FISCAL STUDIES, vol. 27, no. 3, pp. 281–311 (2006) 0143-5671

Economic Capabilities, Choices and Outcomes at Older Ages*

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Abstract

Intense policy and academic interest in the 'economics of ageing' has come about as a result of the demographic trends that have been experienced over the last 50 years and that are projected for the next 50 years. Key economic policy issues relate to the design of public pensions, welfare systems, healthcare and invalidity benefits, and the regulation of private pensions and other retirement saving. This paper presents an overview of the beginnings of a research agenda targeted towards increasing the empirical evidence on these issues in England and providing extensive data for subsequent research. The paper focuses on summarising some recent data on how individuals' economic circumstances, and in particular the ability and willingness to work, change from age 50 onwards. This will be a key factor in determining the ability of economic institutions to adjust to new socio-

*This paper is a revised text of the author's inaugural lecture given at UCL on 2 March 2006. Much of the research drawn on here was supported by the ESRC under the grant 'Late Life Work and Retirement' and by the National Institute on Aging through grant number P01 AG008291-13, with co-funding from the Economic and Social Research Council through the Centre for the Microeconomic Analysis of Public Policy at IFS (grant number M544285003). The English Longitudinal Study of Ageing has been supported by grants from the National Institute on Aging, US National Institutes of Health (2RO1AG7644-01A1, 2RO1AG017644) and several British government departments, specifically Department for Education and Skills, Department for Environment, Food and Rural Affairs, Department of Health, Department of Trade and Industry, Department for Work and Pensions, HM Treasury, HM Revenue and Customs, Office of the Deputy Prime Minister and Office for National Statistics. ELSA is a collaborative study run collectively by University College London, the Institute for Fiscal Studies and the National Centre for Social Research. Any errors or omissions are the responsibility of the author alone.

JEL classification number: J26.

demographic equilibria in which individuals are living for longer. Further issues for more extensive empirical research are also identified.

I. Introduction

This paper is about a very broad set of issues in what has become known as the 'economics of ageing', where we have been developing an ongoing research agenda at the Institute for Fiscal Studies and University College London.[1] I want to summarise a few key findings that have emerged, both through modelling of individual and household behaviour and through collecting and analysing new empirical evidence on the older population as they move into and through their retirements. I will also outline a number of issues that form the agenda for our ongoing research and data collection activities.

The intense policy and academic interest in the 'economics of ageing' has come about as a result of the well-known demographic trends experienced by almost all developed economies over the last 50 years, and the resultant demographic projections for the next 50 years. Put simply, increases in longevity, coupled with declines in fertility, have led to projections of a substantial rise over the next few decades in the fraction of the population who are aged over 65. The key economic policy issues that result relate to the design of pensions, welfare systems, and healthcare and invalidity benefits.[2] I will only really discuss these in passing, although much of the analysis presented here will have some indirect bearing on those policy debates. Instead of talking about the economics of population ageing – the way in which governments can deliver public services and manage welfare systems in economies in which there is an increasing proportion of elderly individuals – I will focus on how individuals' economic circumstances, and in particular the ability and willingness to work, change over the life course, which will be a key factor underlying the ability of economic institutions to adjust to new socio-demographic equilibria in which individuals are living longer.[3]

[1]The IFS–UCL empirical microeconomic research group is highly interactive and many of the ideas discussed here have been developed in conjunction with many colleagues. In particular, in this paper I will draw liberally on work with Richard Blundell, Carl Emmerson, Zoë Oldfield and Sarah Smith, all of whose contributions should be explicitly acknowledged.

[2]For a good overview of the key economic policy issues relating to ageing populations, with particular reference to pensions policy, see Disney (1996).

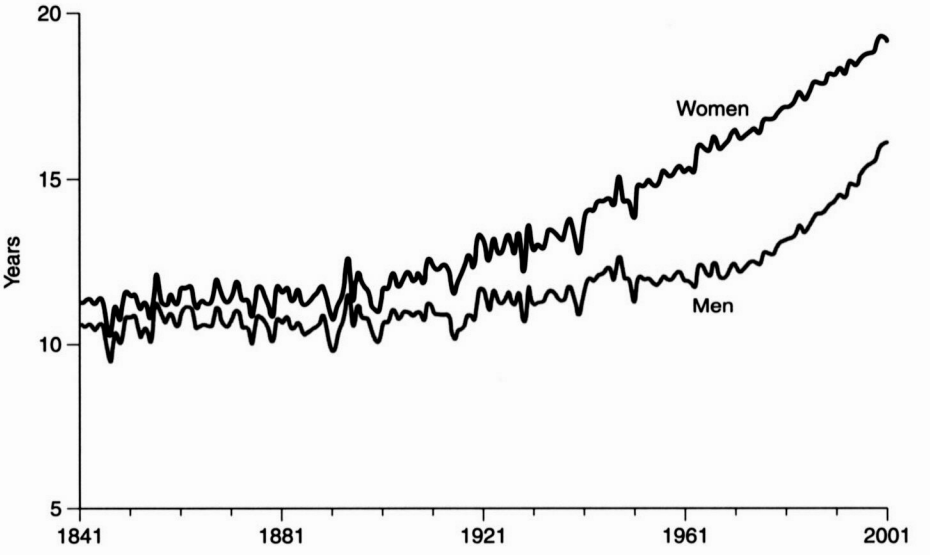
[3]Of course, the social demographic processes driving population ageing could themselves adjust to changing population structures (and indeed economic conditions). Family formation, composition and living arrangements, fertility and immigration may be particularly important in this regard. In what follows, however, I will not address these issues and will instead focus on economic adjustments only.

If the increase in life expectancy is well known, perhaps less well known is how recent and rapid the increase in late-life life expectancy has been – that is, the increase in the number of years one can expect to live for should one reach, for example, age 65. Figure 1 shows that in 1841 a 65-year-old man could have expected to live for around another 10 years. One hundred and twenty years later – by 1961 – this would have increased, but not by much, to around 12 years. By 2001, a 65-year-old man could expect to live for around 16 years. This represents an increase of one year of late-life life expectancy for every decade since 1961 – a 33 per cent increase in the expected length of remaining life for 65-year-old men over a 40-year period. For women, the rise began earlier, but the magnitude of the rise over the second half of the twentieth century is just as striking. During a period of such rapid change at older ages, one might well expect there to have been substantial knock-on effects on economic outcomes and institutions.

The economic effects of this increase in life expectancy have been compounded by recent labour market trends. In particular, individuals have been leaving school later and retiring earlier, so the proportion of life spent working has fallen by even more than would be predicted from the demographic trends alone. Table 1 quantifies this by taking selected cohorts from the analysis of Banks and Smith (2006), who use assorted micro-data to estimate differences in lifetime labour market activity across date-of-birth cohorts.

FIGURE 1

Additional years life expectancy at age 65 in England and Wales



Source: Government Actuary's Department life tables.

TABLE 1

Education, retirement and life expectancy by cohort in the UK

Cohort born in:	*Mean age left school*	*Median retirement age*	*Life expectancy if reach age 55*	*Proportion of life spent in labour market* (p)	p *if retirement age stays at 61*	*Required retirement age for* p = *0.59*
1900	14.1	65	73.5	0.69	–	–
1935	15.9	61	76.7	0.59	–	–
1970	17.7	–	81.7	–	0.53	65.9

Notes: Age left school and retirement age calculated using data from the Family Expenditure Survey. Data on life expectancy from ONS *Population Trends* (2004). Cohorts are five-year cohorts beginning with listed year (so 1900 refers to the cohort 1900–04, etc.).
Source: Reproduced from Banks and Smith (2006), which provides analysis for all cohorts.

The cohort born in 1900 left school, on average, at age 14, worked until 65 and could expect to live until around age 74 – a total of 69 per cent of their life would have been spent in the labour market.[4] By the time we get to the cohort born in 1935, this number has already fallen to 59 per cent, partly because retirement age has fallen from 65 to 61, but also because school-leaving age has increased and the length of retirement has increased also as a result of the first increases in late-life life expectancy.

