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Copy-edited by Judith Payne

The Institute for Fiscal Studies
7 Ridgmount Street
London WC1E 7AE

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The Institute for Fiscal Studies
7 Ridgmount Street
London WC1E 7AE
Tel: +44 (0)20 7291 4800
Fax: +44 (0)20 7323 4780
Email: mailbox@ifs.org.uk
Website: www.ifs.org.uk

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Preface

We are grateful to Help the Aged for funding this research and for co-funding from the Economic and Social Research Council through both the research grant ‘Inequalities in Health in an Ageing Population’ (RES-000-23-0590) and the Centre for the Microeconomic Analysis of Public Policy at IFS (grant number M535255111). Data from the British Household Panel Survey and the English Longitudinal Study of Ageing (ELSA) were made available by the ESRC Data Archive. Data from the Family Resources Survey were provided by the Department for Work and Pensions (and are also available from the UK Data Archive). Data from the ONS Longitudinal Study were made available from the Office for National Statistics; mortality tables were used from the Government Actuary’s Department. We would also like to thank James Banks, Robert Chote, Chris Curry, Chris Drane, Ruth Hancock, Donald Hirsch, Mervyn Kohler, Anna Pearson, Matthew Robinson and Kate Thomson for their useful comments. Responsibility for interpretation of the data, as well as for any errors, is the authors’ alone.

Contents

Executive summary

This report looks at the prospects for pensioner poverty up to 2017–18 under a variety of alternative tax and benefit policies. This is done by modelling the future demographic structure and incomes of the pensioner population up to 2017–18 by simulating mortality, health, receipt of disability benefits and labour market outcomes for thousands of individuals who were aged 50 and over in England in 2002–03 using a dynamic microsimulation model. Different tax and benefit systems are then applied to this simulated pensioner population to examine their effects on future pensioners' net incomes and hence future pensioner poverty. We focus on poverty amongst families with at least one member who is aged 65 or over in any given year.

Simulating the future pensioner population

- We project pensioner poverty forward to 2017–18 by simulating thousands of individuals' future mortality, health, receipt of disability benefits and labour market outcomes, and thus their incomes.
- We use respondents to the English Longitudinal Study of Ageing (ELSA) as the base population which we simulate into the future. ELSA contains the most comprehensive information on health, wealth and incomes currently available on individuals aged 50 or over in England.
- To simulate the demographic structure of the population aged 65 and over in future years, we use a dynamic microsimulation model.
- To simulate individuals' future incomes, we take advantage of the detailed information in ELSA on respondents' income from all sources, including earnings, financial assets and property, and their accumulated rights to private pensions. We also use estimates of their accumulated rights to state pensions.
- We can then calculate individuals' tax liabilities and benefit entitlements under a variety of tax and benefit systems.
- This in turn allows us to project the number of individuals aged 65 or over who are living in income poverty, using several poverty measures and different scenarios for how the tax and benefit system could evolve.

Future pensioner incomes and living standards

We look at the simulated changes in the income distribution of individuals aged 65 and over in England. All the simulations are for this population only and, where appropriate, income is measured before housing costs (BHC).

Individual private incomes

Our simulations suggest that:

- The private incomes of individuals aged 65 and over are likely to rise over time, as new generations reaching this age do so with higher incomes.
- Such income growth arises mainly from a projected growth in income from employment, but also from other sources, including private pensions.
- The rises in private incomes are greater at the lower end of the income scale, implying a reduction in levels of private income inequality among the population aged 65 and over. However, our models might be unable to capture accurately all the distributional changes that might occur in the future, so this finding about income inequality should be taken with some caution.

Living standards

Given this simulated growth in private incomes, our simulations suggest that, under current policy:

- The living standards of the elderly population, as captured by their net equivalised family income, are also likely to rise over time.
- This rise in living standards is likely to be fairly even across the population, though those among the very poorest appear likely to see rather faster income growth than average, while those among the very richest are projected not to see such rapid income growth as in the recent past.

Projections of future pensioner poverty under current policies

Given the simulated growth in net equivalised family income, our simulations suggest:

- Without further substantive reforms to taxes and benefits beyond those proposed in the 2006 Pensions White Paper, relative pensioner poverty will stop falling and remain fairly stable until 2017–18.
- Pensioner poverty might continue to fall if the poverty line rises more slowly than 1.8 per cent per year, or might rise if employment growth among those aged 65 and over turns out not to be as strong as our model projects.

The effects of policy reforms on pensioner poverty

Pensions White Paper

The 2006 Pensions White Paper proposed a package of reforms to state pensions and means-tested benefits for pensioners, including reforms to the pension credit and the basic state pension.

- The White Paper reforms would raise the incomes of the poorest tenth of pensioners, but would make those in the second and third income deciles worse off, compared with a world where the pension credit guarantee continued to be earnings-uprated from 2008–09 but no other reforms were implemented. The net effect of these gains and losses on pensioner poverty rates is very small.
- Pensioner poverty would be reduced only slightly by bringing forward the date at which the basic state pension (BSP) is uprated in line with earnings. For example, if the BSP were earnings-uprated from April 2010 rather than April 2012, this would result in just 60,000 fewer pensioners in poverty by 2017–18.
- However, if the pension credit guarantee were not increased in line with earnings from 2008–09 onwards, and the measures in the White Paper were not introduced, pensioner poverty would rise significantly.

Other policy options

- Pensioner poverty could be reduced significantly if the basic state pension were made universal, but this would be expensive, costing £6.9 billion in today's terms. A lower-cost alternative (in the short term) would be to make the BSP universal just for those retiring after 2012–13. This would cost £1.9 billion a year in 2017–18, but would have a considerably smaller effect on pensioner poverty than the more expensive reform.
- Another option for increasing the generosity of BSP would be to raise it to the level of the pension credit guarantee. This could reduce pensioner poverty significantly, but would cost £8.3 billion a year in 2017–18. Making this more generous BSP universal would reduce pensioner poverty further but cost a further £11.7 billion.
- Compared with many of the policy reforms we have considered, improving the take-up of pension credit, housing benefit and council tax benefit could prove a more cost-effective way of reducing pensioner poverty, if it could be done easily and at little direct cost.
- Other reforms to council tax rates or pensioner tax allowances that we have modelled would have relatively little effect on poverty rates.

1. Introduction

There has been and continues to be widespread concern about the prospects for future pensioner incomes and pensioner poverty in the UK. The government has a commitment to combat poverty and ensure financial security for all pensioners[1] and this issue is likely to become increasingly important as rising life expectancy and low birth rates mean that the proportion of the population aged 65 and over is expected to increase significantly over the next few decades. By the middle of the century, it is expected that almost one-in-three adults in the UK will be aged 65 or over, compared with only just over one-in-five in 2007. The post-war baby boom has delayed the effects on the old-age dependency ratio of the long-term trends in life expectancy and birth rates. However, as the baby-boom generation moves into retirement over the next decade, it will become increasingly important that public policies are well designed to help individuals receive at least an adequate retirement income at a financially sustainable cost to the taxpayer.

It was against this background that the Pensions Commission was established in 2002 to suggest wide-ranging reforms to the UK pension system aimed at ensuring that the appropriate adjustments were made to address the issues raised by an ageing population. The government's response to the Pensions Commission's recommendations[2] was the 2006 Pensions White Paper (Department for Work and Pensions, 2006a), which proposed a raft of reforms to state pensions and means-tested benefits for pensioners, and a second 2006 White Paper (Department for Work and Pensions, 2006d), which proposed significant reforms to the private pension saving environment. However, the changes to private pensions are unlikely to make much difference to the financial outcomes in retirement of those individuals who are currently close to the state pension age (SPA). Far more important in alleviating poverty amongst this group of individuals, and also among those who are already over the SPA, are likely to be changes to state pensions and means-tested benefits.

Currently, 2.2 million or 20.8 per cent of pensioners in the UK live in income poverty.[3] This figure has declined over the last 10 years in large part due to reforms to means-tested benefits for pensioners such as the April 1999 replacement of income support for those aged 60 or over with the more generous minimum income guarantee (MIG) and the October 2003 replacement of the MIG with the more generous pension credit.[4] These reforms sought to target additional public spending on lower-income pensioners. However, the latest figures for poverty in the UK show that while pensioners are less likely to be in poverty than working-age adults in any one year, they are more likely to have been in poverty for longer periods of time and so there remains much debate about the relative merits of different policies that could be used to alleviate pensioner poverty both now and into the future.

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[1] Department for Work and Pensions, 2006b.

[2] Pensions Commission, 2005.

[3] Page 30 of Brewer et al., 2007.

[4] For a discussion, see, for example, Clark and Emmerson (2003).

Though the government maintains its own model of the future pensioner population (PenSim2),[5] up until now there has been little publicly available information to allow non-governmental researchers to assess rigorously the prospects for pensioner poverty going forwards. This means it has not been possible to assess accurately how different reforms to the tax and benefit system could affect future pensioner poverty. This report uses microsimulation methods and comprehensive information on a representative sample of individuals in England currently approaching retirement to examine how poverty amongst those aged 65 and over will evolve up to 2017–18 and how this would change under alternative tax and benefit policies.

This report contains several important results. First, it shows how the sources of pensioners' private incomes are likely to evolve over the next decade. The use in this report of newly available information on those aged 50 and over – in particular, on how their accumulated pension rights correlate with other characteristics – means that, up to 2017–18 for pensioners in England, this analysis is arguably more accurate than existing government studies. The second key result of this analysis is that it shows how relative poverty amongst pensioners is likely to change over the next 10 years if current policies remain unchanged. Finally, it looks at what effect alternative tax and benefit policies could have on the evolution of pensioner poverty.

The evolution of pensioner poverty between 2007–08 and 2017–18 will depend on a number of factors. First, it will depend on how the characteristics of the pensioner population evolve as current pensioners age and new generations of individuals reach the state pension age. Second, it will depend on what private resources future pensioners have. This will depend both on future working patterns of older individuals and on the extent to which individuals currently approaching retirement have built up assets that they will be able to draw on during their retirement. Finally, future pensioner poverty will depend on what tax and benefit reforms are enacted.

In this report, we model the future demographic structure of the pensioner population up to 2017–18 by simulating mortality, health, disability benefits receipt and labour market outcomes for thousands of individuals who were aged 50 and over in 2002–03 using a dynamic microsimulation model (see Box 2.1). The base population that we use is those individuals interviewed in the 2002–03 wave of the English Longitudinal Study of Ageing (ELSA), a representative sample of the household population aged 50 and over in England. This data-set contains detailed information about the health, wealth and incomes of individuals in this age group. We restrict our analysis to those aged 65 and over. An advantage of doing this, rather than using all those who are aged above the state pension age, is that the former avoids changes in the age composition of the pensioner population that will be caused by the increase in the female state pension age (from 60 to 65) which is being phased in between 2010 and 2020. As those in the ELSA sample were aged 50 and over in 2002–03, our simulations cannot run past 2017–18, the point at which all these individuals will be aged 65 or over. Our demographic simulation model simulates the mortality, health,

[5] In addition to PenSim2 (which is a dynamic microsimulation model), the Department for Work and Pensions uses a static microsimulation model (the Policy Simulation Model, PSM). For a comparison of the two models in terms of projected entitlement for the pension credit, see Department for Work and Pensions (2006e). The Pensions Policy Institute model is also a static simulation model; see Pensions Policy Institute (2007).

disability benefits receipt and labour market participation of all those in the ELSA sample. This gives us a simulated population of those aged 65 and over in each year up to 2017–18.

The detailed information from ELSA on the income and assets of this age group also allows us to simulate the future distribution of private incomes and income from state pensions amongst the population aged 65 and over in each year from 2002–03 to 2017–18. Since ELSA contains not only information about current income but also details of accrued pension rights and other forms of wealth, we can simulate what income each of the individuals in the ELSA sample will receive in future. The advantage of this method (rather than, for example, making some assumptions about how the private incomes of future pensioners will compare with the private incomes of current pensioners) is that we do not need to rely on scaling current pensioners' private pension incomes in order to simulate future pensioners' private pension incomes.[6] Instead, we can estimate directly for each individual how much income they will receive from various sources (in particular, private pensions, state pensions, income from savings and other assets, and income from employment). From this, we can derive the distribution of private incomes and state pension incomes (otherwise known as gross incomes) for those aged 65 and over for each year up to 2017–18.

In order to simulate what pensioner poverty will be in future years, we need to convert this measure of gross income into net income (in other words, income after the payment of taxes and the receipt of benefits). To do this, we utilise a comprehensive microsimulation model of the tax and benefit system in the UK operated by the Institute for Fiscal Studies (known as TAXBEN) to model net income under current policies and also under alternative tax and benefit policies. TAXBEN calculates each family's liability for tax and entitlement to tax credits and means-tested benefits and hence calculates its net income. This calculation of net income also incorporates incomplete take-up of means-tested benefits. We compare this measure of net income with certain poverty thresholds in future years to show how many pensioners are likely to be in poverty over the next decade. There are various ways of defining and measuring poverty; measuring such a concept in future years is particularly difficult. The measures of poverty that this report focuses on and how these poverty lines are projected forward for future years are discussed in detail in Section 2.6.

Chapter 2 outlines the methodology we have used and presents our projections of the demographic structure of the pensioner population over the next 10 years. It begins with a description of and results from the dynamic microsimulation model. Then it explains how gross incomes are simulated and looks at the simulation of tax liabilities and entitlements to benefits and tax credits. Finally, it includes a discussion of the issues surrounding the definition and measurement of poverty and sets out which poverty measures we focus on in this report. Chapter 3 shows how private incomes and net incomes of pensioner families are simulated to evolve over the next decade and how pensioner poverty is likely to evolve, both under current policy.

Details of the package of reforms to state pensions and means-tested benefits for pensioners proposed in the 2006 Pensions White Paper are set out in Chapter 4. Chapter 5 shows the effect on pensioner poverty of implementing the White Paper, and also a variety of alternative tax and benefit policies. Chapter 6 concludes.

[6] The Department for Work and Pensions uses both dynamic and static microsimulation models. See footnote 5.

2. Simulating the future pensioner population: an overview of methods

Summary

- We project pensioner poverty forward to 2017–18 by simulating thousands of individuals' future mortality, health, disability benefits receipt and labour market outcomes, and thus their incomes.
- We use respondents to the English Longitudinal Study of Ageing (ELSA) as the base population which we simulate into the future. ELSA contains the most comprehensive information on health, wealth and incomes currently available on individuals aged 50 or over in England.
- To simulate individuals' future incomes, we take advantage of the detailed information in ELSA on respondents' income from all sources, including earnings, financial assets and property, and their accumulated rights to both state and private pensions.
- We can then calculate individuals' tax liabilities and benefit entitlements under a variety of tax and benefit systems.
- This in turn allows us to project the number of individuals aged 65 or over who are living in income poverty, using several poverty measures and different scenarios for how the tax and benefit system could evolve.

2.1 Overview of methodology

This chapter outlines the methods we use to simulate pensioner poverty over the next 10 years, both under current policies and under a selection of different reforms to the generosity of the tax and benefit system. Ours is a 'dynamic microsimulation model', a term that is explained in Box 2.1.

A dynamic microsimulation model requires the selection of a base population, which is then simulated forward in time. For our base population, we use respondents to the English Longitudinal Study of Ageing (ELSA), which offers the most comprehensive and up-to-date information currently available on individuals aged 50 or over in England.

Between March 2002 and March 2003, ELSA surveyed 12,100 individuals, forming a representative sample of the household population aged 50 and over in England. The ELSA survey contains information regarding individuals' incomes and pensions and, where relevant, those of their partner, which is crucial for projecting future poverty. Most importantly – and uniquely among British dynamic microsimulation models – our base data-set includes detailed information regarding individuals' accrued private pension rights. Given that, on

Box 2.1. Dynamic microsimulation models

Microsimulation models are computer models that operate at the level of individual ('micro-level') units, such as families, firms or – in the case of our model – individual people. A large number of such low-level units are simulated, in order to draw conclusions about higher-level entities such as the country as a whole. This micro-level approach contrasts with aggregate models, which make predictions based on high-level (aggregate) data such as the unemployment rate.

Microsimulation modelling has proven particularly useful for evaluating government policies. By modelling thousands of different individuals (instead of a handful of 'typical individuals'), we can take into account the full diversity in the population, and so identify more precisely who might be the winners and losers from a given policy.

Dynamic microsimulation models aim to extend the time frame of analysis beyond the short term. Dynamic models allow the characteristics and behaviour of the individual units (in this case, individuals) to change over time. In our model, we simulate the future incomes of the English population aged 65 and over, by modelling individuals' health, labour market outcomes, mortality and so on. This allows us to model pensioner poverty beyond the years for which we already have data, and into the future.

average, among those aged 50 to the state pension age (SPA), private pension wealth exceeds state pension wealth,[7] this represents a significant step forward in simulating the incomes of the future aged population. Moreover, because the sample is representative, we can analyse it to draw conclusions about England as a whole.

In work projecting child poverty into the future, Brewer, Browne and Sutherland (2006) simulated child poverty forwards to 2020, the year by which the UK government aims to have 'eradicated child poverty'. Because their study analyses the welfare of children who have not yet been born, their simulation method involves adjusting ('reweighting') the current population to make it look like the projected population in 2020. Our study, by contrast, is concerned with people who already exist (individuals who will be aged 65 or over at any point in the next decade), and so we are able to use a more direct method of simulation: simulating artificial 'life paths' for every individual in the ELSA population – their health, employment, mortality and so on – from the first wave of ELSA in 2002–03 up to 2017–18.

While this method has the advantage of being based on the real people who will reach age 65 over the next decade, it also means that our projections cannot run beyond 2017–18, owing to the scope of the ELSA sample. Individuals reaching the age of 65 in years after 2017–18 would have been below age 50 in 2002–03 and so would not have been included in the original ELSA sample.[8] Looking only at those aged 65 or over avoids changes in the age composition of the pensioner population caused by the increase in the female SPA from 2010.

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[7] Median holdings of private pension wealth among this group in 2002–03 were £109,400 for private pensions and £98,600 for state pensions. Source: Table 3.1 of Banks, Emmerson, Oldfield and Tetlow (2005).

[8] Introducing younger individuals from other data sources was not deemed appropriate, since we would not have the detailed information about pension wealth that sets the ELSA study apart.

The prospects for pensioner poverty will depend on four factors that are currently unknown, namely:

1. how the age structure and size of the pensioner population will evolve – as current pensioners age (and inevitably some die), and future generations of pensioners reach the SPA;
2. how individuals' behaviour changes – for example, when they leave the labour market – and other factors such as their health;
3. what private sources of income they will have;
4. what tax and benefit reforms will be enacted.

The rest of this chapter outlines the methods we use to model each of these factors. Section 2.2 describes our simulations of demographic change. Sections 2.3 and 2.4 outline how we project the evolution of private sources of income and state pension entitlements respectively. Section 2.5 sketches the model used to simulate individuals' taxes and benefit and tax credit entitlements under a variety of possible future tax and benefit systems. Finally, Section 2.6 describes the different measures we use to calculate the number of pensioners projected to be in poverty under each system.

2.2 Simulating demographic change

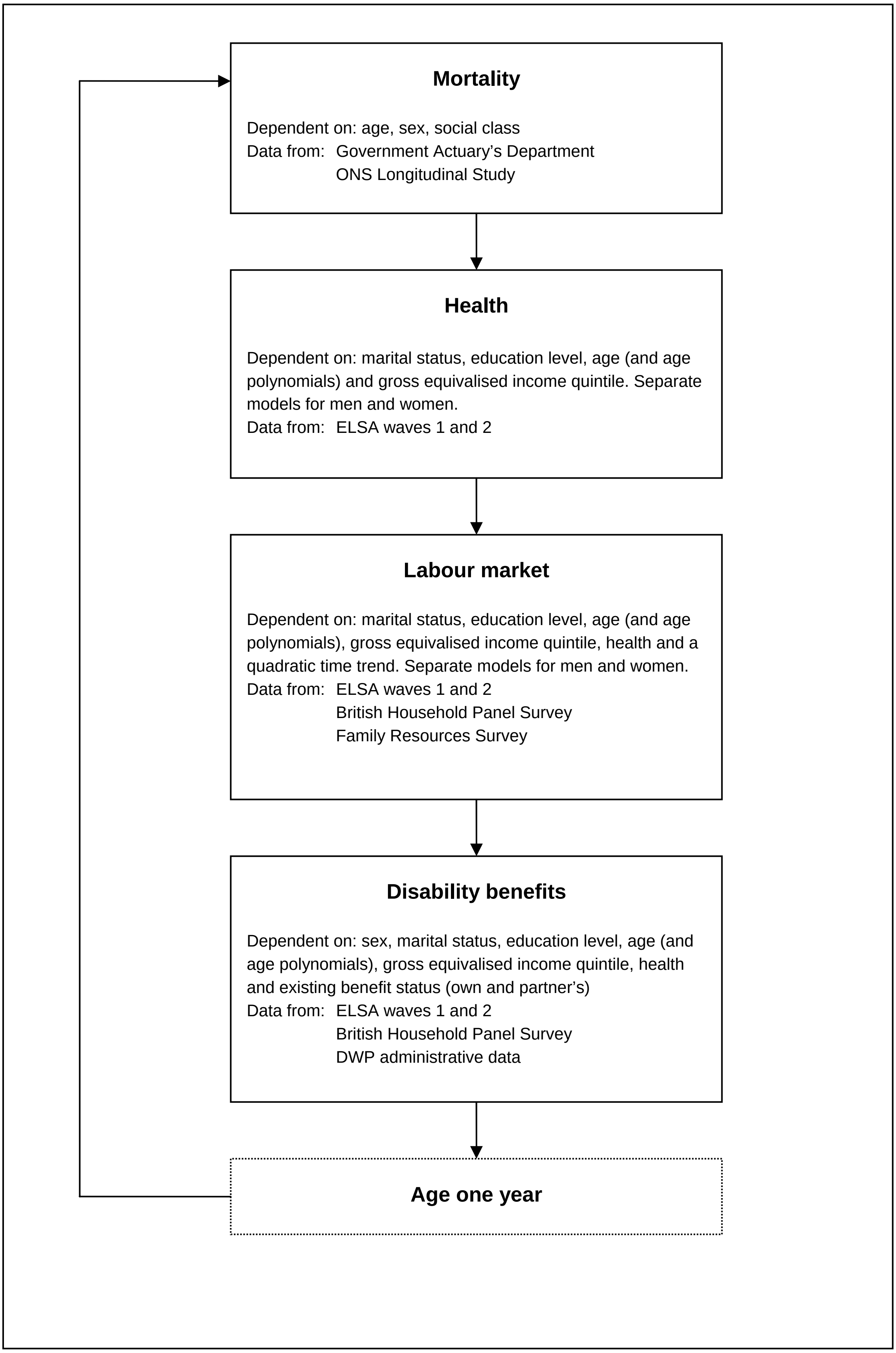
In order to simulate the incomes of pensioners from 2003–04 to 2017–18, we must 'age' the population going forward. Taking respondents to the first wave of ELSA in 2002–03 as our base population, we simulate changes in individuals' characteristics for each year from 2003–04 to 2017–18.

In creating the demographic simulation model, our intention was not to produce a comprehensive model projecting all aspects of the evolving pensioner population, but to project only those characteristics necessary for credible forecasting of pensioners' incomes to 2017–18.

In every simulated year, we pass all individuals through a series of 'modules' corresponding to various life events – starting with a mortality module simulating deaths, followed by a health module simulating illness, and so on. The whole population passes through each module, having their characteristics changed appropriately, before moving on to the next module. Figure 2.1 shows the full list of modules in our model in the order in which they are implemented.

Each module estimates the conditional probability that individuals will change from one state to another (e.g. leave the labour market, fall ill) by the end of the year, with these probabilities being predicted based on individuals' characteristics from the previous year. Figure 2.1 lists the characteristics on which each transition depends, as well as the sources of data used to generate the predicted probabilities. The models are relatively parsimonious, because anything included must either be assumed to be unchanging (e.g. level of education, sex) or else simulated into the future (e.g. health, income).

Figure 2.1. Order of modules in the demographic simulation model



Having generated a predicted transition probability for each individual, we then 'roll the dice' (i.e. draw a random number between 0 and 100) for each person and for each event, and the individual's characteristic is changed if the random number is smaller than the predicted probability.

Because our model uses 'discrete time' (that is, events occur in an annual cycle), it is necessary to impose a somewhat arbitrary order to events. We drew on the experience of similar microsimulation models (e.g. the Department for Work and Pensions (DWP)'s PenSim2 model[9] and the SAGE Research Group's SAGEMOD model[10]) in deciding on the order for our model. However, some events which are relevant for those models (e.g. fertility, marriage and separation) were not deemed necessary for ours, given our focus on the population aged 65 and above. (See Appendix A for further details.)

At the end of each simulated year, the individuals are allocated their projected private income (these income projections are outlined in Section 2.3) and their projected state pension income (outlined in Section 2.4), before their tax liabilities and benefit entitlements are calculated to ascertain their final (net) income.

One advantage of starting the simulation from 2002–03 is that, for the first few years of simulation, we can compare our simulated outcomes with actual observed changes in the English population. We can use this information to 'calibrate' the modules – ensuring that outcomes in the first years of simulation are similar to those that actually occurred – and to make further adjustments to our model as it simulates the future.

A detailed description of the modules is given in Appendix A. Here, we give a brief outline of each module, the data and methods each uses, and the outcomes of the simulation.

2.2.1 Mortality module

The mortality module is the first module through which the population passes each year. It allocates a probability of death to each individual, based on their age, sex and social class, before deciding which individuals die using the 'roll of the dice' described above. These individuals are then removed from the data-set before the population moves on to the next module.

We use projections made by the Government Actuary's Department (GAD) to generate our initial mortality probabilities. However, GAD's life tables only project mortality rates based on age and sex. In order to take into account the fact that mortality is correlated with socio-economic status – on average, those from lower socio-economic groups die younger than those from higher socio-economic groups – we adjust the GAD probabilities using data from the Office for National Statistics (ONS) Longitudinal Study (LS), which offers retrospective life tables by age, sex and social class. It should be noted that while the GAD probabilities are actuarial projections based on various assumptions about life expectancy in the future, the LS adjustments are based on retrospective data (from 1992 to 2001). The mortality module thus

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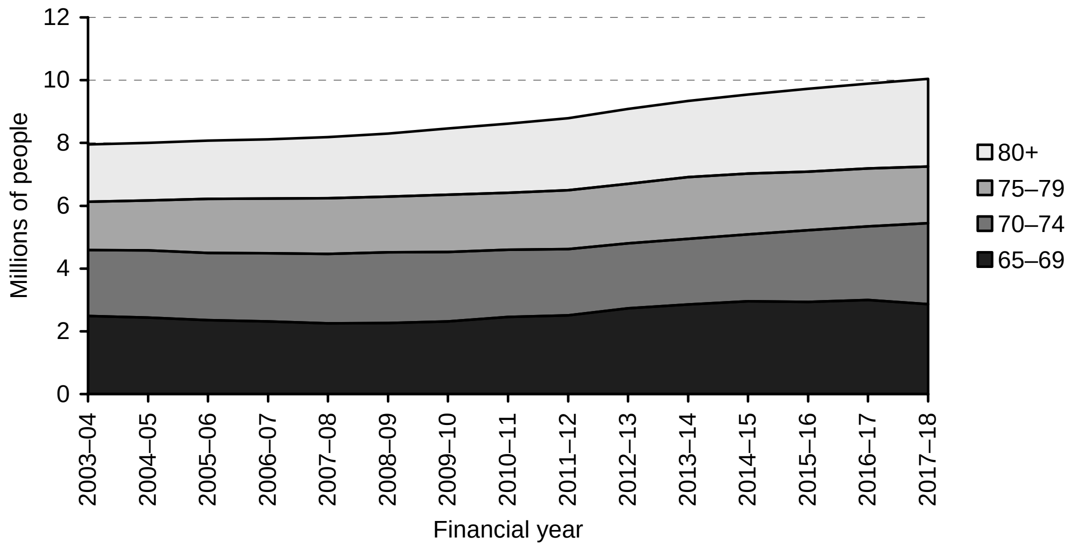
[9] For a discussion, see Emmerson, Reed and Shephard (2004).

[10] For a discussion, see Zaidi and Rake (2001).

implicitly assumes that increases in life expectancy in the future (from the GAD projections) will not change the *relative* mortality rates between social classes (from the LS data).

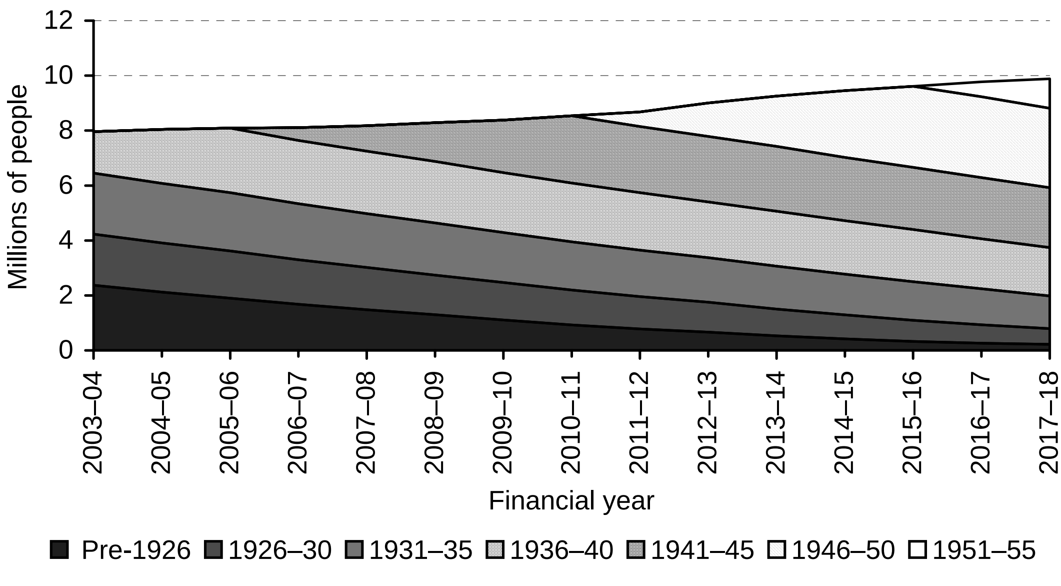
Figure 2.2 shows the projected change in the size and age structure of the population used by our model. The number of individuals aged 65 and above is projected by GAD to increase from 7.9 million in 2003–04 to just over 10 million in 2017–18, an increase of 26 per cent. This increase is not predicted to be distributed evenly. The population aged 65 to 69 increases by only 15 per cent, while the population aged 80 or above increases by over 50 per cent, from 1.8 million in 2003–04 to 2.8 million in 2017–18.

Figure 2.2. Projected English population aged 65 and over



Sources: Government Actuary's Department; authors' calculations.

Figure 2.3. Projected English population, by birth cohort



Sources: Government Actuary's Department; authors' calculations.

Figure 2.3 shows the changing composition of the population aged 65 and over from 2003–04 to 2017–18, by dividing this population into birth cohorts. It shows clearly the impact of the post-war 'baby-boom' generation starting to retire after 2010–11. The population aged 65 and over grows relatively slowly (by less than 1 per cent a year) from 2003–04 to 2006–07, but the growth rate begins to increase as the cohort born after 1941 starts reaching age 65. The strongest growth in the population aged 65 and over begins in 2011–12, when the thick 'wedge' of the population born after the Second World War starts reaching age 65 while the 'pre-war' generations gradually decline in number.

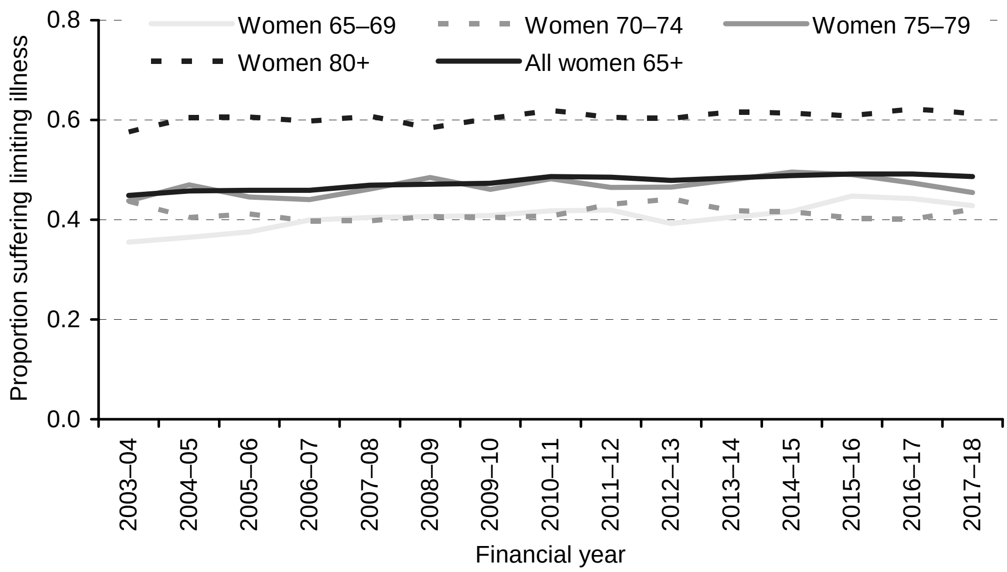
2.2.2 Health module

The second transition in our model is the health module. For healthy individuals, it estimates the probability that they will fall ill in the next year (i.e. develop an illness, disability or infirmity that limits their activities). For individuals already suffering from a limiting long-standing illness, the module estimates the probability that they will recover.

