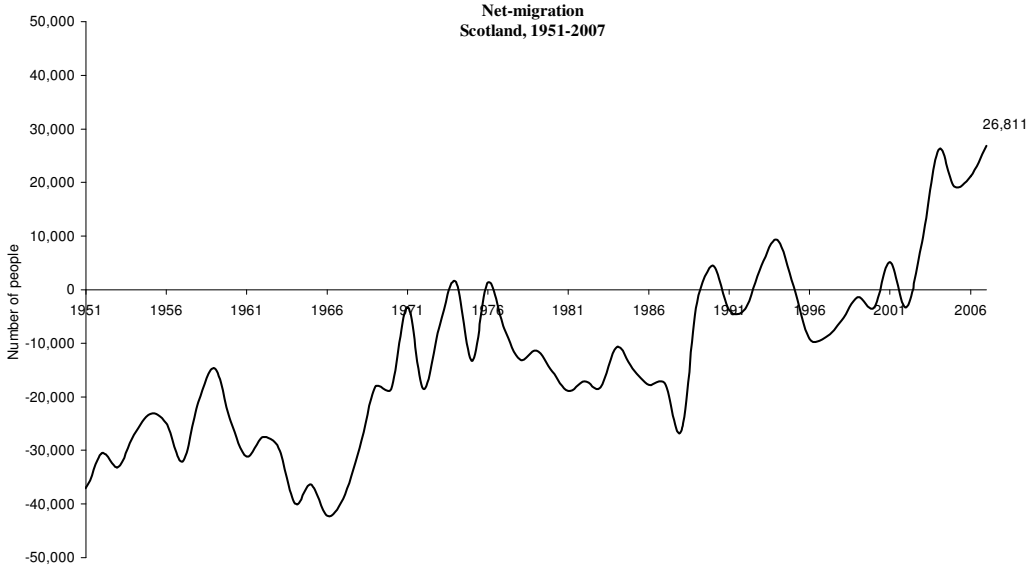
Country	Female		Country	Male
France	84.1		Iceland	79.4
Spain	84.1		Switzerland	79.1
Switzerland	84.0		Sweden	78.7
Italy	84.0		Italy	78.3
Iceland	83.0		Norway	78.1
Sweden	82.9		Spain	77.7
Finland	82.8		Netherlands	77.6
Austria	82.7		France	77.2
Norway	82.7		Austria	77.1
Belgium	82.4		Ireland	77.1
Luxembourg	82.3		United Kingdom	77.0
Germany	82.0		Cyprus	77.0
Greece	82.0		Greece	77.0
Netherlands	81.9		Belgium	76.7
Ireland	81.8		Malta	76.5
Portugal	81.8		Channel Islands	76.5
Cyprus	81.7		Germany	76.4
Slovenia	81.4		Luxembourg	76.2
United Kingdom	81.3		Denmark	75.9
Channel Islands	81.3		Finland	75.8
Malta	80.7		Portugal	75.2
Denmark	80.4		Slovenia	74.1
Czech Republic	79.7		Czech Republic	73.5
Poland	9.6		Albania	73.3
Albania	79.6		Croatia	72.5
Croatia	79.3		Montenegro	72.2
Slovak Republic	78.2		Bosnia/Herzegovina	72.0
Estonia	78.1		Macedonia	71.7
Hungary	77.4		Poland	70.9
Bosnia/Herzegovina	77.3		Slovak Republic	70.4
Lithuania	77.1		Serbia	70.2
Montenegro	76.7		Bulgaria	69.1
Latvia	76.5		Hungary	69.0
Macedonia	76.4		Romania	68.7
Bulgaria	76.3		Estonia	67.3
Romania	75.8		Latvia	65.5
Serbia	75.5		Lithuania	65.3
Belarus	74.5		Moldova	65.0
Ukraine	74.1		Belarus	63.0
Russian Federation	72.5		Ukraine	62.3
Moldova	72.3		Russian Federation	58.9
Europe Average	79.7		Europe average	73.1

Source: World Bank (2008)

3.3 Net-migration

Figure 6 shows the trend in net-migration in Scotland for the period 1951-2007. Throughout most of this period, the number of emigrants was larger than the number of immigrants, leading to population loss. In this period, net-migration loss was over 800,000 people. This is a staggering figure when one remembers that in this period the total population averaged just above 5 million people. Such an intensity of out-migration occurred in very few countries in the same period, with Ireland perhaps being the main exception (see Lisenkova, Mosca and Wright, 2008). However, over time, the gap between immigration and emigration has gradually closed and the 1990s was a period of relative balance. Indeed, since 2000, immigration has exceeded emigration, and for the first time in Scottish history, the country has had five years in a row of positive net-migration. More specifically, in the period 2001-2007, net-migration flows numbered over +100,000 people.

Figure 6
Net-migration
Scotland, 1951-2007



4. Demographic Futures?

4.1 Population Projection Methodology

Scotland can be described as having a population with below replacement level fertility, gradually decreasing mortality and low (but apparently increasing) levels of net-migration. What will happen to the size and age structure of the Scottish population if current trends continue? In order to provide at best a partial answer to these questions, it is necessary to carry out population projections. In order to do this, assumptions relating to fertility, mortality and net-migration (amongst other factors) must be specified. While this, in our view, is less problematic for fertility and mortality, it is extremely difficult to even speculate what future levels of net-migration might be. It must also be remembered that population projections are not population "predictions". In the past, demographers have been notoriously wrong when it comes to population projections (see Fleischhacker et al, 2003). However, projections are useful in the sense that they can provide a range of values where the true value has a high probability of being captured.

The General Register Office for Scotland (in conjunction with the Office of National Statistics) routinely carries out and publishes "official" population projection for Scotland. The most recent set of projections are "2006-based", which implies that the first projection year is 2007 (GROS, 2007). For our purposes, these projections are not particularly well suited since the range of net-migration assumptions employed is rather limited. In addition, population totals (broken down by age and sex) along with fertility and mortality levels are now known for 2007.