For more recent cohorts, we don't know when they are going to retire although we do know when they left school and how long they can expect to live. Should they retire at age 61 like the 1935 cohort, the 1970 cohort will have spent 53 per cent of their life in the labour market, compared with 59 per cent for the 1935 cohort and 69 per cent for the 1900 cohort. This 1970 cohort would need to work to age 74 if they were to spend the same proportion of their life in the labour market as the 1900 cohort. But this may be too much to ask. After all, increases in economic prosperity might lead current cohorts to want to consume more leisure than in the past. So, alternatively, one could say that, to get back to the 59 per cent level – that experienced by the 1935 cohort – the 1970 cohort would require a more modest, although still substantial, increase in the length of working life of 4.9 years, with average retirement age increasing to 65.9.

Alongside these trends, and not unrelated of course, we have seen the shift in responsibility for welfare provision away from the state and towards the individual. This has been particularly acute in the case of retirement income, i.e. state pensions. This shift has been bigger in the UK than in most other countries, and we have seen both a reduction in the generosity and coverage of state pension provision and an increase in the importance of

[4]If anything, this is an underestimate since those in the 1900 cohort who died before the beginning of the Family Expenditure Survey sample used to calculate these averages (i.e. 1968) would have been likely to leave school earlier and will have spent less of their life, if any, in retirement.

private pension alternatives. As a result, many of the questions in the British policy debate on the economics of ageing revolve around whether, and, if so, how, individuals will adjust their behaviour to provide resources for their own retirement. Of course, one of the key margins that individuals can use to provide such increased resources is to work for longer.[5]

As *The Economist* recently put it in a piece on population ageing, 'If people want to work longer, and companies are willing to employ them, then what's the problem?' (18 February 2006). This question forms the background to the analysis presented in the rest of this paper. But I will argue that the issues are not as simple as the tone of this quote implies. In particular, there are systematic differences in health and cognitive abilities within the population that are likely to affect both economic choices and productivity at older ages.

II. New evidence on choices and capabilities at older ages

As individuals approach their retirement, there are three broad economic choices they need to make – how much of their income to save versus spend; how much of their wealth to annuitise (that is, turn into an income stream that will be paid to them until they die, thus insuring them against outliving their resources); and when to leave the labour market. Yet all these choices are taken whilst facing constraints – perhaps over employment opportunities, the availability of annuity market or other savings products, or even health or functional limitations that limit one's ability to carry out tasks either in the paid labour market or at home.

A substantial amount of empirical work has taken place in recent years looking at choices of consumption versus saving over the life cycle, and the more specific issue of the accumulation of pensions and retirement wealth. With the availability of appropriate individual-level data, this empirical work was able to show that the life-cycle model – the economist's standard model of how people distribute consumption over the various periods of their lifetime – does explain the broad patterns of consumption over the life course that we see in data in the UK, but only when adequate controls are introduced for changing circumstances and needs over the life cycle, the

[5]Indeed, if one considers a general equilibrium model, this may well turn out to be the key margin, since increases in private saving (in the absence of increases in productivity growth) may well have knock-on effects on future asset prices. Of course, these issues are more complicated than a simple model would suggest for a small open economy such as the UK, and the presence of similar demographic trends across developed countries and large parts of the developing world becomes relevant (see Attanasio and Violante (2000), for example).

interactions between consumption and leisure, and the fact that decisions are taken in an uncertain environment.[6]

The decision to work or retire is integrally related to the decision to accumulate retirement resources – when people consider their retirement choice, they are implicitly trading off the benefits of an extra year's work in terms of higher income when they retire, against any disutility they get from that work and any financial costs that such work might require. Putting the empirical modelling of retirement choices onto the same footing as that of the life-cycle consumption path has been a longer time coming, mainly because adding uncertainty to the dynamic discrete choice model of whether to work in various periods of life complicates the analysis and estimation somewhat. The recent work of French (2005), for example – building on, amongst others, Blau (1994) and Rust and Phelan (1997) – shows similar conclusions to the consumption literature cited above: when adequate controls for individual circumstances are included, these models can indeed fit broad patterns in data on consumption, saving and retirement.

One of the emerging themes of this recent analysis has been that, particularly when it comes to retirement and labour market outcomes, one needs to control for all dimensions of an individual's circumstances, ranging from the economic to the social to the physical, mental and psychological in order to develop a model of retirement. Given the lack of such data, myself and a number of colleagues at IFS, the Department of Epidemiology and Public Health at UCL and the National Centre for Social Research have been designing and collecting a large-scale survey of older people in England as they move through their later life. The English Longitudinal Study of Ageing (ELSA) is a new interdisciplinary panel data-set that will allow researchers and policy analysts to investigate general issues relevant to ageing populations and retirement in particular. Since ELSA will provide the body of evidence in the rest of this paper, I will describe the key aspects of the data very briefly below before turning to the evidence they provide.

For those with an interest in data, ELSA is an exciting survey development that combines detailed measurements in health, economic and social domains on a longitudinal basis for the first time in Britain, and, for some topics, for the first time anywhere in the world (at least on such a large scale). In addition, we have been able to apply a number of new techniques in applied survey methods – for example, in the quantitative measurement of

[6]The evidence has been accumulating over the course of the last 15 years in a series of papers developed at IFS that predominantly use the time series of expenditure data from the Family Expenditure Survey. See Blundell, Browning and Meghir (1994), Attanasio and Weber (1995), Meghir and Weber (1995), Attanasio et al. (1999), Banks, Blundell and Tanner (1998) or Banks, Blundell and Brugiavini (2001) for a selection of findings.

expectations or the measurement of financial wealth – that hugely increase the value of these data to economic researchers in particular.

When designing a survey, specific research questions and priorities are needed in order to be able to make choices about survey content given constraints on interview time and financial resources. From the outset, the ELSA study has been designed to provide evidence on six key research questions: the nature and timing of retirement and post-retirement labour market activity; the determinants of economic well-being in older age; cognitive functioning and its impact on decision-making among older people; disability, healthy life expectancy and the compression of morbidity; economic, social and health inequalities in an ageing population; and social participation and social productivity at older ages.

ELSA is a panel study beginning with around 11,400 respondents aged 50 and over on 29 February 2002. The core interview, which is conducted face to face and takes place every two years, covers full details of economic position, health, physical and cognitive function, and social and psychological factors. The first ELSA interview was in 2002, and the 2004 interview included a follow-up nurse visit for specific health and biomedical measurements and the collection of blood samples and saliva. This design (with an interview every two years and a supplementary nurse visit every other interview) will continue into the foreseeable future, with funding for data collection through to 2010 already secured. For further details of the topics covered and measures included in the ELSA questionnaire, see the appendix, which also contains details of how to obtain the public-release data.

Importantly, the ELSA sample was initially recruited from respondents to three separate years of the Health Survey for England (HSE) survey in such a way as to provide a representative sample of the older population in England. In particular, the sample was taken from respondents to the 1998, 1999 and 2001 surveys. Importantly, ELSA individuals can be linked back to their HSE data, so the HSE effectively provides the first 'baseline' observation on each ELSA respondent. All HSE surveys contain information on health and labour market position, but information on detailed economic position (and, in particular, income and assets) is weak. In addition, different years of HSE focus on different themes; detailed modules of self-reports on health and/or biomedical samples are collected to allow research on the theme in that particular year.

In 2004, 9,432 wave 2 ELSA interviews were delivered on 8,837 core members or partners, and 595 younger partners or new partners, representing a wave-on-wave response rate of 81.5 per cent. Follow-up nurse visits were performed in 7,666 cases, representing 88.2 per cent of the eligible core members (see Cheshire et al. (2006) for further details). Going

forward, the 2006 wave went into the field in May and contains a refreshment sample of individuals born between 1952 and 1956 so that the overall sample will remain representative of the population aged 50 and over.

The evidence that ELSA provides for the policy and academic debates on the economics of ageing is already mounting up, and this paper will do no more than bring together some of the findings that are already beginning to emerge from the study. In particular, I will focus on evidence relating to the nature of labour market choices, health and cognitive abilities at older ages. I will begin, in Section III, by discussing retirement, health and the physical ability to work, before moving on to issues relating to individuals' cognitive abilities and economic outcomes in Section IV.