Health is not in itself an outcome of interest for this report, but health events are strongly correlated with other outcomes that affect individuals' incomes (such as labour market exit and the drawing of disability benefits). Since we wish to use individuals' health status, and the health status of their partners, as explanatory variables in later modules, a health module was deemed a necessary part of our model. Running the health module before both the labour market and disability benefits modules allows us to use the current year's health events to predict changes in employment and benefit status.

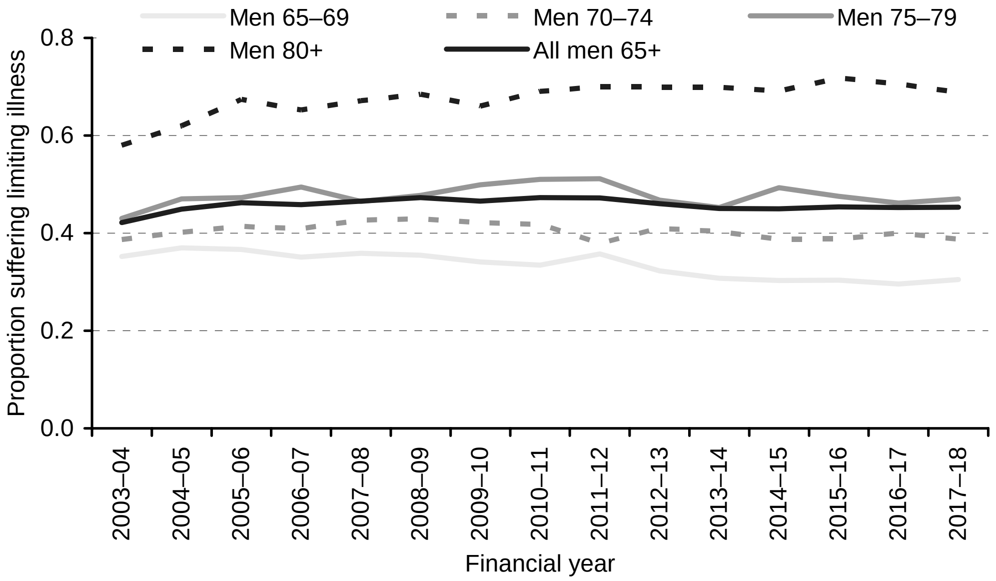
Our health module implicitly assumes that individuals who 'get sick' in the future will have similar characteristics, and similar probabilities of getting sick, to those individuals observed in the first and second waves of the ELSA survey who developed limiting illnesses between 2002–03 and 2004–05.

Figure 2.4a. Proportion of women projected to suffer limiting illness



Source: Authors' calculations based on simulated ELSA data.

Figure 2.4b. Proportion of men projected to suffer limiting illness



Source: Authors' calculations based on simulated ELSA data.

Figures 2.4a and 2.4b show how our model projects the health of the population aged 65 and over to evolve. The model predicts a small increase in the proportion of women aged 65 and over suffering from a limiting illness (from 45 per cent to 49 per cent), including an increase among women aged 80 and over (from 58 per cent to 61 per cent). A similar small increase is projected in the proportion of men aged 65 and over suffering such an illness (from 42 per cent to 45 per cent), including a larger proportionate increase among men aged 80 and over (from 58 per cent to 69 per cent). One potential reason for these increases in the population aged 80 and over is that, owing to increased longevity, the average age of this group is set to increase from 83.9 to 84.9, with older individuals more likely in our model to suffer a limiting illness, and men more likely to be affected than women.

2.2.3 Labour market module

The labour market module has two separate components:

1. a model for full-time workers, simulating their decision to stay in full-time work, move into part-time work or move straight out of the labour market;
2. a model for part-time workers, simulating their decision to stay in part-time work or to leave the labour market.

Because returning to work after a period of absence is relatively uncommon among our population of interest, all transitions in this module represent 'downsizing' – individuals are not permitted to re-enter the labour force once they have left, nor are part-time workers permitted to move into full-time work.

As with the mortality and health modules, the labour market module first estimates the probability that an individual will make a transition (this time based on the characteristics of individuals observed making these transitions between 1991 and 2005 in the British

Household Panel Survey), then uses a 'roll of the dice' to decide whether or not the transition occurs for that individual.

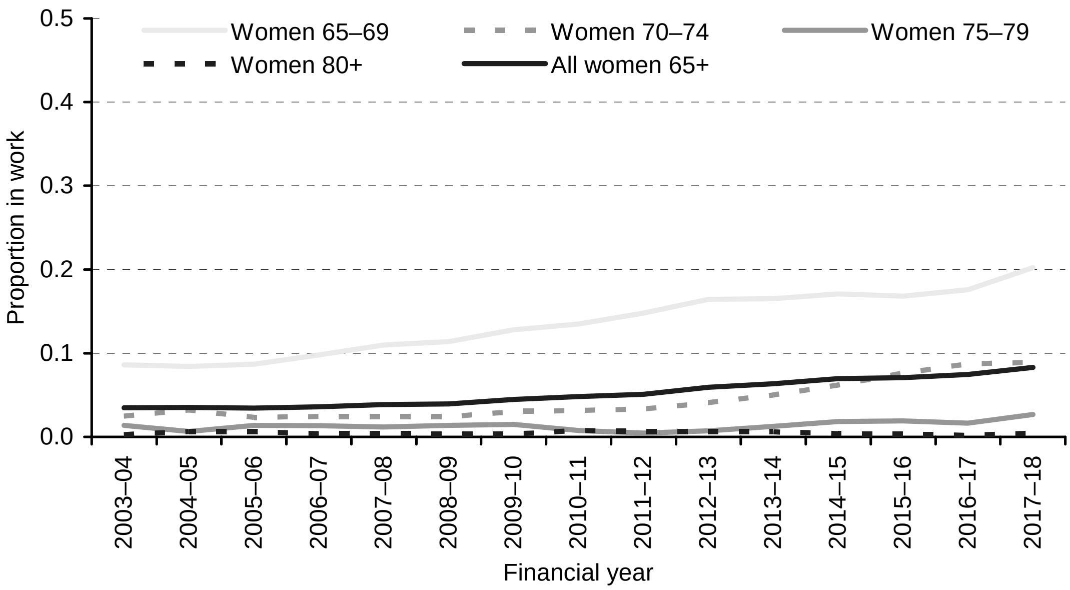
Because of the critical importance of labour supply for individuals' earnings (and thus for income poverty), we 'calibrate' the labour market module using a third data-set – the Family Resources Survey (FRS), an annual survey of around 28,000 private households. For the years for which we have both ELSA and FRS data (2003–04 to 2005–06), we correct the labour market transitions to ensure that the resulting proportions in full- and part-time work (by age and sex) match the FRS as closely as possible. For years after 2006–07, the model makes the *average* of the corrections it made from 2003–04 to 2005–06. For further details of the calibration procedure, see Appendix A.

Our model projects dramatic increases in the labour force participation of individuals aged 65 and over, driven in large part by the inclusion of a time trend in the model. This extrapolates from a period in which there was an increase in the employment rates of older working-age individuals and assumes that such trends continue into the future. This extrapolation reduces the probability of an individual in employment leaving the labour market by more than 10 per cent by 2017–18 compared with 2003–04.

In order to test the extent to which our poverty results are driven by these extrapolated employment trends, we also created a 'low employment growth' version of the model, in which the time trend was removed. This has the effect of flattening labour supply at around the 2003–04 level for both men and women.

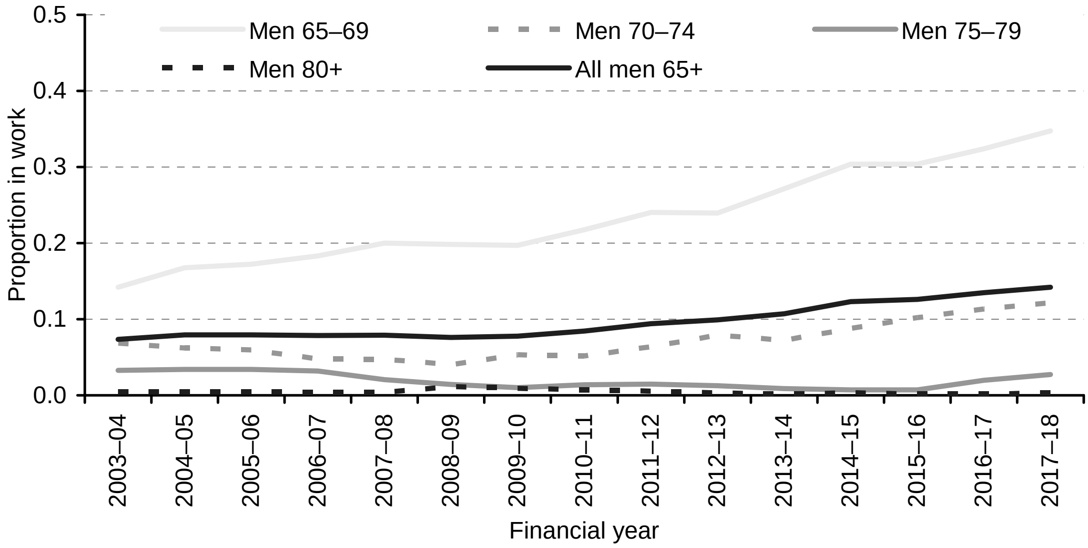
Figures 2.5a and 2.5b show the proportions in work (full- and part-time), by age and sex, projected by our central model, which includes the time trend. As noted earlier, the central model projects large increases in the proportion of individuals aged 65 and over in work,

Figure 2.5a. Proportion of women projected to be working (full- or part-time): central model



Source: Authors' calculations based on simulated ELSA data.

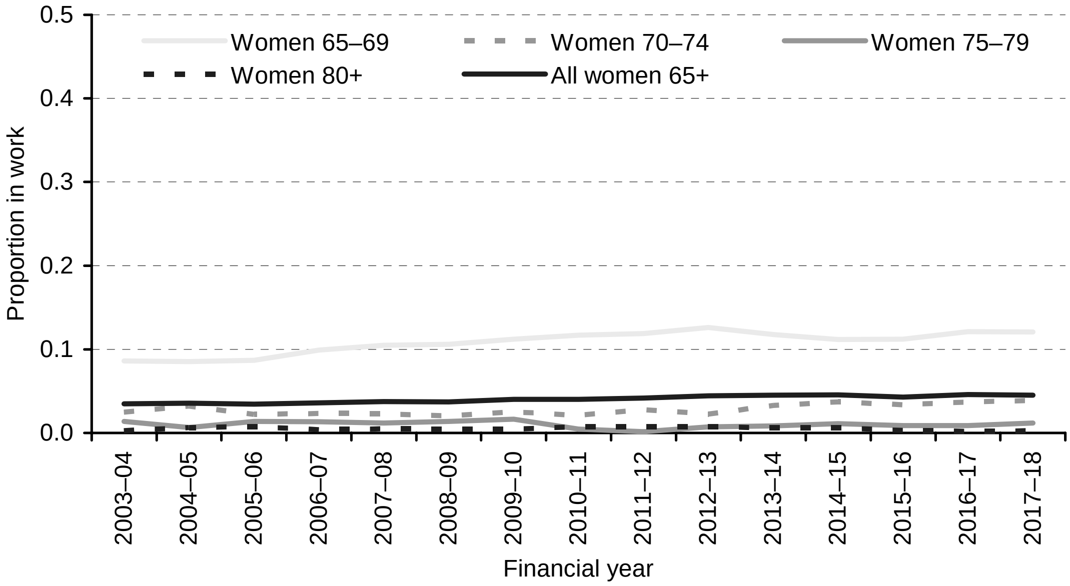
Figure 2.5b. Proportion of men projected to be working (full- or part-time): central model



Source: Authors' calculations based on simulated ELSA data.

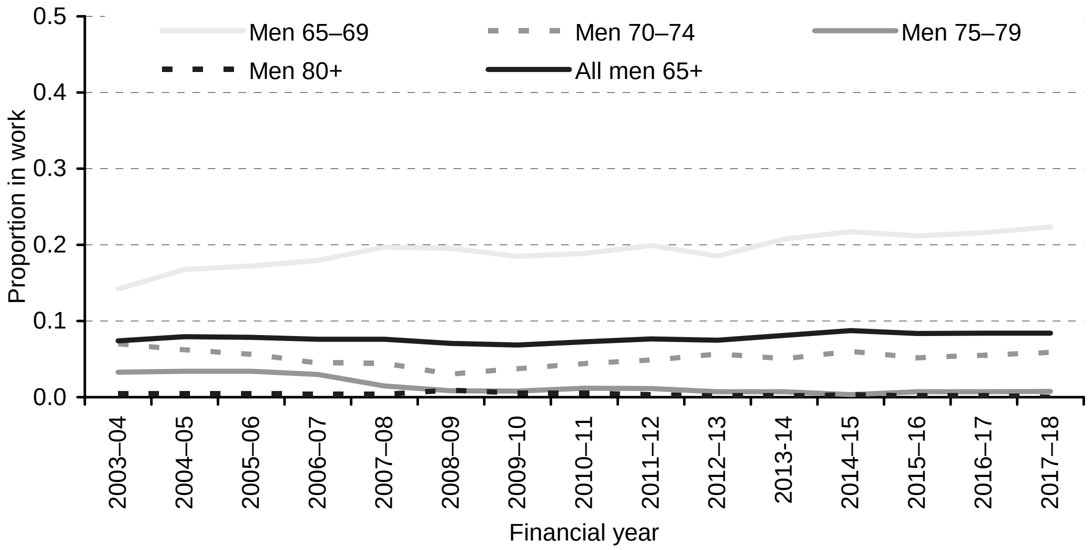
doubling from 4 per cent to 8 per cent for women and from 7 per cent to 14 per cent for men. The most significant increases are seen in the youngest (65 to 69) age group, with participation in this group projected to more than double, from 9 per cent to 20 per cent among women and from 14 per cent to 35 per cent among men. This increase in employment

Figure 2.6a. Proportion of women projected to be working (full- or part-time): low-employment variant



Source: Authors' calculations based on simulated ELSA data.

Figure 2.6b. Proportion of men projected to be working (full- or part-time): low-employment variant



Source: Authors' calculations based on simulated ELSA data.

of men aged 65 to 69, while large, would bring employment rates for this group back to the levels last seen in the late 1960s.

Figures 2.6a and 2.6b show the same graphs for the low-employment variant of our model (without the time trend). Labour force participation among individuals aged 65 and over rises very slightly, from 4 per cent to 5 per cent for women and from 7 per cent to 8 per cent for men. Even without the time trend, however, increases are projected in the proportions for men and women aged 65 to 69, from 9 per cent to 12 per cent among women and from 14 per cent to 22 per cent among men. The consequences this lower growth in labour force participation has for our poverty results are explored in Section 3.3.2.

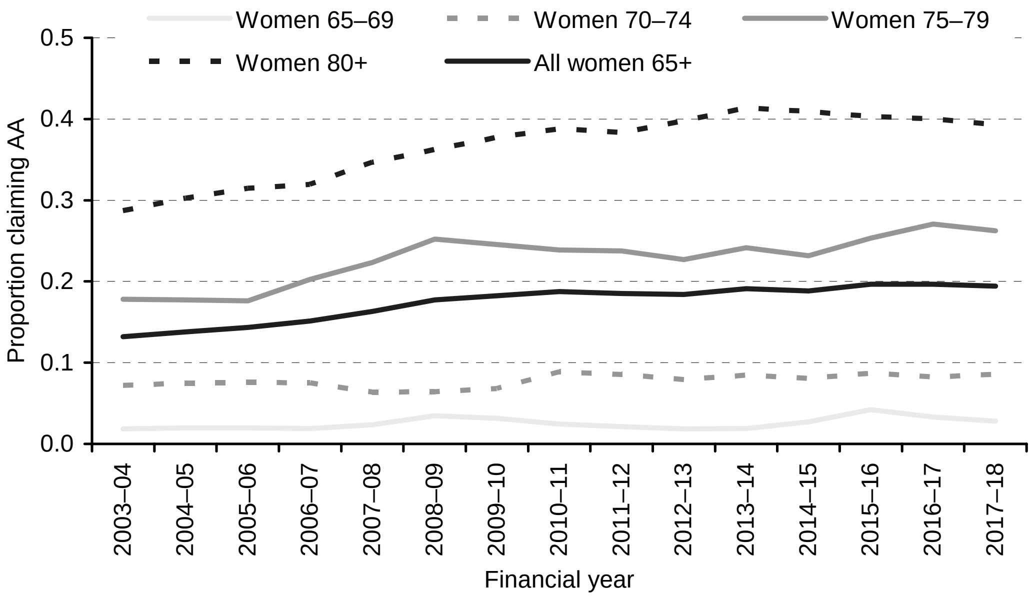
2.2.4 Disability benefits module

In order to assess income from health-contingent state benefits, we model transitions onto and off attendance allowance (AA), disability living allowance (DLA), incapacity benefit (IB) and carer's allowance (CA). The module also simulates transitions off severe disablement allowance (SDA), but not transitions onto SDA as this benefit is no longer available to new claimants.

For individuals not currently claiming a benefit, the module estimates the probability that they will make a new claim, based on a number of characteristics including age, sex, education, income and health status. (For further information on the rules, models and characteristics used to estimate these transitions, see Appendix A.) For individuals already in receipt of a benefit, the module allocates a probability of ending the benefit claim. Due to small sample sizes, these probabilities vary only by age and sex, and they are based on DWP administrative data.

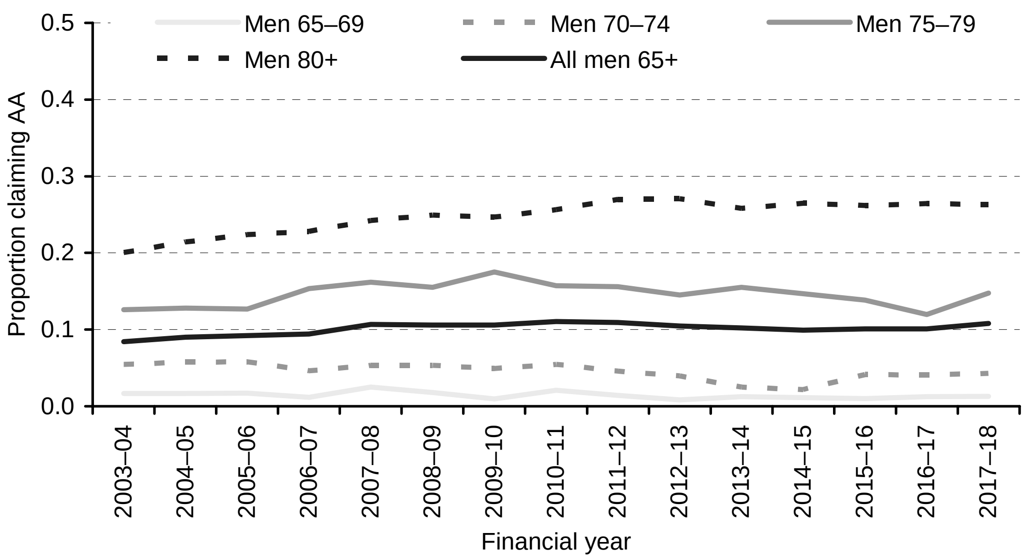
As with the labour market module, poverty rates are likely to be quite sensitive to the results of the disability benefits module, for the simple reason that the income from these benefits could potentially lift individuals above the poverty threshold. For the simulated years 2003–04 to 2005–06, therefore, we calibrate the outcomes of this module to match DWP administrative data on the number of individuals receiving each of these benefits. For future years, the module makes a correction equal to the *average* of the corrections made from 2003–04 to 2005–06.

Figure 2.7a. Proportion of women projected to claim attendance allowance



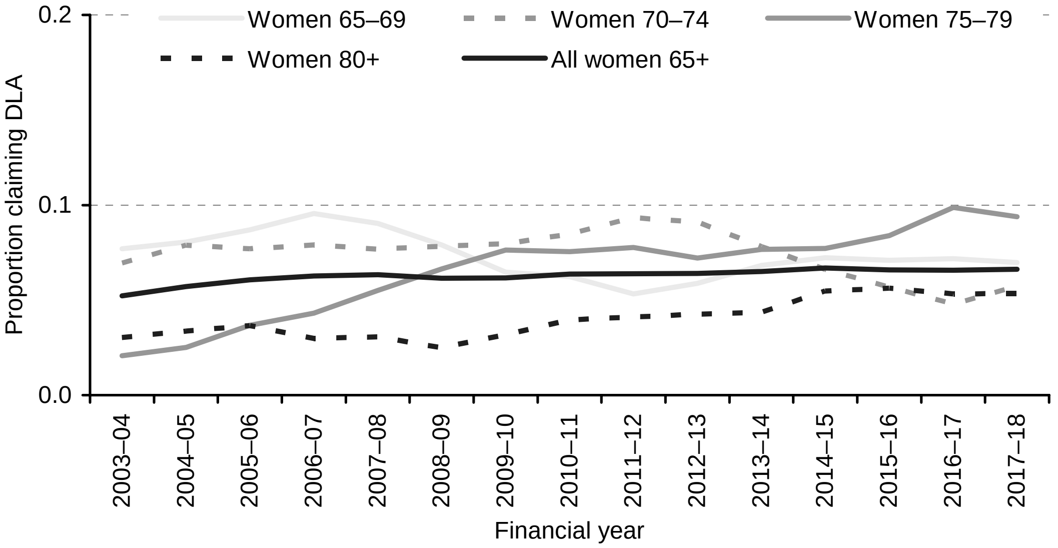
Source: Authors' calculations based on simulated ELSA data.

Figure 2.7b. Proportion of men projected to claim attendance allowance



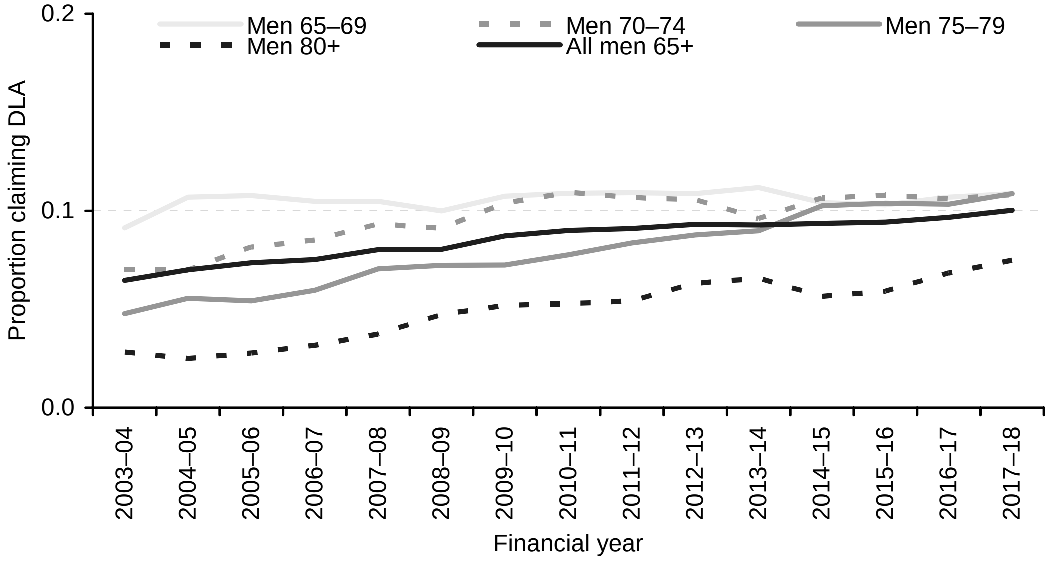
Source: Authors' calculations based on simulated ELSA data.

Figure 2.7c. Proportion of women projected to claim disability living allowance



Source: Authors' calculations based on simulated ELSA data.

Figure 2.7d. Proportion of men projected to claim disability living allowance



Source: Authors' calculations based on simulated ELSA data.

Figures 2.7a, 2.7b, 2.7c and 2.7d show the proportions of individuals aged 65 and over simulated to claim AA and DLA. Results for IB and CA are not shown, because these benefits are claimed by only a tiny fraction of individuals aged 65 and over.

The proportion of women aged 65 and over claiming AA is projected to rise from just over 13 per cent in 2003–04 to 19 per cent in 2017–18. AA claims among men aged 65 and over are also projected to rise, from 8 per cent in 2003–04 to 11 per cent in 2017–18.

The proportion of women in this age group claiming DLA is projected to increase from just over 5 per cent in 2003–04 to around 7 per cent in 2017–18. For men aged 65 and over, an increase of similar magnitude is predicted, from 6 per cent in 2003–04 to 10 per cent in 2017–18.

Because of the possible sensitivity of our results about pensioner poverty to these simulated changes in disability receipt, we present in Appendix Section B.2 a subset of our findings based on an alternative income measure that does not include income from these benefits.

2.2.5 End of year

At the end of each simulated year, individuals are allocated their private income and state pension income (see Sections 2.3 and 2.4 for details of income projections). All individuals then have one year added to their age, and the next year's simulation begins as they pass into the mortality module once more. Once this process is completed up to 2017–18, we use the IFS tax and benefit model, TAXBEN to model taxes, tax credits and benefits for each person in each year, so that their net family income can be estimated.

2.2.6 Repetitions

Because individuals are subject to a random 'roll of the dice' before being selected to undergo a transition (retirement, ill health, etc.), the outcome of our model is itself a random variable. It is thus important to ensure that our projections are the result of genuine trends captured by the model and not by an unusual ('outlier') set of random dice rolls.

We therefore ran a set of repetitions – setting our model running 250 times, from 2003–04 to 2017–18, using a different set of random numbers each time, and calculating poverty rates among those aged 65 and over for each repetition. The results of these repetitions are shown in Appendix C, which illustrates that 90 per cent of our 250 simulated poverty rates in 2017–18 lie within a 1.5 per cent bound.

We then calculated the median poverty rate among the 250 repetitions for every year from 2003–04 to 2017–18. Finally, we selected as our 'preferred simulation' the repetition that, on average, gave a simulated poverty path closest to the median in the years from 2003–04 to 2017–18.

2.3 Simulating private income

The previous section explained how the demographic composition of the population aged 65 and over was simulated for the years from 2003–04 to 2017–18. In order to estimate the level of pensioner poverty in each of these years and how this would be affected by changes to the tax and benefit system, we also need to know how much pre-tax, non-benefit income these individuals will have in each future year. This section therefore describes how individuals' private incomes were simulated for the years 2003–04 to 2017–18, while Section 2.4 outlines the simulation of entitlement to state pensions in the same years.

The ELSA survey collected very detailed information on respondents' income from all sources at the time of interview. This included income from employment and self-employment, private pensions, financial assets, property and other sources such as maintenance payments. In addition, the survey collected information on employer and personal pensions to which individuals had entitlement but from which they were not at that time drawing a pension. This section describes the information available on private incomes in 2002–03 and how this information was used to simulate individuals' private incomes in future years. Descriptive statistics on the evolution of these private incomes are presented in Section 3.1.

2.3.1 Employment and self-employment income

The ELSA survey asked all those who were in employment or self-employment at the time of interview how much they were paid or what the value was of their share of the profits from their business. In cases where the respondent either did not know or refused to give this information, earnings or self-employment income were imputed using a 'conditional hot-deck' (see Appendix Section D.1 for further details). Table 2.1 shows summary statistics on the resulting distribution of gross employment and self-employment income in 2002–03 amongst those who were in employment or self-employment respectively.

Table 2.1. Distribution of employment income in 2002–03, by age group

	Under 50	**50–59**	**60–74**	**75 and over**
Percentage with any earned income	79.0	70.7	19.9	2.0
Amongst whom:				
Mean	£336.0	£371.6	£283.3	£77.9
p25	£143.9	£161.2	£53.3	£11.8
Median (p50)	£259.2	£293.1	£153.8	£49.3
p75	£419.2	£486.9	£307.7	£76.9
Number with any earned income	499	2,875	925	44

Note: The ELSA survey is representative of the household population aged 50 and over in England. The information included in this table for those under 50 relates to some younger partners of ELSA respondents.
Source: Authors' calculations based on simulated ELSA data.

The employment transitions simulated in future years were described in detail in Section 2.2. In order to estimate individuals' future income from work, we need to make some extra assumptions about how earnings will evolve for those who continue to do some form of paid work.

For those remaining in full-time work or remaining in part-time work, we assume that they experience 2 per cent real earnings growth each year while they are aged under 55 and no real earnings growth from this age onwards. This assumption is based on evidence from changes in earnings among those in employment in both the first and second waves of ELSA (see Banks, Emmerson and Tetlow (2007)), which suggests that there was, at the median, some real earnings growth amongst men and women aged between 50 and 54 in 2002–03 who were in employment in both waves, though no real earnings growth amongst those aged 55 and over.

One final assumption is needed in order to simulate earnings for all those in our sample in future years. For full-time workers who are simulated to move into part-time work in the future, we need to make some assumption about how their earnings will change when this happens. The assumption we have used is based on the observed change in earnings amongst those individuals who moved from full-time to part-time work between ELSA wave 1 (2002–03) and ELSA wave 2 (2004–05). Mean earnings in the second wave amongst all those who had moved from full-time to part-time work were 48.3 per cent of the mean earnings for the same group of people in the first wave. However, this varied between men and women. Mean earnings amongst men were 39.6 per cent of what they had been earning when they worked full-time, while mean earnings amongst women were 61.1 per cent of their full-time level. We therefore assume that, if a man moves from full-time to part-time work, he will earn 40 per cent of his previous full-time earnings and, if a woman moves from full-time to part-time work, she will earn 60 per cent of her previous full-time earnings.

2.3.2 Private pension income

Estimates of income from private pensions in the years between 2002–03 and 2017–18 are based on very detailed questions in ELSA, which collected information on both private pension schemes that an individual was contributing to at the time of interview and private pension schemes of which they had previously been a member (and from which they were drawing a pension or to which they had retained rights). The use of this information to estimate accrued pension rights rather than using information on the private pension income of older cohorts is particularly appropriate given the large changes to private pensions in recent years which are likely to have had differing impacts across cohorts – for example, the introduction of personal pensions from April 1988.

The estimates of future pension incomes used in this study draw heavily on previous work that created estimates of pension wealth amongst the ELSA population. This section provides a summary of the methods used. A more detailed description of the methods used to estimate future income from each type of pension can be found in Banks, Emmerson and Tetlow (2005).

Defined benefit occupational pension schemes

The income that individuals will receive from employer defined benefit (DB) occupational pension schemes will depend on a number of factors. The income that will be received in the first year in which the pension is drawn from such schemes is typically calculated by multiplying the number of years of membership by some accrual fraction and some measure of final salary. However, if an individual leaves the labour market before the normal retirement age (NRA) in their pension scheme, an actuarial reduction is usually applied to the income. Income in years after this will additionally depend on the indexation rules of the scheme.

From the ELSA survey, we know the accrual fraction[11] of the scheme, the NRA in that scheme and the number of years of membership up to 2002–03. In addition, individuals are asked whether their pension in payment will be indexed above inflation. We assume that individuals will start to draw their employer DB pensions at the point at which they are first simulated to either leave employment or move from full-time to part-time work (see Section 2.2). The pension income in the first year of receipt is therefore calculated by multiplying the reported accrual fraction by earnings in the last year of work[12] and pension tenure (which is equal to pension tenure in 2002–03 plus the number of years between 2002–03 and leaving work or moving into part-time work). For labour market exits prior to the NRA, we apply a 4 per cent per year actuarial reduction since this is the most common rate of reduction applied.

In later years of receipt, we assume that this pension income goes up in line with inflation (2½ per cent a year) or, if the individual reported that their pension would be indexed above inflation, we assume that their pension income will be increased in line with nominal average earnings (4½ per cent growth a year).

Defined contribution pension schemes

In defined contribution (DC) pensions, members make contributions each year. These accrue investment returns until the individual leaves the labour market, at which point he or she buys an annuity with the fund. Defined contribution pensions may either be provided by an individual's employer (employer pensions) or have been taken out by the individual (personal or stakeholder pensions). In either case, the income received from such pensions will depend on a number of factors. First, the pension income will depend on the total value of the pension fund in 2002–03. Second, if the individual does not draw the pension immediately, the future income from the scheme will also depend on whether he or she makes any further contributions to the scheme in future years and also on the real return on the investments held in the fund. Third, the actual income received will depend on the annuity rates available at the point of annuitisation.

From ELSA, we know the value of the pension fund in 2002–03 (in cases where individuals did not know this, we impute it using a conditional hot-deck; see Appendix Section D.1). We also know how much they and (where applicable) their employer contributed to the pension in the previous 12 months. As we do for DB pensions, we assume that individuals start to draw a pension from these schemes when they first leave employment or move from full-time to part-time work. Therefore, for those who are not simulated to leave full-time employment immediately, we need to make some assumption about their future pension contributions and about the return received on investments held in the fund in future in order to estimate their future pension income.