Given that future levels of net-migration are a big unknown, a series of population projections with the base-year 2007 are included in this paper. These projections incorporate a wide range of net-migration assumptions. The assumptions relating to fertility and mortality are however similar to those used in 2006-based GROS "official" population projections, with key assumptions relating to fertility and mortality being updated. Because of space constraints, no attempt is made in this paper to explore alternative mortality and fertility assumptions. However, projections along these lines can be found in Lisenkova et al (2008) and will be briefly discussed below. The main fertility assumption is that the TFR decreases slightly to 1.65 births per woman in the early period of the projection and stays at this level until 2051. With respect to mortality, the main assumption is that male/female life expectancy at birth gradually increases in an almost linear manner to 82.9/87.0 years by 2051.The projection technique used is the "cohort component" method, which is the same as used in the official population projections (see Hinde, 1998). The span of the projection is just less than 4½ decades. The base-year is 2007 and the end-year is 2051, with the first projected year being 2008.

The projections begin with the assumption of zero net-migration. This projection provides a useful "baseline" since it provides information on how the size and age/sex structure of the population will be shaped by fertility and mortality (i.e. natural change). It should be stressed that this does not mean that there is an expectation of zero net-migration in the future.

In the other projections it is assumed that the levels of net-migration range from +10,000 to +50,000 people per year. It is assumed that all migrants are less than age 40. Of this total, 25 per cent are less than age 15. The sex ratio is assumed to be balanced at 50:50. These assumptions reflect the reality that most migrants are relatively young with the majority being of labour force age. This assumed age structure can also be thought of as the outcome of having a successful immigration policy/system that targets/attracts young workers with children.

4.2. Zero Net-migration Projection

Under the assumption of zero net-migration, the projection suggests that the Scottish population will decrease in size in the future. This is shown in Figure 7, which shows population size from 1951 onwards, with the post-2007 totals coming from the projection. If these projections prove to be correct, the population will decline from the current level of round 5.1 million to 4.7 million by 2051, which represents a decrease of nearly 8.5 per cent (see Table 4). The decline is even more pronounced for the population aged 20-64. This is shown in Figure 8. Currently there are about 3.1 million people in this age group. The zero net-migration suggests that this group will decrease to 2.4 million, which represents a decline of around 23 per cent. Such a decline implies that the share of the total population in this age range will fall from about 61 per cent to 47 per cent in this period.

Table 4
Age Structure Estimates
Scotland, 2007 and 2051
(Zero Net-migration Assumption)

Scotland	2007		2051			Change	
Age group	N	% share	N	% share		Δ	%Δ
0-4	*275,200*	*5.4*	*203,731*	*4.0*		*-71,469*	*-26.0*
5-19	*905,707*	*17.6*	*652,050*	*12.7*		*-253,657*	*-28.0*
20-64	*3,117,680*	*60.6*	*2,405,803*	*46.8*		*-711,877*	*-22.8*
65+	*845,613*	*16.4*	*1,448,969*	*28.2*		*+603,356*	*+71.4*
85+	*98,270*	*1.9*	*408,036*	*7.9*		*+309,766*	*+315.2*
Total	*5,144,200*	*--*	*4,710,513*			*-433,687*	*-8.4*

In addition to the total population and the population aged 20-64, Table 4 show estimates for the "0-4", "5-19", "65+" and "85+"age groups, implied by the zero net-migration projection. Examining changes in the younger and older age groups presented in this table, it is not difficult to conclude that the Scottish population will age rapidly in the future, as the projection suggests a sizeable shift in population age structure away from the younger to older age groups.

Figure 7
Population Size
Scotland, 1951-2051
(Zero Net-migration Assumption)

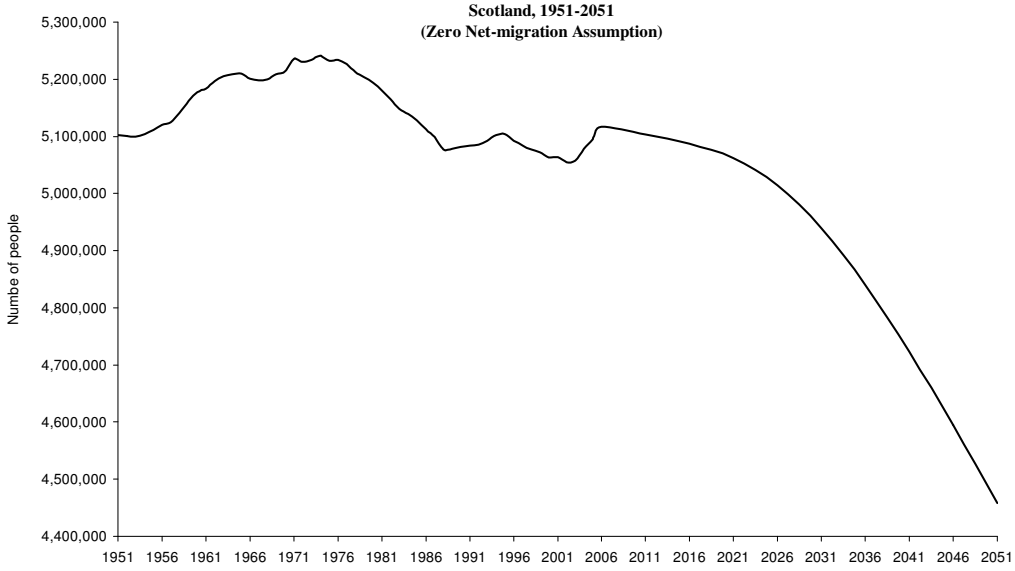
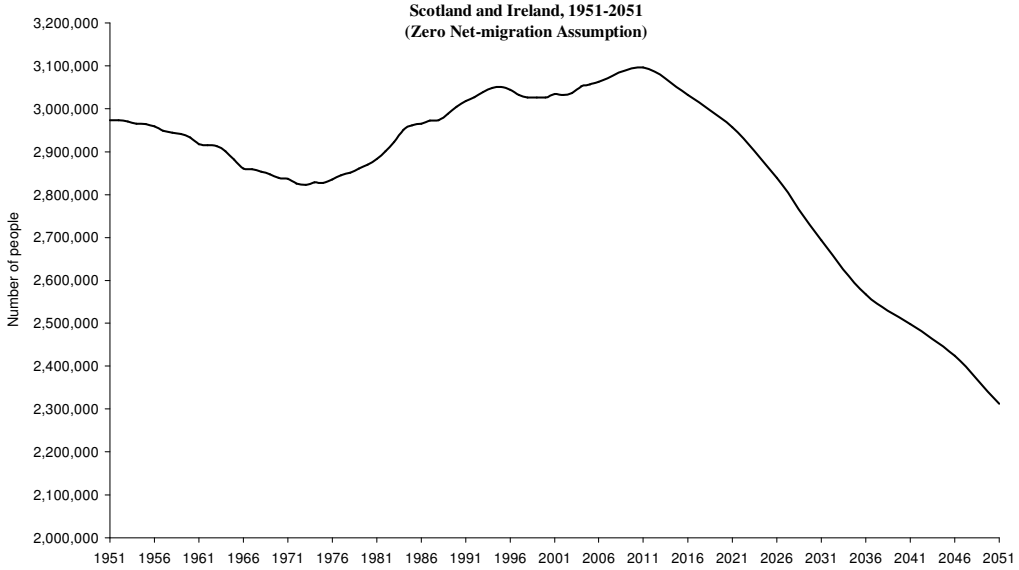