III. Retirement, labour market inactivity and health

Recent years have seen striking trends in the labour market activity rates of older workers. They fell sharply during the late 1970s and 1980s, before rising slowly from the mid-1990s (although they are still well below the levels of 30 years ago). Only around 40 per cent of men aged 60–64 are working (compared with around 70 per cent in the late 1970s), for example, and the equivalent number is around 60 per cent for 55- to 59-year-olds (compared with 80 per cent).[7] But such trends conceal an important heterogeneity in the older population that emerges when one looks at inactivity rates of older working-age individuals by wealth. Figure 2 presents such an analysis for men (with groups defined by wealth quintile within each narrow age band) from the first wave of ELSA data. It shows that at the top of the wealth distribution, a relatively large fraction of the population are retired even at ages 55–59.

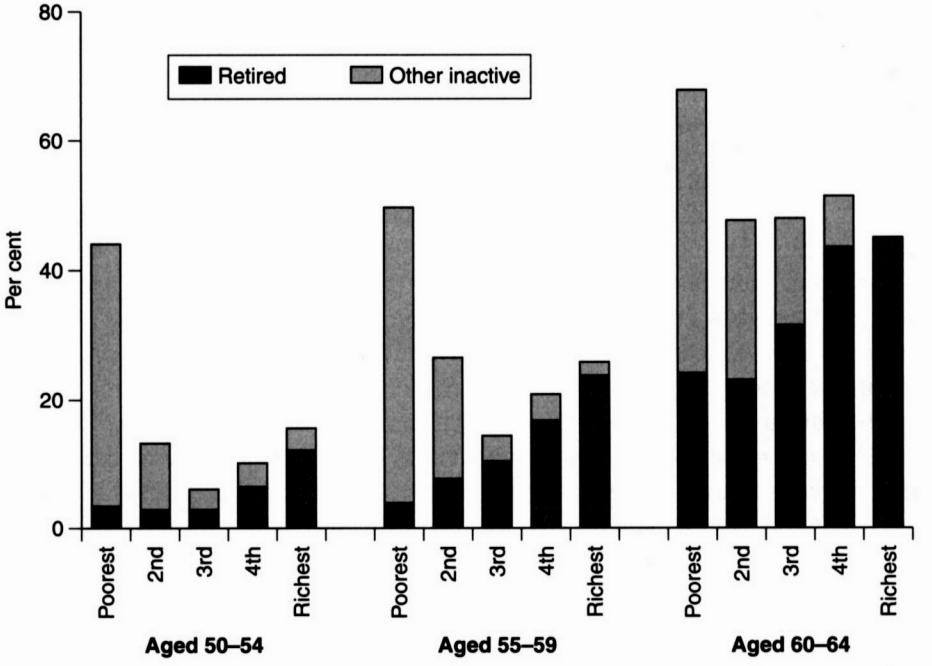
Inactivity rates are much higher at the bottom of the wealth distribution, although the proportion reporting themselves as retired is much lower. As a consequence, there is a U-shape pattern by wealth in the proportion of the population approaching retirement age who are not working, with those in the middle of the wealth distribution being least likely to be out of work, and rather high levels of non-work at both the top and bottom of the distribution from well before the state pension age.

The issue of early retirement, and in particular the role of the incentives to stop work that are inherent in many pension schemes, have been discussed at much length. Successive analysis has shown that such incentives can have quite sharp effects on retirement behaviour, particularly

[7]See Banks and Blundell (2005), for example.

FIGURE 2

Male retirement and labour market inactivity by age and wealth



so for schemes that are defined benefit (DB) in nature.[8] This evidence is supported by analysis of the ELSA data, which contain detailed information on pension arrangements which allows this issue to be investigated in some detail. Analysis of wave 1 ELSA data shows that those with DB plans, who on average have greater disincentives to work, did indeed report lower expectations of working at older ages – Banks, Blundell and Emmerson (2005) show that, even when one controls for demographic factors, education and wealth, those with DB plans had 4 percentage points lower expected chances of working at 60 than those in the state scheme and those with individual DC plans had 7 percentage points higher expected chances of working at 60 than those in the state scheme.[9] Analysis of transitions in work status between wave 1 and wave 2 confirms the U-shape pattern that is

[8]Gruber and Wise (1999) provide a series of cross-country analyses showing that international variation in the work incentives in pension schemes is correlated with labour market participation of older workers. Meghir and Whitehouse (1997) and Blundell, Meghir and Smith (2002) provide a more detailed analysis for the UK. More structural models of the role of pension incentives can be found in Gustman and Steinmeier (1986), Rust and Phelan (1997) or French (2005), for example.

[9]Of course, the possibility of reverse causality must be admitted here – individuals may have joined industries or employers with DB pensions because of their retirement preferences. The correlation should therefore not be taken necessarily to represent a causal effect on the basis of this evidence alone.

apparent in cross-section and also confirms that those with DB plans are more likely to retire at earlier ages (see Emmerson and Tetlow (2006)).

Less work has focused on employment decisions and outcomes with specific relevance to the bottom part of the wealth distribution, but the ELSA data reveal a number of key features of this part of the non-working population. Since the proportion of the inactive group that fall into these low-wealth groups is large, I will spend a little time summarising the empirical evidence in what follows. At this point, given the data available, the analysis just provides conditional correlations and can therefore be seen as only circumstantial evidence in favour of a causal link between dimensions. But one of the most exciting things about the ELSA agenda is that, as time goes on, we will follow sample members over time and observe changes in some dimensions preceding changes in other dimensions, which in turn will allow us to build and estimate richer and more specific models of the various mechanisms at work. I will return to this point briefly later.

One of the key correlations with work status, particularly at the lower end of the wealth distribution, is with poor health. The rise in the number of people on disability benefits is well known (see Banks et al. (2002) for details of the UK trends) and health-related labour market inactivity is now a policy issue in its own right. Figure 3 shows the difference in employment rates between those in the ELSA sample who report themselves to be in the best health and those with the worst self-reported health. At all ages, even between 50 and 60, those in poor health are substantially less likely to be working than those in good health.

FIGURE 3

Employment rates and self-reported general health status by age and gender

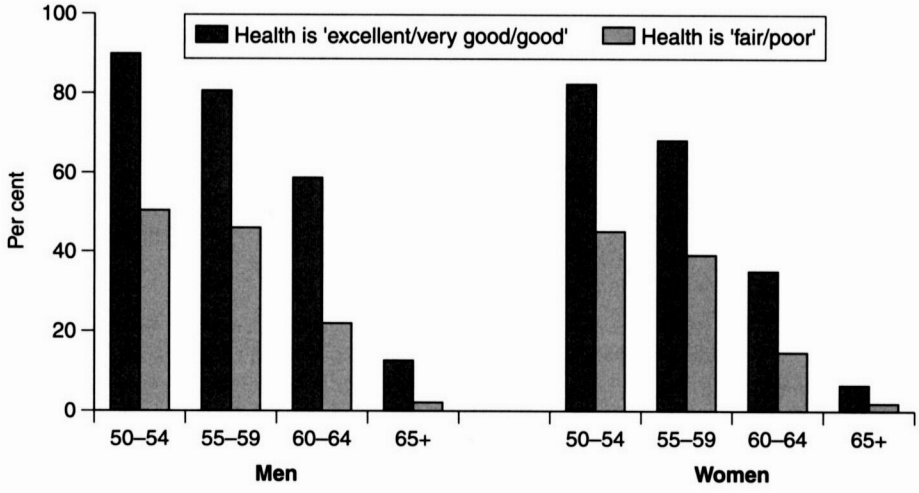
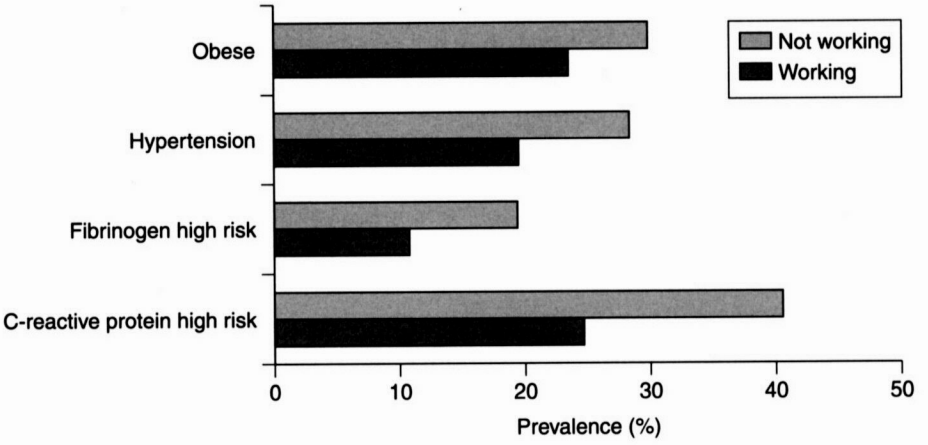