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[11] If the individual did not know the scheme's accrual fraction, we assume that the most common accrual fraction in their type of scheme applies. In particular, we assume that public sector workers have an accrual fraction of $^{1}/_{80}$ and that private sector workers have an accrual fraction of $^{1}/_{60}$. For a more detailed summary of accrual fractions in DB schemes amongst ELSA respondents, see Banks, Emmerson and Oldfield (2005).

[12] We assume that individuals' salaries used for the purposes of calculating DB pension entitlement do not grow in real terms beyond 2002–03. This is a slightly more cautious assumption than we use in simulating individuals' actual future earnings (see Section 2.3.1). Banks, Emmerson and Tetlow (2007) find that incorporating 2 per cent real earnings growth for those aged under 55 made relatively little difference to estimates of pension wealth for these people.

To estimate future contributions, we assume that individuals contribute the same amount in real terms to their pension in future years as they did in 2002–03. This assumption is based on cross-sectional evidence of the variation in pension contributions by age and is consistent with evidence on changes in contributions observed amongst individuals between the first two waves of ELSA (see section 3.1.2 of Banks, Emmerson and Tetlow (2005) and section 2.2 of Banks, Emmerson and Tetlow (2007) respectively). We also assume that the underlying fund earns a 2½ per cent real return each year.

Knowledge of the fund value in 2002–03, combined with the assumptions about future contributions to the scheme and the return accrued on investments held in the fund, allows us to estimate the value of the fund in all future years. The final step in estimating the future income that this fund will generate is to make some assumption about the annuity rates that will be available in future years. We assume that the annuity rates prevailing will be the same as the second-best age- and sex-specific annuity rates quoted on the Financial Services Authority website in January 2005. In particular, we assume that all individuals purchase a nominal annuity, which is currently by far the most popular type of annuity. As a result, income from these pensions is assumed to remain constant in cash terms.

Pensions already in receipt in 2002

Many of those surveyed by ELSA in 2002–03 were already receiving income from one or more private pensions. This included both pensions to which they personally had previously contributed and pensions to which a former spouse had contributed and from which they were receiving some income. Where respondents were not sure of their income from any of these schemes, we imputed their annual income using a conditional hot-decking procedure (see Appendix Section D.1). In future years, we assume that this pension income is indexed to inflation (2½ per cent per year).

Past pensions yet to be received

Some individuals also had pension schemes in 2002–03 to which they were no longer contributing but from which they had yet to draw a pension (these could, for example, include pensions provided by previous employers). In order to estimate future income from these schemes, we had to make assumptions about when the individual would start drawing an income from these schemes and how the income from them would be calculated.

Since we know during which years the individual had been a member of the scheme, we estimate future pension income assuming that it was a DB-type scheme. In other words, we assume that income from this pension will be equal to the number of years of scheme membership multiplied by an accrual fraction ($^1/_{60}$) and earnings in the year the individual left the scheme[13] uprated by inflation to the year they start drawing the pension. We assume that each individual starts drawing these pensions when they reach the SPA.

Inheritance of private pension income

In the case of past pensions (both those already in receipt and those not yet in receipt) and current DB pensions, we assume that an individual's partner will receive 50 per cent of the

[13] See Banks, Emmerson and Tetlow (2005) for a description of how earnings histories of ELSA respondents were estimated.

pension income after the original scheme member has died. The annuity rates we use when calculating income from DC pensions are single life annuity rates and so for this type of pension we assume that the surviving partner receives no income after the original scheme member has died.

Detailed analysis of the distribution of private pension wealth can be found in chapter 3 of Banks, Emmerson, Oldfield and Tetlow (2005).

2.3.3 Income from non-pension assets

ELSA also contains information on individuals' annual income from other (non-pension) assets. In particular, this covers income from property (such as buy-to-let housing, farms and business premises), financial assets (such as dividend payments from stocks and shares and interest income from bank accounts) and other sources (such as royalties).

In the case of income received from financial assets or property, the survey collects information on total income of couples jointly. Therefore, in order to calculate post-tax income (see Section 2.5), we need to know which of the partners received this income. We make the simplifying assumption that all such income is received equally by each partner (in other words, 50 per cent of the income is received by each person). In couples where the marginal tax rates of the individuals are not the same, we will overstate true after-tax income in cases where the higher-tax-rate partner received more asset income and understate true after-tax income in cases where the lower-tax-rate partner received more asset income. Information on income from other miscellaneous sources, such as royalties, is requested from each partner separately. Therefore, we assign to each partner the actual income from each source that he or she personally received.

Table 2.2 shows summary statistics on the resulting distribution of income from all these sources in 2002–03.

Table 2.2. Distribution of income from financial assets in 2002–03, by age group

	Under 50	**50–59**	**60–74**	**75 and over**
Percentage with any income from assets	79.4	80.0	83.1	82.3
Amongst whom:				
Mean	£16.1	£19.8	£21.2	£25.1
p25	£0.3	£0.6	£0.7	£0.5
Median (p50)	£2.2	£3.3	£4.1	£3.1
p75	£8.7	£13.3	£16.8	£14.5
Number with any income from assets	502	3,258	3,867	1,819

Note: The ELSA survey is representative of the household population aged 50 and over in England. The information included in this table for those under 50 relates to some younger partners of ELSA respondents.
Source: Authors' calculations based on simulated ELSA data.

To estimate individuals' income from assets in future years, we assume that income from all of these sources remains constant in real terms. This assumption is based on an analysis of changes in the stock of net financial and physical assets held by ELSA respondents over the two-year period between the first and second waves. This shows no systematic pattern of change in levels of wealth held in these forms, and an increase in mean wealth of 7.5 per cent, which is in line with growth in the RPI of 6.1 per cent.[14] Hence we assume that individuals' income from such wealth remains constant in real terms.

2.4 State pension income

In the UK, there are two main types of state pension provision. The first is the basic state pension (BSP), to which individuals accrue entitlement during each year (between the ages of 16 and the SPA) that they are earning above a certain minimum level or through certain other criteria (such as certain formal caring responsibilities, being an unemployed man aged 60 to 64 or being aged 16 to 18). The other type of state pension provision is second-tier state provision (the State Earnings-Related Pension Scheme (SERPS) or the State Second Pension (S2P)). Entitlement to this is based on an individual's earnings and employment history (or, from 2002–03, receiving child benefit for a child aged under 5).

For those individuals who were already aged over the SPA in 2002–03, we observe in ELSA how much state pension income they received in total in 2002–03. As has been observed in other surveys,[15] it appears that some individuals reported certain means-tested and health-related benefits as state pension income rather than as benefit income. Therefore, reported receipt of state pension income was cleaned to take account of this (see Appendix Section D.2 for more details of the cleaning procedure).

Even after cleaning the data, because state pension income was reported as one total figure, we do not know whether this income came from BSP or from SERPS. Knowing how much comes from each source is important when we simulate the effect of policy changes (discussed in Chapter 4). Therefore, we have had to make some assumptions about the division of state pension income between BSP income and SERPS income. If an individual was in receipt of state pension income of less than the amount of a full individual BSP entitlement (£75.50 per week in 2002–03), we assume that all this income came from the BSP. If an individual was in receipt of more than £75.50 per week of state pension income, we assume that they were receiving a full BSP and that the remainder (total state pension income less £75.50) came from SERPS.[16]

For those individuals who were not already aged over the SPA in 2002–03, certain assumptions have had to be made when calculating both future BSP and future SERPS/S2P entitlements, since we do not yet have individuals' National Insurance (NI) contribution histories for ELSA respondents. The way in which we have calculated these entitlements is described in Sections 2.4.1 and 2.4.2.

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[14] See section 3.2 of Banks, Emmerson and Tetlow (2007) for further details.

[15] See, for example, Hancock and Barker (2003), who analyse the Family Resources Survey.

[16] Income from the Graduated Retirement Scheme, which operated from 1961 to 1975, is ignored since it is typically very small.

2.4.1 Estimating basic state pension entitlement

An individual's entitlement to the BSP will depend on the number of years that he or she was working and earning above the lower earnings limit (LEL) between the ages of 19 and the SPA (with ages 16 to 18 being automatically credited). An individual accrues one year's entitlement for each year worked and the fraction of a full BSP to which he or she is entitled is calculated by dividing the number of years' entitlement by the total number of years between 16 and the SPA (49 for men, 44 for women[17]). Since April 1978, individuals who received child benefit for children aged under 16 but who were not earning above the LEL in any year were eligible for home responsibilities protection (HRP). This reduces the denominator used when calculating the proportion of BSP to which the individual is entitled, subject to a minimum of 20 years. In addition, prior to 1978, married women could opt to pay reduced-rate NI contributions in exchange for not accruing their own entitlement to the BSP.

Under the policy rules as they stand prior to the implementation of the recommendations from the 2006 Pensions White Paper (Department for Work and Pensions, 2006a), anyone entitled to less than 25 per cent of a full BSP receives no BSP income, while anyone entitled to at least 90 per cent receives 100 per cent of a full BSP.

Since we do not have a full history of NI contributions for ELSA respondents, we have to make some assumptions about their previous work history in order to estimate how much BSP income they will be entitled to in future. We assume that individuals were in work between leaving full-time education and the date they left their last job (or 2002–03 if they were still working in 2002–03). If a woman in the ELSA data is assumed to be out of work in any year when one of her children was aged less than 16 years, we credit her with HRP. We assume that any women who report having ever paid reduced-rate NI contributions have always paid reduced-rate contributions (in other words, they are assumed to have accrued no BSP entitlement).

Combining these assumptions, we estimate the fraction of a full BSP to which an individual had accrued entitlement up to 2002–03. For those who are simulated to remain in work beyond 2002–03, we assume they continue to accrue entitlement as long as they are in work and aged under the SPA.

2.4.2 Estimating second-tier state pension entitlement

An individual's entitlement to the second-tier state pension depends on his or her employment and earnings history (and, from 2002–03, whether he or she is receiving child benefit for a child aged under 5). Though the exact calculation of second-tier pension entitlement has changed several times, essentially entitlement accrues in proportion to earnings between the LEL and the upper earnings limit (UEL) in all years of a person's working life since 1978–79. We estimate entitlement to SERPS accrued up to 2002–03 for each individual by using an estimated earnings history from 1978–79 to 2002–03 and applying to this the SERPS rules prevailing in each year.

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[17] For those women affected by the increase in the female state pension age from 60 to 65 that is being phased in between 2010 and 2020, the number of years between age 16 and the SPA will be higher than 44, ultimately reaching 49 when the male and female state pension ages equalise.

In order to calculate future accrual for those individuals who are simulated to be in work in some future years, we use their future earnings (see Section 2.3.1) and the current second-tier state pension rules. When considering future pensioner incomes under the proposals set out in the White Paper (Section 5.1), we also incorporate in our calculation of future S2P accrual the changes to S2P that have been proposed. See Chapter 4 for a more detailed description of these proposed changes.

Detailed analysis of the distribution of state pension wealth can be found in chapter 3 of Banks, Emmerson, Oldfield and Tetlow (2005).

2.5 Simulating taxes, benefits and tax credits

Having simulated the private incomes of pensioners and their entitlements to both state pensions and health-contingent state benefits, we can simulate the net incomes of pensioners using the IFS tax and benefit microsimulation model, TAXBEN.

TAXBEN calculates each family's tax liability and entitlement to tax credits and means-tested benefits, and hence its net income, under any given tax and benefit system. One complication is that not everyone takes up the tax credits and means-tested benefits to which they are entitled. This could be due to them not being aware that they are entitled, them thinking the application procedure is too complicated or time-consuming, them anticipating only being entitled to a low award or because of a stigma about claiming.[18] We take account of incomplete take-up by removing the income from means-tested benefits (pension credit, housing benefit and council tax benefit for the group aged 65 and over) and tax credits from some pensioner families chosen at random.

The proportion of families we do this for is taken from the actual take-up rate calculated by Department for Work and Pensions (2006c) for means-tested benefits and by HM Revenue and Customs (2006) for tax credits. These are calculated separately for different types of family and, for pension credit and tax credits, by level of entitlement. The fraction of families from whom we remove income from a means-tested benefit or tax credit – and therefore the proportion of total entitlement – is equal to the expenditure take-up rate estimated by DWP and HMRC (the expenditure take-up rates measure the proportion of total benefit entitlements estimated to be received; the actual rates used can be found in Appendix E).

Choosing this take-up rate means that the total amount of means-tested benefit income and tax credits received by our sample, and the estimated cost of changing entitlements to means-tested benefits and tax credits, should be modelled correctly. However, given that non-take-up is in reality correlated to the level of entitlement, this process may underestimate income for families with high entitlements to means-tested benefits and tax credits and overestimate income for families with low entitlements. (Note that since we model receipt of the main disability-related benefits directly, as described in Section 2.2, rather than modelling entitlement to these benefits, we do not need to adjust receipt of these for incomplete take-up.)

[18] See Hancock et al. (2004), Hernandez, Pudney and Hancock (2007) and Talbot, Adelman and Lilly (2005), all on take-up of means-tested benefits amongst those aged 60 or over in Great Britain.

One issue that arises when using the ELSA data-set is that it does not contain information about those benefit units in ELSA households where there is no one aged 50 or over in 2002–03. This will, for example, include any non-dependent children living in the household. By ignoring these people (and the income they may bring in), we overestimate means-tested benefit entitlement because of ‘non-dependent deductions’ that reduce the amount of entitlement by a certain amount depending on the income of others in the household. As most of those aged 65 and over do not live with other families, this is only likely to be an issue in a minority of cases and should, in any case, involve a fairly small change to total income.

2.6 Measuring net equivalised family income and relative poverty

Once we have calculated individuals’ net incomes, we are able to add these up across family members, where the family is defined as any individual, their spouse and any dependent children. The income measure is then ‘equivalised’ to take into account family size and composition, using the modified OECD equivalence scale.[19]

The intention is to follow the principle of measuring living standards that is used in the Households Below Average Incomes (HBAI) data-set published annually by DWP and presented in the DWP’s annual report on its anti-poverty policies, *Opportunity for All (OfA*) (Department for Work and Pensions, 2006b). But there are a number of reasons why we cannot replicate that measure perfectly. The main differences between the measure of poverty used here and that used in HBAI and *OfA* are the following:

- The measure of income in this report is at the family, not the household, level. This means that we assume that individuals only benefit from the income of other family members and not from that of members of the wider household (this is relevant, for example, when a pensioner lives together with his or her adult children).
- We are able to consider the population aged 65 and over only, whereas in HBAI and *OfA*, pensioner poverty rates cover anyone above the SPA and so also include women pensioners aged 60 to 64.
- We consider the population resident in England only, whereas HBAI and *OfA* now cover the whole of the UK (and until recently covered the whole of Great Britain).
- The relative paucity of data on housing costs in ELSA and the difficulty of attributing a household’s housing costs between its constituent families mean that this report mainly considers incomes measured before housing costs (BHC), whilst HBAI and *OfA* generally show incomes on both a before- and an after-housing-costs (AHC) basis. (We show some simulations for pensioner poverty where income is measured AHC in Appendix Section B.1 and a further variant where income is measured excluding income from disability benefits in Appendix Section B.2).

[19] For more information regarding equivalisation, see appendix 2 of Department for Work and Pensions (2007).

Box 2.2. Measuring poverty using the HBAI methodology

It is important to recognise that there are a number of limitations to measuring poverty in this way. First, the poverty measure is entirely based on income. Policymakers, policy analysts and people in poverty are generally agreed that poverty is multidimensional; these statistics, though, attempt to capture just one dimension.

Furthermore, none of the measures of poverty presented is explicitly based on an assessment of needs or on a level of income that would be adequate to achieve some standard of living. Nor do they take into account public perceptions of what poverty is. This criticism might lead one to view these estimates of poverty as merely another way of summarising the shape of the income distribution that focuses on individuals with lower incomes.

Even accepting the above limitations, poverty measures counting the number of people below specific poverty thresholds are only informative about the number of low-income people. They provide no information on the 'distance' that separates those with incomes below poverty lines from the poverty thresholds, and so contain no information on how poor the poor households are. Nor do they take into account how long people are poor. Yet the 'depth' of poverty may be a very important issue and one requiring different policies from those aiming simply to bring people from just below the poverty line across it.

There are, of course, advantages to this way of measuring poverty. For example, the process of producing the eventual statistic is relatively transparent and does not require many subjective decisions on the part of the researcher or government statistician. Furthermore, the measures have been used for many years, they are well understood and it is easy to make comparisons with them over time, across different groups of the population and across countries.

With this definition of income, we can then follow the practice of HBAI of classifying individuals as being in poverty if they live in families whose net equivalised family income falls below some poverty line. In this report, we show the proportions of individuals aged 65 and over in relative and absolute poverty. A relative poverty measure is usually defined as the number of individuals whose income falls below some percentage of median income in that year. The implied poverty line therefore changes each year in line with the change in median income. The current government defines absolute poverty measures with reference to median income in some arbitrary base year; this implied poverty line is then uprated only in line with inflation. Further details are given in Box 2.2.

The ELSA data-set cannot be used to estimate median income, because it is only representative of individuals aged 50 and over in England. One option is to take the relative poverty thresholds that are defined by the official HBAI data-set for those years that overlap with our simulated ELSA sample (i.e. 2003–04 to 2005–06). However, this involves imposing an estimate of median income derived from one survey (the FRS) onto another survey (ELSA). There are a number of reasons why the levels of income will not be directly comparable between the actual HBAI data-set and our simulated ELSA sample. First, the surveys do not adopt identical questions to estimate net income. Second, both FRS and ELSA are random samples, and so sampling error means that even were the questions identical, we might not get identical estimates of the distribution of income. Third, we are simulating liability to taxes and entitlement to some state benefits in our simulated ELSA sample, rather than using the self-reported data in the FRS on taxes paid and benefits received. As Chapter 3 shows, there are indeed differences in the distribution of individual private incomes and net family income between our simulated ELSA sample and a comparable FRS sample of individuals in England aged 65 or over. This means that using poverty thresholds (in pounds) derived from the official HBAI data-set with the simulated ELSA sample would lead to a lower estimate of poverty amongst individuals in England aged 65 or over. For our simulated ELSA sample in 2003–04 to 2005–06, we therefore set the poverty threshold that gives us the same poverty rate in ELSA as found using the FRS. We do this by choosing a value (in pounds) such that there are as many individuals in England aged 65 or over with family income below that threshold as there are individuals in England aged 65 or over with below 60 per cent of median family income in the FRS. In other words, we calibrate the poverty threshold so that it matches the poverty rate in the official HBAI data-set for our sample. This means that, for 2003–04 to 2005–06, our poverty rates match the FRS exactly, by construction.[20]

Of course, we do not know how the median income (and thus relative poverty thresholds) will change over time in the future, and so we must make some assumptions about this in order to simulate changes in relative pensioner poverty over time. For our central poverty scenarios, we assume that the population median income – and therefore the poverty line – will grow by 1.8 per cent per year in real terms, which is the long-run average annual median HBAI income growth projected in Brewer, Browne and Sutherland (2006) between 2004–05 and 2005–06. However, we also consider some higher and lower median income growth scenarios in Section 3.3.2.

For both the absolute and relative poverty measures, three poverty lines are defined, corresponding to 50 per cent, 60 per cent and 70 per cent of the relevant median income, though we mainly focus on the central one of these – namely, the 60-per-cent-of-the-median threshold. We measure absolute poverty with reference to the (calibrated) poverty threshold in 2003–04, uprated only in line with expected inflation.

In order to be sure that our results are not sensitive to the specific (and, ultimately, arbitrary) choice of poverty line, in Chapter 5 we also show how different policy reforms affect the level of income of the pensioner at the 10th percentile of the pensioner income distribution – that is, the level of income below which 10 per cent of pensioners fall.

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[20] Note, however, that we are measuring poverty among the population aged 65 and over, in England, based on family income, whereas HBAI measures pensioner poverty among all individuals over the SPA, for the whole of the UK, based on household income. These differences mean that our projections do not match (nor are they designed to match) the official HBAI statistics on pensioner poverty.

3. Simulated changes in the pensioner income distribution

Summary

This chapter analyses the simulated changes in the income distribution of individuals aged 65 and over in England. All simulations are for this population only, and all incomes are shown in real terms. Where appropriate, income is measured before housing costs (BHC).

Individual private incomes

Our simulations suggest that:

- The private incomes of individuals aged 65 and over are likely to rise over time, as new generations reaching this age do so with higher incomes.
- Such income growth arises mainly from a projected growth in income from employment, but also from other sources, including private pensions.
- The rises in private incomes are greater at the lower end of the income scale, implying a reduction in levels of private income inequality among the population aged 65 and over. However, our models might be unable to capture accurately all the distributional changes that might occur in the future, so this finding about income inequality should be taken with some caution.

Living standards

Given this simulated growth in private incomes, our simulations suggest that:

- The living standards of the elderly population, as captured by their net equivalised family income, are also likely to rise over time.
- This rise in living standards is likely to be fairly even across the population, though those among the very poorest appear likely to see rather faster income growth than average, while those among the very richest are projected not to see such rapid income growth as in the recent past.

Pensioner poverty projections

Given this simulated growth in net equivalised family income, our simulations suggest that:

- Without further substantive reforms to taxes and benefits beyond those proposed in the Pensions White Paper (Department for Work and Pensions, 2006a), relative pensioner poverty will stop falling and remain fairly stable until 2017–18.
- Pensioner poverty might continue to fall if the poverty line rises more slowly than 1.8 per cent per year, or might rise if employment growth among those aged 65 and over turns out not to be as strong as our model projects.

This chapter sets out our simulations of how we expect the income distribution of those aged 65 and over to change over the coming decade. It should be remembered that our simulations have been developed primarily as a tool for understanding how different policy reforms in the future might affect the distribution of pensioner incomes (see Chapter 5). They are based on some rather simple assumptions about how individual incomes will evolve over time and about the transitions between employment, retirement and benefits that people will make (Chapter 2 set out the assumptions in more detail). For this reason, our simulations are unable to capture every feature of future changes to the distribution of income, many of which of course cannot be known with certainty in advance, and so they should be taken as indicative of how the income distribution might change.

The chapter is divided into three sections. Section 3.1 describes our simulations of how the distribution of *private* incomes of *individuals* aged 65 and over will evolve (Sections 2.1 to 2.3 set out how these simulations were produced). Section 3.2 then considers how living standards are likely to change, by showing how the distribution of *net equivalised family* income might change, given these changes in private incomes and under some assumptions about the tax and benefit system in place in every year. Finally, Section 3.3 shows what these changes imply for our simulations of how pensioner poverty might change in the future, if there are no substantive tax and benefit reforms beyond those proposed in the Pensions White Paper (Department for Work and Pensions, 2006a) (Sections 2.5 and 2.6 gave more detail on how we convert simulations of private income into simulations of future poverty rates, while Chapter 4 provides details of the main reforms to state pensions and means-tested benefits for pensioners proposed in the White Paper).

3.1 Individual private incomes

This section outlines how individuals' private incomes – their incomes before taxes and benefits – are simulated to evolve over time. Further details are given in Box 3.1.

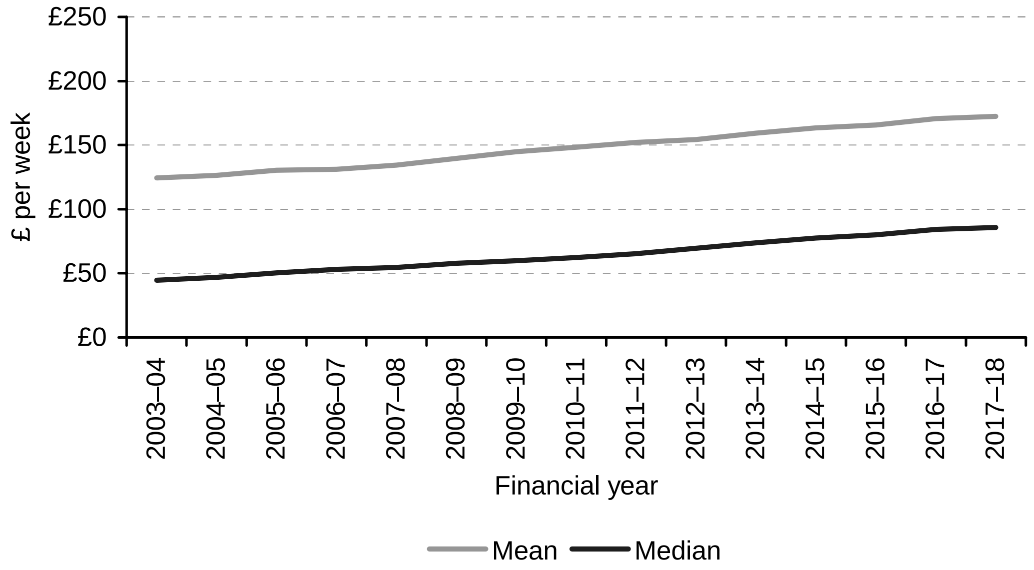
Box 3.1. Individual private income

This measure of income captures income from private sources – including income from employment, self-employment, private pensions, savings and investments, property and other sources. It does not include income from state benefits, pensions or tax credits, and it is measured before any payment of direct taxes. It is measured at the individual level and so does not capture the income of any partner or spouse. As with all our simulations, it is presented for individuals aged 65 and over in England.

3.1.1 Changes in different sources of private income

Figure 3.1 shows the rising average real incomes among the population aged 65 and over projected by our model. Mean incomes in this age group are projected to rise from around £124 per week in 2003–04 to over £173 per week by 2017–18 (in constant 2007–08 pounds), while median income is projected to rise by roughly the same amount, from £45 to £86, over the same period.

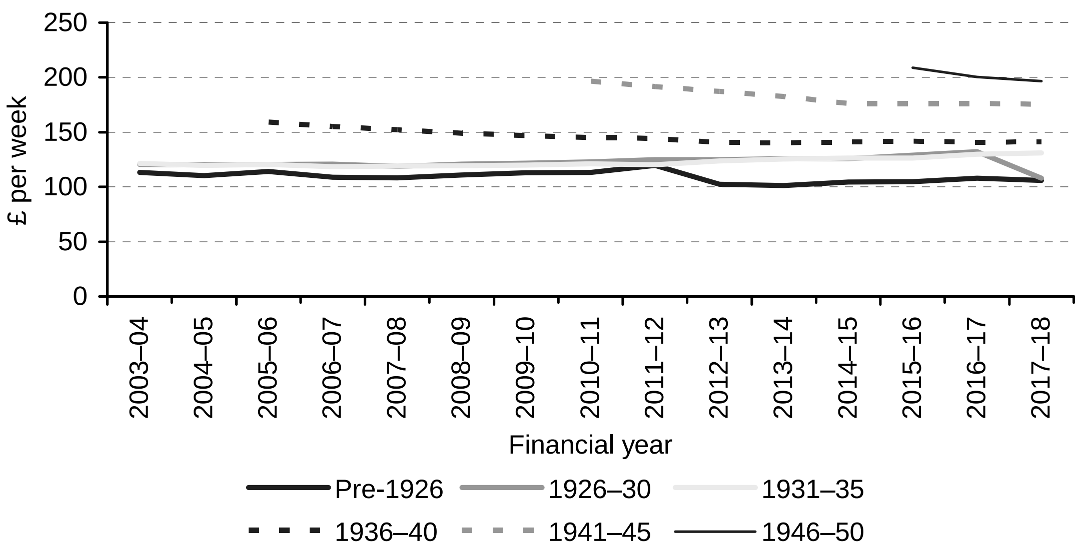
Figure 3.1. Simulated real private income



Note: In 2007–08 real terms.
Source: Authors' calculations based on simulated ELSA data.

As discussed in Section 2.3, our model assumes zero real growth in virtually all components of private income for a given individual,[21] so it might seem surprising that it then predicts consistent private income growth throughout the 15 years of simulation. This result suggests that the individuals reaching age 65 each year must have higher private incomes, on average, than those who preceded them. This cohort effect is examined in Figure 3.2.

Figure 3.2. Mean private income, by birth cohort



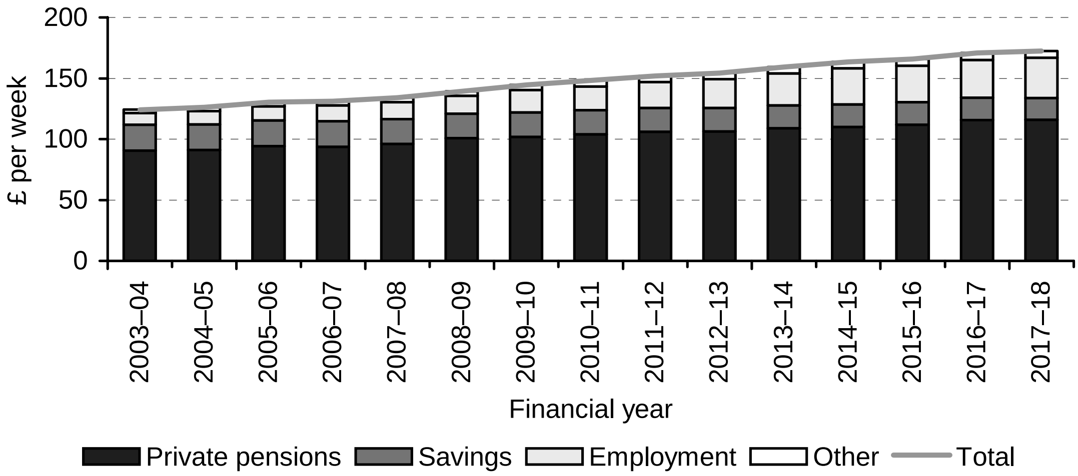
Notes: In 2007–08 real terms. Cohorts are only presented in this graph after the entire cohort has reached age 65 and where ELSA sample sizes exceed 500.
Source: Authors' calculations based on simulated ELSA data.

[21] The exception being employment incomes among individuals aged 50 to 54, which are assumed to grow at a rate of 2 per cent a year in real terms – see Section 2.3.

Figure 2.3 showed that the post-war cohorts are more numerous than the cohorts that preceded them; Figure 3.2 shows that they also have higher private incomes, on average. The cohorts born before 1936 have similar average incomes of around £130 per week in each year (in constant 2007–08 pounds), while each cohort born after 1935 has, on average, higher private income than the cohorts that preceded it.

Of course, private income is made up of several components – including income from pensions, employment and savings. Our simulated growth in private incomes could be the result of increases in some or all of these components. Figure 3.3 and Table 3.1 therefore show how the growth in income over time can be broken down into changes in each of four income components: private pensions (including all annuity income), income from savings, employment income and income from other sources.

Figure 3.3. Sources of private income



Note: In 2007–08 real terms.
Source: Authors' calculations based on simulated ELSA data.

Table 3.1. Average annual growth in sources of income, 2003–04 to 2017–18

	Private pensions	Savings	Employment	Other	Total
Average annual growth 2003–04 to 2017–18 (simulated population)	1.8%	–1.2%	9.2%	5.0%	2.4%
Memo: Average annual growth 2000–01 to 2005–06 (FRS)	2.1%	–3.9%	5.1%	2.0%	0.9%
Memo: Average level 2005–06 (simulated population)	£94.31	£21.15	£11.51	£3.48	£130.45
Memo: Average level 2005–06 (FRS)	£88.73	£27.62	£13.52	£2.21	£132.10

Note: All in 2007–08 real terms.
Source: Authors' calculations based on FRS (the English population aged 65 or over) and our simulated ELSA sample.

Figure 3.4. Mean income by source at age 65 to 69, by cohort

Figure 3.5. Mean income by source at age 70 to 74, by cohort

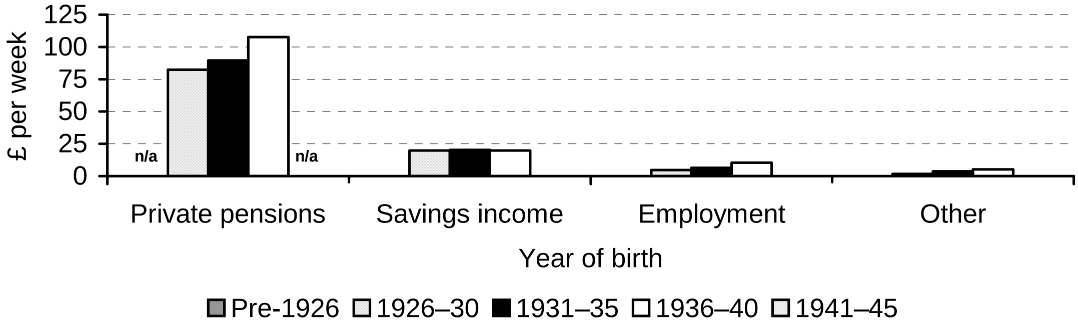


Figure 3.6. Mean income by source at age 75 to 79, by cohort

Figure 3.7. Mean income by source at age 80 and over, by cohort

Notes and Source to Figures 3.4 to 3.7
Notes: All in 2007–08 real terms. Cohorts are only presented in these graphs after the entire cohort has reached age 65 and where ELSA sample sizes exceed 500.
Source: Authors' calculations based on simulated ELSA sample.