Figure 8
Population Aged 20-64
Scotland and Ireland, 1951-2051
(Zero Net-migration Assumption)



There will be a sizeable decrease of around 26 per cent in the number of pre-school age children (approximated by the 0-4 age group). Likewise there will be a slightly larger decrease of 28 per cent in the number of school age children and young adults (5-19 age group). The projection suggests that the number of people of "pension age" (65+ age group) will increase by over 70 per cent. Likewise the number of "frail elderly" (85+) will increase by over 300 per cent. If these projections turn out to be correct, then the ratio of older to younger people (65+/0-19) will change from 80:100 to 210:100 by 2051.

4.3 Positive Net-migration Projections

It seems unlikely that net-migration will be zero in the future. However, it is very difficult to estimate future net-migration levels since levels of immigration are very much driven by policy in those countries that have managed immigration system. As is discussed below, a points-based immigration system is being currently be phased in. In principle, this system could have a significant impact on regulating immigration from countries outside the European Union. That is, it could be used to increase or decrease this immigration flow.

This section explores the demographic consequences of various levels of net-migration ranging up to +50,000 per year. 50,000 net-migrants per year is about one per cent of the total Scottish population or about the same as the immigration targets set in Canada. It may seem like a large number, given negative net-migration is more typical for Scotland (see Figure 6), however, it is not excessively large when compared to other countries.

Figure 9 shows the total size of the Scottish population for the period 1951 to 2051 based on a net-migration of zero, +10,000, +20,000, +30,000, +40,000 and +50,000 per year. The graph suggests that a net-migration of between +20,000 and +30,000 per year is required (year on year) to prevent the population declining below the 5 million mark. As Figure 10 shows, a net-migration of between +20,000 and +30,000 per year is also needed to stop the population aged 20-64 from shrinking. Values above +30,000 per year will make both the total population and population aged 20-64 increase in the future. With a net-migration of +50,000 per year, the Scottish population would grow by about 1 million per decade over the next four decades. The estimates illustrate the importance of being able to attract migrants who are predominately of labour force age.

Figure 9
Population Size
Scotland, 1951-2051
(Different Zero Net-migation Assumptions)

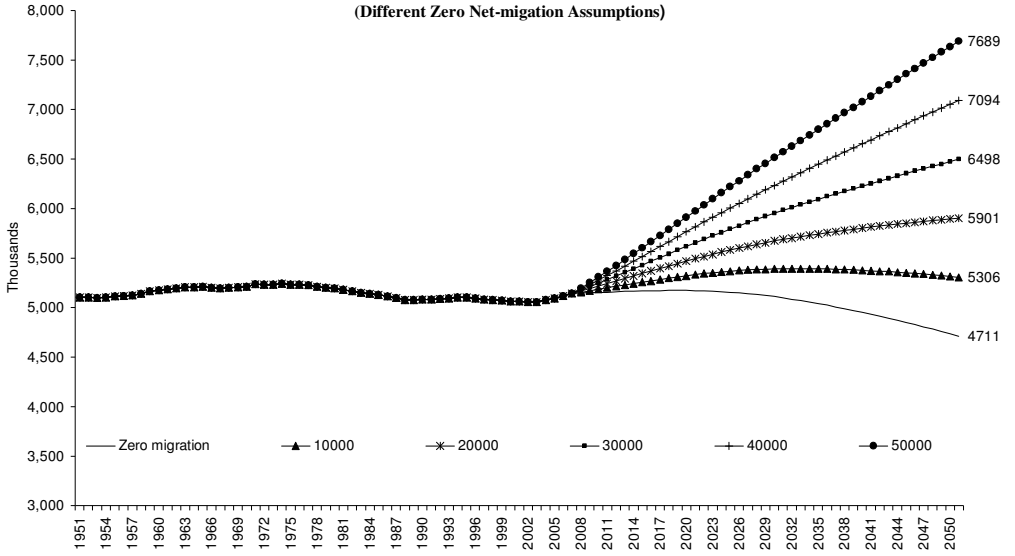
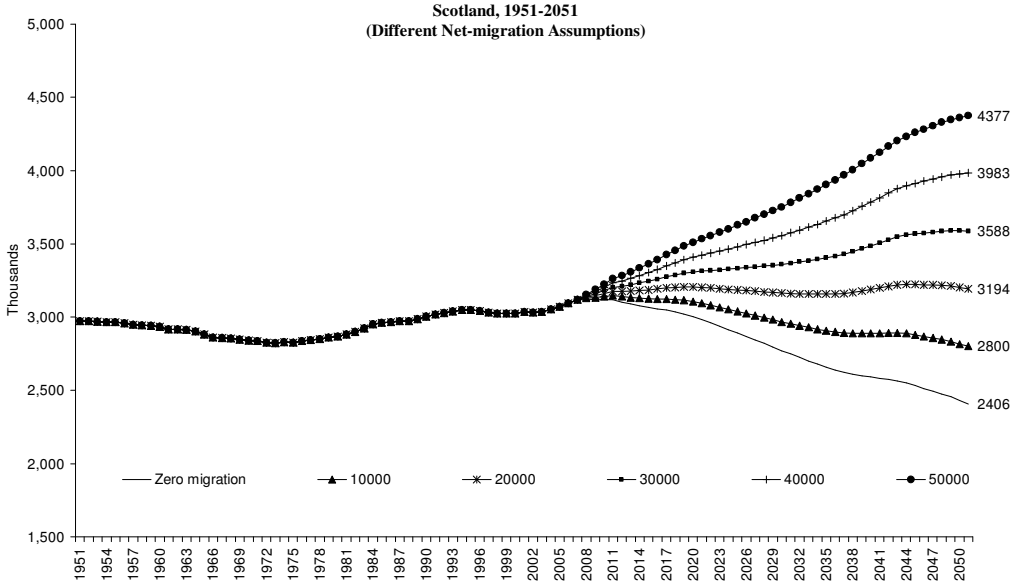