FIGURE 4

Specific health markers by work status: men aged 50–64



This correlation is not an artefact of reporting behaviour whereby those without jobs are somehow unobservably different in their subjective assessment of their health given common 'objective' health levels. Other studies have shown similar correlations with more specific health measures, and have also revealed important differences by occupation (see Bartley and Owen (1996), for example). Using the detailed health measures in ELSA, one can see that the same correlation holds true for measures of health such as whether or not individuals have been diagnosed with specific conditions and even for measures based on biological markers of disease. Figure 4 shows that such objective measures of poor health (as measured by either specific measures of health risk or biomedical markers of disease) are indeed worse for those who are not working.

As measures of health risk, obesity (defined by body mass index (BMI) greater than 30) and hypertension (defined by a blood pressure reading of greater than 140/90 or being on blood pressure medication) are well known. The other two measures in Figure 4 – fibrinogen and C-reactive protein – are measures of inflammatory markers that come from blood samples (which are collected in ELSA). As well as being measures of current disease, these final two are risk factors for future bad health, referred to as pre-clinical markers of disease, and in particular cardiovascular disease, arthritis and (in the case of C-reactive protein) more generic poor health outcomes. Figure 4 therefore shows us not only that those who are not working are already in worse health, but also that their health is more likely to get worse in the future too.

Of course, the dynamic relationship between current health and future work is a key issue. In related ongoing work with Meena Kumari, who is a

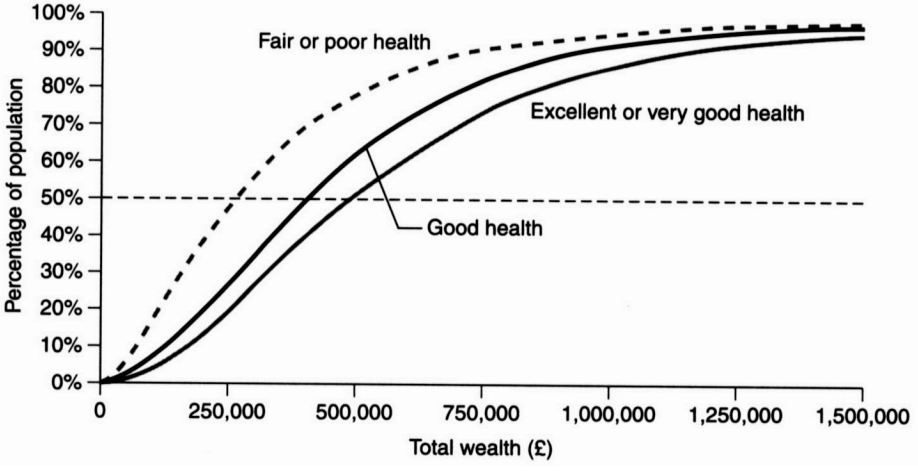
biologist in the Department of Epidemiology and Public Health at UCL, we have been exploiting the link between the Health Survey for England and the ELSA data to look at variation in subsequent work outcomes by variation in these bio-markers within the group of workers, i.e. the darker bars in Figure 4. It turns out that even within workers, it is those with higher 'baseline' levels of these markers in 1998 (i.e. at higher risks of subsequent poor health events) that are most likely to stop work over the five-year period from 1998 to 2002.

Finally, it is worth noting that low employment rates amongst low-health individuals are consistent with individuals' reported subjective expectations of work. Banks and Casanova (2003) show that those in poor health who are working report significantly lower expectations of working at later ages than do their counterparts in better health. Similarly, those who are out of work and in poor health are significantly less likely to report high expectations of returning to work (see Banks and Blundell (2005), for example).

One of the key correlations that has been observed around the world for older populations is that between wealth and health;[10] as a result, many of the low-wealth inactive individuals in Figure 2 are the same individuals who are in poor health and out of work in Figure 3. Figure 5, taken from our study on the distribution of retirement resources in England (Banks et al., 2005), shows the extent of the health–wealth correlation amongst older working-age adults in ELSA. This graph shows an estimate of the cumulative distribution of total wealth within each of three health groups,

FIGURE 5

The distribution of wealth by subjective self-reported health status: individuals between 50 and the state pension age in 2002



[10]See Deaton (2003) or Smith (2001) for useful summaries.

with data for individuals between age 50 and the state pension age only. In order to construct this, all sources of wealth had to be aggregated at the individual level – an analysis that has previously been impossible for the English population. These wealth measures include estimates of both state and private pension wealth as well as owner-occupied housing, and they capture the entirety of economic resources available to fund individuals' retirements.[11]

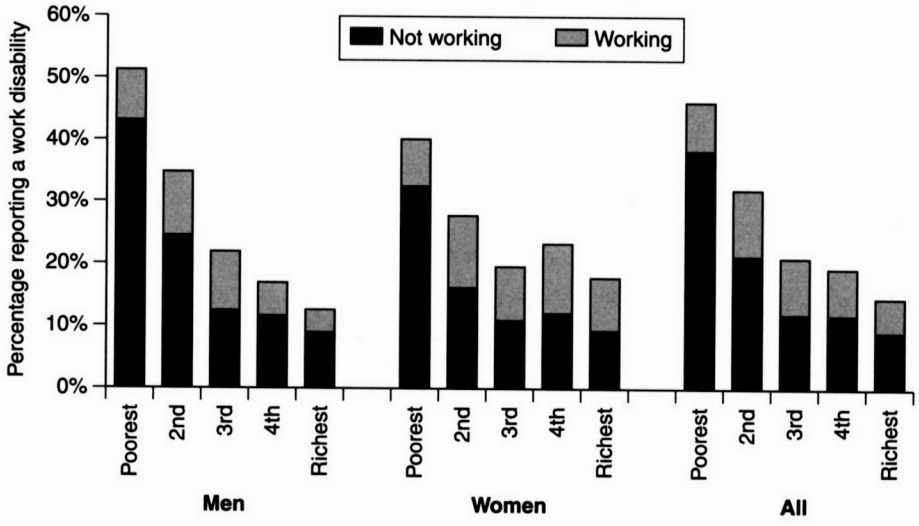
The easiest way to begin to read Figure 5 is to read along at the 50 per cent level, which gives median wealth for each of the three groups. This shows that for the lowest health group, median wealth is around £250,000, whereas the median for the best health group is around twice as much. (To put these numbers into perspective, stocks of wealth can be divided by 20 to get the approximate annuity value – the stream of income that such an amount of wealth would buy for someone of this age on an annual basis until they die. Hence, £250,000 of wealth would provide an income of around £12,500 per year.) Alternatively, when reading Figure 5, one can select an amount of wealth (or the associated level of annuity income) and read up to each line to find the fraction of each health group that lies below this level of economic resources. Whichever way one reads the graph, however, the strong correlation between health and wealth is apparent. And it is not a gap between the poor and the rest or between the rich and the rest. The differences in health are observed at all points on the wealth distribution, and the differences in wealth are apparent across all three points of the health distribution – the feature known as the socio-economic 'gradient' in health (see Marmot and Wilkinson (1999)).