Income from private pensions makes up by far the largest chunk of private income for those aged 65 and over – around 70 per cent on average. Our simulations suggest that average private pension income will grow at an average rate of around 1.8 per cent per year, while income from employment is simulated to grow at a far faster average rate of over 9 per cent a year. This rapid growth in employment earnings reflects both the increased proportions of those aged 65 and over that our model predicts will stay in paid work (see Section 2.2.3) and the fact that the new cohorts reaching age 65 are higher earners, on average, than those preceding them.[22]

We can explore further the factors driving these higher private incomes for successive cohorts by examining the sources of income for each birth cohort at a given age. Figures 3.4 to 3.7 show the average level of simulated private pension, savings, employment and other incomes for different birth cohorts at ages 65 to 69, 70 to 74, 75 to 79 and 80 and over respectively. They highlight the growing importance of employment income particularly among younger cohorts of 65- to 69-year-olds and 70- to 74-year-olds (Figures 3.4 and 3.5), as well as a general growth in private pension incomes across cohorts at each age.

3.1.2 Changes in the simulated distribution of private income

The measures of average private income considered so far mask the wide variation in private incomes across the population. To consider this in more detail, Figures 3.8a and 3.8b and Table 3.2 provide information about the simulated changes at different points in the income

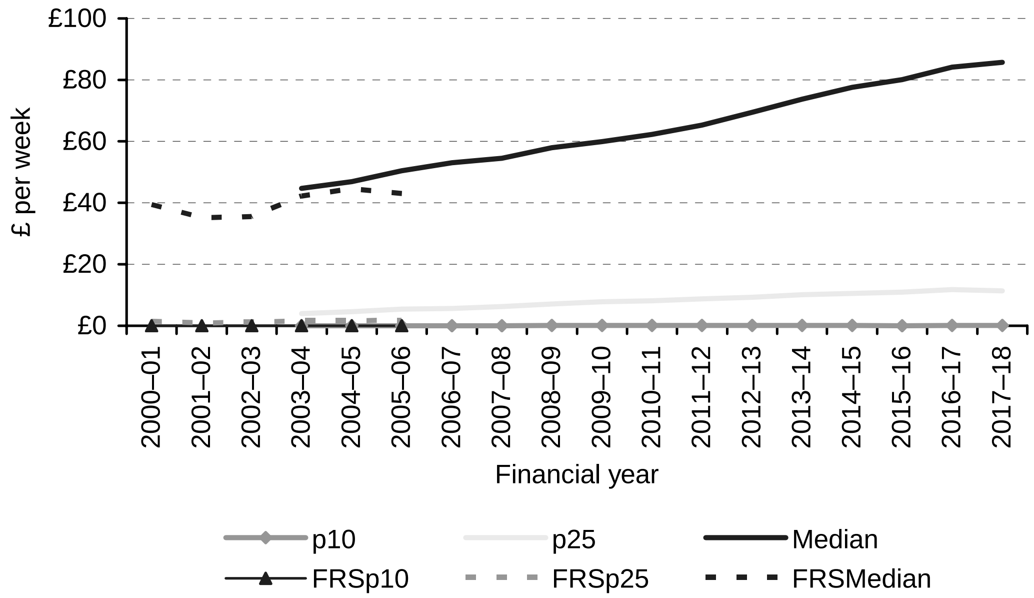
Table 3.2. Average annual private income growth at different points in the income scale, 2003–04 to 2017–18

	Mean	**10th**	**25th**	**50th**	**75th**	**90th**
Average annual growth 2003–04 to 2017–18	2.4%	5.1%	7.9%	4.8%	3.5%	2.6%
Memo: Average annual growth 2000–01 to 2005–06 (FRS)	0.9%	n/a	3.7%	1.8%	1.7%	1.5%
Memo: Average level 2005–06 (simulated population)	£130.45	£0.04	£5.44	£50.37	£159.95	£322.30
Memo: Average level 2005–06 (FRS)	£132.10	£0.00	£1.81	£43.01	£157.27	£360.86

Notes: All in 2007–08 real terms. Growth in 10th percentile in the FRS is not available as private income was £0 in 2000–01.
Source: Authors' calculations based on FRS (the English population aged 65 or over) and simulated ELSA sample.

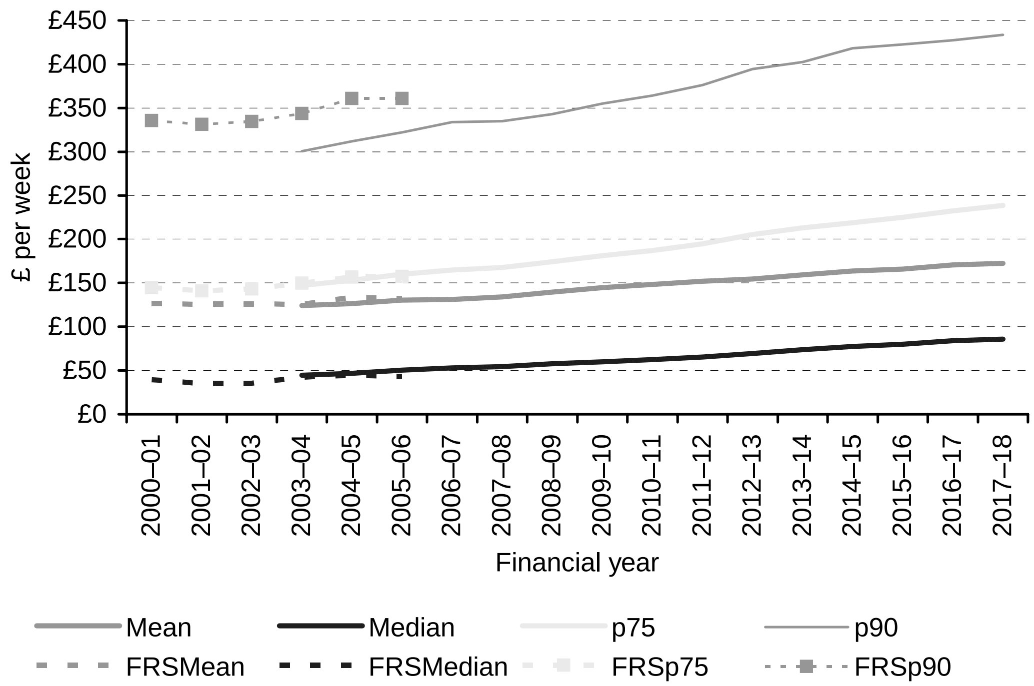
22 See Section 3.3.2 for discussion of how our poverty projections would change under a 'low employment' scenario, where employment rates among those aged 65 and over grow more slowly over time. Note that we still project substantial increases in employment income under this scenario, as new cohorts are higher earners than older ones.

Figure 3.8a. The bottom half of the distribution of individual private income



Note: All in 2007–08 real terms.
Source: Authors' calculations based on FRS (the English population aged 65 or over) and simulated ELSA sample.

Figure 3.8b. The top half of the distribution of individual private income



Note: All in 2007–08 real terms.
Source: Authors' calculations based on FRS (the English population aged 65 or over) and simulated ELSA sample.

distribution. For comparison, we also show the changes between 2000–01 and 2005–06 derived from an equivalent sample from the FRS.

The simulated growth in mean and median income over the years to 2017–18 has already been shown above (in Figure 3.1), but Figure 3.8a makes clear that this growth is not reflected at the very bottom of the income distribution: we project that the bottom 10 per cent of the population (labelled as p10 on the graph) will continue to have near-zero private incomes in each year up to 2017–18. Slightly higher up the distribution, however, we project significant real income growth, with annual average real income growth at the 25th percentile projected to be an extremely rapid 7.4 per cent per year, rising from £3.92 to £11.37 a week. Indeed, as shown in Table 3.2, the real income growth at the lower and middle parts of the private income distribution is simulated to be faster than that at the top (e.g. at the 75th and 90th percentiles of the distribution, shown in Figure 3.8b). This means that simple measures of inequality are projected to fall over time.

Figures 3.8a and 3.8b also compare our simulated growth of private incomes with historical growth since 2000–01 based on the FRS. In the years for which we have estimates from both surveys, the FRS has higher incomes at the very top of the distribution, but lower incomes elsewhere, than our simulated ELSA sample. This is also shown by Table 3.3, which shows the proportion of each decile of the 65-and-over income distribution eligible for means-tested benefits – the FRS has more people eligible for means-tested benefits at the bottom of the income distribution than ELSA but fewer at the top, indicating that the FRS has lower private incomes at the bottom of the distribution but higher ones at the top. In addition, the growth in simulated incomes is higher than that historically experienced over the past five years.

Table 3.3. Percentage of those aged 65 and over eligible for means-tested benefits in ELSA and FRS

	2003–04		2004–05		2005–06	
	FRS	**ELSA**	**FRS**	**ELSA**	**FRS**	**ELSA**
Poorest	87	78	99	99	99	99
Decile 2	85	77	97	96	96	97
Decile 3	76	72	92	90	87	89
Decile 4	71	63	78	72	77	74
Decile 5	58	45	65	61	65	58
Decile 6	51	46	58	50	54	48
Decile 7	44	34	48	46	47	45
Decile 8	37	25	48	35	43	36
Decile 9	29	16	34	19	20	19
Richest	3	14	2	14	2	13
Overall	54	47	62	59	59	59
Singles	66	58	74	70	70	69
Couples	40	34	47	45	44	44

Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

3.2 Living standards

This section describes how our simulations of pensioner living standards will change between 2003–04 and 2017–18, using net family equivalised income as our measure of living standards (this is the measure that forms the basis of our projections for the path of pensioner poverty over time, discussed in Section 3.3). Further details of how net family equivalised income is defined are contained in Box 3.2.

Box 3.2. Net family equivalised income

This includes private sources of income and income from state benefits and tax credits. It is measured net of direct taxes including council tax, income tax and National Insurance contributions (the latter only paid by those below the SPA).

It is a measure of family income, and therefore includes the income of any partner or spouse. It has also been equivalised using the modified OECD equivalence scale to take into account the fact that single individuals typically require a smaller income than couples in order to attain the same standard of living. Unlike the measure of income in HBAI, it does not include income from household members other than the partner or spouse.

As with all our simulations, it is presented for individuals aged 65 and over in England.

Box 3.3. White Paper reforms to state pensions and the pension credit

The most relevant part of the Pensions White Paper (Department for Work and Pensions, 2006a) are the proposed reforms to the basic state pension, S2P and pension credit. These are as follows:

Basic state pension

- The level of the BSP will be linked to earnings growth, rather than growth in prices, in April 2012, subject to affordability, and by April 2015 at the latest.
- The number of years' accrual required to receive a full BSP will be reduced to 30 years for those reaching the SPA from April 2010 onwards.

State Second Pension

- The maximum level of earnings on which S2P can be accrued will be frozen in nominal terms from 2012.

Pension credit

- The government's aspiration to increase the guarantee credit by continuing earnings indexation beyond 2007–08 was formalised.
- The maximum savings credit award payable from April 2008 onwards will be reduced.

These changes are explained in more detail in Chapter 4.

Box 3.4. Simulating net income with incomplete take-up of means-tested benefits and tax credits

We simulate the net incomes of pensioners using the IFS tax and benefit microsimulation model, TAXBEN. TAXBEN calculates each family's tax liability and entitlement to tax credits and means-tested benefits. Not all families receive the means-tested benefits and tax credits to which they are entitled. We take account of this by removing means-tested benefits (pension credit, housing benefit and council tax benefit for the group aged 65 and over) and tax credits from some pensioner benefit units chosen at random. The proportion of benefit units we do this for is equal to official (expenditure) take-up rates estimated by the Department for Work and Pensions (2006c) for means-tested benefits and by HM Revenue and Customs (2006) for tax credits; this should ensure that the correct amount is being received and that the cost of increasing means-tested benefit and tax credit rates is being modelled correctly.

Given that non-take-up is in reality correlated to the level of entitlement, this process may underestimate income for families with high entitlements to means-tested benefits and tax credits and overestimate income for families with low entitlements.

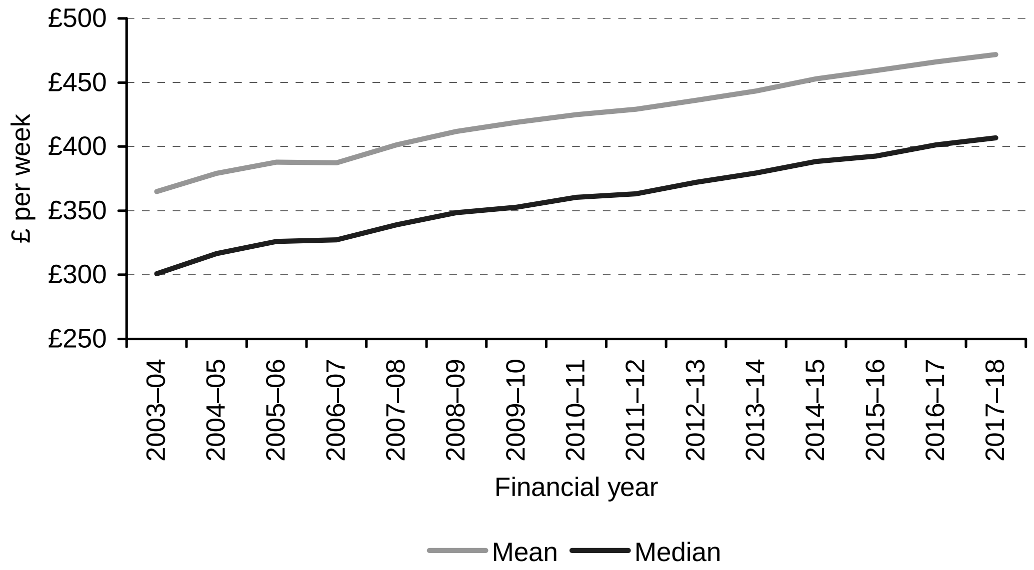
See Section 2.5 for more detail.

In order to simulate net incomes in the future, we start with our simulations of individual private incomes, described in Section 3.1. But we also need to take a position on what we think the tax and benefit system will be in the future, and how many people take up the benefits to which they are entitled. In this chapter, we show the evolution of the net income distribution under the assumption that the Pensions White Paper (Department for Work and Pensions, 2006a) is implemented (see Box 3.3 and Chapter 4), including that the basic state pension is indexed to average earnings from April 2012 onwards, and that there is incomplete take-up of benefits and tax credits (as described in Box 3.4).

Figure 3.9 shows mean and median net family income over the 15 years of our simulation. As with private incomes, these are projected to increase fairly steadily up to 2017–18. Mean net family income is projected to rise from £365 in 2003–04 to £472 in 2017–18 (in constant 2007–08 pounds), while the median is projected to increase from £301 to £407 over the same period.

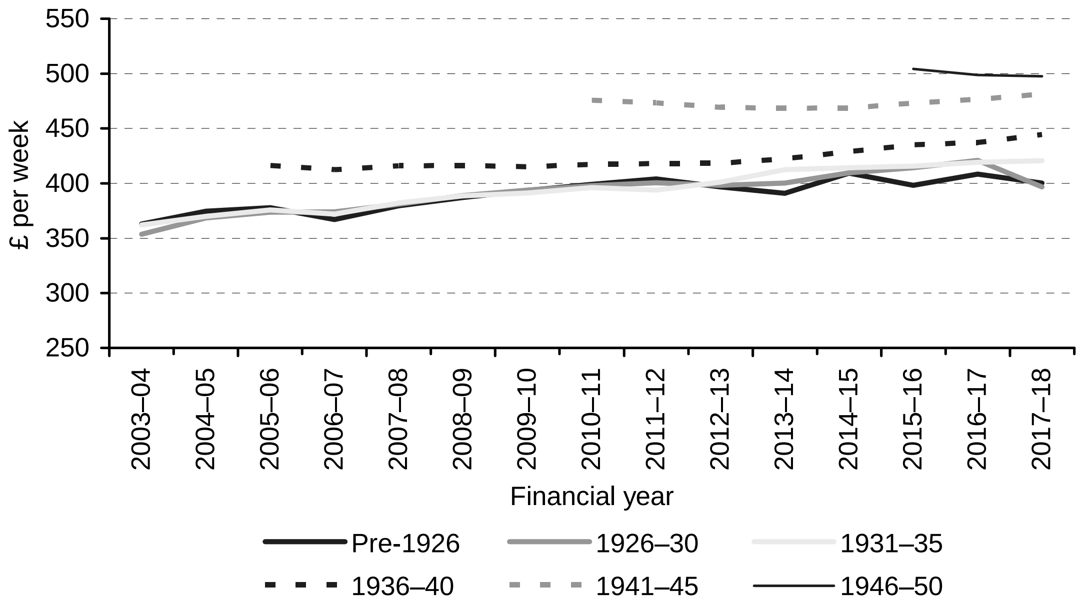
As was the case with individual private incomes, much of this income growth can be attributed to a very strong cohort effect, as shown in Figure 3.10. Just as with private incomes, we can see the cohorts reaching age 65 having successively higher incomes, which in turn drives increases in living standards over time for those aged 65 and over. While those born before 1935 all show similar paths for mean net income over time, our projections suggest that subsequent cohorts will reach 65 considerably better off than the cohorts that preceded them. In particular, those born between 1941 and 1945 are simulated to have substantially higher net incomes than those cohorts born before them. We expect a further substantial increase again among the 'baby-boomer' cohort born in the five years immediately after the end of the Second World War.

Figure 3.9. Simulated net family income



Note: In 2007–08 real terms.
Source: Authors' calculations based on simulated ELSA data.

Figure 3.10. Mean net family income, by birth cohort



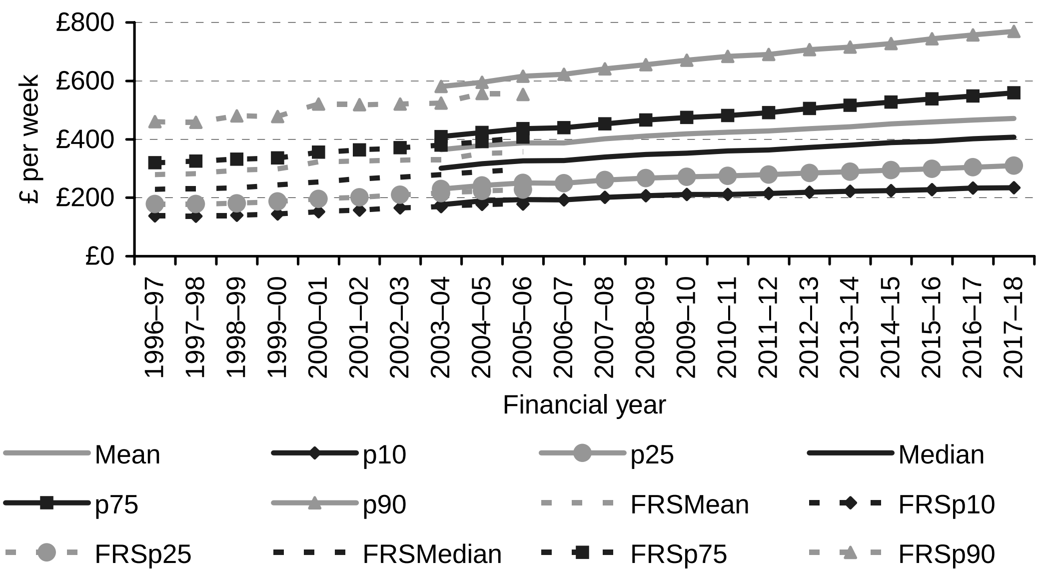
Note: In 2007–08 real terms.
Source: Authors' calculations based on simulated ELSA data.

For a more detailed picture of the evolving income distribution, Figure 3.11 shows simulated net income paths at the 10th, 25th, 75th and 90th percentile points, as well as the mean and median. Because our simulation period (2003–04 to 2017–18) overlaps with several years for which we have actual (i.e. non-simulated) data on the incomes of those aged 65 and over from the FRS/HBAI data-sets, we can compare our simulated income paths with actual income growth in the recent past. Figure 3.11 does this by showing the path of the same income points between 1996–97 and 2005–06, based on data from the FRS, in addition to our ELSA-based simulations from 2003–04 to 2017–18. The average changes in incomes over time are also provided in Table 3.4.

Figure 3.11 shows that net incomes are projected to rise at a somewhat slower rate than seen in the recent past. Going forward, Table 3.4 shows that the value of these incomes is projected to grow at a remarkably similar rate across most of the distribution, at around 2 per cent real income growth on average each year.

This pattern of change, taken alone, implies reasonable stability in the degree of income inequality among the bulk of the population aged 65 and over. This can be seen from the measures of income inequality shown in Table 3.5 for years between 2003–04 and 2017–18. For example, the 90/10 ratio – one commonly used measure of the gap between the rich and the poor – remains fairly even at a value of around 3.2 to 3.3, whilst the 50/10 and 90/50 ratios are projected to remain at around 1.7 and 1.9 respectively throughout the period.

Figure 3.11. The distribution of net family income



Notes: In 2007–08 real terms. The FRS income measure is constructed to be as similar as possible to that used for our ELSA-based simulations, i.e. net family equivalised income for the English population aged 65 or over.
Source: Authors' calculations based on simulated ELSA data.

Table 3.4. Average annual net family income growth at different points of the income scale

Average annual growth	Mean	10th	25th	50th	75th	90th
Actual, 1996–97 to 2005–06 (FRS)	2.8%	2.8%	2.8%	2.9%	2.7%	2.1%
Simulated, 2003–04 to 2017–18	1.9%	2.1%	2.1%	2.2%	2.3%	2.0%

Notes: In 2007–08 real terms. The FRS income measure is constructed to be as similar as possible to that used for our ELSA-based simulations, i.e. net family equivalised income for the English population aged 65 or over.
Source: Authors' calculations based on simulated ELSA data.

Table 3.5. Measures of income inequality

	90/10 ratio	50/10 ratio	90/50 ratio	Gini coefficient
2003–04	3.29	1.71	1.93	0.303
2007–08	3.19	1.69	1.89	0.280
2012–13	3.23	1.70	1.90	0.273
2017–18	3.28	1.74	1.89	0.270

Source: Authors' calculations based on simulated ELSA data.

In contrast, the value of the Gini coefficient – a measure of inequality that takes into account all points in the income distribution, including the very bottom and the very top of the income scale – shows quite a sharply falling trend over the period between 2003–04 and 2017–18. However, it is important not to place too much weight on this apparent 'finding', as our modelling methods are less well suited to measuring income levels at the very top of the income distribution or to projecting changes in these highest incomes. This is because individuals at the very top (and very bottom) of the income distribution are subject to a high degree of sampling error in virtually all surveys, ELSA included. Moreover, even with an adequate sample, it is far from clear what assumptions one should make about growth in the gross incomes of this diverse group.

3.3 Pensioner poverty projections

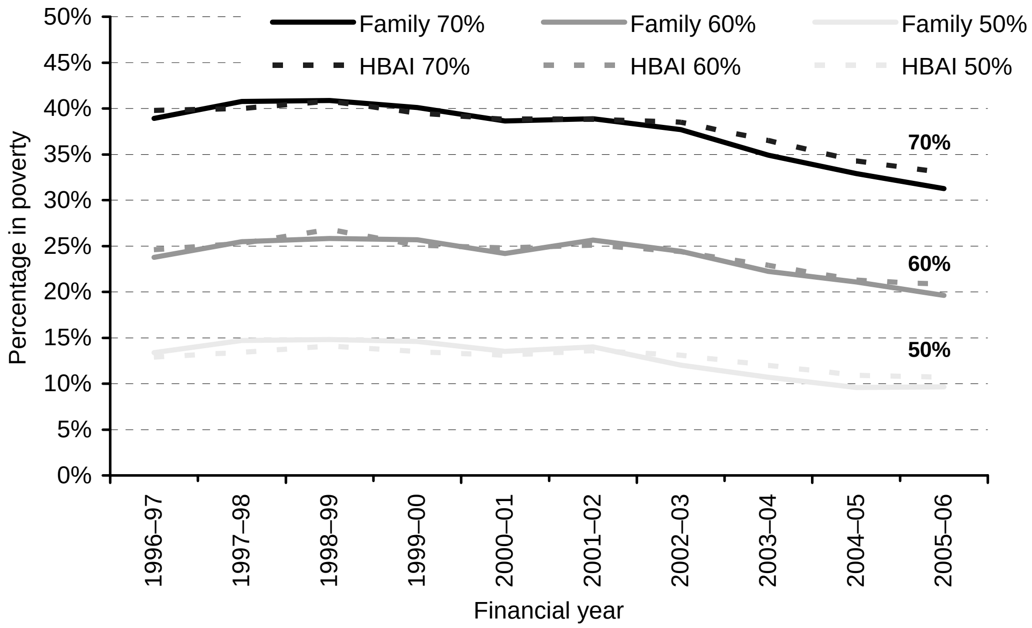
Our simulations of the changes in the net income distribution, shown above, allow us to make projections about the rate of poverty amongst those aged 65 and over. Details of the income poverty definition used in this report are contained in Box 3.5.

Box 3.5. Measuring income poverty

Individuals are classified as being in income poverty if they live in families whose net equivalised family income falls below a certain poverty threshold. The poverty threshold for our simulated ELSA population has been calibrated so that, in 2005–06, the proportion of individuals aged 65 or over in England in poverty in our simulated population derived from the ELSA survey is identical to that in a comparable sample from the official HBAI data-set. For example, in the official HBAI data-set, 19.6 per cent of individuals aged 65 and over in England have family incomes below 60 per cent of median family income. This compares with the official HBAI UK pensioner poverty rate (which includes all pensioners and takes household rather than family income) of 20.8 per cent (before housing costs).

Our calibrated poverty threshold is then increased by 1.8 per cent per year in real terms in each year after 2005–06 (see Section 2.6 for more detail). As with all our simulations, our simulated poverty rates apply to individuals aged 65 and over in England.

Figure 3.12. Comparing our poverty measure with official HBAI statistics at 50%, 60% and 70% median poverty thresholds



Notes: The 'family' series show poverty rates calculated using the Family Resources Survey, based on this report's family income measure. The HBAI series show official poverty statistics, also calculated using the Family Resources Survey, but based on a household income measure.
Sources: HBAI statistics from Department for Work and Pensions (2007); authors' calculations using Family Resources Survey.

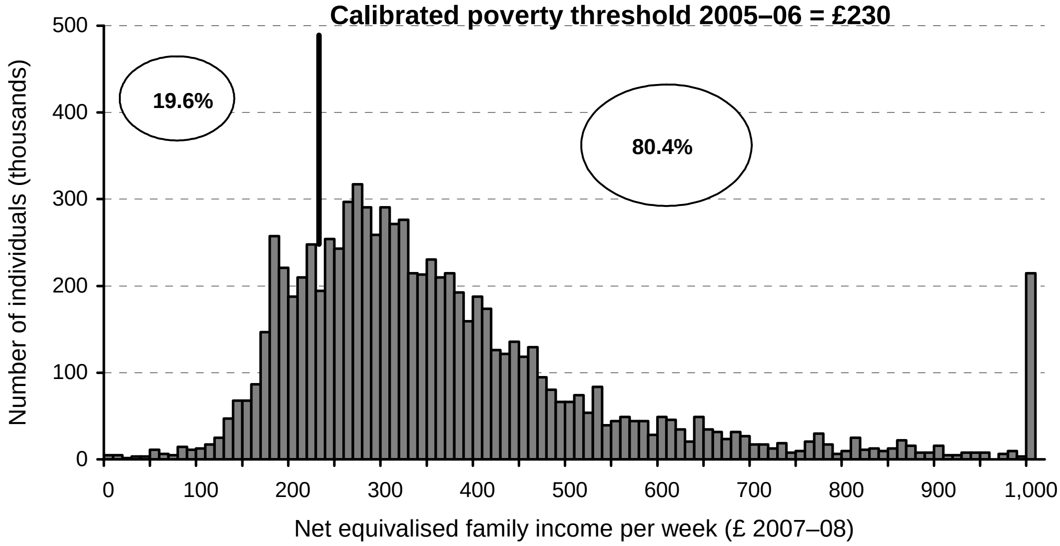
As noted in Box 3.5, our poverty measure differs somewhat from the measure of pensioner poverty reported in DWP's HBAI statistics. Figure 3.12 shows how our poverty measure (for family income in England) compares with the official HBAI rates of pensioner poverty (based on household income for the UK as a whole).

The two measures follow broadly similar patterns over time, although in more recent years the poverty rate amongst those aged 65 and over in England using family income (the focus of this study) has been slightly below the official UK pensioner poverty rate, particularly when using the higher (70 per cent of median income) poverty threshold. The difference between the two measures has never exceeded 2 percentage points for any of the poverty thresholds shown in Figure 3.12.

3.3.1 Our main simulation of pensioner poverty

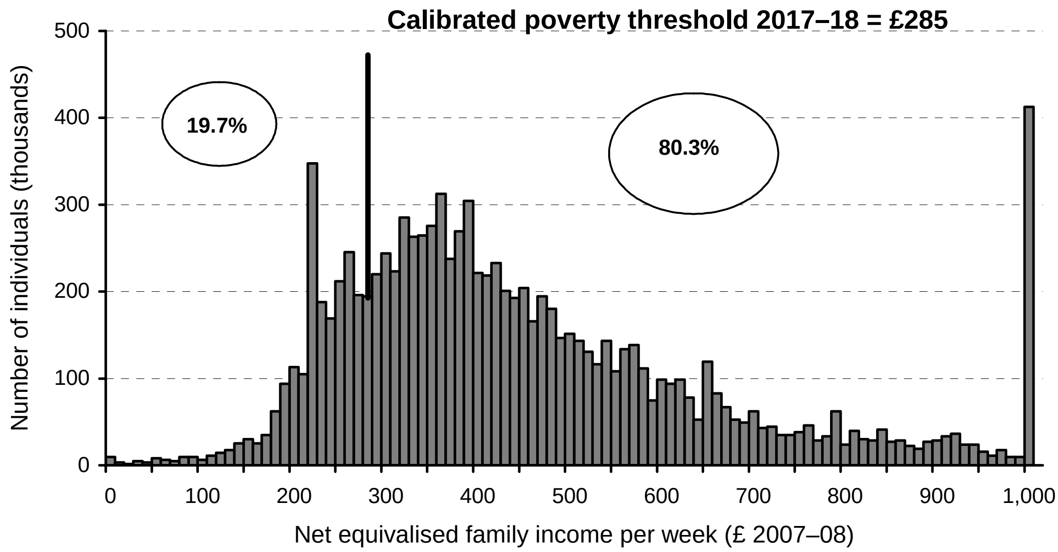
Figures 3.13a and 3.13b show the full distribution of net income in 2005–06 (the latest year for which 'actual' poverty rates based on FRS data are known) and in 2017–18. They show the number of individuals falling into £10 bands of net family equivalised income, as well as the position of the main poverty threshold used in our simulations. In 2005–06, this threshold is around £230 per week in 2007–08 prices, a value chosen so that 19.6 per cent of the simulated population of those aged 65 and over have incomes below this threshold. By 2017–18, we project that the incomes of those aged 65 and over will have grown, but so too will the

Figure 3.13a. The simulated income distribution among those aged 65 and over in 2005–06



Notes: Incomes have been measured before housing costs have been deducted. The right-most bar represents incomes of over £1,000. The calibrated poverty threshold has been set in 2005–06 so that the proportion of our simulated sample of individuals in ELSA aged 65 or over in England in poverty is equal to the proportion of a comparable sample drawn from the official HBAI data-set who have incomes below 60 per cent of the population median (see Section 2.6 for more details).
Source: Authors' calculations based on simulated ELSA data.

Figure 3.13b. The simulated income distribution among those aged 65 and over in 2017–18



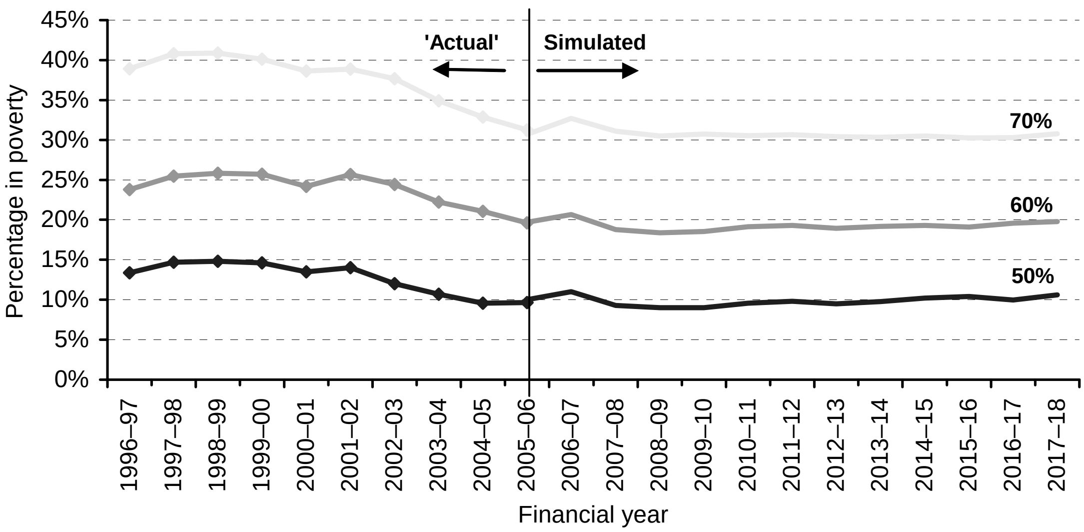
Notes: As Figure 3.13a. Simulations are based on 'White Paper policies'. Poverty threshold is increased from its 2005–06 level by 1.8 per cent per year in real terms.
Source: Authors' calculations based on simulated ELSA data.

poverty threshold: under our central scenario where median income across the whole population grows by an average of 1.8 per cent in real terms a year, we would expect the poverty threshold to have risen to £285 by 2017–18 in 2007–08 prices. Our baseline simulation is that relative poverty will rise fractionally over this period, with 19.7 per cent of the population aged 65 and over simulated to have incomes below this threshold in 2017–18.[23]

Figure 3.14 shows our simulated path for pensioner poverty in full, as well as estimates of the relative poverty rates of the English population aged 65 and over between 1996–97 and 2005–06, based on data from the official HBAI data-set.[24]

There has been a decline in the proportion of those aged 65 and over below each of the poverty lines shown here, particularly since 2001–02. Our simulations effectively start after 2005–06, from when we assume that the poverty line will grow by 1.8 per cent in real terms in each year. Our simulations show that under this 'central' median income growth assumption, pensioner poverty will stop falling in around 2008–09, so that by 2017–18 the proportion of those aged 65 and over with incomes below 60 per cent of the median will be roughly the same as it was in 2005–06.