Figure 10
Population Aged 20-64
Scotland, 1951-2051
(Different Net-migration Assumptions)



Figures 11-14 show similar graphs for the other age groups considered above. Since we assume that migrants are young and that the sex ratio is balanced, increases in net-migration will help slow down, and perhaps turnaround, the decline in the number of young people. It is also assumed that migrants will have children at the rates specified in the fertility assumption described above.

Figure 11
Population Aged 0-4
Scotland, 1951-2051
(Different Net-migration Assumptions)

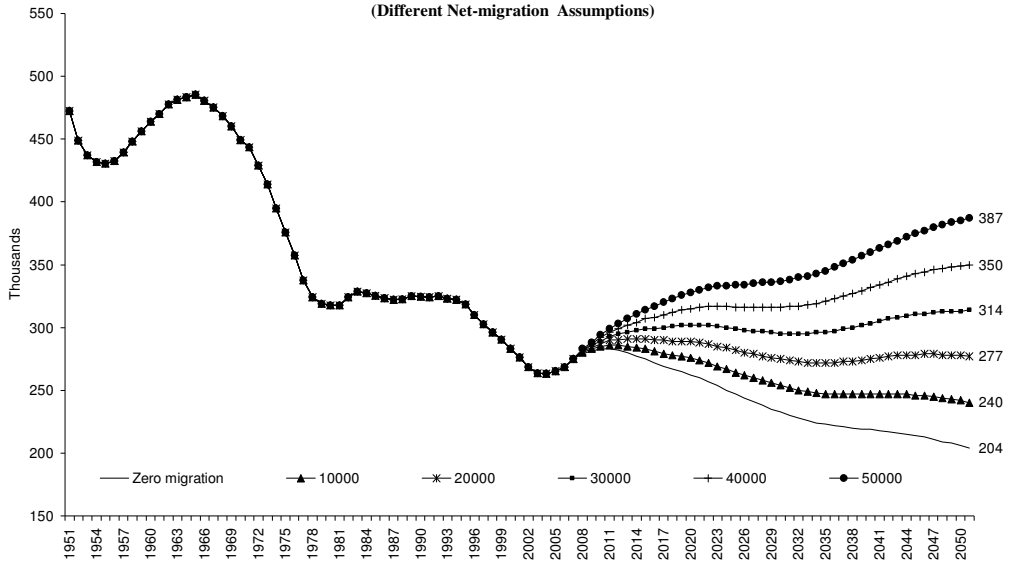
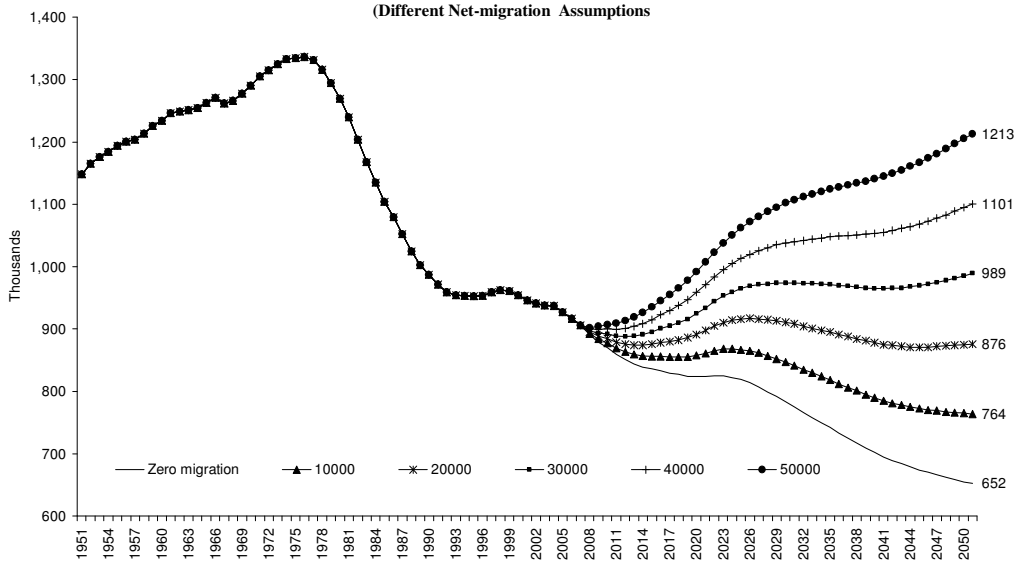
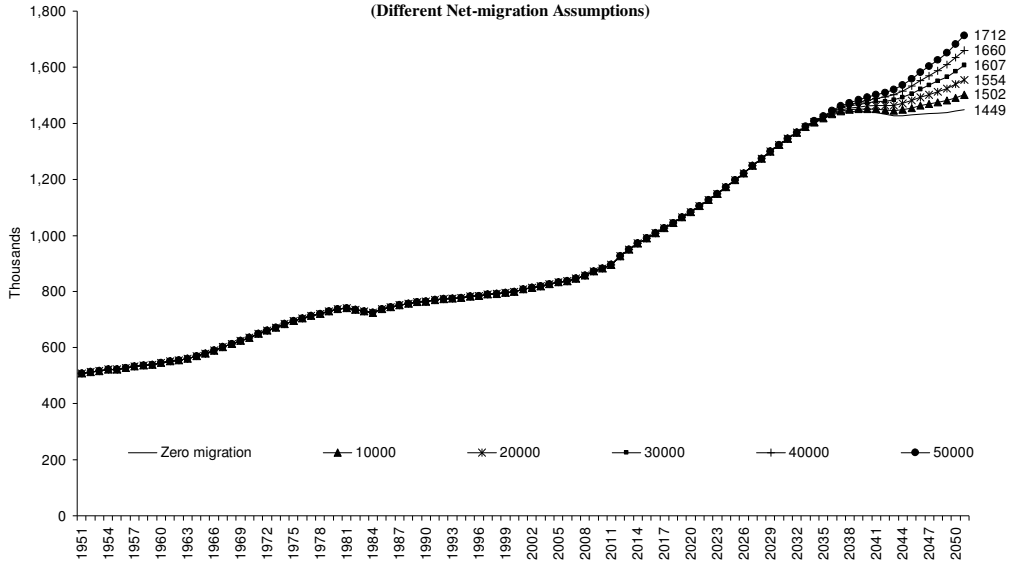