When one puts this evidence together, what emerges is a striking picture of economic inactivity at the bottom of the wealth distribution which is strongly associated with poor health and disability. This is perhaps most strikingly illustrated by looking at self-reported work disability – individuals' answers to the question 'Do you have a health problem or disability that limits the type or amount of work you can do?'. Figure 6 (taken from Emmerson and Tetlow (2006)) shows the proportion answering such a question in the affirmative by wealth quintile and gender, and also breaks down each group according to whether the individuals are working (despite their reported disability) or not. Over half of men in the bottom wealth quintile report a work disability and the vast majority of these do not

[11]Such calculations are complex and require many assumptions. Pension wealth is calculated using respondents' self-reported probabilities of working at future ages, coupled with age–gender-specific life expectancies. Future earnings are assumed to grow in line with average earnings, and past earnings are assumed to be such that individuals' positions relative to median earnings for their cohort–gender–education group remain constant. For further explanation of the pension wealth calculations, along with a more detailed description of the resulting data, see Banks, Emmerson and Tetlow (2005).

FIGURE 6

Work disability and employment status by wealth and gender: individuals aged 52 to the state pension age in 2004



work. As expected, a strong downward-sloping 'gradient' in work disability emerges by wealth.[12] Taking self-reported disability at face value, this limited (subjective) capability for work, highly prevalent at ages long before the state pension age, presents problems for ageing economies in which policymakers are trying to extend working lives.

IV. Cognitive function and economic choices

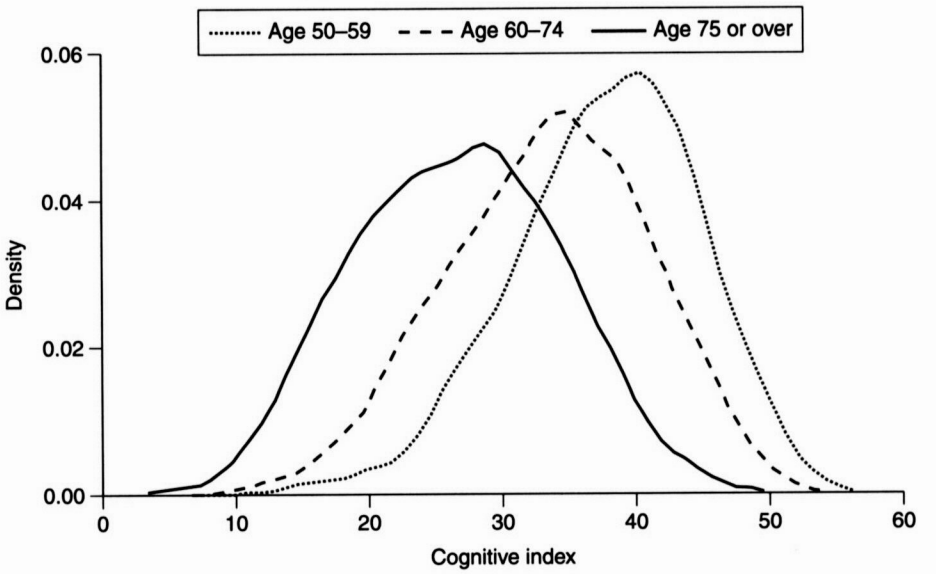
The other aspect of economic capabilities on which I will present some descriptive evidence is cognitive function and, more specifically, numeracy. The ELSA survey measures cognitive function in several domains, including memory, executive function and numeracy. Figure 7, taken from Steel et al. (2003), presents an overall index capturing these three elements, which can clearly be seen to shift to the left and spread out with age. This implies that cognitive function diminishes with age, even between ages 50–59 and 60–74, and that the change is greater for those at the bottom of the distribution than for those at the top, although there is clear evidence of decline even at the right-hand tail of the distribution.[13]

[12]Closer inspection of the bars reveals that, amongst men with a work disability, the group most likely to work is the middle wealth quintile, which accords once more with the U-shape pattern documented in Figure 2.

[13]Whilst, strictly speaking, comparisons of age groups from cross-sectional data cannot reveal 'decline' with age due to possible cohort effects and differential mortality, in this case one can be reasonably confident that the data are revealing an age effect. Broad measures of cognitive function are

FIGURE 7

Distribution of global cognitive index by broad age band



Source: Steel et al., 2003, figure 7.6.

In a system where individuals are encouraged to make their own retirement saving choices, one key question that arises is individuals' abilities to plan for their retirement and provide for themselves. The cognitive function modules of ELSA provide a unique opportunity to assess cognitive abilities and their correlation with both accumulated levels of retirement wealth and expectations of future financial security in retirement. In recent work, we have focused on one particular aspect of cognitive function – numeracy – since it is most likely to be associated with financial choices over the life cycle and, in particular, provision for retirement income. Once again, such issues are key to the policy debate in the UK, where the government has identified 'informed choice' as an important item on the policy agenda.

The ELSA cognitive function instrument fielded in 2002 tested numeracy by asking a series of simple financial questions. These data can be used to divide the ELSA sample into four groups, from the least numerate, who either get all questions wrong or only get the simplest addition and subtraction questions correct, to the most numerate, who can correctly answer a question on interest compounded at 10 per cent over a two-year

unlikely to display cohort effects, and differential mortality – the fact that those with the worst cognitive functioning are most likely to die at early ages – would tend to bias the age profiles the other way since the surviving sample would have had higher-than-average functioning levels at younger ages.

period (see Banks and Oldfield (2006) for further details). Figure 8 shows considerably lower levels of numeracy for older individuals within the ELSA sample, with a steady decline in the proportion in the top two numeracy groups from age 50 onwards. Once again, this age pattern is unlikely to be a cohort effect, although the marked gender difference may be eroded in future generations of older individuals since the ELSA generation of 50+ women (who do display lower levels of numeracy than their male counterparts) will have had very different experiences of education and labour markets from their successors.

FIGURE 8

Numeracy levels by age and gender

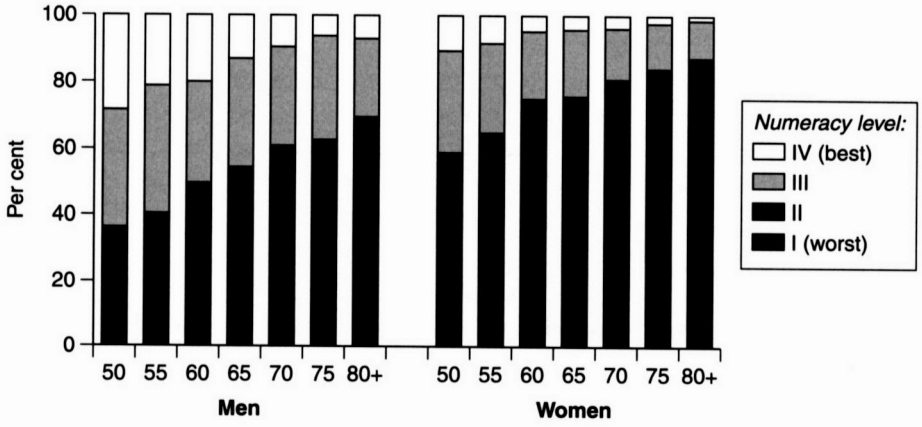
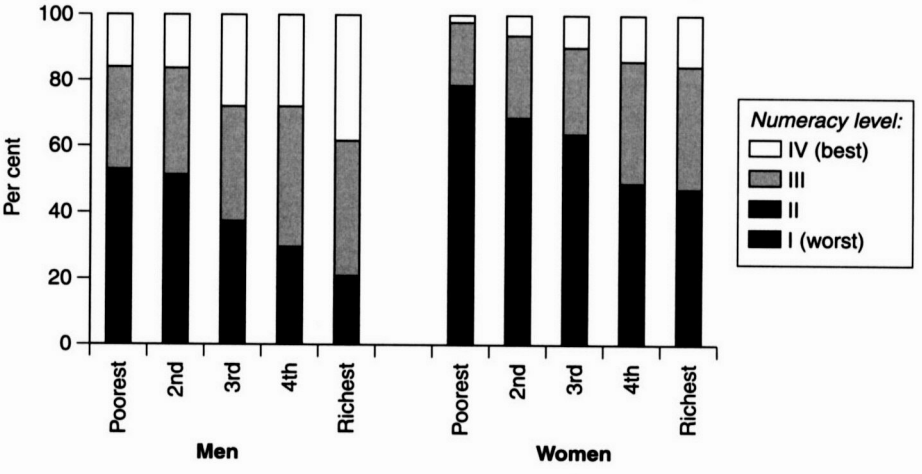


FIGURE 9

Numeracy levels by wealth quintile and gender: individuals aged 50–59 in 2002



When the population is split according to wealth levels, systematic differences in functioning appear and a strong gradient becomes apparent (see Figure 9). For example, more than half of men in the lowest wealth quintile fall into the bottom two numeracy groups, compared with around 20 per cent of the top quintile. Whilst it bears repeating that causality is impossible to identify given the cross-sectional nature of the data, it is at least worth noting that this relationship still holds strongly when one controls for other individual differences, such as education, family and demographic circumstances, and also for other dimensions of cognitive abilities.