Figure 3.14. Simulations of poverty rate among those aged 65 and over (under White Paper reforms) for 50%, 60% and 70% median poverty thresholds

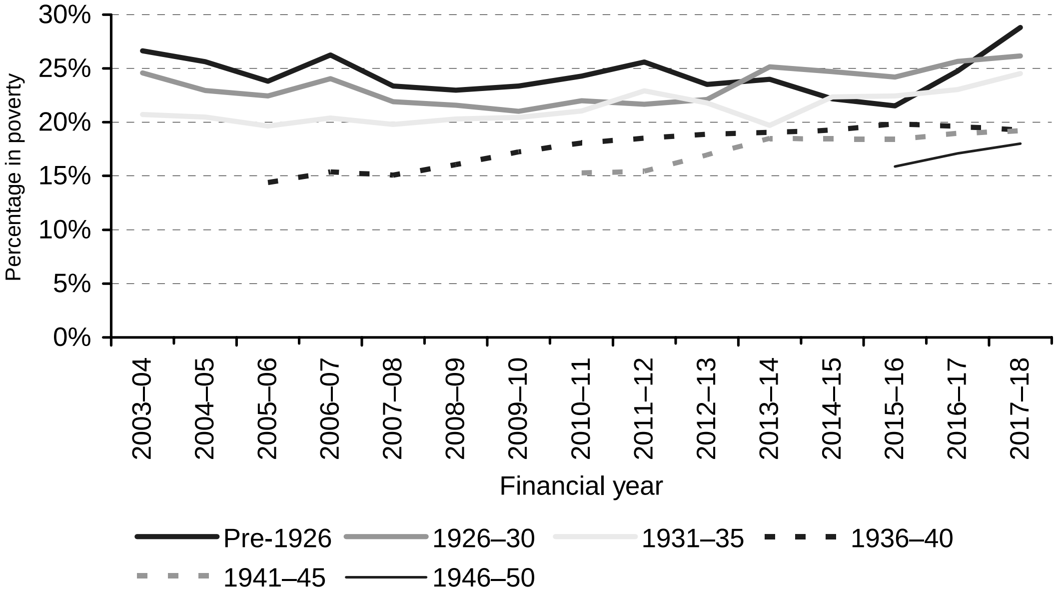


Notes: Simulations are based on 'White Paper policies'. The 60 per cent poverty threshold has been calibrated in 2005–06 so that the proportion of our simulated sample of individuals in ELSA aged 65 or over in England in poverty is equal to the proportion of a comparable sample drawn from the official HBAI data-set who have incomes below 60 per cent of the population median (see Section 2.6 for more details). The 50 and 70 per cent thresholds have been calculated by scaling this 60 per cent poverty threshold. All thresholds are then increased by 1.8 per cent in real terms in successive years.
Source: Authors' calculations based on simulated ELSA data.

[23] The number of individuals aged 65 or over is forecast to rise between 2005–06 and 2017–18, and so the number of pensioners in relative poverty will rise even if the rate stays the same (or even falls slightly).

[24] The official series for pensioner poverty – which is based on individuals aged 60 or over in the UK and which is not shown here – has a very similar level in every year to our series for the poverty rate among individuals aged 65 or over in England.

Figure 3.15. Simulated poverty rate (60% median), by birth cohort



Notes: See Figure 3.14.
Source: Authors' calculations based on simulated ELSA data.

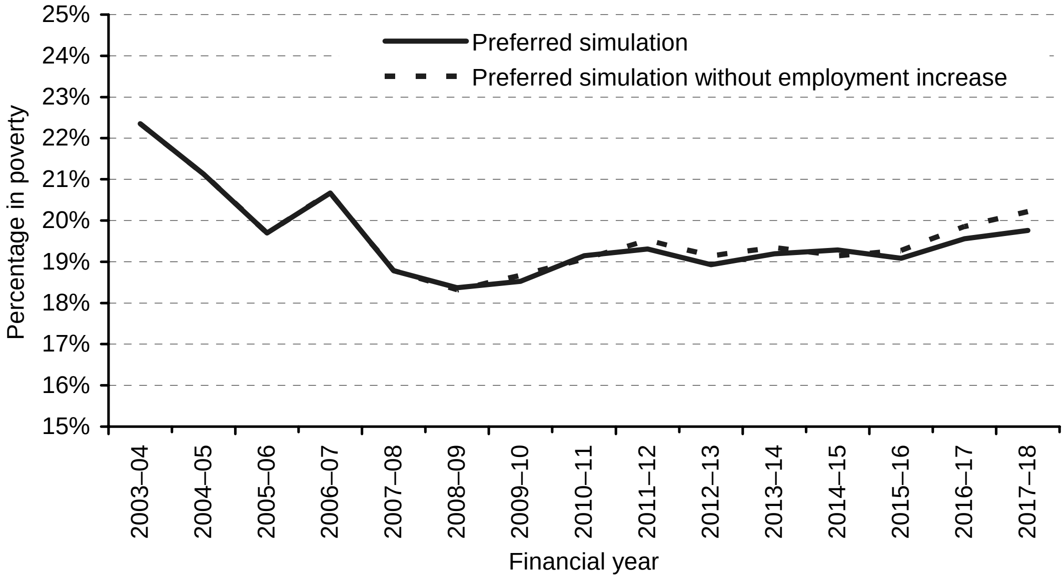
Section 3.1 showed that much of the simulated growth in (average) private income was due to cohort effects and Section 3.2 confirmed this for the simulated growth in (average) net equivalised income. Figure 3.15 is an equivalent analysis of the relative poverty rate, showing how this varies by birth cohort. It clearly shows that younger cohorts are simulated to be at less risk of relative poverty than older ones, with a clear distinction between cohorts born from 1936 onwards and those born earlier. However, these falling poverty rates between successive cohorts are offset by generally rising poverty rates *within* cohorts over time, although much of the rise occurs in the first few years after retirement and will correspond to a decline in earned income, something that becomes more important for each successive cohort.

3.3.2 Alternative simulations for pensioner poverty

This section presents a number of alternative simulations of pensioner poverty. (Appendix B shows how alternative measures of pensioner poverty – an absolute poverty measure, poverty defined using incomes measured after housing costs, poverty defined using incomes excluding disability benefits – are simulated to change over time and with the introduction of the Pensions White Paper.)

Our demographic simulation forecasts an increase in the employment of older people, in particular among women aged between 60 and 65. Figure 3.16 shows that the simulated path of pensioner poverty would be very slightly higher if there were lower employment growth than implied by our central model. (As explained in Chapter 2, our model allows employment rates among those aged 65 and over to continue growing at a similar rate to the rise over the last 15 years, but our 'low employment growth' model maintains a steady rate of employment over time.)

Figure 3.16. Alternative projections for the poverty rate among those aged 65 and over (60% median) under low-employment variant



Notes: See Figure 3.14.
Source: Authors' calculations based on simulated ELSA data.

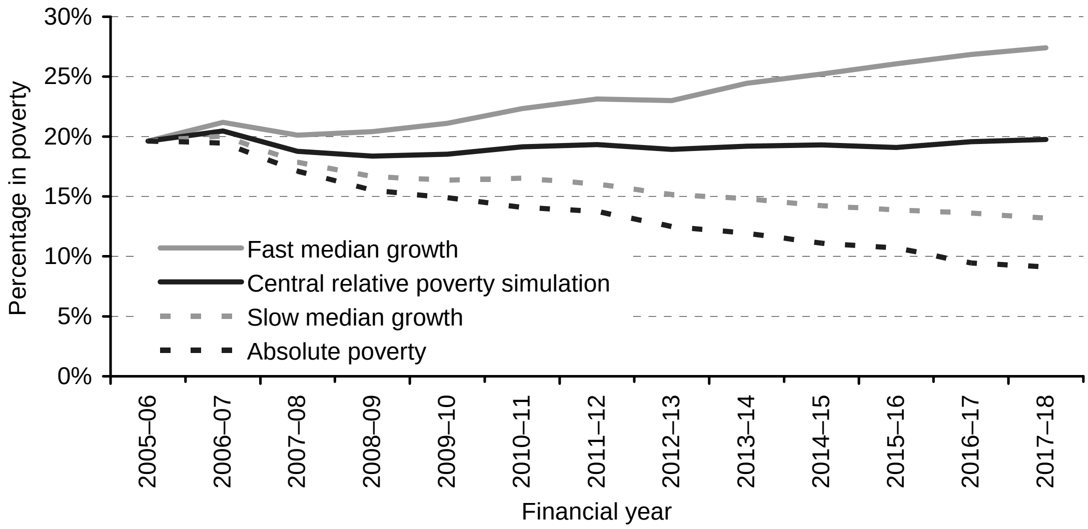
How sensitive are these projections to the exact choice of poverty line?

Figure 3.17 shows that the projected path of pensioner poverty is very sensitive to our assumption about how fast median income will grow over time. If the median income across the population were to grow faster than the 1.8 per cent real growth we have assumed, and holding all other things equal, we project that pensioner poverty would rise over time.[25] This is because the poverty line would be rising faster than our simulations for the growth in pensioner incomes. Figure 3.17 provides an example where the median income rises by 2.8 per cent in real terms each year. If this were the case, then we would project the rate of pensioner poverty to rise from its lowest point at around 19.6 per cent in 2005–06, to around 27.4 per cent by 2017–18. If instead the median income continues to grow more slowly than our central assumption of 1.8 per cent, as it has done in recent years, then pensioner poverty could continue to fall. Under the scenario that the median income rises by 0.8 per cent in real terms each year from 2005–06 onwards, we would see pensioner poverty falling from 19.6 per cent in 2005–06 to 13.2 per cent in 2017–18.

Figure 3.17 also shows that the rate of absolute poverty (using 2005–06 as the base year) – equivalent to a relative poverty measure where there was zero real rise in the poverty line each year – is set to fall substantially. By 2017–18, our projections suggest that just 9.1 per cent of the population aged 65 and over will have incomes below today's poverty line.

[25] Note that in all scenarios, earnings (and therefore various benefit levels that are linked to earnings growth) are assumed to grow by 2 per cent in real terms per year. This means that we probably overstate the sensitivity of pensioner poverty to growth in the median income; in practice, if the annual average real growth in median income is much higher than 1.8 per cent, then it is very likely that earnings growth would exceed 2 per cent (and equivalently for slower growth in median income).

Figure 3.17. Alternative projections for poverty rate among those aged 65 and over (60% median), with slow and fast median income growth



Notes: All projections are based on 'White Paper policy baseline'. The calibrated poverty threshold has been set in 2005–06 so that the proportion of our simulated sample of individuals in ELSA aged 65 or over in England in poverty is equal to the proportion of a comparable sample drawn from the official HBAI data-set who have incomes below 60 per cent of the population median (see Section 2.6 for more details). In the 'central' scenario, this threshold is increased by 1.8 per cent in real terms in successive years. 'Slow median growth' and 'fast median growth' scenarios assume 0.8 per cent and 2.8 per cent annual real growth in the poverty threshold respectively.
Source: Authors' calculations based on simulated ELSA data.

In Chapter 5, we focus just on our 'central' projected path for pensioner poverty, and set out how a number of reforms to taxes and benefits might affect the number of pensioners who are poor.

4. The Pensions White Paper

Summary

The Pensions White Paper (Department for Work and Pensions, 2006a) proposed a package of reforms to state pensions and means-tested benefits for pensioners, including reforms to the basic state pension, the State Second Pension and pension credit.

Basic state pension

Two major changes were proposed to the BSP in the White Paper:

- The level of the BSP will be formally linked to earnings growth, rather than growth in prices, in April 2012, subject to affordability, and by April 2015 at the latest.
- The number of years' accrual required to receive a full BSP will be reduced to 30 years for both men and women, for those reaching the SPA from April 2010 onwards.

State Second Pension

The White Paper proposed freezing in nominal terms the maximum level of earnings on which S2P can be accrued from 2012. This will have relatively little effect on the incomes of pensioners up to 2017–18, who are the subject of our pensioner poverty simulations.

Pension credit

There are two elements to the pension credit – the guarantee credit and the savings credit – which were the subject of different reforms announced in the White Paper:

- The government's aspiration to increase the guarantee credit by continuing earnings indexation from 2008–09 was formalised.
- Changes to the savings credit (SC), which will reduce the maximum SC award payable from April 2008 onwards, were also announced.

The Pensions White Paper (Department for Work and Pensions, 2006a) proposed a package of reforms to state pensions and means-tested benefits for pensioners which are due to be legislated on this year. This chapter explains the major changes proposed by the White Paper that will affect pensioner incomes up to 2017–18 and which we model in our simulations. In Chapter 5, we go on to show our simulations of what effect these, and some other possible policy reforms, are likely to have on pensioner poverty.

Whilst the Pensions White Paper – and a second White Paper (Department for Work and Pensions, 2006d) – also proposed significant changes to private pensions (most notably, the introduction of new personal accounts and the abolition of contracting-out for defined contribution pension schemes), these changes are likely to have little impact on those who have already retired or are relatively close to retirement, the age group that we are considering in this report. Therefore, we do not incorporate any potential impact of these changes on the future private pension incomes of this age group.

The White Paper proposed changes to the basic state pension, the State Second Pension and the main means-tested benefit for pensioners, the pension credit. In addition, it proposed increasing the SPA to 68 by 2046. This last change, however, will only affect individuals born after 5 April 1960 and so will not be discussed here.[26] Table 4.1 provides a summary of the major changes proposed by the White Paper that will affect pensioner incomes up to 2017–18.

Table 4.1. Summary of changes proposed by the 2006 Pensions White Paper

	Current situation	**White Paper proposal**
Basic state pension		
Formal annual uprating	Prices	Move to indexation with average earnings at some point between April 2012 and April 2015
Contributions required for full BSP	44 years (men) 39 years (women)	Reduced to 30 years for those reaching SPA from April 2010
Contributions required for any BSP	One-quarter of working life	Reduced to no minimum for those reaching SPA from April 2010
State Second Pension		
Annual accrual	Related to earnings until around 2056, flat-rate thereafter	Related to earnings until around 2030, flat-rate thereafter
Pension credit		
Annual uprating of guarantee credit (GC) level	Average earnings to April 2008 Aspiration to index in line with earnings from April 2008	Average earnings indefinitely
Maximum savings credit payable	Equal to 60 per cent of gap between BSP and GC level (which, if earnings grow faster than prices, would mean the savings credit growing faster than earnings each year)	Reduced in generosity from April 2008 onwards (lower threshold earnings-indexed from 2008–09 to 2014–15, maximum award frozen in real terms from 2015–16)

[26] Whilst younger partners of ELSA eligible individuals are also included in our analysis, less than 1 per cent of individuals interviewed in ELSA in 2002–03 had partners who were aged under 43.

4.1 Changes to the basic state pension

Two major changes were proposed to the BSP in the White Paper. First, it proposed formally linking the level of the BSP to earnings growth rather than growth in prices, as has been the case since the 1980 Social Security Act (although above-inflation increases were implemented in 1994, 2001 and 2002[27]). The value of the BSP has declined from a peak of 26.0 per cent of average earnings in 1979 to 15.5 per cent of average earnings in 2006.

Restoring earnings indexation will mean that the level of the BSP will keep pace with growth in average earnings and, as long as earnings grow faster than prices, the level of the BSP will increase in real terms. The exact date at which the earnings link will be restored was not firmly announced in the White Paper, however. The White Paper proposed that the link should be restored in April 2012, subject to affordability, and by April 2015 at the latest. Restoring it in 2012 would mean that the BSP would from this date be worth about 14.1 per cent of average earnings, whereas if the link were not restored until 2015 it would be worth about 13.3 per cent of average earnings. Section 5.1 considers the effect of restoring the earnings link in April 2012, while Section 5.2 shows how the effects on pensioner poverty would change if the link were restored earlier (in April 2008 or April 2010) or later (in April 2015).

The second major change proposed to the BSP is to reduce the number of years' accrual required to receive a full BSP. Currently, men require 44 years and women 39 years of contributions in order to receive a full BSP. For those reaching the SPA from April 2010 onwards, this will be reduced to 30 years for both men and women. This will have no direct effect on those who reach the SPA before April 2010 (although some could benefit from having a partner who reaches the SPA after this date) but it will increase BSP coverage amongst those reaching the SPA after this date. This is likely to have a much greater impact on women than on men, since most current working-age men are already expected to reach the SPA with full BSP entitlement.

4.2 Changes to the State Second Pension

Prior to the introduction of the State Second Pension (S2P), accrual of second-tier state pension entitlement (under SERPS, the predecessor to S2P) had been entirely related to earnings. The introduction of S2P changed this so that accrual was flat-rate up to a certain level of earnings (£10,800 in 2002–03) and earnings-related above this. The indexation of the various thresholds within S2P means that, under current policy, all accrual would become flat-rate in around 2056. The White Paper proposed accelerating this move to flat-rate accrual by freezing in nominal terms the maximum level of earnings on which S2P could be accrued from 2012. This will mean that S2P accrual will become flat-rate in around 2030. The change has been incorporated into our estimates of individuals' future entitlements to S2P. However, since the change will not come into effect until April 2012 (and the effect in the first few

[27] The April 1994 increase was related to the government's decision to introduce VAT on domestic fuel, while the April 2001 and April 2002 increases (which were larger than would have been implied by earnings indexation) appear to have been in response to the very low increase of 75p delivered in April 2000 as a result of retail price inflation of just 1.1 per cent.

years will be small), it will have relatively little effect on the incomes of pensioners up to 2017–18. The change will slightly reduce the second state pension income of higher earners who are still contracted into S2P.[28]

4.3 Changes to the pension credit

The pension credit was introduced in October 2003 (replacing the minimum income guarantee, MIG) as the main means-tested benefit for lower-income pensioners. The pension credit differs from the MIG because, rather than being withdrawn pound-for-pound against additional income above the full BSP (i.e. an effective withdrawal rate of 100 per cent), it is withdrawn at a rate of 40p in the pound. The government chooses to describe this benefit in terms of two elements: guarantee credit (GC) and savings credit (SC). GC tops income up to a specified minimum level, while SC gives additional income to those with small amounts of private income.

Since the introduction of the pension credit, the level of the GC has been increased in line with growth in average earnings and the maximum SC payable has been set to be equal to 60 per cent of the gap between the BSP and GC levels. Prior to the publication of the White Paper, the government had a firm commitment to continue earnings-indexing the GC until 2008. Beyond this date, there was no firm commitment, although the then Prime Minister Tony Blair stated in his Foreword to the 1998 Pensions Green Paper that 'Over the longer term our aim is that it [the MIG (i.e. the predecessor to the pension credit)] should rise in line with earnings so that all pensioners can share in the rising prosperity of the nation'.[29]

The White Paper formalised the government's aspiration to earnings-index the GC in the long term. In addition, the White Paper proposed changes to the savings credit to reduce the maximum SC award payable from April 2008 onwards. Specifically, the White Paper proposed indexing the SC in line with average earnings from 2008–09 to 2014–15, and from 2015–16 onwards freezing in real terms the maximum SC award. As a result, the pension credit will be withdrawn at a rate of 100 per cent on income between the level of a full BSP and the level of the SC threshold (under pre-2006-White-Paper indexation rules, these are exactly equal) – this is shown by region A in Figure 4.1. This proposed change will reduce the amount of SC income received by any individual who otherwise (under a policy of continuing the earnings indexation of the GC level and setting the SC threshold equal to the level of the BSP) would have qualified for some SC award. Figure 4.1 shows how these changes to the SC would change the post-pension-credit income of a single pensioner for given pre-pension-credit income in 2017–18.

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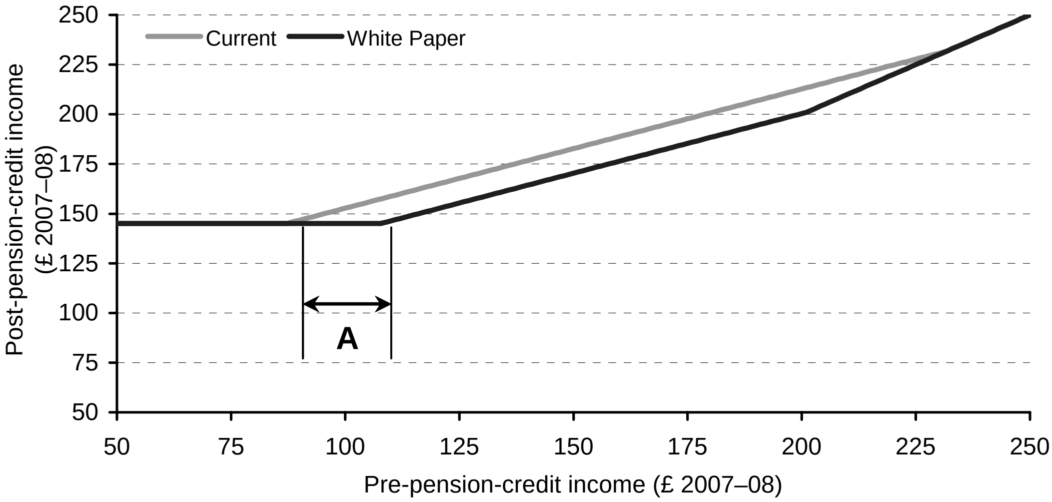
[28] A further simplification to the rules for S2P accrual was introduced in the Pensions Bill (2006–07) which was not included in the White Paper. The attractive feature of this change is that in any given year, all individuals with a particular level of earnings will accrue the same entitlement to S2P. This is in contrast to the current system of accrual, under which individuals of different ages accrue slightly different entitlements to S2P even if they have exactly the same earnings. We have not included this change in our modelling of S2P entitlements. However, for the age group we are considering here, this change will have little or no effect on their future S2P entitlements.

[29] Source: Page iii of Department of Social Security (1998).

Figure 4.1. Pension credit entitlement for a single pensioner in 2017–18 under the current system and under the White Paper proposals



Source: Authors' calculations.

These cuts to the SC are being proposed in combination with increases in the level of the BSP (see Section 4.1). However, the more generous BSP will not be sufficient to offset the cuts to SC for some individuals and so the combination of these policies could result in many recipients of the pension credit SC having lower income if the White Paper proposals are implemented in full than they would have under current policy (i.e. GC indexed to earnings and the SC threshold set equal to full BSP, which is indexed to prices).

For those individuals entitled to a full BSP, earnings indexation of the BSP from April 2012 means that their BSP income will be about £11 per week higher by 2017–18 (in 2007–08 prices). The maximum loss of SC income is about £17 per week by 2017–18 (in 2007–08 prices). This means that single individuals could lose up to around £6 of weekly income from the combination of these reforms. While those on the lowest incomes would not lose, those on relatively low incomes (about £60 to £100 per week of private income on top of a full BSP) who were taking up the pension credit would suffer the greatest loss of income. Higher-income pensioners who were not eligible for the pension credit, and those lower-income pensioners who were eligible for the pension credit but not taking it up, would not lose from the change.

There are therefore two basic elements to the pension credit policy set out in the White Paper. The first is the formalisation of the aspiration to continue earnings indexation of the GC beyond 2007–08; the second is the proposed cut to the SC. In the analysis in Chapter 5, we separate out the effects of continuing the earnings indexation of the GC beyond 2007–08, which could arguably be described simply as a continuation of pre-White-Paper policy (and hence referred to as 'pre-White-Paper policy with earnings indexation' in our policy simulations), and the remaining White Paper reforms.

5. The effects of policy reforms on pensioner poverty

Summary

- The White Paper reforms would raise the incomes of the poorest tenth of pensioners, but would make those in the second and third income deciles worse off, compared with a world where the pension credit guarantee continued to be earnings-uprated from 2008–09. The net effect of these gains and losses on pensioner poverty rates is very small.
- However, if the pension credit guarantee were not increased in line with earnings from 2008–09, and the measures in the White Paper were not introduced, pensioner poverty would rise significantly.
- Pensioner poverty would be reduced only slightly by bringing forward the date at which the basic state pension is uprated in line with earnings. For example, if the BSP were earnings-uprated from April 2010 rather than April 2012, this would result in just 60,000 fewer pensioners in poverty by 2017–18.
- Pensioner poverty could be reduced significantly if the BSP were made universal, but this would be expensive, costing £6.9 billion in today's terms. A lower-cost alternative (in the short term) would be to make the BSP universal just for those retiring after 2012–13. This would cost £1.9 billion a year in 2017–18, but would have a considerably smaller effect on pensioner poverty than the more expensive reform.
- Another option for increasing the generosity of BSP would be to raise it to the level of the pension credit guarantee. This could reduce pensioner poverty significantly, but would cost £8.3 billion a year in 2017–18. Making this more generous BSP universal would reduce pensioner poverty further but cost a further £11.7 billion.
- Compared with many of the policy reforms we have considered, improving the take-up of means-tested benefits could prove a more cost-effective way of reducing pensioner poverty, if it could be done easily and at little direct cost.
- Other reforms to council tax rates or pensioner tax allowances that we have modelled would have relatively little effect on poverty rates.

In this chapter, we simulate the effects of tax and benefit changes that were announced in the Pensions White Paper (Department for Work and Pensions, 2006a) on pensioner poverty and then discuss other possible changes to the tax and benefit system that could potentially affect the rate of pensioner poverty. It should be noted that the fact that various reforms are discussed here does not mean that the authors are recommending that they should be introduced.

5.1 The Pensions White Paper

The White Paper reforms, explained in Chapter 4, entail significant changes that could affect the rate of pensioner poverty over the next 10 years. Details of how net incomes and therefore poverty rates are measured under different tax and benefit systems are summarised in Box 5.1, with a more comprehensive discussion in Chapter 2. As we discussed in Chapter 4, it is open to interpretation whether the indexation of the pension credit guarantee from 2008–09 onwards simply marks a continuation of current policies or whether it represents a new policy reform. For this reason, we consider the effects of this element of the White Paper separately from the other policy reforms announced (Sections 5.1.1 and 5.1.2), before drawing together an assessment of the overall effects of the White Paper (Section 5.1.3).

Box 5.1. Simulating net income and relative poverty

We simulate the net incomes of pensioners using the IFS tax and benefit microsimulation model, TAXBEN. TAXBEN calculates each family's tax liability and entitlement to tax credits and means-tested benefits. Not all families receive the means-tested benefits and tax credits to which they are entitled. We take account of this by removing means-tested benefits (pension credit, housing benefit and council tax benefit for the group aged 65 and over) and tax credits from some pensioner benefit units chosen at random. The proportion of benefit units we do this for is equal to official (expenditure) take-up rates estimated by the Department for Work and Pensions (2006c) for means-tested benefits and by HM Revenue and Customs (2006) for tax credits; this should ensure that the correct amount is being received and that the cost of increasing means-tested benefit and tax credit rates is being modelled correctly.

Given that non-take-up is in reality correlated to the level of entitlement, this process may underestimate income for families with high entitlements to means-tested benefits and tax credits and overestimate income for families with low entitlements. See Section 2.5 for more detail.

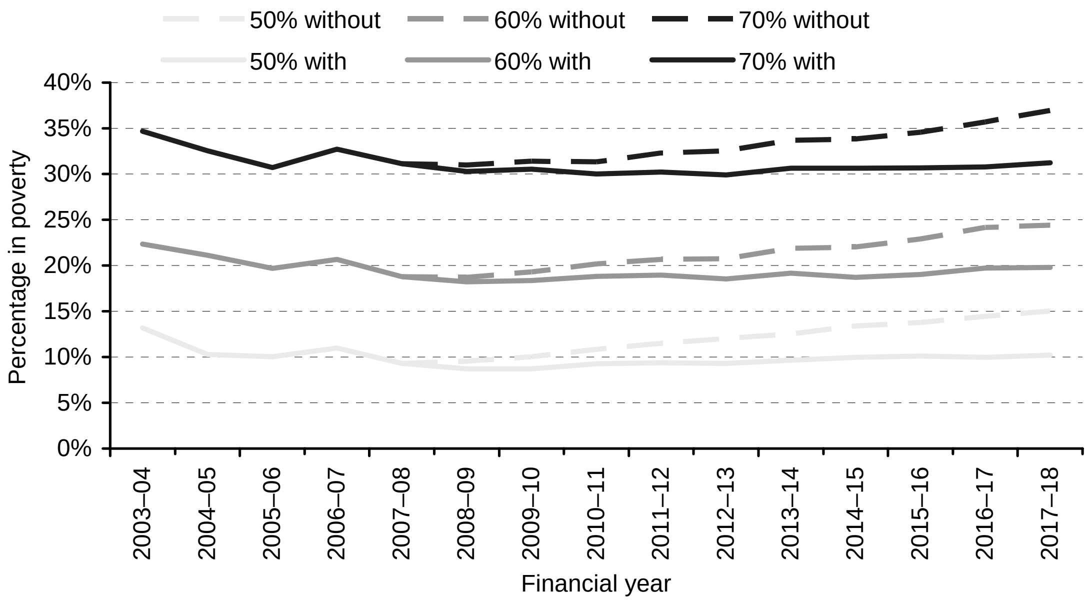
Individuals are classified as being in income poverty if they live in families whose net equivalised family income falls below a certain poverty threshold. The poverty threshold for our simulated ELSA population has been calibrated so that, in 2005–06, the proportion of individuals aged 65 or over in England in poverty in our simulated population derived from the ELSA survey is identical to that in a comparable sample from the official HBAI data-set. This calibrated poverty threshold is then increased by 1.8 per cent per year in real terms in each year after 2005–06 (see Section 2.6 for more detail). The estimates of the impact of the reforms on pensioner poverty do not take account of the fact that the reforms themselves might affect median income in the whole population, and thereby the poverty threshold. This effect will mean that the estimated impacts on relative poverty may slightly overstate the true impact (whether up or down).

As with all our simulations, our simulated poverty rates apply to individuals aged 65 and over in England, and references to 'pensioner poverty' should be understood to mean 'income poverty amongst individuals aged 65 or over in England'.

5.1.1 The effect of earnings indexation of the pension credit guarantee on pensioner poverty

The Pensions White Paper formalised the current government's aspiration that the guarantee credit would continue to be increased in line with earnings indefinitely (rather than just until 2007–08). Our simulations suggest that maintaining earnings indexation of the pension credit guarantee from 2008–09 means that the poorest pensioners are likely to continue to see their incomes increase at approximately the same rate as those of the working population. As shown in Figure 5.1 (and earlier in Chapter 3), this should lead to a relatively constant rate of relative poverty. By contrast, if earnings indexation ceased in 2007–08, relative rates of pensioner poverty would rise quite significantly from 2008–09 onwards (see Figure 5.1). The announced earnings indexation of the pension credit guarantee is therefore only just sufficient to keep rates of pensioner poverty relatively stable over time.