Figure 12
Population Aged 5-19
Scotland, 1951-2051
(Different Net-migration Assumptions



This is a conservative assumption in the sense that immigrants tend to have a fertility rate that is on average higher than the native-born population for at least one generation. In this sense, estimates of the population aged 0-4 and 5-19 shown in Figures 11 and 12, respectively, are likely to be underestimates. Anyway, the projections suggest that if net-migration was +50,000 per year, the numbers in both these age groups would increase. The difference is sizeable—almost double of what is expected in the case of zero net-migration.

Figure 13
Population Aged 65+
Scotland, 1951-2051
(Different Net-migration Assumptions)



The other end of the age distribution is shown in Figures 12 and 13, which show the projection estimates for the 65+ and 85+ age groups. It is clearly the case that migrants age in the same sense as native-born individuals. However, we assume that all the migrants are less than age 40. In this sense they only start entering the older age groups near the end of the projection period. For example, someone aged 40 in 2007, will turn 65 in 2032. Likewise, the same individual will only turn 85 in 2052. It is therefore not surprising that different net-migration levels do not have much impact on the numbers in these age groups in the projection period that ends in 2051.

Figure 14
Population Aged 85+
Scotland, 1951-2051
(Different Net-migration Assumptions)

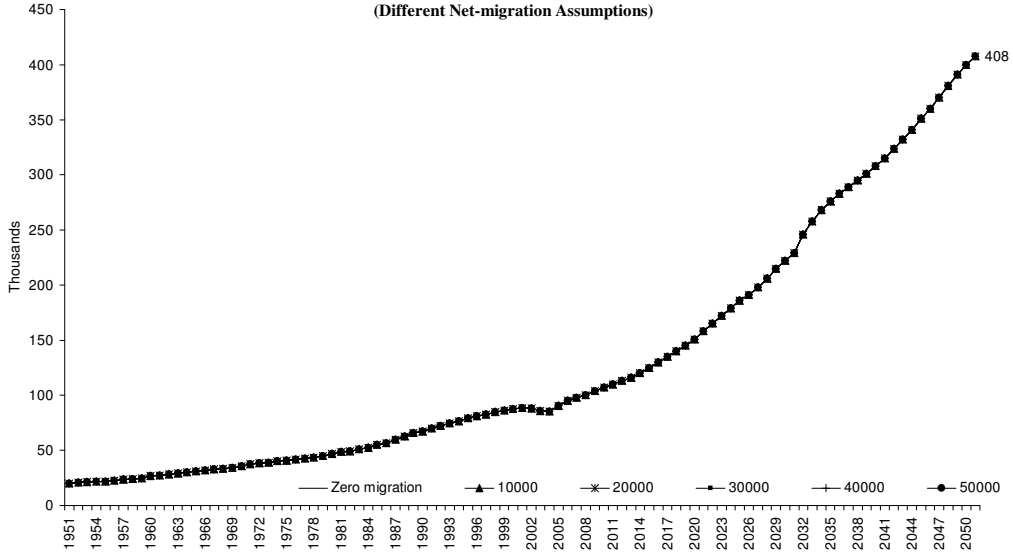
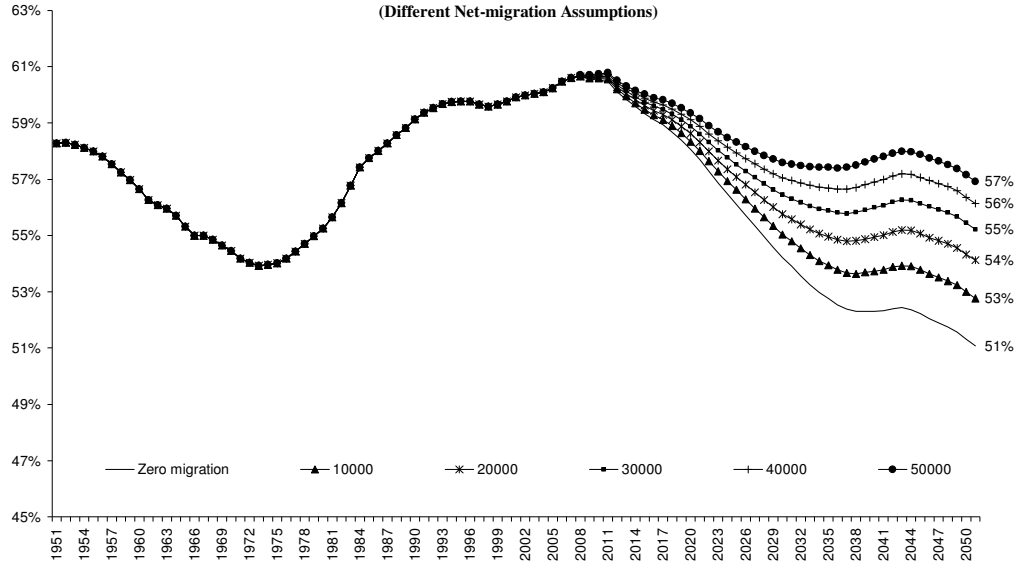


Figure 15
Share of Total Population Aged 20-64
Scotland, 1951-2051
(Different Net-migration Assumptions)



Finally, Figure 15 shows the percentage of the total population in the 20-64 age group. This is a measure of the labour force's share of the total population. What is interesting about this graph is that despite quite a wide range of net-migration assumptions, this share does not vary much—from 51 per cent in 2051 under zero net-migration to 57 per cent when net-migration is +50,000 per year. In addition, for all values of net-migration, the slope is downwards. This is indicative evidence of the considerable amount of momentum towards population decline and rapid population ageing currently "built-in" to the Scottish population.