As mentioned above, the shift to individual pension provision that has occurred through successive decades of pension reform in the UK means there is a more important role for potentially complex individual choices when it comes to retirement saving. The key elements of such choices are not only the ability to make financial decisions but also a degree of information about the options available and an understanding of expectations for future needs and resources.

Analysis of the ELSA data suggests that there is some degree of underestimation on perhaps the most fundamental piece of information one would need for retirement planning – how long individuals are expecting to live (Banks, Emmerson and Oldfield, 2004). There are a number of potential explanations for the fact that average reported chances of living to older ages are lower than those that would be predicted from life tables, but to investigate fully will really require longitudinal data on longevity expectations and perhaps an estimate of the true longevity differences between socio-economic groups within the population. One important question is whether all groups underestimate the chances of living to older ages by the same amount, or whether some groups underestimate by more than others. I suspect the answer is the latter – certainly, the poorest groups, with the worst health and the lowest education, do indeed report lower expectations of living to older ages than their better-off counterparts, but only comparison with the 'true' probabilities for each group will reveal the extent of differences in underestimation.

When it comes to broader information about retirement resources, financial choices and, ultimately, financial security in retirement, I won't go into detail here, but analysis of the ELSA data reveals that, other things (including education, other dimensions of cognitive abilities and overall level of financial wealth) equal, more numerate individuals hold more financial assets, are more likely to hold private pensions and are more likely to know and understand the detailed arrangements of their pensions (Banks and Oldfield, 2006). Since wealth accumulation choices are often taken jointly, we also looked at controlling for the numeracy and ability of the

spouse in the cases where they were greater than those of the individual themselves, and the results were, if anything, strengthened.

V. Key questions for the future

Employment outcomes for older workers will be a key margin by which economies can potentially adjust to the pressures of an ageing population. Yet the data presented above have suggested, albeit only circumstantially, that only a part of the current distribution of employment outcomes can be explained by a labour supply effect operating through the disincentives in private pensions, and that this effect is predominantly in the upper half of the wealth distribution. Hence, questions surrounding individuals' health and their ability to work, coupled with how productivity and wage opportunities might evolve with age, come into play. The evidence above has suggested that trajectories for health and cognitive functioning differ across the wealth distribution and that decline occurs earliest for poorer individuals.[14] Consequently, the issue of labour demand will be relevant when thinking about the drivers of labour market outcomes for this group.

Of course, when thinking about productivity, the positive effects of experience may offset cognitive decline such that firms will continue to demand older workers as they age. But as yet this is an under-researched issue and more needs to be learnt about how the kind of age profiles for health and cognitive functioning provided above interact with the nature of work (and indeed occupation) to generate age–productivity profiles. Empirical studies are beginning to emerge, often for specific industries or employers (see Börsch-Supan, Düzgün and Weiss (2006) or Daniel and Heywood (2006), for example), but this issue has to be seen as an important one for future investigation.

One thing we do know, of course, is that observed wages by age are a poor indicator of wage opportunities for those not working, given the fact that non-workers are certainly not a random sample of the older population. Hence, age–wage profiles taken from raw data do not tell us the right story. Attempts to adjust age–wage profiles to account for the selection of workers into the labour market have suggested two conclusions. First, it seems that the wage opportunities for older workers taken as a group have not kept up with average earnings over the last 20 years. In addition, the low-education older workers have fallen even further behind (Banks et al., 2002). Put differently, older workers have not appeared to benefit directly from the productivity growth observed elsewhere in the economy. But this does not

[14]Of course, since the evidence of differences by age has been cross-sectional rather than longitudinal in nature, it needs to be treated as circumstantial rather than conclusive when making statements about age decline.

look at age profiles within the group of older workers. When one attempts to construct age–earnings profiles by using panel data to control for permanent individual differences, it appears that it is indeed poorer workers – those without occupational pensions – who experience falling wage opportunities with age after age 50, whereas those with pensions tend to experience less decline (Smith, 2005).

Another topic for future research is the extent to which the data and evidence referred to above can provide evidence on what might happen for future cohorts of retirees, for whom the pressures to work longer and to provide more private retirement income will be even greater. Key to this research, given the nature of the correlations identified earlier, will be the identification of the extent of the causal links between health and functioning and work outcomes, and vice versa. Whilst it is very plausible that health and cognitive abilities limit one's ability to work productively and to find gainful employment, the reverse causal link – where working keeps some individuals active and engaged in society, preventing physical and cognitive decline – is also important to bear in mind. Both are probably at work in driving the correlations observed earlier, and future research must address both of these pathways, taking into account early-life variation in both health and labour market circumstances. Until we have more extensive panel data on which to base estimations of such causal models, some hand-waving is required.

The balance of evidence suggests that the shift from defined benefit (DB) to defined contribution (DC) pensions that is occurring for younger cohorts ought to reduce incentives for future older workers to retire early, at least after age 55. Before 55, the effects are more uncertain, since most DB plans implicitly have an incentive to stay in work until the normal retirement age, and there is a possibility that the move to DC pensions may, other things equal, reduce participation amongst the youngest of older workers.[15] On the other hand, DC pensions may facilitate more part-time work, and the removal of legal restrictions on working for an employer whilst drawing a pension, implemented this year, will also presumably have an effect on the labour supply of those with DB pensions.

Perhaps more interestingly, there is considerable uncertainty about future trends in firms' demand for older workers. After all, ageing populations lead to ageing workforces, not growing workforces, so there will be an implicit substitution of older (potential) workers for younger workers. Empirical work on the returns to education and changes in the distribution of wages has suggested that the increasing returns to skill have been concentrated amongst younger cohorts (see Card and Lemieux (2000) or Gosling, Machin

[15]For a discussion of some of the particular issues associated with the move towards greater DC pension provision in the UK, see Banks and Blundell (2005).

and Meghir (2000) for UK evidence) and this may suggest a limited degree of substitution between cohorts. But a more complex model of production processes, where four types of labour – older workers and younger workers of high and low skill levels – are allowed to differ in their productivity and substitutability for capital would really be required to say more about the potential evolution of wage opportunities for future generations of older workers.

Such a model would need to control for changes in the nature of economic activity. As undergraduate economics teaches us, labour demand by firms is just a derived demand, and hence trends in the nature of productive activity, and in particular the labour intensity of production processes, will be a factor. This in turn will depend on the nature of consumer demand, which will also, presumably, be affected by population ageing. A scenario in which older consumers demand relatively more services and fewer goods, and where the production of services is relatively labour intensive, is one possibility. But even in a closed economy, this is quite a hard model to write down and understand. In an open economy – where capital and labour may move, and domestic firms may be supplying domestic or international markets – the issues are more complicated.

Finally, there is a set of issues about the operation of financial and insurance markets – of which pensions and saving are an important case in point – which may be relevant for future cohorts. Standard economic theory teaches us that an insurance market relies on an equal amount of ignorance on both sides of the transaction. As we move to more individual pension provision, it will be important to investigate the role of insurance market imperfections, and in particular the potential adverse selection that characterises annuity markets. In a simple example, the movement from DB to DC pensions shifts the point at which the annuity contract is committed to from the beginning of working life to the end of working life. To the extent that annuity decisions are voluntary, or at least flexible, the fact that by the end of working life individuals will presumably have considerably more private information about their longevity than they had at the beginning could lead to an increased degree of selection in annuity markets. The precise extent of such possible effects needs to be quantified, along with the role of information and risk in retirement saving choices more generally.