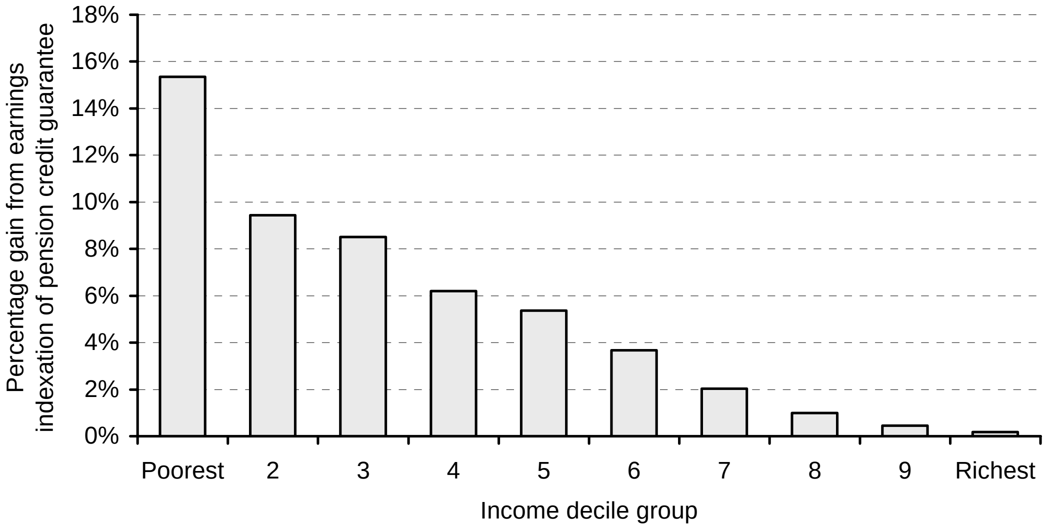
Figure 5.1. Relative poverty rates under pre-White-Paper policy, with and without earnings indexation of pension credit guarantee from 2008–09



Note: Poverty lines increase by 1.8 per cent per year in real terms from 2006–07.
Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

Figure 5.2 presents in more detail the distributional impact of earnings-indexing the pension credit guarantee from 2008–09, by splitting the population aged 65 and over into 10 equally-sized groups ranked by income, considering the effects on our simulated pensioner population in 2017–18. The poorest tenth (or decile) of the population benefit most from the earnings indexation of the pension credit guarantee, whereas richer deciles who are not eligible for this means-tested support do not gain from it. There are, however, some small gains towards the top of the income distribution. These are due to some families receiving disability benefits, which are disregarded for purposes of assessment against the pension credit and passport individuals onto a higher rate of pension credit, and due to some families with relatively high rents being eligible for housing benefit.

Figure 5.2. Distributional effect of earnings indexation of pension credit guarantee between 2008–09 and 2017–18



Note: Income decile groups are derived by dividing all benefit units containing someone aged 65 and over into 10 equal-sized groups according to income adjusted for family size using the modified OECD equivalence scale. Decile group 1 contains the poorest tenth of those aged 65 and over, decile group 2 the second poorest, and so on up to decile group 10, which contains the richest tenth.
Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

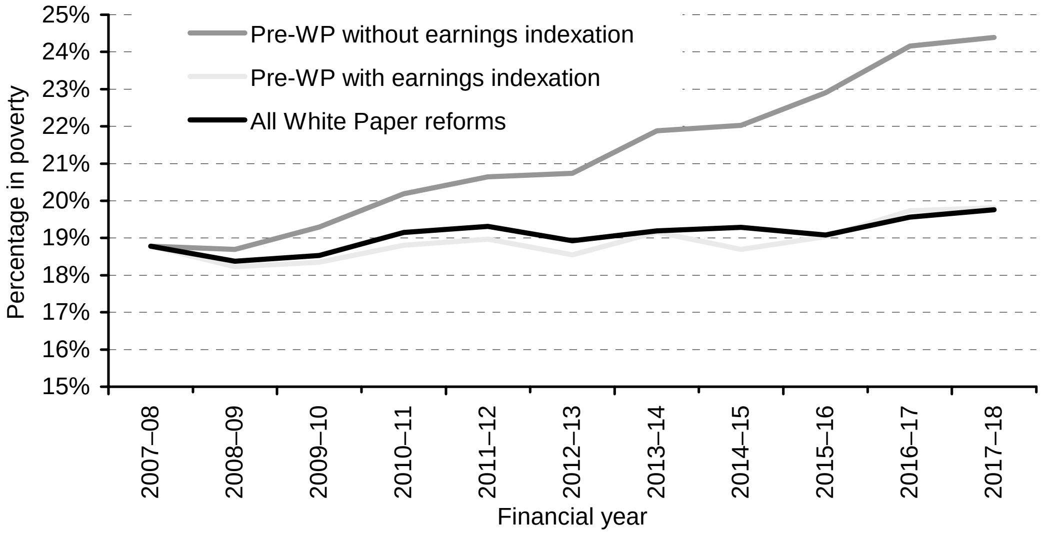
5.1.2 The effect of other elements of the Pensions White Paper on pensioner poverty

Further changes announced in the White Paper (see Chapter 4) include reducing the number of years of National Insurance contributions required for eligibility to the basic state pension, a gradual scaling-back of the savings credit, and the earnings indexation of the BSP from 2012–13. The effect of these on relative poverty is shown in Figure 5.3, which presents our simulated poverty rates in a world in which the White Paper is introduced in full, compared with both what we have termed 'Pre-WP without earnings indexation', in which none of the reforms announced in the White Paper is introduced, and what we have termed 'Pre-WP with earnings indexation', in which the only element of the White Paper enacted is the continuation of earnings indexation of the pension credit guarantee from 2008–09.

Figure 5.3 shows that these additional elements of the White Paper reforms taken together will initially imply a higher rate of pensioner poverty relative to the pre-White-Paper policy with earnings indexation of pension credit, primarily because of the reduced amounts of savings credit available to those with small private pensions or other savings income. These effects are reduced once the earnings indexation of the basic state pension starts in 2012–13. However, the magnitude of the projected changes in pensioner poverty as a result of these reforms is relatively small.

Another way of understanding how these reforms affect pensioner poverty is to focus on how they change the incomes of the very poorest pensioners, in absolute terms. Such analysis is

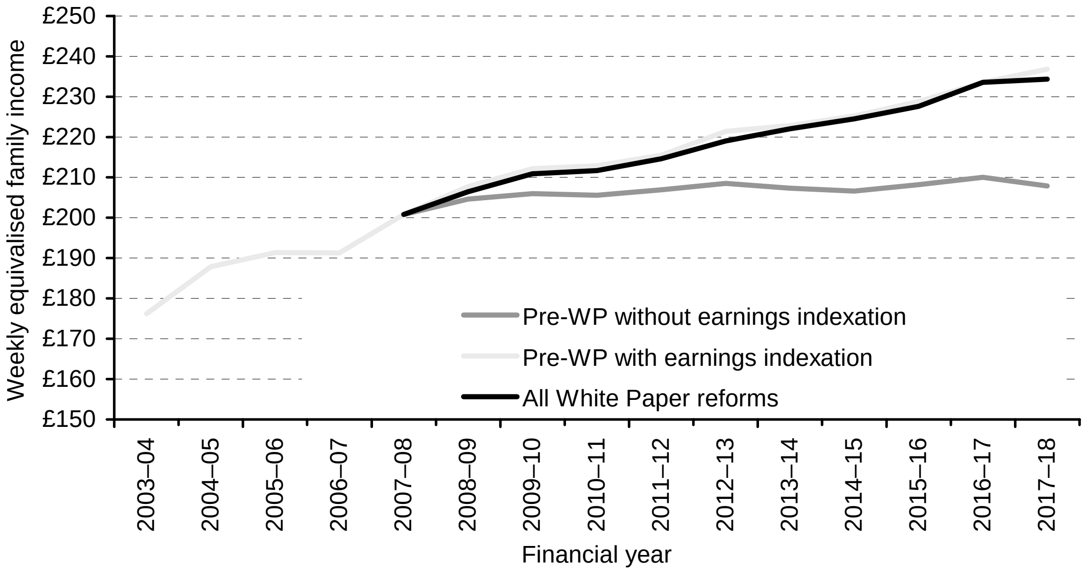
Figure 5.3. Proportion of those aged 65 and over with incomes of less than 60% of the median before and after the White Paper



Note: Poverty line increases by 1.8 per cent per year in real terms.
Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

useful because the findings are not sensitive to the exact position of the poverty line. Figure 5.4 shows the income of the 10th percentile of the income distribution of those aged 65 and over under pre- and post-White-Paper policies. It shows that the other White Paper reforms make the 10th percentile of the pensioner income distribution a little worse off in absolute terms (around £2.50 per week in 2017–18) compared with if only the indexation of the pension credit guarantee were enacted. However, compared with a world in which the

Figure 5.4. Incomes of the 10th percentile of those aged 65 and over under different baselines



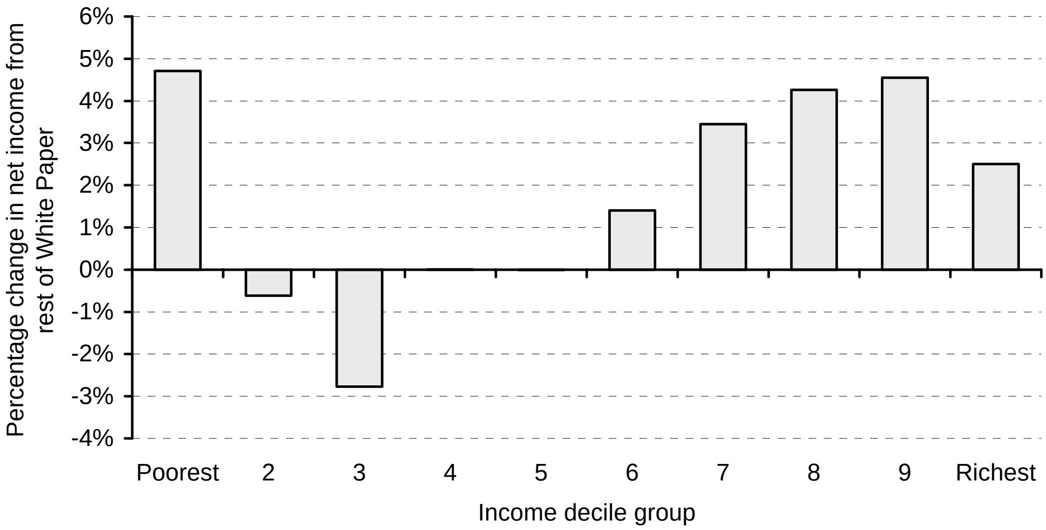
Note: Poverty line increases by 1.8 per cent per year in real terms from 2005–06.
Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

earnings indexation of the pension credit guarantee were not continued beyond 2007–08, the White Paper ensures that the poorest pensioners would be more than £25 a week better off. Note that while the bottom decile as a whole gains from the other elements of the White Paper, the 10th percentile does not – this is because the gainers are eligible non-recipients of means-tested benefits who are at the very bottom of the income distribution, who benefit from increased coverage and level of the BSP.

We can see the distributional effects of the additional parts of the White Paper reforms more closely in Figure 5.5, which splits our simulated population of individuals aged 65 or over in 2017–18 into 10 equally-sized groups ranked by income. It shows that these other White Paper reforms benefit the top and very bottom of the distribution but not the middle. The bottom decile tends to contain those who do not take up their means-tested benefit entitlement, and these people benefit from increases to the coverage and rate of the basic state pension. Those in deciles 2 and 3 tend to be recipients of the savings credit, and so lose out from the cuts to its generosity which are not fully compensated for by increases in the basic state pension (as illustrated in Figure 4.1). Such individuals will still be considerably better off than they would be without earnings indexation of the pension credit guarantee. Deciles 4 and 5 are broadly unaffected by other changes in the White Paper because any losses from cuts to the savings credit are roughly balanced out by gains from reforms to the basic state pension. Those in the top half of the income distribution tend to benefit from the changes: although some of this group may lose out as a result of reforms to S2P, these losses will be more than offset by increases to the BSP.

It is worth noting that if earnings indexation of the pension credit guarantee were to continue to 2017–18 without any of the other White Paper reforms, then an increasing proportion of pensioner families would become eligible for means-tested benefits. If the generosity of

Figure 5.5. Distributional effect of other White Paper reforms by 2017–18



Note: Income decile groups are derived by dividing all benefit units containing someone aged 65 and over into 10 equal-sized groups according to income adjusted for family size using the modified OECD equivalence scale. Decile group 1 contains the poorest tenth of those aged 65 and over, decile group 2 the second poorest, and so on up to decile group 10, which contains the richest tenth.

Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

Table 5.1. Effect of White Paper on percentage of benefit units containing someone aged 65 or over eligible for means-tested benefits

	2008–09		2010–11		2012–13		2015–16		2017–18	
	Pre-WP	Post-WP	Pre-WP	Post-WP	Pre-WP	Post-WP	Pre-WP	Post-WP	Pre-WP	Post-WP
Poorest	100	100	100	100	100	100	99	99	99	99
Decile 2	100	100	100	99	99	99	100	99	100	99
Decile 3	93	94	93	93	96	94	98	94	99	93
Decile 4	84	83	87	86	84	83	86	80	88	80
Decile 5	70	71	71	71	76	71	80	73	81	75
Decile 6	62	62	65	63	65	62	63	61	65	61
Decile 7	56	55	54	55	54	52	56	51	58	51
Decile 8	46	44	47	45	44	40	40	34	38	32
Decile 9	26	26	25	24	21	19	21	18	23	18
Richest	17	17	18	17	15	15	16	14	15	13
Overall	66	66	67	66	67	65	67	64	68	64
Singles	77	77	78	78	79	78	80	77	80	78
Couples	50	50	51	50	50	47	51	45	51	44

Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

means-tested benefits increased while the BSP remained constant in real terms, then an ever-higher level of private income would be necessary to escape means-testing. The approach adopted in the White Paper to correct this is to earnings-index the BSP and cut back on means-tested savings credit. Table 5.1 shows our simulations of the impact of these changes on the percentage of families in each decile of our simulated sample who would be eligible for means-tested benefits over time. It shows that the White Paper is moderately successful in its objective of reducing the proportion of those aged 65 and over subject to means-testing, with 4 percentage points fewer pensioner families entitled to means-tested benefits by 2017–18 than there would otherwise have been. This reduction occurs in the top eight deciles of the income distribution of those aged 65 and over.

5.1.3 The 'overall' effect of the Pensions White Paper on pensioner poverty

In addition to looking at the impact of the reforms on poverty, we also estimate the cost to the public finances. These estimates are presented as a percentage of national income in 2017–18 and also expressed in today's terms by multiplying this cost by an estimate of national income in 2007–08. We adopt this practice since estimates of the cost in cash terms in 2017–18 appear very expensive relative to current national income, because national income tends to increase over time.

Table 5.2 provides a summary of the effects of the different elements of the White Paper reforms on pensioner poverty in 2017–18, alongside estimates of the projected cost of such reforms. It is also important to note that the costs are for individuals aged 65 and over in England only. Costs for those aged 65 and over across the UK will be around 20 per cent

Table 5.2. Effect of White Paper on pensioner poverty in 2017–18

Policy	**Cost as a % of GDP / Equivalent in 2007–08**	**Percentage / Number of those aged 65 or over with less than: 50%**	**60%**	**70%**
		of contemporaneous median income		
Pre-WP without earnings indexation of pension credit guarantee	0% £0	15.0% 1.5m	24.4% 2.4m	36.9% 3.7m
Pre-WP with earnings indexation of pension credit guarantee	0.29% £4.0bn	10.2% 1.0m	19.8% 2.0m	31.2% 3.1m
White Paper baseline	0.37% £5.1bn	10.6% 1.1m	19.8% 2.0m	30.8% 3.1m

Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

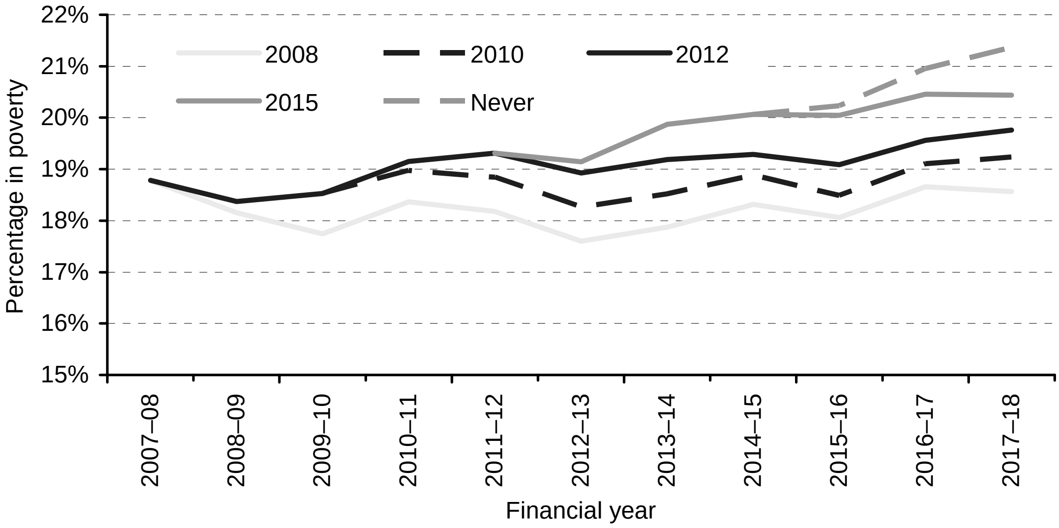
higher, and some reforms will also have cost implications for those aged under 65. This table allows us to note the difference in size between the cost of uprating the pension credit guarantee in line with earnings from 2008–09 and the other elements of the White Paper reforms. As would be suggested by the relative sizes of the bars in Figure 5.5 compared with those in Figure 5.2, the earnings indexation of pension credit guarantee is a reform that increases government spending on pensioners quite significantly, by 0.29 per cent of national income by 2017–18 (£4 billion in today's terms), whereas the other reforms in the White Paper are smaller in scale, representing an increase in government spending of 0.08 per cent of national income (£1.1 billion).

5.2 White Paper variants

One decision that the government is still to make concerning the implementation of the policies in the White Paper is precisely when the earnings indexation of the BSP will start. The government's stated intention (and what we have assumed so far) is for this to happen, subject to affordability, in April 2012. This stands in contrast to the original proposal from the Pensions Commission for it to happen earlier, in April 2010. Alternatively, the government could still meet its commitment to begin earnings indexation by the end of the next parliament by delaying the earnings indexation (and the general election after next!) until April 2015. It is possible that the government could abandon the commitment altogether or introduce earnings indexation immediately (in 2008–09). Figure 5.6 shows the effect of each of these policies on a poverty rate defined using the most commonly used poverty threshold, 60 per cent of contemporaneous median income.

Clearly, the earlier the BSP is earnings-indexed, the lower pensioner poverty will be in 2017–18. The impact on pensioner poverty and the costs of earnings indexation starting at different points in time are shown in Table 5.3. In order for pensioner poverty to remain at around its 2007–08 level (of 18.8 per cent) and under our central projections for median income growth, the earnings indexation needs to be introduced from April 2008 rather than from April 2012. This reform reduces poverty by 1 percentage point or, given that there are projected to be just

Figure 5.6. Effect of changing when BSP is earnings-indexed on relative pensioner poverty



Note: Poverty line increases by 1.8 per cent a year in real terms.
Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

over 10 million people aged 65 or over in 2017–18, 100,000 individuals. Introducing earnings indexation of the BSP from April 2010, in line with the proposals from the Pensions Commission, would reduce pensioner poverty in 2017–18 by around 0.6 percentage points or 60,000 individuals relative to starting the uprating in April 2012. Delaying earnings indexation to the latest point consistent with the government's commitment (April 2015) would increase pensioner poverty by 0.6 percentage points or 60,000. Alternatively, if the government never introduced it, pensioner poverty would return to levels close to those seen in 2003–04, an increase of 1.6 percentage points or 160,000 relative to our baseline (this is also the impact on the poverty rate of the cuts to savings credit and the increase in state pension coverage alone). The costs of introducing earnings indexation four years early is 0.11

Table 5.3. Effect of when BSP is earnings-indexed on pensioner poverty in 2017–18

Policy	**Cost as a % of GDP / Equivalent in 2007–08**	**Percentage / Number of those aged 65 or over with less than: 50%**	**60%**	**70%**
		of contemporaneous median income		
April 2008	0.11% £1.5bn	9.8% 1.0m	18.6% 1.9m	29.2% 2.9m
April 2010	0.05% £700m	10.2% 1.0m	19.2% 1.9m	30.0% 3.0m
April 2012	0% £0	10.6% 1.1m	19.8% 2.0m	30.8% 3.1m
April 2015	–0.07% –£1.0bn	11.0% 1.1m	20.4% 2.0m	31.7% 3.2m
Never	–0.14% –£1.9bn	11.5% 1.5m	21.4% 2.1m	32.7% 3.3m

Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

per cent of national income in 2017–18, equivalent to £1.5 billion today, while introducing it two years early costs 0.05 per cent of national income or £700 million today. Delaying earnings indexation by three years reduces government expenditure by 0.07 per cent of national income or around £1 billion, while never implementing this policy reduces expenditure by 0.14 per cent of national income by 2017–18 or £1.9 billion.

5.3 Other policy options

In this section, we discuss other potential reforms that might have an effect on the rate of pensioner poverty, all compared with the White Paper.

5.3.1 Universal basic state pension

Currently, the basic state pension is only given to those who have paid sufficient National Insurance contributions throughout their working life. One potential reform to the system would be to make everyone above the SPA eligible. This could be done as a one-off 'Big Bang' reform whereby everyone currently over the SPA was given a basic state pension or it could be introduced just for those reaching the SPA after a particular date. In Table 5.4, we present the impacts on pensioner poverty and the public finances of a Big Bang reform and of making coverage universal for those reaching the SPA after April 2012, when the earnings indexation of the BSP is due to start (subject to affordability).

Clearly, making the BSP universal is a big reform, in terms of both cost and the impact it has on reducing poverty rates. It reduces the proportions of people aged 65 and over with less than 50, 60 and 70 per cent of contemporaneous median income by 4, 5 and 6 percentage points respectively. It would reduce the growth in the proportion of pensioner families entitled to a means-tested benefit so that by 2017–18, 59 per cent would be expected to be eligible compared with 64 per cent under the White Paper (as shown in Table 5.1). Introducing this reform gradually would not have such a big impact on pensioner poverty in the first few years and would lead to the cost also increasing gradually.

Table 5.4. Effect of universal BSP on pensioner poverty in 2017–18

Policy	Cost as a % of GDP / Equivalent in 2007–08	Percentage / Number of those aged 65 or over with less than: 50%	60%	70%
		of contemporaneous median income		
White Paper baseline	0% £0	10.6% 1.1m	19.8% 2.0m	30.8% 3.1m
Big Bang introduction of universal BSP	0.50% £6.9bn	6.4% 0.6m	14.8% 1.5m	24.8% 2.5m
Gradual introduction of universal BSP from 2012	0.14% £1.9bn	10.3% 1.0m	19.3% 1.9m	29.8% 3.0m

Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

5.3.2 Increase take-up of means-tested benefits

Between £2.93 billion and £4.19 billion of means-tested benefits were not taken up by benefit units containing someone aged 60 or over in 2004.[30] As the poorest pensioners are those who do not claim benefits to which they are entitled, increasing the rate of take-up would reduce poverty rates, especially the numbers falling below the lowest poverty lines. We have simulated the effect on pensioner poverty of eliminating non-take-up entirely for all means-tested benefits and looked at the effect of just eliminating non-take-up for pension credit, housing benefit and council tax benefit separately. Complete take-up is unattainable: there will always be some people who will not claim means-tested benefits, so this simulation should be seen as an upper bound on the effectiveness of increasing take-up as a policy tool and gives us an indication of which of the benefits the government could focus campaigns to increase take-up on if it wished to reduce pensioner poverty in this way.[31] It should also be remembered that the way we simulate non-take-up (see Box 3.4) means that the estimates below may overstate the impact of full take-up on pensioner poverty, though the costs should be estimated correctly.

We can see from Table 5.5 that pension credit and council tax benefit are the most significant benefits for the 65-and-over age group – eliminating non-take-up of each of these reduces the poverty rates by around 1½–2 percentage points. Increasing take-up is particularly effective at reducing the number of people with less than 50 per cent of median income, as those with incomes below this threshold in our baseline tend to be people who do not take up the benefits to which they are entitled.[32]

Table 5.5. Effect of eliminating non-take-up of means-tested benefits on pensioner poverty in 2017–18

Policy	Cost as a % of GDP / Equivalent in 2007–08	Percentage / Number of those aged 65 or over with less than: 50%	60%	70% of contemporaneous median income
White Paper baseline	0% £0	10.6% 1.1m	19.8% 2.0m	30.8% 3.1m
Full take-up of all means-tested benefits	0.28% £3.9bn	5.9% 0.6m	15.0% 1.5m	26.2% 2.6m
Full take-up of council tax benefit	0.09% £1.2bn	8.5% 0.9m	18.0% 1.8m	29.3% 3.0m
Full take-up of housing benefit	0.05% £0.7bn	10.0% 1.0m	18.8% 1.9m	29.9% 3.0m
Full take-up of pension credit	0.13% £1.8bn	8.5% 0.9m	17.8% 1.8m	28.7% 2.9m

Note: Costs only reflect cost of extending full take-up to those benefit units that contain someone aged 65 or over.
Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

[30] These are the lower and upper bounds in Department for Work and Pensions (2006c).

[31] Sir Michael Lyons has suggested that the government could find a way of automatically handing out means-tested benefits without the need for recipients to actively claim, but it is hard to imagine how this would work given the structure and rules of the current set of means-tested benefits (Lyons, 2007).

[32] If full take-up were achieved in 2008–09, we simulate that relative (60 per cent median) poverty in that year among those aged 65 or over would fall to 13.1 per cent from 18.4 per cent.

5.3.3 Council tax reforms

Council tax is commonly thought to hit the elderly particularly hard because of their relatively low income relative to their house value, and there has been some debate about the merits of lowering pensioners' council tax payments to help poorer pensioners. For example, at the last general election, the Conservatives proposed a 50 per cent reduction in council tax bills (subject to a cap of £500) for households in England containing only individuals aged 65 or over, at an estimated cost of £1.4 billion.[33]

Table 5.6 shows the effect on pensioner poverty of higher and lower council tax levels (relative to our baseline of 2 per cent real growth per year) in England for those aged 65 or over.[34] In particular, we consider a policy of freezing the level of council tax in nominal terms from 2008–09 for 10 years (equivalent to a 28 per cent real-terms cut) and a policy of continuing to increase the level of council tax at the same real rate it has risen by since 1997–98 (4.1 per cent per year). However, even with non-take-up of council tax benefit, changes in the level of council tax do not affect the rate of poverty greatly: none of the changes here makes more than 1 percentage point (or 100,000 individuals) difference to any poverty rate (or level) considered.

Another potential reform, suggested by the Lyons Inquiry (Lyons, 2007), was to increase the maximum amount of savings pensioners can have while still qualifying for council tax benefit, from the current £16,000 to £50,000. However, the limit for those claiming pension credit guarantee has already been removed, so only those with savings between £16,000 and £50,000 with incomes low enough to claim council tax benefit but too high to claim pension credit would benefit. Therefore, this reform is likely to have a negligible impact: indeed, we are unable to find anyone in the ELSA sample who would benefit from this reform.

Table 5.6. Effect of council tax changes on pensioner poverty in 2017–18

Policy	Cost as a % of GDP / Equivalent in 2007–08	Percentage / Number of those aged 65 or over with less than: 50% of contemporaneous median income	60%	70%
White Paper baseline	0% £0	10.6% 1.1m	19.8% 2.0m	30.8% 3.1m
Council tax nominal freeze from 2008–09	0.13% £1.8bn	9.9% 1.0m	19.0% 1.9m	29.8% 3.0m
Real increases of 4.1% p.a. (same as 1997–98 to 2006–07)	–0.09% –£1.2bn	10.9% 1.1m	20.3% 2.0m	31.6% 3.2m
Increase council tax benefit capital limit	0% £0	10.6% 1.1m	19.8% 2.0m	30.8% 3.1m

Note: Costs assume the changes in council tax only apply to individuals aged 65 or over in England.
Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

[33] Further details can be found at http://www.ifs.org.uk/press.php?publication_id=3275.

[34] The ELSA survey contains the respondents' reported council tax payments, which we can then increase at varying rates.

5.3.4 Pensioner tax allowances

Currently, those aged 65 and over have higher income tax allowances than younger people. One way to reduce poverty might be to increase these allowances, or alternatively the government could raise money by bringing them back down to the level for those under 65. Table 5.7 shows the effect on poverty of each of these reforms.

With the income tax allowances for those aged 65 and over at their current levels, the poorest pensioners do not pay income tax. This means that they cannot benefit from any increase in the income tax allowance, and so increasing pensioner income tax allowances has almost no impact on relative poverty at the 50 per cent level, although it does reduce poverty by 1 percentage point at the 60 per cent level and by 2 percentage points at the 70 per cent level. However, if these tax allowances were reduced, some poorer pensioners would start paying tax, and this would increase poverty by at least 3 percentage points or 300,000 at both the 60 per cent and 70 per cent levels.

Table 5.7. Effect of changes to pensioner tax allowances on pensioner poverty in 2017–18

Policy	Cost as a % of GDP / Equivalent in 2007–08	Percentage / Number of those aged 65 or over with less than:		
		50%	60%	70%
		of contemporaneous median income		
White Paper baseline	0% £0	10.6% 1.1m	19.8% 2.0m	30.8% 3.1m
Double pensioner tax allowances	0.33% £4.5bn	10.5% 1.1m	18.8% 1.9m	28.7% 2.9m
Reduce pensioner tax allowances to level of those for under-65s	–0.22% –£3.0bn	12.4% 1.2m	22.8% 2.3m	34.5% 3.5m

Source: Authors’ calculations using TAXBEN and various assumptions specified in the text.

5.3.5 Savings credit taper reforms

Part of the reasoning behind the policies put forward in the White Paper is that they will reduce the number of pensioners on means-tested benefits. This will happen by restricting increases in the pension credit savings credit. An alternative way of reducing the scope of means-testing would be to increase the rate at which savings credit is withdrawn as income increases, from 40 pence for every pound of private income to, for example, 60 pence. Table 5.8 shows the effect of this policy on pensioner poverty rates in 2017–18.

Increasing the savings credit taper rate to 60 per cent increases pensioner poverty by around 0.5 percentage points or 50,000 at the 50 per cent, 60 per cent and 70 per cent levels, but it does not save the government very much money. It has a small impact on the proportion of pensioner benefit units eligible for means-tested benefits, which falls from 64 per cent to 62 per cent.

Table 5.8. Effect of savings credit reform on pensioner poverty in 2017–18

Policy	Cost as a % of GDP / Equivalent in 2007–08	Percentage / Number of those aged 65 or over with less than:		
		50%	60%	70%
		of contemporaneous median income		
White Paper baseline	0% £0	10.6% 1.1m	19.8% 2.0m	30.8% 3.1m
Increase savings credit taper to 60%	–0.04% –£550m	11.2% 1.1m	20.1% 2.0m	31.3% 3.1m

Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

5.3.6 Upper and lower bounds of generosity

This section considers what might be described as the upper and lower bounds of generosity that a government might realistically display towards pensioners. For a generous scenario, we have increased the level of the basic state pension to the level of the pension credit guarantee and increased it in line with earnings all the way through to 2017–18. Perhaps the most generous variant is to make this higher BSP universal. The scenario we have taken as our least generous one is where the pension credit guarantee and the basic state pension are not increased in real terms between 2008–09 and 2017–18 but the other White Paper reforms (in particular, the cuts to savings credit) are introduced.

As shown in Table 5.9, increasing the BSP to the level of the pension credit guarantee is expensive, costing some £8.3 billion, but it would also lead to a large reduction in pensioner poverty. It would also lead to significantly fewer pensioner families being eligible for means-tested benefits than there would be under the White Paper proposals: in 2017–18, 56 per cent of pensioner families would be eligible for a means-tested benefit, which is significantly lower than the 64 per cent that would be eligible in 2017–18 under the White Paper proposals (see Table 5.1). Making this increased BSP universal would cost a total of £20 billion on top of the White Paper baseline, and would reduce pensioner poverty and eligibility for means-tested benefits by substantially more.

Table 5.9. Effects of high- and low-cost reforms on pensioner poverty in 2017–18

Policy	Cost as a % of GDP / Equivalent in 2007–08	Percentage / Number of those aged 65 or over with less than:		
		50%	60%	70%
		of contemporaneous median income		
White Paper baseline	0% £0	10.6% 1.1m	19.8% 2.0m	30.8% 3.1m
Low-cost, high-poverty scenario	–0.38% –£5.2bn	15.1% 1.5m	25.0% 2.5m	37.7% 3.8m
BSP at level of pension credit guarantee	0.60% £8.3bn	7.2% 0.7m	14.4% 1.4m	23.5% 2.4m
Universal BSP at level of pension credit guarantee	1.45% £20.0bn	1.8% 0.2m	7.3% 0.7m	14.6% 1.5m

Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

It is also interesting to note from Table 5.9 that under the low-cost, high-poverty scenario, poverty is predicted to climb to a level similar to, though if anything slightly higher than, its level under the 'pre-White-Paper policy without earnings indexation of pension credit guarantee' (as shown in Table 5.2).

5.4 A comparison of selected policy reforms

In this section, we summarise the effects of the policies considered above on poverty reduction and compare their cost-effectiveness. Figure 5.7 summarises the effects of all the policy reforms examined in this chapter on the proportion of those aged 65 or over with incomes below 60 per cent of the median in 2017–18, together with the cost relative to the White Paper both as a share of national income and expressed in the equivalent pounds in 2007–08. We can see that the three policies that would do the most to reduce poverty among those aged 65 and over are eliminating non-take-up of means-tested benefits, making the basic state pension universal and increasing the basic state pension to the level of the pension credit guarantee. By contrast, the reforms to income tax and council tax we have considered have far less impact.