5. Discussion and Implications for Policy

The population projections suggest that any future growth in the potential supply of labour in Scotland will almost exclusively be driven by future levels of net-migration. The data suggests that much of the increase in net-migration in the last few years in Scotland has been caused by higher levels of international immigration. Much of this increase in immigration is from the so-called A8 countries, which joined the European Union in 2004 (see Wright, 2008). Although immigration from these countries has increased sharply, the largest group of immigrants are still from Commonwealth countries, mainly the so-called New Commonwealth countries of the Indian sub-continent.

A key question concerns whether this atypically high level of immigration from A8 countries (and particularly from Poland) will continue in to the future and for how long. There is some evidence that the bulk of immigration from A8 countries is short-term in nature with large numbers of immigrants returning to their country of origin within two years (see Wright, 2008). Evidence from the A8 Workers Registration Scheme, large government surveys (such as the Labour Force Survey), small-scale surveys carried out by local governments and anecdotal evidence (such a newspaper reports and interviews) all suggest that immigration is decreasing and emigration is increasing. In addition, there are restrictions on the free movement of labour from A8 countries to the "old 15 EU states" (most notably Germany). That is, nationals from these countries do not have an "automatic" right to work in all EU countries.

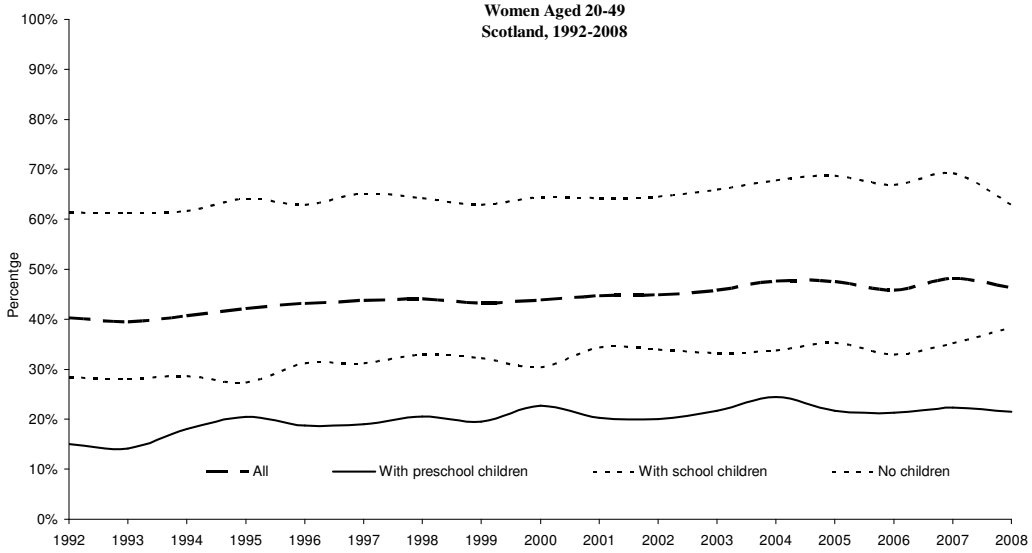
We believe that these restrictions have been a factor contributing to the high levels of A8 immigration to Scotland (and to the UK generally). For many A8 immigrants, Scotland is simply not their "first choice" destination country. When (if) these restrictions are relaxed, it is likely that many A8 nationals who immigrated to Scotland will move to these countries. One obvious example of where this is likely to happen is in Germany where there is already a large Polish immigrant population, and despite restrictions, a continued legal flow of Polish migrants. More generally, immigration from A8 countries is not a long-term solution to Scotland's demographic deficit. The populations and labour forces of all these countries are declining and there is not an unlimited pool of people wanting to emigrate to other countries.

If Scotland is to maintain the levels of net-migration implied by the population projections, an immigration system is required that will allow Scotland to attract new migrants. However, in the United Kingdom matters relating to immigration are a "reserved power". That is, responsibility lies with the central government in London and not with devolved administrations (such as the Scottish Parliament). In this respect, there is nothing in the Canadian-like "points-based" immigration system being currently phased in to manage immigration at the UK-level that plays to Scotland's advantage. There is nothing in this new system that explicitly takes into consideration the fact that demographic needs differ across regions in the UK. This is in sharp contrast to the Canadian (and to a lesser extent the Australian) immigration systems, where more points are awarded and/or lower points thresholds are applied if immigrants agree to live, work and stay for a minimum period of time in a particularly region (i.e. provinces/territories in the case of Canada and states/territories in the case of Australia).

It is also important to remember that migration is potentially endogenous in the sense that increasing wages should increase immigration and decrease emigration. Lisenkova, et al (2008) attempt to "endogenise migration" by adopting the standard Harris and Todaro view that migration is positively related to the real wage differential, and negatively to the unemployment rate differential. This work is at a preliminary stage, but it does appear that "endogenous migration" does not generate a net-migration flow large enough to seriously curb the negative macroeconomic impacts reported above. That is, even though endogenous migration does "help" it is not in itself "the solution" to the problem.

Although managed immigration is important, it is not the only policy that should be pursued. In fact there are a range of policies that complement each other. The key is to introduce policies that increase the potential supply of labour available to employers but these policies must not put upwards pressure on wages, and such policies should be seriously pursued in Scotland. The first is that the government and the private sector should be prepared to subsidise female employment through "family friendly policies" (such as free day care), which will increase the employment rate of women who have children (especially children of pre-school age).