VI. Conclusions

I motivated the analysis presented here by saying that the length of working lives would need to increase to adjust to the new demographic equilibrium that will occur as a result of population ageing, but also with a somewhat stark quotation arguing that if labour supply and labour demand adjust then

everything else will be fine. I would argue that the evidence presented here suggests that the implicit and automatic labour market adjustment alluded to in that quote may only be relevant for those at the top and perhaps even in the middle of the lifetime earnings distribution. These individuals are providing enough for their retirement already and are being affected by pension incentives. Hence, it is not unreasonable to assume they will react to the changes in economic circumstances and any changes in the pension incentives that they face.

So this is probably not the most important group for policy purposes. At the other end of the lifetime wealth distribution, functioning levels at older ages tell a very different story. Poor health sets in early, work disability rates are high and individuals have lower numeracy levels and much greater levels of financial insecurity. Arguably, the extending-working-lives agenda is as much about getting low-wealth individuals back into the labour market in their 50s (or getting future cohorts to stay in the labour market during their 50s) as it is about getting middle- or high-wealth individuals to work up to, or beyond, current state pension age. A focus on skills in later life and retraining is a natural consequence and there is already some encouraging evidence from the 'Pathways to Work' pilots that improved employment outcomes are possible given the right (albeit intense and potentially somewhat costly) intervention programmes (Adam et al., 2006).

Given that the cohorts that experienced the biggest increase in the returns to education (and hence presumably lifetime earnings inequality) during the 1980s have yet to reach older ages, one reasonable supposition is that inequalities in the older population will begin to rise as trajectories for health and labour market activity for these cohorts take their course and experiences of late-life work and retirement begin to evolve. But there is much research to be done before we can say that this will happen for certain, or indeed suggest policy interventions to optimally target such inequalities in later life. More particularly, the role of early-life socio-economic, labour market and health factors important in governing later-life trajectories needs to be quantified. If early-life events cast a long shadow, as looks likely from what current research there is on the issue, then policy prescriptions need to operate on two margins – targeting long-term interventions on younger cohorts and endeavouring to allay the effects of inequality and poverty in late life for the older cohorts in as efficient a way as possible in the short to medium term (in the sense that the choices of younger cohorts are not distorted too much).

More data (of greater relevance and quality) to facilitate such research are rapidly becoming available. Age trajectories will be observed in all dimensions at the individual level, and the longitudinal nature of the new data will capture recent past histories and previous (and current)

expectations, both of which will help with the estimation of dynamic models of behaviour. But simply having more and better data on more dimensions is, of course, not a substitute for a model of behaviour. Indeed, if anything, it makes the importance of having a model even greater and even more transparent. The challenge is to build all the key factors – economic incentives, uncertainty, health and cognitive ability as well as the labour demand side – into a coherent empirical model to aid our understanding of the economics of choices and constraints in later life. And, although I have not mentioned them here, understanding the way in which consumption needs change with age, and how couples make decisions between themselves, will also likely be key links in the chain. Encouragingly, genuine exchanges have already begun between economists, epidemiologists and sociologists, both at UCL and elsewhere, that are beginning to inform the models that are being applied to such data.

I will end with a note about the potential role for international comparisons. Comparative microeconomic evidence is building up, with broadly (and in some cases strictly) comparable data to ELSA being collected around the world. Exploiting international variation in policy institutions can be seen as one way of understanding the effect of such institutions on behaviour, if one can measure enough common covariates, in a comparable enough way, to control for other differences between countries. An early example of the value of such research was the Gruber and Wise (1999) study of retirement incentives around the world. But the potential to do more is hugely increased by having the same or similar micro-data available in different countries. As such, the developments of the Survey of Health, Ageing and Retirement in Europe, the Health and Retirement Study in the US and other related studies in Eastern Europe and Asia can only enhance the possibilities for empirical research on issues pertaining to the older population and population ageing more generally.

To give an example of the value of cross-national research, recent work has shown that older people (both rich and poor) are in worse health in the US than in the UK despite it being a richer country, spending twice as much on healthcare and having lower rates of work disability and higher rates of labour market participation (Banks, Marmot et al., 2006). Understanding why such differences are present, now that we know they are not caused by measurement or data differences, can only be instructive in thinking about the causes of outcomes for older individuals more generally.

Even for solely domestic research, the real value of ELSA data will come as subsequent waves become available, new cohorts are added and a greater fraction of the later life of ELSA respondents has been observed. Nevertheless, the study is already providing empirical evidence on a number of policy-related questions and issues and we would expect such utility only

to increase. I have argued that particularly promising avenues of research look to be the joint evolution of health and socio-economic status in later life, and the various causes and timing of retirement itself. There is much work to be done but the outlook looks good, and it will hopefully keep our research group, along with many others working in the field, occupied for some years to come.

Appendix. Summary of content of the ELSA survey

The following text is a brief description of the survey content to date, broken down into broad topic areas. For further details, see http://www.ifs.org.uk/elsa. Sensitive data notwithstanding (and these include linked administrative records, geographical variables that are disclosive in nature and data on genetic material), the ELSA data are available from the UK Data Archive (http://www.data-archive.ac.uk/). Details of the questionnaire content, data access procedures (including for the restricted variables as they become available) and links to key publications are all available on the ELSA website at http://www.ifs.org.uk/elsa. Further description of the survey content, along with summary descriptive analysis of the key variables in each module, can be found in Marmot et al. (2003) and Banks, Breeze et al. (2006) for waves 1 and 2 respectively.

Demographic measures

The ELSA questionnaire is designed to collect a full range of demographic data at both a household and an individual level. The coverage of current circumstances includes factors such as age, sex, educational attainment, marital status, household size and structure, ethnic background, number of children (natural, step, adopted, etc.) and number of grandchildren and great-grandchildren. In addition, basic information on childhood circumstances is collected to facilitate the examination of the influence of early-life circumstances on later life, including family structure (who respondents lived with during most of their childhood), father's or main carer's occupation (when the respondent was 14 years old), number of siblings, parents' ages (if alive) or ages at death and causes of parents' deaths.

Economic measures

The economic measures in the main ELSA instrument provide complete measurements of income, wealth and debt, including housing-related wealth and debt. In addition, we collect current job and pension details, summary

details on past pension contributions, and selected dimensions of consumption items, durable good ownership and durable good replacement. Income is reported by source, requiring separate collection of detailed information for the components of earnings, pension income, asset income, benefit income and other income. Benefit and pension incomes are collected by source and according to the frequency with which they are paid to the respondent.

Following the design of the US Health and Retirement Study (HRS), individuals in couples that keep their finances jointly are asked to nominate a Financial Respondent. With the exception of employment income (which is asked of each individual along with their employment details), the Financial Respondent reports incomes and wealth on behalf of the couple, along with details of who received which components. Also following the HRS, all financial variables are collected using the 'unfolding bracket' methodology where a series of follow-up questions of the form 'would it amount to more or less than £x' are used to try to identify a band for an income or wealth component in the cases where respondents do not know or refuse to answer. Whilst the proportion of item non-response is relatively low for most wealth and income components, the use of unfolding brackets still substantially reduces the number of cases for which researchers have absolutely no information on the item.

Evidence from the first wave of ELSA suggests that the financial data are of exceptionally high quality. The distributions of income and sources of income match very closely those reported by other official surveys for this age group, non-response on income and wealth data is low, and the unfolding-bracket follow-ups mean that there are relatively tight upper and lower values of bands within which observations with missing values can be imputed (see Banks et al. (2005)). Supplementary data-sets of financial derived variables, containing income and wealth sub-aggregates with imputations for missing cases along with estimates of accrued pension wealth under various retirement and past earnings assumptions, are also released.