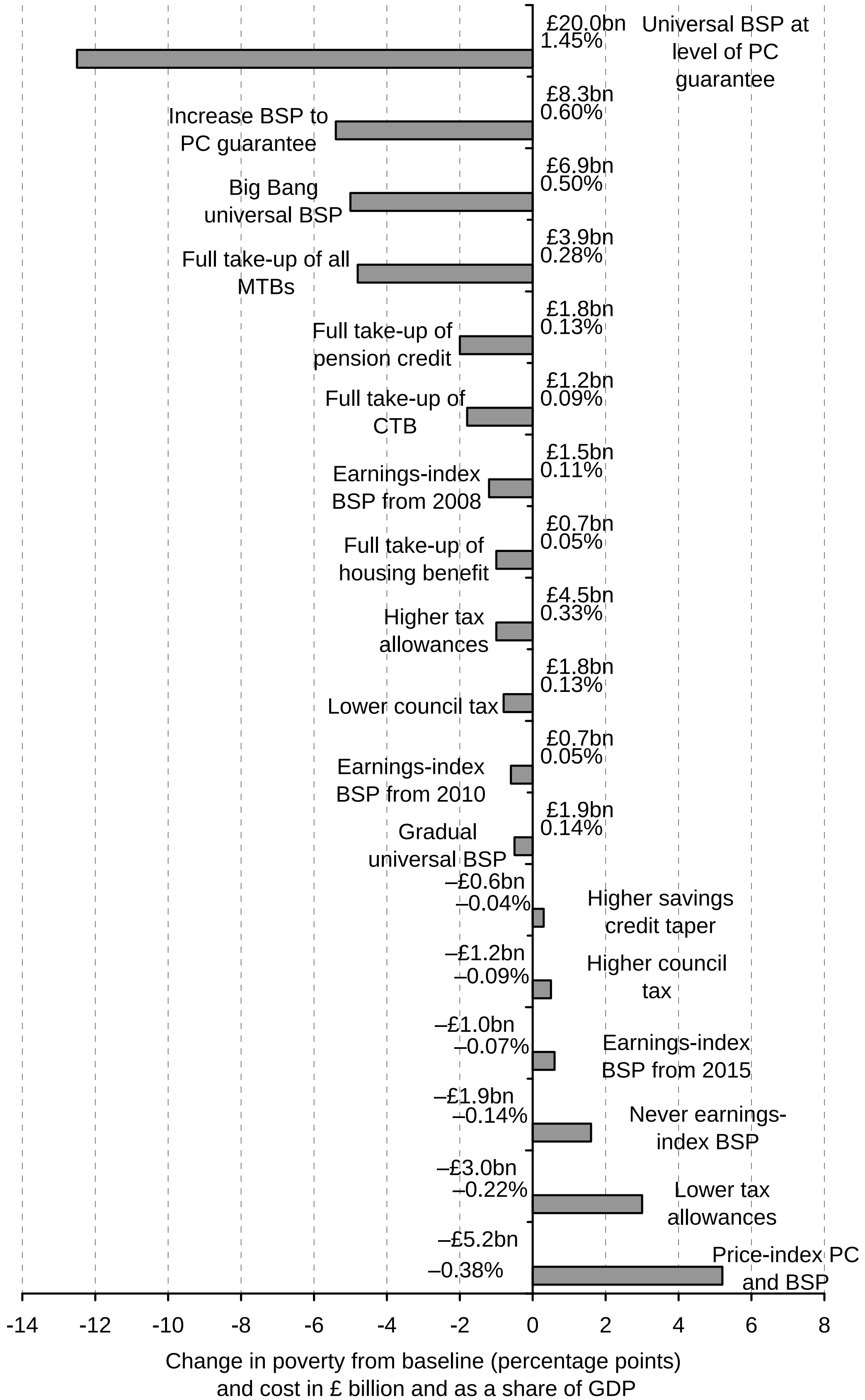
Another way of measuring the effects of these reforms on the poor is to look at how the 10^{th} percentile of the income distribution of those aged 65 and over is affected by them. Figure 5.8 shows the income of the 10^{th} percentile under the White Paper baseline and under various reforms, including those that have the largest impact on poverty (full take-up of all means-tested benefits, making the basic state pension universal, increasing the basic state pension to the level of the pension credit guarantee from 2012–13 and doing both of the last two).

As we saw before in Figure 5.4, the incomes of the poorest pensioners continue to grow at a modest rate under the White Paper, due to the continued earnings indexation of the pension credit guarantee. Without this earnings indexation, the incomes of the poorest pensioners do not increase in real terms. Earnings indexation of the BSP from 2008–09 rather than 2012–13 gives the poorest pensioners higher income growth between 2008–09 and 2012–13 and a higher level of income thereafter. The three more expensive options increase the incomes of the 10^{th} percentile by around £25 a week in 2017–18 compared with those seen under the White Paper. The most expensive policy considered in this report – increasing the BSP to the level of the pension credit guarantee and making it universal – increases the incomes of the 10^{th} percentile by around £70 a week.

To provide an idea of the relative effectiveness or efficiency of each reform in reducing pensioner poverty, we also consider how much each of the policies costs for each individual taken out of poverty (Figure 5.9) and what proportion of any additional public spending goes to individuals who would be below the poverty line under the White Paper system (Figure 5.10).

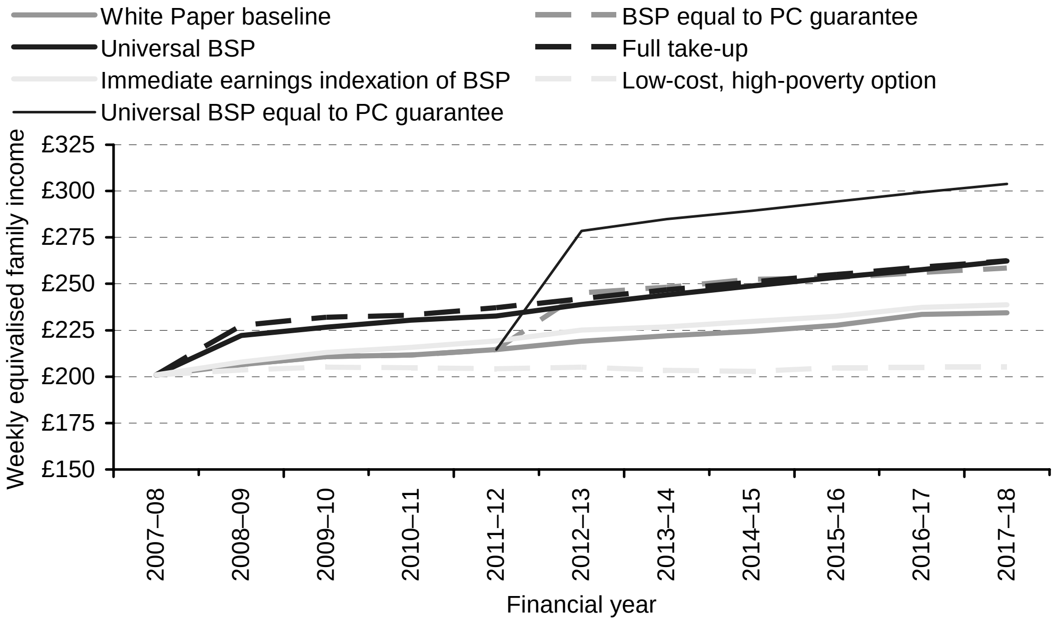
Figures 5.9 and 5.10 provide similar pictures about the relative efficiency of the reforms in reducing pensioner poverty (but for this objective alone). By far the most cost-effective way of increasing the incomes of those in poverty would be to increase take-up of means-tested benefits, particularly of housing benefit and pension credit: we simulate that at least half the

Figure 5.7. Summary of all policies in 2017–18: impact on percentage of those aged 65 and over in (60% median) poverty, cost as a percentage of national income, and equivalent in £bn 2007–08



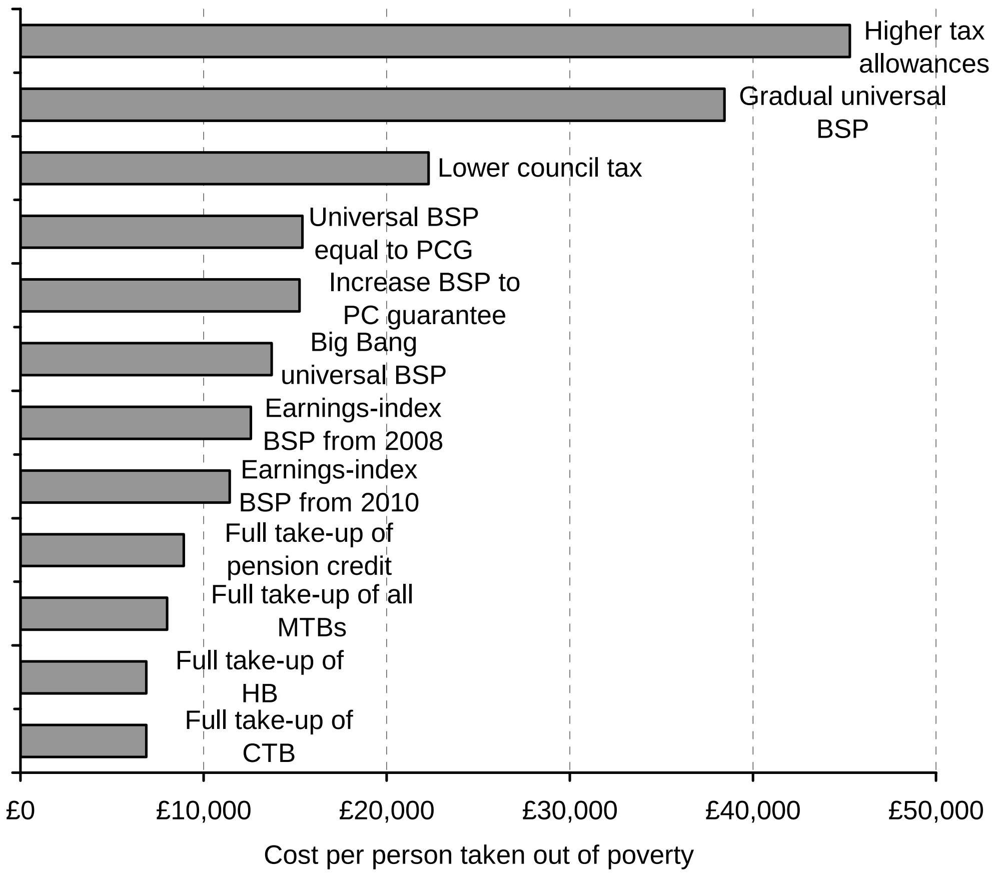
Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

Figure 5.8. Effect of various policies on the 10th percentile of pensioner incomes



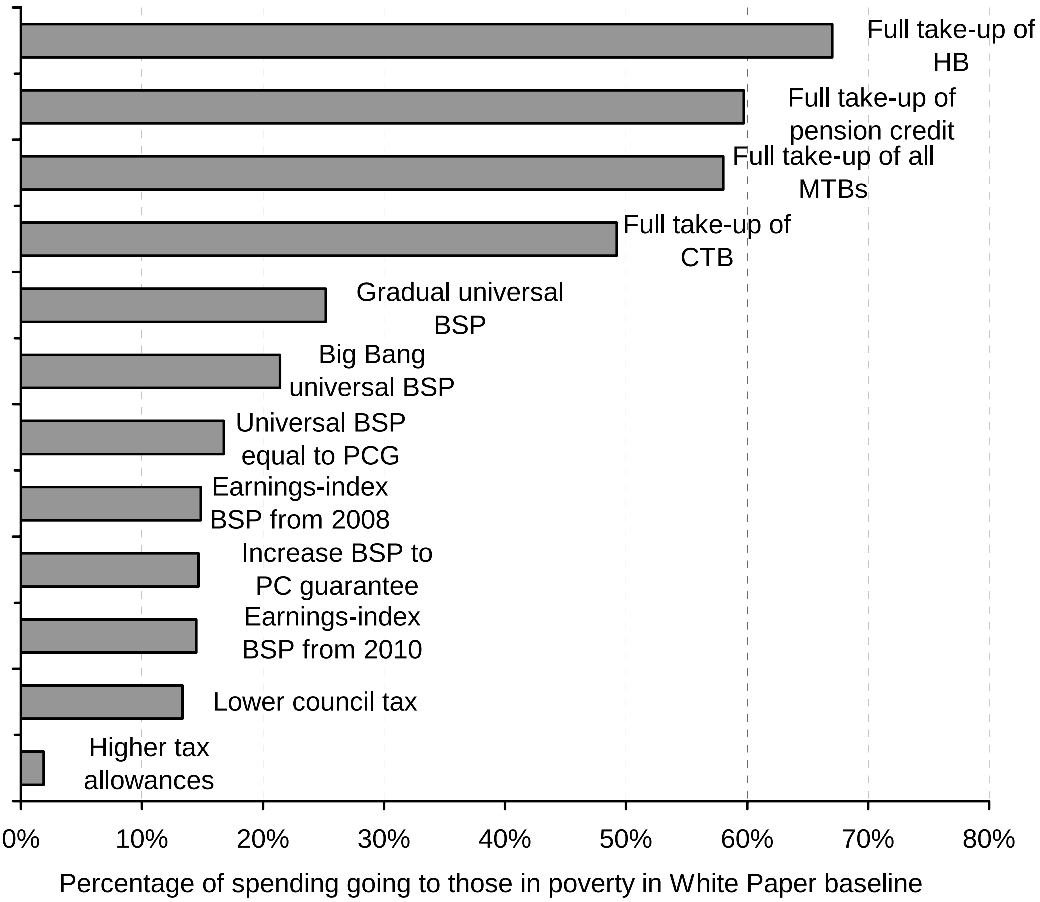
Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

Figure 5.9. Amount spent per person taken out of poverty



Note: Effects in 2017–18, in 2007–08 prices.
Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

Figure 5.10. How well targeted are the policies on those in poverty?



Note: Effects in 2017–18.
Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

money would go to those below the poverty line on current take-up rates (although, as explained in Section 2.5, this is probably an overestimate, given the way we have simulated non-take-up). This is not surprising – by definition, eligible non-recipients of means-tested benefits tend to have low incomes. However, eliminating non-take-up of means-tested benefits is not a policy that any government can implement without the cooperation of eligible non-recipients, at least with the current administrative apparatus; achieving it might also require resources to be expended.

Less cost-effective, but feasible, poverty reduction measures would be to make the BSP universal or to introduce earnings indexation of the BSP earlier than 2012–13. These are two very different policies, however. Making the BSP universal would help those with very low incomes who do not take up the benefits to which they are entitled, but it does not necessarily lift beneficiaries above the (arbitrary) poverty line. However, 78.6p of every £1 spent on this policy would go to pensioners whose incomes were already sufficiently high to keep them out of poverty. The same is true of making the BSP universal at the level of the pension credit guarantee, except that even more of the additional resources (83.3p of every £1 spent) would go to those who are already above the poverty line. Earnings-indexing the BSP earlier than 2012–13 does less to help those who are not taking up means-tested benefits while still benefiting individuals all the way up the income distribution. However, it would move a reasonable number of people from just below the poverty line to just above it, and so the cost per person lifted out of poverty is around £12,000, which is slightly lower than the cost per person lifted out of poverty of making the BSP universal (around £14,000). Reducing council tax is a poorly targeted policy, as even with the current low levels of take-up, the poorest are by and large insulated from council tax changes through council tax benefit. Raising tax allowances for those aged 65 or over is the least cost-effective policy, which is not surprising given that this policy only benefits those with incomes higher than the tax-free allowance.

6. Conclusions

The well-being of current and future pensioners and especially their financial security is of great interest to the government and to society as a whole. Combating poverty amongst pensioners in the coming years will be increasingly important and increasingly challenging as increasing life expectancies and low birth rates mean that a greater and greater proportion of the adult population will be aged over the state pension age. The 2006 Pensions White Papers set out proposals for reforms to state pensions, private pensions saving and means-tested benefits for pensioners. In this report, we have assessed the likely impact of these proposed reforms on pensioner poverty in England over the next 10 years and the additional effect that a variety of alternative policies could have.

Assessing the impact of the proposed reforms required us to simulate what the pensioner population will look like over the next decade, not only in terms of their demographic characteristics but also in terms of their work patterns and income sources. We did this by simulating thousands of individuals' future mortality, health, disability benefits receipt and labour market outcomes using evidence collected by the English Longitudinal Study of Ageing (ELSA). This survey also contains detailed information on respondents' income, private pension provision and asset holdings, which allowed us to simulate their future private incomes. ELSA contains the most comprehensive information currently available on individuals aged 50 and over in England.

Our simulations suggest that the private incomes of individuals aged 65 and over are likely to rise over time, as new generations of individuals reaching this age do so with greater entitlement to private pensions and higher levels of earned income. These changes in private incomes mean that the living standards of the elderly, as captured by net equivalised family income, are likely to grow over time. These changes in net incomes mean that, without further substantive reforms to taxes and benefits beyond those proposed in the 2006 Pensions White Paper, relative pensioner poverty will stop falling and remain fairly stable until 2017–18.

The most significant commitment made in the 2006 White Paper in terms of impacting on pensioner poverty is the formalisation of the government's aspiration to continue to index the level of the pension credit guarantee in line with earnings beyond 2007–08. We find that, were the pension credit guarantee to be indexed in line with prices from 2008–09 onwards, the percentage of pensioners living in families with income below 60 per cent of median income would rise from 18.8 per cent in 2007–08 to 24.4 per cent (or 2.4 million pensioners) in 2017–18. In contrast, continuing with earnings indexation beyond 2007–08 would lead to pensioner poverty remaining fairly stable: the proportion of pensioners living in families with income below 60 per cent of the median would be 19.8 per cent (or 2 million pensioners) by 2017–18.

It is open to interpretation, however, whether the continuation of earnings indexation from 2008–09 really represents a new policy announcement or simply a continuation of existing policy. Looking just at the impact of the remaining elements of the White Paper proposals, we find that the combined effect of these on pensioner poverty is very small. In fact, we find that the other reforms will slightly increase pensioner poverty over the next few years. On average, the very poorest pensioners (those who qualify for but do not claim pension credit) will benefit from the increases in the level of the basic state pension (BSP) once this is linked to earnings from 2012. However, those in the second and third deciles of the pensioner income distribution will lose as a result of the combined effect of the remaining White Paper policies. This is because of the proposed cuts to the generosity of the pension credit savings credit. The decrease in the generosity of the savings credit will more than offset any gains they experience from higher BSP income for this group.

One important decision that the government has yet to firmly announce in relation to the White Paper proposals is when exactly the earnings indexation of the BSP will start. Currently, the government proposes to start it in 2012, subject to affordability, and by 2015 at the latest. We find, however, that bringing forward the date at which this starts will decrease pensioner poverty only slightly by 2017–18 and, similarly, delaying the date at which it is done will increase pensioner poverty in 2017–18 only very slightly. Were the government to restore the earnings link in 2010 (as the Pensions Commission proposed) rather than 2012, there would be just 60,000 fewer pensioners living in poverty by 2017–18. On the other hand, if the government delayed starting the earnings uprating until 2015, only an additional 60,000 pensioners would be in poverty by 2017–18.

Of the policies we have considered, we find that the ones that would have the greatest impact on pensioner poverty over the next 10 years are introducing a universal basic state pension and increasing the level of the BSP to the level of the pension credit guarantee. These are, however, expensive policy options, implying additional public spending of £6.9 billion and £8.3 billion respectively. A lower-cost alternative would be to introduce a universal BSP just for those people reaching state pension age from 2012 onwards. This would be less expensive, at £1.9 billion, but would have a much smaller effect on pensioner poverty (as it would obviously have no effect on the incomes of those who retire before 2012).

Increased take-up of means-tested benefits could reduce pensioner poverty dramatically at relatively low cost to the public purse, since the additional spending would (by definition) go almost exclusively to the poorest pensioners (those who fail to claim the means-tested benefits to which they are entitled). Therefore, improving the take-up of pension credit, housing benefit and council tax benefit could prove a cost-effective way of reducing pensioner poverty. The problem with this option in practice, however, is how the government would be able to increase these take-up rates. One proposal put forward by the Lyons Inquiry (Lyons, 2007) was that some means-tested benefits (such as council tax benefit) could be automatically handed out to reduce the need for individuals to actively claim them, but it is not clear how this could be done. In practice, campaigns to increase take-up themselves cost money, but we have not made any estimate of what it would take to eliminate non-take-up.

This report provides the first comprehensive look at the prospects for pensioner poverty over the next 10 years by researchers outside government, making use of newly available comprehensive survey information on the financial, work and family circumstances of current pensioners and those approaching retirement. Applying dynamic microsimulation methods to detailed information on the older population in England and utilising IFS's microsimulation model of the UK tax and benefit system has allowed us to look in detail at the prospects for pensioner poverty over the next decade under current policies, under the policies set out in the 2006 Pensions White Paper and under a variety of other policy options.

Appendix A. Demographic simulations

This appendix gives a more detailed description of the methods used in the demographic simulation model described in Section 2.2 of the main text. It first outlines some general aspects of our approach, before considering each of the model's 'modules' in turn.

The model

Before designing our dynamic microsimulation model, we reviewed the documentation from a variety of existing models – including the UK government's PenSim2 model (as described in Emmerson, Reed and Shephard (2004)), the Canadian Office of the Chief Actuary's DYNACAN model (see Morrison and Dussault (2000)) and in particular the excellent documentation produced by the SAGE Research Group in the course of developing its SAGEMOD model (Zaidi and Rake, 2001).

Those models are 'full population' models, however; that is, they include individuals of all ages, and must simulate a correspondingly broad range of transitions. The base population for our model, by contrast, consists almost entirely of individuals aged 50 and over – the only under-50s in the data being the younger spouses of core ELSA members, and their dependent children. Certain events that must be included in full population models such as PenSim2 and SAGEMOD – such as new marriages and new births – occur comparatively rarely in the ELSA population.

In deciding which events to simulate, therefore, we faced a trade-off between complexity and comprehensiveness. Where the increase in the complexity of our simulation was deemed to outweigh the potential benefits of modelling an event, the event was either excluded from the model or else modelled using only simple rules. Transitions initially considered for simulation, but rejected on these grounds, include new marriage/cohabitation, separation/divorce, fertility and household composition (that is, explicitly modelling when children leave home).

Hence, in our model no new marriages take place and marriages end only when one partner dies. Children are assumed to leave home at age 17.

Ours is a 'discrete time' model, with all transitions taking place in an annual cycle. Transitions are defined 'prospectively', i.e. we estimate what characteristics of an individual in year t predisposed them to make a transition (e.g. recover from illness, retire) by year t+1.

All modules are written in the STATA programming language.

Mortality module

As stated in the main text, the mortality module allocates a probability of death to each individual in the population, based on their age, sex and social class. These probabilities are derived from two sources:

1. Initial projected probabilities by age and sex are derived from GAD's Historical Interim Life Tables. These probabilities are 'forward-looking', being based on GAD's projections for increasing life expectancy over time.

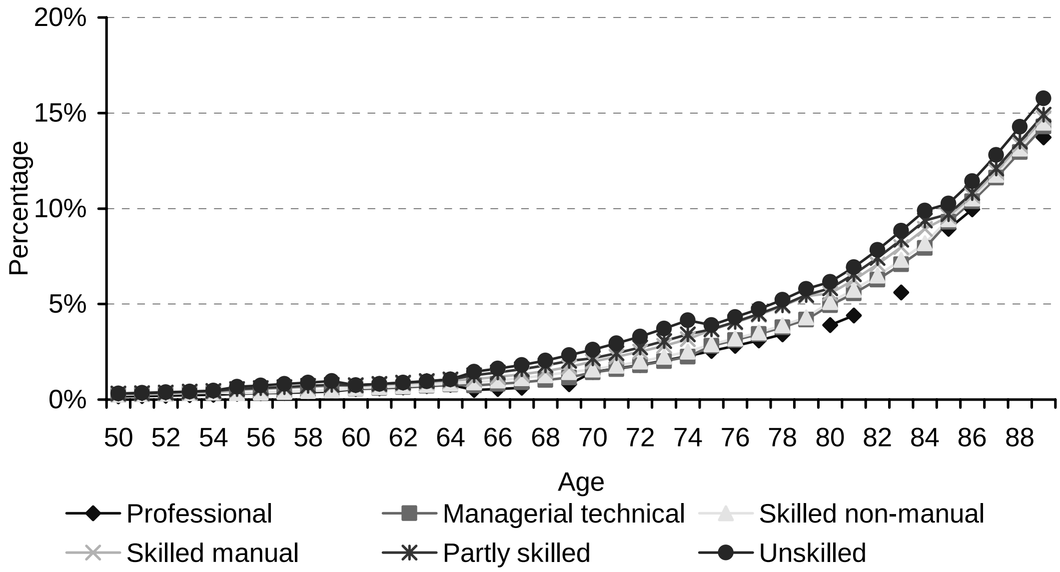
2. Data from the ONS Longitudinal Study (LS), from 1992 to 2001, are then used to adjust GAD's projected probabilities to take into account social class.

Our projected mortality probabilities therefore incorporate assumptions about increasing life expectancy but assume that these increases will be distributed equally across social classes, leaving the long-run relativities between classes unchanged.

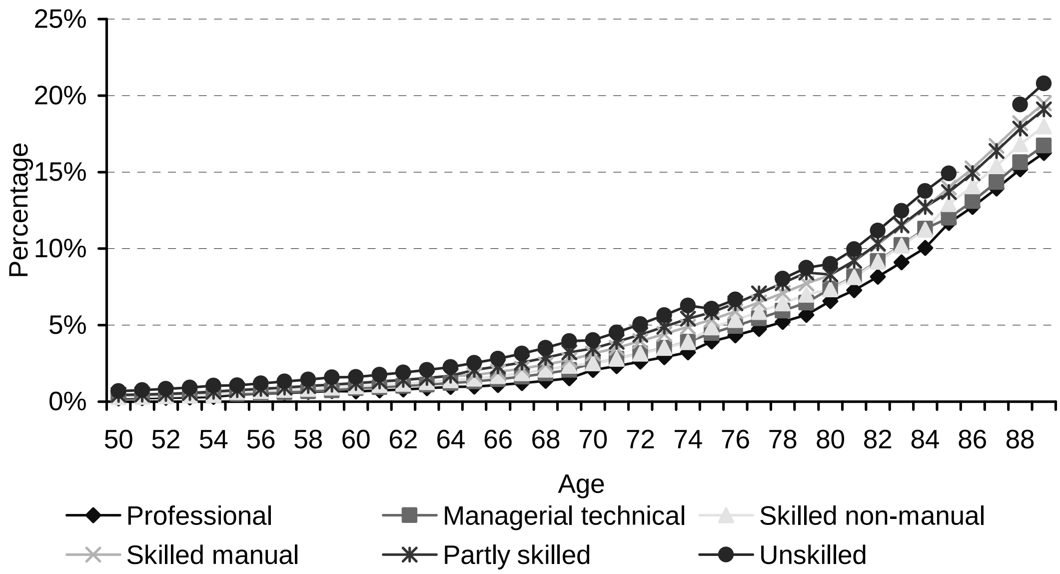
Figure A.1 illustrates the average mortality probabilities for men and women of different ages, by social class.

Figure A.1. Average mortality probabilities, by age and social class

Women



Men



Notes: Probabilities are calculated from simulated data. When no individuals are present in a category, no probability is calculated.

Once all individuals have been assigned their probability of death, the Monte Carlo method is used to select which individuals die. A random number between 0 and 1 is allocated to each member of the population (a ‘roll of the dice’) and an individual dies if their random draw is smaller than their probability of death.

‘Dead’ individuals are removed from the data-set and are not eligible for any further transitions.

Health module

The health module simulates whether individuals begin to suffer or recover from a limiting illness. The definition of ‘limiting illness’ derives from two questions in the health module of the ELSA questionnaire. All individuals are first asked:

1. ‘Do you have any long-standing illness, disability or infirmity? By long-standing I mean anything that has troubled you over a period of time, or that is likely to affect you over a period of time.’ (Yes / No)

If the individual answers ‘Yes’ to question 1, they are then asked a second question:

2. ‘(Does this/Do these) illness(es) or disability(ies) limit your activities in any way?’ (Yes / No)

Individuals answering ‘Yes’ to both questions are defined as suffering a ‘limiting illness’ for the purpose of this study. For the ‘healthy’ sample, the module predicts the probability that they will develop such an illness. For the ‘ill’ sample, the health module predicts the probability that they will recover from their illness.

It should be noted that this is a subjective, self-reported measure of health. Thus our module does not predict the probability that an individual will contract any particular disease, but rather predicts the probability that an individual would answer ‘Yes’ if asked questions 1 and 2.

To generate the transition probability for each individual, we take advantage of the panel nature of the ELSA data-set, estimating two logistic regression equations on ELSA wave 1 (conducted in 2002) and wave 2 (conducted in 2004). The sample was split into two: those suffering a limiting illness in wave 1 (the ‘ill’ sample) and those not suffering such an illness in wave 1 (the ‘healthy’ sample). For those individuals suffering a limiting illness in wave 1, our regression estimated the probability of recovering from the illness between waves 1 and 2. For the ‘healthy’ population, our regression estimated the probability of developing such an illness between waves 1 and 2.

Variables included in the regression models were marital status, education level, age (and age polynomials) and gross equivalised income quintile. Separate models were estimated for men and women. Individuals aged under 40 or over 85 were excluded from the sample, to avoid estimating on sparse data (this is particularly important for the coefficients on the age polynomials).

The coefficients from these regressions are reported in Tables A.1 and A.2. The ‘got sick’ regression in Table A.1 has a dependent variable defined only for individuals who were ‘healthy’ in ELSA wave 1, and this variable is equal to 1 if an individual reported a limiting illness in wave 2 ('got sick') and equal to 0 otherwise. The 'got well' regression in Table A.2 has a dependent variable defined only for individuals who were suffering a limiting illness in wave 1, and this variable is equal to 1 if an individual reported no such illness in wave 2 ('got well') and equal to 0 otherwise.

These coefficients are used to generate a predicted probability, for our simulated population, that individuals fall sick or get well. However, the ELSA waves on which these transitions are estimated are two years apart, while our model simulates events on an annual cycle, so we also convert the biennial probabilities derived from ELSA into annual probabilities.

Figure A.2 shows the average predicted probabilities, by age and sex, of individuals in our simulated population developing a limiting illness (for those not already suffering from one) or recovering (for those currently 'ill').

Table A.1. Logistic regression for 'got sick' transition probability

	Men	**Women**
In couple	–0.063 *(0.137)*	–0.075 *(0.111)*
Age	–0.387 *(0.780)*	0.574 *(0.511)*
Age squared	0.006 *(0.012)*	–0.008 *(0.008)*
Age cubed	–0.00002 *(0.00006)*	0.00004 *(0.00004)*
Lower than O-level qualification	–0.088 *(0.215)*	0.394 *(0.299)*
O levels (no A levels)	–0.248 *(0.179)*	–0.005 *(0.136)*
A levels or higher (no degree)	–0.267* *(0.159)*	0.051 *(0.148)*
Degree or higher	–0.292 *(0.184)*	–0.083 *(0.193)*
Foreign/Other qualification	–0.430 *(0.280)*	0.224 *(0.150)*
Second (from bottom) income quintile	–0.541** *(0.218)*	–0.430*** *(0.145)*
Middle income quintile	–0.202 *(0.194)*	–0.393*** *(0.150)*
Fourth income quintile	–0.545*** *(0.197)*	–0.393** *(0.156)*
Top income quintile	–0.569*** *(0.200)*	–0.592*** *(0.170)*
Constant	6.445 *(16.734)*	–14.696 *(10.755)*

Notes: Coefficients and *(standard errors)* are reported. Statistical significance denoted by: 1 per cent level = ***, 5 per cent level = ** and 10 per cent level = *. Sample sizes: men = 2,603; women = 3,209.