Figure 16
Full-time Employment Rates
Women Aged 20-49
Scotland, 1992-2008



The employment rate of women with children in Scotland is very low, and has not changed much in the last two decades. This is especially the case for full-time employment. This is shown in Figure 16, which gives the full-time employment rate of women with and without children. Women with children of pre-school age have a full-time employment rate of 20 per cent.

The second policy implication relates to education. Education policy and the education system must be made more attuned to the demands of the labour market. There has been a large increase in the proportion and number of young people in higher education. Participation rates in higher education are much higher than in the other countries of the United Kingdom. Much of this expansion has been at the expense of further education. Evidence suggests that a large share of graduates end up in non-graduate jobs. At the same time, there is a shortage of individuals with middle-level skills (i.e. those skills that are generated through further education and work-led training programmes). Also recent evidence suggests that over-education and skill miss-match are factors contributing to high rates of emigration of Scottish-domiciled higher education graduates (Faggian, Li and Wright, 2008).

The third policy is that public sector employment should be reduced to allow for the productivity gains associated with the provision of public services by the private sector (see Armstrong, 2008). There is a (not unanimous) view that public sector employment is too high in Scotland. We believe there is a mindset amongst politicians and the general public that public services must be provided by public employees. As the potential labour force declines, labour becomes more valuable and it must be employed in sectors with the highest productivity. If the private sector can provide public services of a given quality for a lower cost, then they should be encouraged and allowed to do so.

It is also worth noting that increases in fertility and decreases in mortality will also affect the size of the potential labour forces. In addition, there is a strong link between mortality, morbidity and ill-health. Therefore, as mortality declines labour productively should also increase and work absenteeism should fall because of improved health. Lisenkova et al (2008) examined the impact that different mortality levels would have on the size of the potential labour force. They carried out population projections based on a both "high" and "low" life expectancy assumptions, which represent a wide range of possible future values for both men and women.

Essentially, the "low" assumption implies Scotland falling still further behind Europe (and the UK). On the other hand, the "high" assumption implies a gradual catching up. The main finding was that these alternative mortality assumptions had little effect on the size of the population aged 20-64, relative to the baseline mortality assumptions described above.

The fertility rate in Scotland is relatively high when compared to most countries in Europe. Since low fertility is the main cause of population ageing and population decline, increasing fertility should at least slow both of these processes. While this is clearly true, any increase in fertility will only impact on the size of the labour force 15-20 years later, as those new-born individuals grow-up into workers. To explore this effect more formally, Lisenkova et al (2008) carried out population projections based on different fertility assumptions. This analysis suggested that the increase in fertility needed to reverse labour force decline is very large and this increase would need to occur in a very short period of time. More generally, this work suggests that even a very large (and unlikely) increase in fertility will not generate a sizable increase in the potential labour force in the next four and a half decades.

Table.5
Year Total Population and Population Aged 15-64 Started to Decline or Year Expected to Start to Decline European Countries

Country	Total		Country	Aged 20-64
Hungary	1981		Bulgaria	1986
Bulgaria	1989		Macedonia	1989
Bosnia/Herzegovina	1990		Belarus	1990
Croatia	1991		Bosnia/Herzegovina	1991
Czech Republic	1991		Croatia	1991
Estonia	1991		Estonia	1991
Latvia	1991		Latvia	1991
Romania	1991		Lithuania	1992
Albania	1992		Albania	1993
Lithuania	1992		Ukraine	1993
Slovenia	1992		Serbia	1995
Moldova	1993		Italy	1997
Russian Federation	1993		Germany	1998
Belarus	1994		Romania	2000
Ukraine	1994		Montenegro	2000
Serbia	1996		Poland	2001
Poland	1999		Russian Federation	2001
Slovakia	2000		Hungary	2003
Montenegro	2000		Moldova	2004
Germany	2004		Netherlands	2004
Macedonia	2010		Czech Republic	2005
Italy	2012		Slovenia	2006
Portugal	2015		Denmark	2007
Greece	2017		Channel Islands	2010
Channel Islands	2020		Finland	2010
Finland	2028		Greece	2010
Malta	2030		Malta	2010
Austria	2032		Slovakia	2010
Denmark	2032		Belgium	2010
Belgium	2033		Spain	2011
Netherlands	2040		Portugal	2011
Spain	2040		France	2011
France	> 2050		Austria	2012
Iceland	> 2050		Switzerland	2015
Ireland	> 2050		Iceland	2026
Luxembourg	> 2050		Ireland	2040
Norway	> 2050		Luxembourg	> 2050
Sweden	> 2050		Norway	> 2050
Switzerland	> 2050		Sweden	> 2050
United Kingdom	> 2050		United Kingdom	> 2050

Source: World Bank (2008), United Nations (2007)

In closing, it is worth reminding the reader that Scotland is not the only country facing population and labour force decline. However, there is considerable cross-country variation in this respect. Some evidence of this considerable variation for European countries is shown in Table 5. This table gives the year the total population and the population aged 20-64 started to decline or is expected to start to decline based on World Bank population data (World Bank, 2008) and the most-recently available set of United Nations population projections (United Nations, 2007). Figures 17 and 18 show the percentage declines for European countries based on these projections. This information suggests that there are numerous countries where both the general population and population of labour force age are expected to decline much more than is likely to happen in Scotland. For example, if these projections prove to be correct, then the labour force will almost halve in Ukraine in the next 4 to 5 decades.