A further innovation introduced originally by HRS and implemented in ELSA is a battery of questions on expectations of the future, where answers are elicited using the 'per cent chance' methodology. Respondents are asked to rate the chances of various events happening in the future on a scale of 0 to 100, where 0 represents absolutely no chance that the event will happen and 100 indicates that it is absolutely certain to happen. Expectations questions are collected for various dimensions including bequests and inheritances, the adequacy of retirement resources, pension incomes, longevity, retirement age and health limiting the ability to work.

Health, physical functioning and disability measures

The health section was designed to support the core uses of ELSA data, especially exploring causes of disability, compression of morbidity, socio-economic inequalities in disease and disability, and the contribution of health and other factors to retirement. Interview items were designed to include many of the relevant HRS questions to maximise the potential for international comparisons. There are three key areas in which the health section of the ELSA interview is exceptional: cardiovascular disease; disability and physical function performance measurement; and the quality of medical care received.

Cardiovascular disease (CVD) is a major cause of morbidity and mortality, and its distribution shows a strong socio-economic gradient. As such, it has been a central focus of inquiry into socio-economic inequalities in middle age and the contributory role of life-course, material and psychosocial factors (see Marmot and Wilkinson (1999)). ELSA has been designed to explore these factors in an ageing cohort and includes validated diagnostic interviews covering CVD. A variety of physical examination data and blood analytes have been collected (see below), identifying the intermediate steps in the development of CVD and providing objective markers of biological risk and of the onset of biological change.

Ascertainment of functioning and disability in ELSA has been designed to allow valid comparisons across nations, across social groups and over time. Broad coverage of functional limitations and activity-of-daily-living disabilities has been supplemented by detailed data collection on mobility (walking), which, because more than 90 per cent of older people with any disability have difficulties walking, was chosen as the leading functional indicator. Anticipating differences in thresholds for reporting mobility disability across social groups and across national contexts, a set of objective tests (gait speed test, balance test, timed chair stands and lung function) are used to supplement subjective questions on many aspects of mobility.

There is some evidence that the quality of healthcare received is an important contributor to social inequalities in health. Differences in rates of 'high-tech' interventions may be particularly important in explaining international variations in health and disability. To explore hypotheses about the role of healthcare, we have adapted the US 'Assessing the Care of Vulnerable Elders' evidence-based care standards for epidemiological use in ELSA wave 2 (see Steel et al. (2004)). These include questions on quality of care received for a range of disease categories, such as diabetes and arthritis. This will enable us to establish whether high-quality healthcare has a long-term impact on health trajectories.

Biomedical measures

ELSA currently has the most detailed biomedical data of the international multidisciplinary health and retirement studies. The key element here is the nurse visit that takes place every other wave (i.e. every four years) in order to collect detailed anthropometric and biomedical data. Among the measures collected are blood pressure, lung function, height, weight, waist–hip ratio, haemoglobin, ferritin, inflammatory markers (C-reactive protein and plasma fibrinogen), cortisol and measures associated with the metabolic syndrome (lipids, fasting lipids, fasting glucose and glycated haemoglobin).

Two novel biomedical measures are planned for wave 4 – namely, anabolic/catabolic balance (IGF-1) and telomere length. IGF-1 is a measure of growth hormone activity which typically decreases with increasing age. It is hypothesised that the balance between IGF-1, which is anabolic, and inflammatory markers and cortisol, which are catabolic, would be related to functioning measures and to mortality in the elderly. Telomere length, a measure obtained from the genetic material that is also collected for ELSA respondents, has been shown in small-scale studies to be associated with mortality in older individuals (Cawthon et al., 2003), with those with short telomeres having mortality rates twice those of people with long telomeres. This effect is mainly attributable to a 3.2-fold higher mortality rate from heart disease, with a number of recent reports suggesting that short telomere length is associated with cardiovascular risk factors (Benetos et al. (2004), for example). With regard to the use of genetic material, the APO-E and glucocorticoid receptor genes will be analysed, and proposals are in place for an ELSA DNA repository allowing investigators to propose other genes for analysis with data subsequently released into the ELSA database.

Cognitive function

The assessment of cognitive function in ELSA is driven by the importance of examining the full spectrum of cognitive capability in the population, not just identifying those with marked impairment or dementia. The prevalence of dementia is low before the age of 70 (around 1.4 per cent for ages 65–69, rising to 4.1 per cent for ages 70–74), but the presence of mild cognitive impairment may nevertheless interfere with work performance, the management of finances and social activities and may lead to social withdrawal and depression. Many of the decisions that individuals make about retirement, health and housing in later life are complex, and may be compromised by impairments in decision-making ability or in other aspects of memory and executive functioning, including planning, organisation and mental flexibility.

The cognitive measures used include basic abilities (literacy, using an item from the International Adult Literacy Survey, and numeracy, using items developed for ELSA and now used in the HRS), learning and memory (self-rated memory from the HRS; orientation in time, using the HRS version of the mini mental state examination; and word-list learning, also from the HRS), word-finding ability, executive function and speed of processing. Given the primacy of memory in age-related cognitive impairment, ELSA includes an assessment of prospective memory (i.e. remembering to carry out an intended action) using newly developed items, in addition to an assessment of retrospective memory (i.e. recalling information that was learned previously). The term 'executive function' refers to a number of cognitive control processes, including attention, initiation, set-shifting or mental flexibility, organisation, abstraction, planning and decision-making. The non-memory tasks used in ELSA (verbal fluency and letter cancellation) tap into a number of these processes. For some purposes, we use summary cognitive performance measures as our leading indicators, including a memory index, an executive function index and a global cognitive index.

Psychological and social measures

The collection of data on the psychological and social characteristics of ELSA respondents has been directed at three broad and interrelated agendas. The first is concerned with describing the extent of social and civic participation of older people: volunteering; informal care-giving; membership of and activities in a range of organisations; engagement in a range of cultural activities; and participation in the political sphere. Closely related to these measures are assessments of the quality of participants' social networks (frequency and mode of contact, quality of interactions and sense of closeness, covering partners, children, family and friends), a measure of social isolation (taken from the HRS), access to a range of facilities (health services, supermarkets, banks etc.) and a measure of social capital.

The second agenda is concerned with examining psychosocial factors that may be important in explaining social inequalities in health. Psychosocial measures that have been incorporated into ELSA include perceptions of control and demand, both generally and in relation to paid work, and effort–reward imbalance in relation to key roles, such as work, volunteering and caring. Also included here is a direct measure of participants' perception of their social status (where they place themselves on an image of a 10-rung ladder in terms of their social standing), alongside measures of perceived (relative) deprivation in particular domains (too little

money to meet needs, financial situation compared with others, unable to do certain activities because of shortage of money) and perceived financial difficulties.

Third is the collection of measures of psychological and social well-being that, as well as being outcomes in their own right, may well relate to both health and economic outcomes. Included here are broad measures, such as a theoretically derived and validated measure of quality of life (the CASP-19 measure covering control, autonomy, self-realisation and pleasure – see Netuveli et al. (2006)) and the Diener life satisfaction scale, and more specific measures, such as the CES depression scale (taken from the HRS).

Other issues

There has been much recent interest in the extent to which household survey data can be supplemented with other information on respondents that is held elsewhere, particularly in government records. Matching survey data with administrative data about social security benefits, tax credits and National Insurance contributions has a number of benefits for ELSA – namely, to check and improve the accuracy of survey information, in particular about benefits; for completeness of financial information, particularly in relation to past state pension contributions; and to increase the periodicity for which data are available and ensure that it is systematic between sample members (i.e. to compensate for unit non-response at specific waves).

At wave 1, ELSA respondents were asked to provide their National Insurance number and to give permission for their survey records to be linked to official records of National Insurance contributions, welfare and benefit receipt, and details of any tax credits they may be claiming. Permissions were collected for both prospective and retrospective linkages. Similarly, permissions were collected to link to records from the Hospital Episodes Statistics (HES) and to the ONS mortality records. Permission rates were uniformly high (between 75 and 85 per cent), and highest amongst working-age groups. Linking to these records is now underway although full details of the nature and conditions of access to such data are still to be finalised.

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