Figure 17
Projected Percentage Change in Total Population
European Countries, 2005-2050

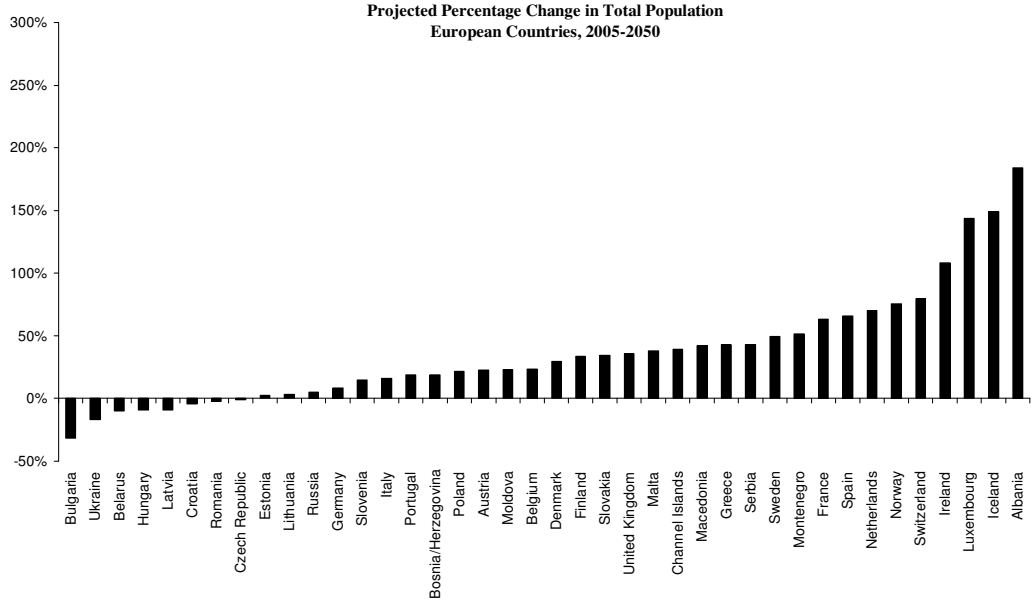
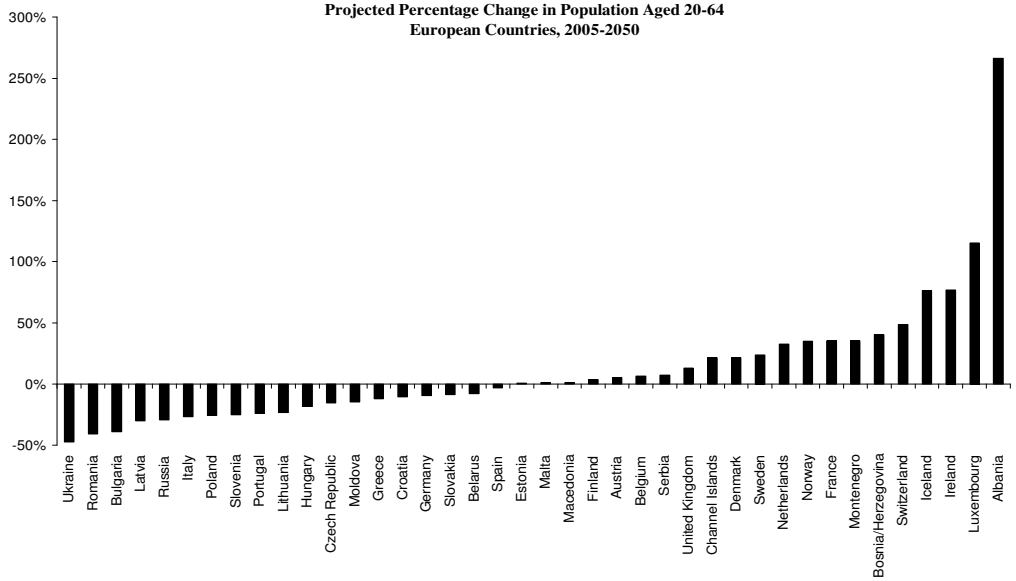


Figure 18
Projected Percentage Change in Population Aged 20-64
European Countries, 2005-2050



6. Conclusions

What is "Scotland's demographic dilemma"? Past trends in fertility, mortality and net-migration have established the pre-conditions for significant population and labour force decline in the coming decades. Most economists and businessmen would agree that a shrinking labour force is not desirable. There is nothing good about having to pay people more, simply because there are fewer of them. Although technological change and capital investment are clearly important, having a growing labour force with the appropriate skill-base is required for sustained economic growth.

Given fertility has been below the replacement-level for over three decades, it seems unlikely that it will increase to, and stay at, the very high levels needed for sustained labour force growth in the long-run. Likewise, realistic improvements in mortality (remembering that Scotland has a long way to go in this respect) will have little impact on the overall size of the labour force. This suggests that without a sustained increase in net-migration, the labour force will shrink. The "dilemma" therefore that Scotland faces is to either grow the labour force through increased immigration and/or decreased emigration or face negative macroeconomic consequences that will likely lead to a lowering of the average standard of living.

With lower economic growth, it will be more difficult to pay for population ageing. Almost anything is affordable with high rates of economic growth. Constraints in the labour force caused by demographic change will make generating high rates of economic growth very difficult. In this respect, it is often argued that improvements in technology and investment in capital will increase labour productivity and therefore lower the demand for workers. However, it would be pure folly to conclude than this "will happen" just because it is needed. One implication of this voiced by many (especially the anti-immigration lobby) is that there should be a "conscious effort" to move away from labour-intensive to capital-intensive industries. The problem with this "solution" is that this is easier said than done.

One view is that population ageing is not an economic problem but a political problem. In welfare states such as Scotland, tax-payers are required by their Governments to pay for a given minimum standard of living to all those who cannot achieve this for themselves. With population ageing this "minimum standard of living" may very well have to fall, since the financial requirements needed to maintain, for example, state pensions and home help at current levels indefinitely are unlikely to be obtainable. However, as a population ages so does it electorate, and older people compared to younger people have much higher rates of participation in elections at all levels of government.

The problem facing politicians is that if they do not—or cannot—accommodate the demands of their ageing electorate they will suffer dearly at the ballot box. A "greying electorate" will not vote in mass for politicians who they believe are ignoring their interests. At the same time, those politicians who promise and don't deliver will be treated in a similar manner. Therefore, politicians in the main political parties will have to agree that it may not be possible to provide the standard of living that an increasing share of the electorate wants. In this sense, population ageing will force a political consensus in Scotland, which is occurring in other countries with rapidly ageing populations (with Germany being a good example).

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