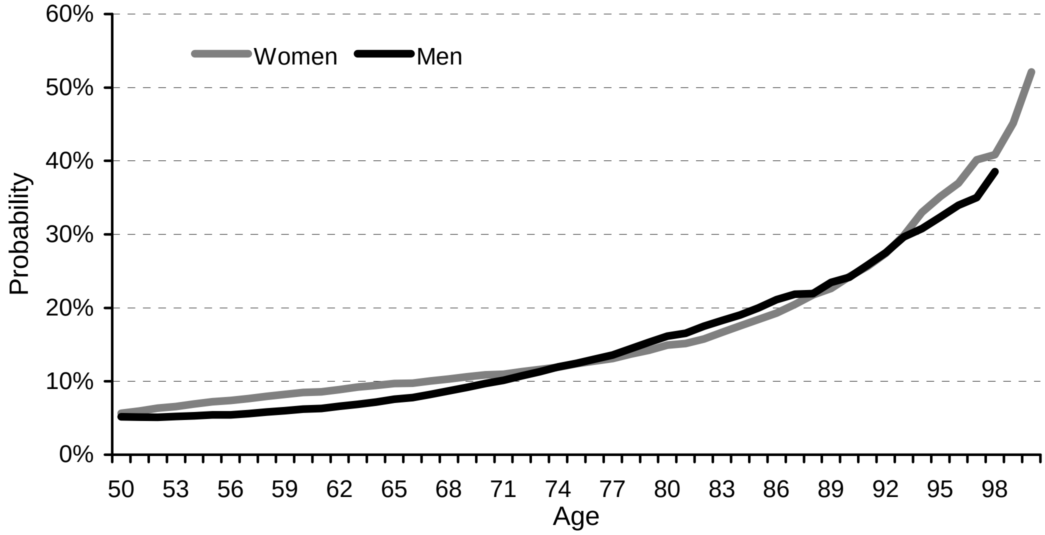
Table A.2. Logistic regression for 'got well' transition probability

	Men	Women
In couple	0.026 *(0.171)*	0.213 *(0.137)*
Age	–0.626 *(1.014)*	–0.610 *(0.580)*
Age squared	0.011 *(0.016)*	0.010 *(0.010)*
Age cubed	–0.00006 *(0.00008)*	–0.00005 *(0.00004)*
Lower than O-level qualification	–0.253 *(0.264)*	0.123 *(0.461)*
O levels (no A levels)	0.396* *(0.204)*	0.363** *(0.171)*
A levels or higher (no degree)	0.094 *(0.199)*	0.058 *(0.184)*
Degree or higher	–0.058 *(0.249)*	0.467** *(0.230)*
Foreign/Other qualification	0.374 *(0.308)*	0.081 *(0.200)*
Second (from bottom) income quintile	0.402* *(0.220)*	0.295* *(0.176)*
Middle income quintile	0.810*** *(0.222)*	0.462** *(0.184)*
Fourth income quintile	0.621*** *(0.234)*	0.504*** *(0.193)*
Top income quintile	1.288*** *(0.241)*	0.651*** *(0.214)*
Constant	10.560 *(21.644)*	10.700 *(12.130)*

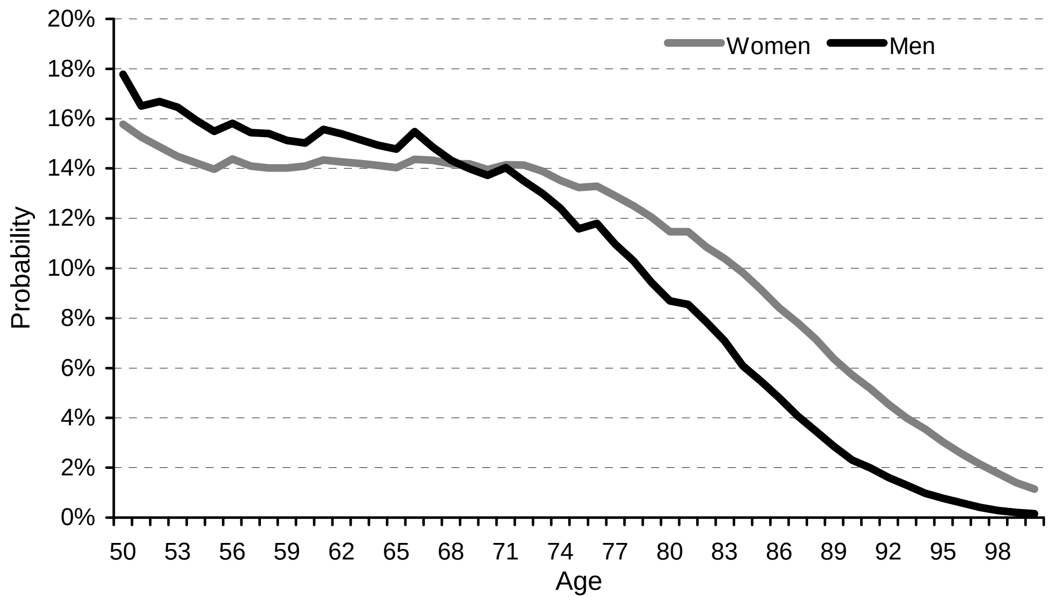
Notes: Coefficients and *(standard errors)* are reported. Statistical significance denoted by: 1 per cent level = ***, 5 per cent level = ** and 10 per cent level = *. Sample sizes: men = 1,192; women = 1,615.

Figure A.2. Predicted transition probabilities in the health module: averages by age and sex

Predicted probability of developing limiting illness (conditional on being well)



Predicted probability of recovering from limiting illness (conditional on having limiting illness)



Once individuals' probabilities of falling sick or getting well have been calculated, actual transitions into or out of illness are decided using the Monte Carlo method. For each individual, a random number is drawn from the uniform distribution between 0 and 1. A healthy individual is then simulated to fall ill if their random draw is smaller than their estimated probability of falling sick. An unwell individual is simulated to recover if their random draw is smaller than their estimated probability of recovering.

Labour market module

As described in the main text, the labour market module has two components:

1. a model for full-time workers, simulating their decision to stay in full-time work, move into part-time work or move straight into retirement;
2. a model for part-time workers, simulating their decision either to stay in part-time work or retire.

For full-time workers, the module estimates a series of logistic regression equations, using data from the British Household Panel Survey (BHPS), a longitudinal survey of around 9,000 households in the UK (though we use only data from England for our estimation). The first regression estimates the probability that a full-time worker will remain in full-time work. The second regression estimates, conditional on leaving full-time work, the probability of an individual moving into part-time work rather than retiring entirely.

For part-time workers, the module estimates the probability that they remain working part-time rather than retiring.

The module initially runs unconstrained, moving individuals out of work using probabilities estimated from the BHPS to generate a pilot simulation. The results of this pilot simulation are then adjusted (calibrated) in a manner described below.

All transitions in this module are 'one-way' – individuals are not permitted to re-enter the labour force once they have retired, nor are part-time workers permitted to return to full-time work. This avoids the problem of having to impute earnings for individuals who are out of the labour force in ELSA wave 1 and whose actual earnings are therefore not observed. Since the fraction of individuals aged 50 or over moving back into the labour force is not negligible (see Emmerson and Tetlow (2006)), however, we use a calibration procedure (described below) to ensure that we do not underestimate employment rates.

Tables A.3 to A.5 report the logit coefficients from the regressions on the BHPS which we use to generate our transition probabilities. For all regressions, individuals under the age of 40 are excluded from the sample, since our ELSA population includes very few individuals below this age. Characteristics included in the regression models are marital status, education level, age (and age polynomials), gross equivalised income quintile, a quadratic time trend and dummy variables for whether the individual reached the SPA this year, whether the individual is 'ill', whether they developed an illness this year and whether they recovered from an illness this year. For the full-time workers, separate models are estimated for men and women. For part-time workers, due to small sample sizes, both sexes are pooled, but with a dummy variable included in the model for whether the individual is a single man, a man in a couple or a woman in a couple.

Figure A.3 shows the average predicted probabilities for each transition, by age and sex.

Table A.3. Logit coefficients for 'left full-time work'

	Men	Women
In couple	–0.358**	0.415***
	(0.142)	*(0.131)*
Age	–1.798**	–1.176
	(0.836)	*(1.142)*
Age squared	0.033**	0.020
	(0.016)	*(0.022)*
Age cubed	–0.00019**	–0.00010
	(0.00010)	*(0.00014)*
Suffering limiting illness	1.464***	1.166***
	(0.160)	*(0.170)*
Contracted limiting illness this year	1.344***	0.845***
	(0.172)	*(0.192)*
Recovered from limiting illness this year	–1.149***	–0.400
	(0.297)	*(0.263)*
Reached SPA this year	2.373***	0.656
	(0.686)	*(0.952)*
Qualification below O level / Foreign / Other	–0.226	–0.217
	(0.219)	*(0.192)*
O levels (no A levels)	–0.005	–0.460***
	(0.187)	*(0.162)*
A levels or higher (no degree)	0.085	–0.116
	(0.139)	*(0.143)*
Degree or higher	0.243	–0.135
	(0.198)	*(0.206)*
Second (from bottom) income quintile	–0.478*	–0.615***
	(0.274)	*(0.211)*
Middle income quintile	–0.803***	–0.856***
	(0.267)	*(0.212)*
Fourth income quintile	–1.057***	–0.730***
	(0.268)	*(0.205)*
Top income quintile	–0.583**	–0.800***
	(0.261)	*(0.211)*
Year	–0.066	–0.074
	(0.064)	*(0.065)*
Year squared	0.001	0.004
	(0.005)	*(0.005)*
Constant	28.701*	20.394
	(14.814)	*(19.522)*

Notes: Coefficients and *(standard errors)* are reported. Statistical significance denoted by: 1 per cent level = ***, 5 per cent level = ** and 10 per cent level = *. Sample sizes: men = 6,711; women = 4,155.

Table A.4. Logit coefficients for 'moved from full-time to part-time work (conditional on leaving full-time work)'

	Coefficient
Single man	–0.724** *(0.359)*
Woman in couple	0.977*** *(0.256)*
Man in couple	–1.105*** *(0.265)*
Age	2.780** *(1.350)*
Age squared	–0.055** *(0.025)*
Age cubed	0.0004** *(0.0002)*
Suffering limiting illness	–0.676*** *(0.251)*
Contracted limiting illness this year	–0.850*** *(0.286)*
Recovered from limiting illness this year	0.077 *(0.423)*
Reached SPA this year	–1.072*** *(0.396)*
Qualification below O level / Foreign / Other	0.327 *(0.314)*
O levels (no A levels)	0.462* *(0.267)*
A levels or higher (no degree)	0.408* *(0.222)*
Degree or higher	1.003*** *(0.307)*
Second (from bottom) income quintile	–0.221 *(0.335)*
Middle income quintile	–0.243 *(0.333)*
Fourth income quintile	–0.924*** *(0.336)*
Top income quintile	–0.892*** *(0.334)*
Year	0.091 *(0.100)*
Year squared	–0.001 *(0.007)*
Constant	–46.001* *(23.570)*

Notes: Coefficients and *(standard errors)* are reported. Statistical significance denoted by: 1 per cent level = ***, 5 per cent level = ** and 10 per cent level = *. Sample size = 884.

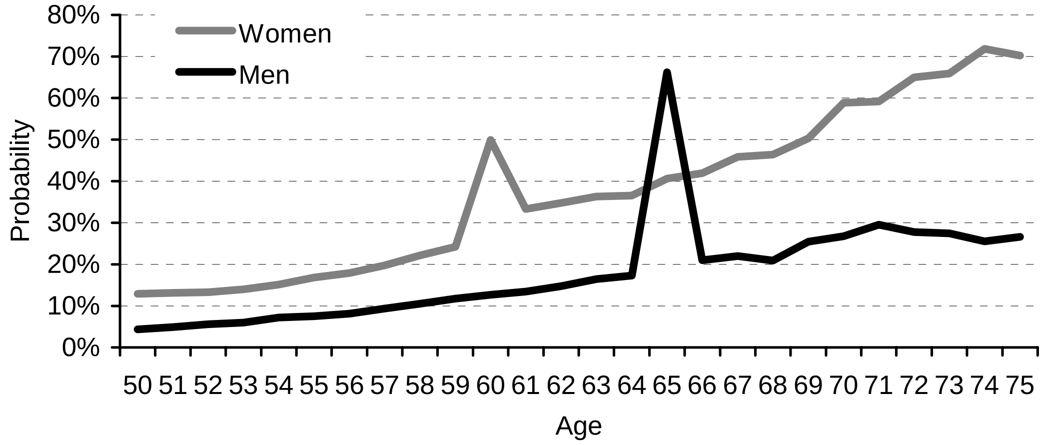
Table A.5. Logit coefficients for 'moved from part-time work to retirement (conditional on working part-time)'

	Coefficient
Single man	0.101 *(0.308)*
Woman in couple	–0.109 *(0.154)*
Man in couple	–0.267 *(0.225)*
Age	–1.463*** *(0.556)*
Age squared	0.026*** *(0.010)*
Age cubed	–0.0001** *(0.0000)*
Suffering limiting illness	1.243*** *(0.154)*
Contracted limiting illness this year	0.994*** *(0.189)*
Recovered from limiting illness this year	–0.553** *(0.248)*
Reached SPA this year	0.811*** *(0.218)*
Qualification below O level / Foreign / Other	–0.191 *(0.191)*
O levels (no A levels)	–0.231 *(0.151)*
A levels or higher (no degree)	–0.280* *(0.153)*
Degree or higher	0.002 *(0.222)*
Second (from bottom) income quintile	–0.129 *(0.179)*
Middle income quintile	–0.176 *(0.183)*
Fourth income quintile	–0.054 *(0.191)*
Top income quintile	0.134 *(0.191)*
Year	0.033 *(0.067)*
Year squared	–0.003 *(0.005)*
Constant	23.426** *(10.297)*

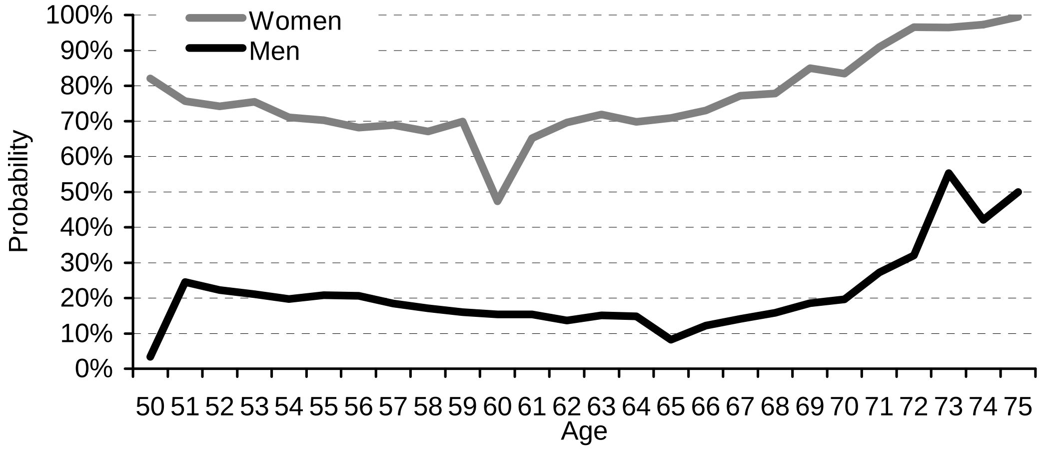
Notes: Coefficients and *(standard errors)* are reported. Statistical significance denoted by: 1 per cent level = ***, 5 per cent level = ** and 10 per cent level = *. Sample size = 4,311.

Figure A.3. Predicted transition probabilities in the labour market module: averages by age and sex

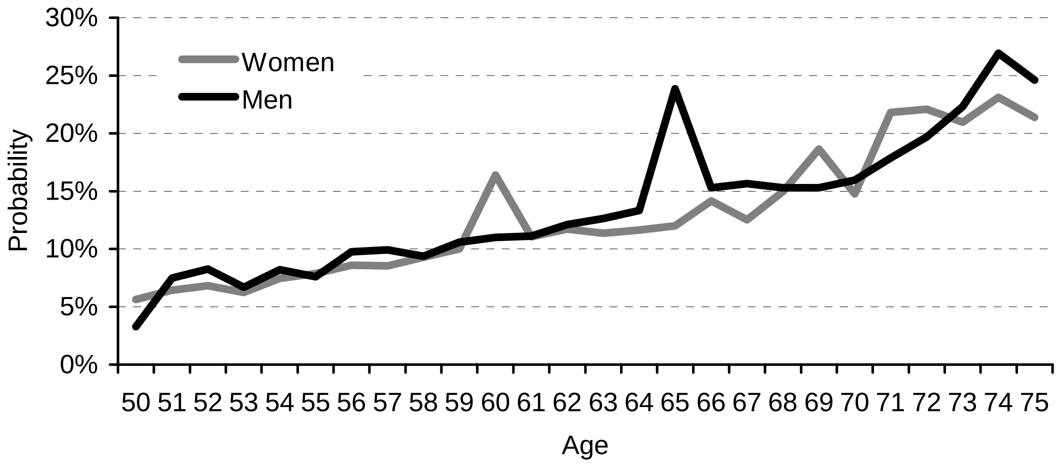
Predicted probability of leaving full-time work (conditional on being in full-time work)



Predicted probability of moving into part-time work instead of retiring completely (conditional on leaving full-time work)



Predicted probability of moving from part-time work to retirement (conditional on working part-time)



Once these probabilities have been calculated, the module uses the Monte Carlo method to decide which individuals actually make a transition. This is only a pilot simulation, however – the results are then calibrated using data from the Family Resources Survey (FRS).

Calibrating the labour market module

The calibration is implemented by dividing the population into cells according to their sex, education level and age (in five-year bands). In years for which we have FRS data (2003–04 to 2005–06), the calibration then compares the predicted proportions in full-time work in each cell after the pilot simulation with the actual proportions in the FRS for the corresponding year.

If too many people in a given cell are in full-time work, the module then identifies the 'marginal non-shifters' in that cell – that is, the individuals who, based both on their (deterministic) predicted probability and their (random) draw, were closest to moving out of full-time work. These individuals are then moved out of full-time work until the proportions match the FRS as closely as possible. The module must then allocate these newly 'shifted' individuals into either retirement or part-time work – which is done in exactly the same manner as in the pilot simulation.

If too few individuals in a given cell are in full-time work, the module identifies the 'marginal shifters' – the individuals who were closest to staying in full-time work in the pilot simulation but were in fact moved out of full-time work. It then moves these individuals back into full-time work (from either retirement or part-time work) until the proportions match the FRS as closely as possible.

After the full-time work transition has been calibrated, the module examines the proportions in part-time work, comparing each cell with the corresponding cell from the FRS. If too many individuals in a cell are in part-time work, the module moves marginal 'non-shifters' into retirement, as was done for full-time workers, until the proportions match as closely as possible. If too few individuals are in part-time work, marginal shifters are moved back into part-time work.

For every cell, in every year from 2003–04 to 2005–06, the correction made (that is, the proportion of individuals in the cell who had to be shifted in the course of calibrating each transition) is stored. In 2006–07, the module calculates, for each cell and each transition, the average of the corrections made from 2003–04 to 2005–06. In the future (2006–07 and all subsequent years to 2017–18), the module then makes this average correction to the results of each year's pilot simulation. This represents an attempt to use information about how inaccurate the pilot simulations were between 2003–04 and 2005–06, in order to improve the model's estimates in the future.

As discussed in the main text, men moving into part-time work have their earnings reduced to 40 per cent of their previous earnings, while women going part-time receive 60 per cent of their previous earnings (Section 2.3.1). Individuals who retire and individuals who move into part-time work both immediately begin receiving their pension.

Disability benefits module

The disability benefits module simulates transitions onto and off four non-means-tested benefits: incapacity benefit (IB), disability living allowance (DLA), attendance allowance (AA) and carer's allowance (CA).

The module uses a similar approach to the labour market module: that is, it generates pilot predictions of which individuals start (or stop) a benefit, using probabilities derived from the BHPS, but then 'calibrates' these pilot predictions, using a separate data source (DWP administrative data, in this case). The module also simulates transitions off severe disablement allowance (SDA), but not transitions onto it, as this benefit was closed to new claimants in April 2001.

A very brief outline of each of these benefits is given below. The rules for claiming them are complex, depending on age, level of disability and National Insurance contributions, among other things. More detail can be found in the IFS *Survey of the UK Benefit System* (Phillips and Sibieta, 2006) and the Child Poverty Action Group's *Welfare Benefits and Tax Credits Handbook* (Child Poverty Action Group, 2006).

Incapacity benefit is a benefit for individuals incapable of paid work due to sickness. It is paid at three different rates – short-term (lower), short-term (higher) and long-term. Long-term IB can only be claimed by individuals below the SPA, while short-term IB can be claimed by individuals below the SPA and individuals not more than five years above the SPA.

Disability living allowance is a benefit for individuals who become disabled before the age of 65. DLA has two components – a 'mobility' and a 'care' component – and each component has different rates, depending on the severity of the claimant's disability. Only individuals below the age of 65 can make a *new* claim for DLA, but payments on *existing* claims can continue beyond age 65.

Attendance allowance is a benefit for individuals aged 65 or over with care or supervision needs. It is paid at two rates – lower and higher – depending on the severity of the individual's needs.

Carer's allowance is a benefit for people aged 16 or over who are giving substantial and regular care to an individual on DLA or AA.

Severe disablement allowance is a benefit that was claimed by individuals unable to work because of ill health or disability. Since April 2001, however, people have not been able to make a new claim for SDA. Individuals already in receipt of SDA, however, continue to receive it unless their circumstances change.

Our aim in the disability benefits module was to move people onto and off benefits in much the same way as we move them into part-time work and retirement in the labour market module – that is, using probabilities from full regression models estimated on the BHPS. This proved possible for transitions *onto* benefits, where we have large sample sizes, but for transitions *off* benefits the sample sizes are too small to fit a full model. These transitions, therefore, depend only on age and sex.

The following sections describe the models used to generate the probabilities of transitions onto each benefit (used in the pilot simulations) from the BHPS.

Incapacity benefit and disability living allowance

There is a strong relationship between receipt of DLA and receipt of IB, with the DWP noting that 'in many cases DLA and IB will be claimed simultaneously'.[35] For this reason, it was decided to model transitions onto these two benefits simultaneously, using a bivariate probit specification. This specification (see below) allows for correlation in the disturbances which would not be captured by separate (univariate) logistic regressions.

We first define a variable y_{i1} indicating whether an individual i who is *not* currently claiming DLA starts a new claim (y_{i1} = 1) or continues not claiming (y_{i1} = 0). Similarly, we define a variable y_{i2} indicating whether an individual who is *not* currently claiming IB starts a new claim (y_{i2} = 1) or continues not claiming (y_{i2} = 0).

We then specify two underlying ('latent'), unobserved variables, y_{i1}^* and y_{i2}^*, capturing how 'close' an individual is (probabilistically) to claiming DLA and IB. Let x_{i1} and x_{i2} be vectors of characteristics of individual i that affect these unobserved probabilities. The specification for the bivariate probit[36] is then as follows:

$$y_{i1}^* = x_{i1}'\beta_1 + \varepsilon_{i1}, \qquad y_{i1} = 1 \text{ if } y_{i1}^* > 0, \text{ 0 otherwise}$$

$$y_{i2}^* = x_{i2}'\beta_2 + \varepsilon_{i2}, \qquad y_{i2} = 1 \text{ if } y_{i2}^* > 0, \text{ 0 otherwise}$$

$$E[\varepsilon_{i1} \mid x_{i1}, x_{i2}] = E[\varepsilon_{i2} \mid x_{i1}, x_{i2}] = 0$$

$$Var[\varepsilon_{i1} \mid x_{i1}, x_{i2}] = Var[\varepsilon_{i2} \mid x_{i1}, x_{i2}] = 1$$

$$Cov[\varepsilon_{i1}, \varepsilon_{i2} \mid x_{i1}, x_{i2}] = \rho$$

Having estimated the bivariate probit model in the BHPS, the module uses the resulting coefficients to predict the values of $x_{i1}'\beta_1$ and $x_{i2}'\beta_2$ for members of the ELSA sample. We then take a random draw for each individual from a bivariate normal distribution with variance-covariance matrix $\begin{pmatrix} 1 & \hat{\rho} \\ \hat{\rho} & 1 \end{pmatrix}$, where $\hat{\rho}$ is the bivariate probit estimated covariance parameter. Summing each individual's linear prediction and their randomly-drawn error component gives the individual's simulated values of y_{i1}^* and y_{i2}^*, and hence their simulated transitions.

The results of this bivariate probit on the BHPS data are given in Table A.6. Before estimating the model, we dropped all individuals aged below 40 from the sample (our ELSA sample contains almost no one below age 40) and all individuals aged 65 or over (our model does not allow those aged 65 or over to start these benefits).

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[35] Page 9 of Department for Work and Pensions (2002).

[36] See, for example, page 710 of Greene (2003).

Table A.6. Bivariate probit regression on starting DLA and starting IB

	Start DLA		Start IB	
	Men	**Women**	**Men**	**Women**
In couple	0.262 *(0.284)*	0.057 *(0.158)*	–0.052 *(0.169)*	–0.094 *(0.163)*
Age	–2.399 *(2.789)*	–4.816** *(1.927)*	–0.001 *(1.887)*	3.304 *(2.363)*
Age squared	0.049 *(0.055)*	0.093** *(0.038)*	0.001 *(0.037)*	–0.059 *(0.046)*
Age cubed	–0.00033 *(0.00036)*	–0.00060** *(0.00025)*	–0.00001 *(0.00024)*	0.00035 *(0.00029)*
Suffering limiting illness	1.372*** *(0.238)*	0.781*** *(0.147)*	0.938*** *(0.152)*	1.061*** *(0.172)*
Contracted limiting illness this year	1.230*** *(0.296)*	0.534** *(0.222)*	1.182*** *(0.180)*	1.164*** *(0.201)*
Qualification below O level / Foreign / Other	–0.375 *(0.497)*	–0.927*** *(0.345)*	0.013 *(0.270)*	–0.165 *(0.275)*
O levels (no A levels)	–0.462 *(0.377)*	–0.628** *(0.217)*	–0.172 *(0.232)*	–0.223 *(0.225)*
A levels or higher (no degree)	–0.146 *(0.234)*	–0.415** *(0.166)*	–0.173 *(0.173)*	–0.197 *(0.194)*
Degree or higher	–0.208 *(0.410)*	–0.712** *(0.307)*	–0.099 *(0.244)*	0.149 *(0.249)*
Second (from bottom) income quintile	–0.701** *(0.310)*	–0.099 *(0.178)*	0.021 *(0.203)*	–0.163 *(0.193)*
Middle income quintile	–0.492* *(0.258)*	–0.634** *(0.250)*	–0.209 *(0.209)*	–0.530** *(0.245)*
Fourth income quintile	–0.625** *(0.287)*	–0.141 *(0.200)*	–0.514** *(0.236)*	–0.378 *(0.236)*
Top income quintile	–5.754 *(8702.3)*	–0.450* *(0.258)*	–0.520** *(0.169)*	–0.738** *(0.313)*
Constant	36.739 *(46.875)*	80.247** *(32.144)*	–2.856 *(31.960)*	–62.494 *(40.416)*
$\hat{\rho}$	0.355** *(0.157)*			

Notes: Coefficients and *(standard errors)* are reported. Statistical significance denoted by: 1 per cent level = ***, 5 per cent level = ** and 10 per cent level = *. Sample sizes: men = 3,277; women = 3,722.

It was also necessary to simplify the benefit rules somewhat, in particular for IB. Our model predicts whether an individual starts claiming a benefit before it imputes bands (this maximises sample sizes for the first stage). However, different bands of IB can be claimed at different ages – long-term IB can only be claimed by those under the SPA, while short-term IB can be claimed by individuals who are not more than five years above the SPA. We simplified this by allowing individuals to claim IB up to age 65 but not after (bringing it into line with DLA).

Having simulated which individuals start DLA and/or IB, we must then impute which bands of these benefits they claim. We divide the population of benefit starters into cells according to their age (in five-year bands) and sex. We then use the FRS to calculate the proportion of individuals in each 'cell' who were claiming each benefit band between 2003–04 and 2006–07. Individuals in our simulated ELSA population are then allocated to benefit bands randomly, with probabilities for each band that match the proportion of individuals claiming that band in the FRS.

Attendance allowance

The probabilities of individuals starting a new claim of AA were generated from a logistic regression on the BHPS. The coefficients from this regression are reported in Table A.7.

Table A.7. Logistic regression on starting AA

	Men	Women
In couple	0.238 *(0.231)*	0.317* *(0.166)*
Age	3.762 *(4.921)*	–4.374 *(3.329)*
Age squared	–0.044 *(0.063)*	0.059 *(0.043)*
Age cubed	0.00018 *(0.00027)*	–0.00026 *(0.00018)*
Suffering limiting illness	2.329*** *(0.328)*	2.483*** *(0.246)*
Contracted limiting illness this year	1.671*** *(0.403)*	1.677*** *(0.309)*
Qualification below O level / Foreign / Other	0.197 *(0.288)*	–0.252 *(0.282)*
O levels (no A levels)	–0.807* *(0.442)*	–0.357 *(0.311)*
A levels or higher (no degree)	–0.611* *(0.331)*	–0.206 *(0.231)*
Degree or higher	–0.634 *(0.626)*	0.326 *(0.505)*
Second (from bottom) income quintile	–0.184 *(0.329)*	–0.141 *(0.205)*
Middle income quintile	–0.337 *(0.347)*	–0.154 *(0.212)*
Fourth income quintile	–0.489 *(0.355)*	–0.433* *(0.236)*
Top income quintile	–0.077 *(0.347)*	–0.380 *(0.257)*
Constant	–113.620 *(128.198)*	101.050 *(86.122)*

Notes: Coefficients and *(standard errors)* are reported. Statistical significance denoted by: 1 per cent level = ***, 5 per cent level = ** and 10 per cent level = *. Sample sizes: men = 4,733; women = 6,336.

Individuals aged under 65 are dropped from the sample for this regression, since they cannot start AA.

Coefficients from this regression are used to generate the linear prediction of an individual in ELSA starting AA. We then take a random draw from a logistic distribution, and add this to the linear prediction to generate a stochastic 'propensity statistic'. If this statistic is greater than 0, then an individual is simulated to have started AA – though this may change in the course of calibration (see below).

Carer's allowance

As with AA, probabilities for transitions onto CA are estimated from a logistic regression on the BHPS. The coefficients from this regression are reported in Table A.8. Individuals under

Table A.8. Logistic regression on starting CA

	Men	Women
In couple	–0.752 *(0.474)*	0.623 *(0.343)*
Age	0.074 *(0.957)*	0.550 *(0.526)*
Age squared	–0.001 *(0.015)*	–0.011 *(0.008)*
Age cubed	0.000007 *(0.00008)*	0.00007 *(0.00004)*
Partner on AA	1.977** *(0.810)*	0.979 *(0.775)*
Partner on DLA	1.993*** *(0.563)*	1.749*** *(0.402)*
Qualification below O level / Foreign / Other	0.237 *(0.589)*	–0.958 *(0.611)*
O levels (no A levels)	0.256 *(0.608)*	–0.361 *(0.397)*
A levels or higher (no degree)	–1.509* *(0.789)*	–1.618*** *(0.547)*
Degree or higher	0.627 *(0.718)*	–0.243 *(0.573)*
Second (from bottom) income quintile	–0.426 *(0.497)*	–1.019*** *(0.370)*
Middle income quintile	–1.227** *(0.615)*	–0.932** *(0.377)*
Fourth income quintile	–1.683** *(0.698)*	–1.720*** *(0.506)*
Top income quintile	–2.720** *(1.093)*	–2.079*** *(0.640)*
Constant	–6.056 *(19.494)*	–13.138 *(10.793)*

Notes: Coefficients and *(standard errors)* are reported. Statistical significance denoted by: 1 per cent level = ***, 5 per cent level = ** and 10 per cent level = *. Sample sizes: men = 9,185; women = 10,871.

the age of 40 were dropped from the BHPS sample for this regression, since our ELSA population contains very few individuals below this age.

Transitions onto CA are then simulated using exactly the same method as for AA – that is, a propensity statistic is generated by adding each individual's linear prediction (using coefficients estimated from the BHPS) to a random draw from the logistic distribution, and individuals are simulated to have started CA if this propensity statistic exceeds 0.

Transitions off benefits

Transitions off benefits are subject to very small sample sizes, even in a large panel data-set such as the BHPS. It is therefore virtually impossible to specify a regression model for these transitions. This problem was also faced by the Department for Work and Pensions when creating the Disability Model for PenSim2,[37] and we use the same solution that it used: transitions off benefits are modelled using probabilities derived from simple transition matrices by age (in five-year bands) and sex.

Individuals claiming a benefit are divided into cells by age and sex, and every individual in a given cell is allocated an identical probability of stopping their claim. That probability is in turn derived from the fraction of people in the BHPS in each cell who stopped their benefit claim (averages from 1991 to 2004 for AA, CA and SDA, from 1995 to 2004 for IB and from 1998 to 2004 for DLA).

We then 'roll the dice' (generate a random number between 0 and 1) for each individual and move individuals off a given benefit if their random draw is lower than their probability of stopping the benefit.

Calibrating the disability benefits module

The processes described above generate the pilot simulations for the number of individuals starting and stopping benefit claims. As described in the main text, however, it was felt necessary to calibrate the results of these simulations using an external data source – in this case, Department for Work and Pensions administrative data – to ensure as far as possible that we do not over- or under-predict the proportion of individuals claiming disability benefits. The calibration process also allows us to 'incorporate the past error' (i.e. the corrections made to previous predictions) in future predictions.

We used historical benefits statistics tables from the DWP website[38] to calculate the proportions of individuals (by age and sex) claiming each benefit. The calibration for the years 2003–04 to 2005–06 is then conducted in much the same way as in the labour market module. That is, the population is divided into cells according to their sex and age (in five-year bands), and in years for which we have DWP data (2003–04 to 2005–06), the proportions on each benefit after the pilot simulation are matched as closely as possible to the proportions in the DWP data for the corresponding year.

The matching is accomplished, as with the labour market module, by moving 'marginal switchers' onto or off benefits until the proportions match as closely as possible. This method

[37] Page 9 of Department for Work and Pensions (2002).

[38] http://www.dwp.gov.uk/asd/dcm.asp.

means that only benefit *starters* can be used to calibrate benefit proportions – because we have no ‘propensity statistic’ for transitions off benefits (everyone in a given age/sex cell has the same probability of stopping a benefit, by construction) – and therefore we cannot define any individuals moving off a benefit in a given cell as ‘marginal’.

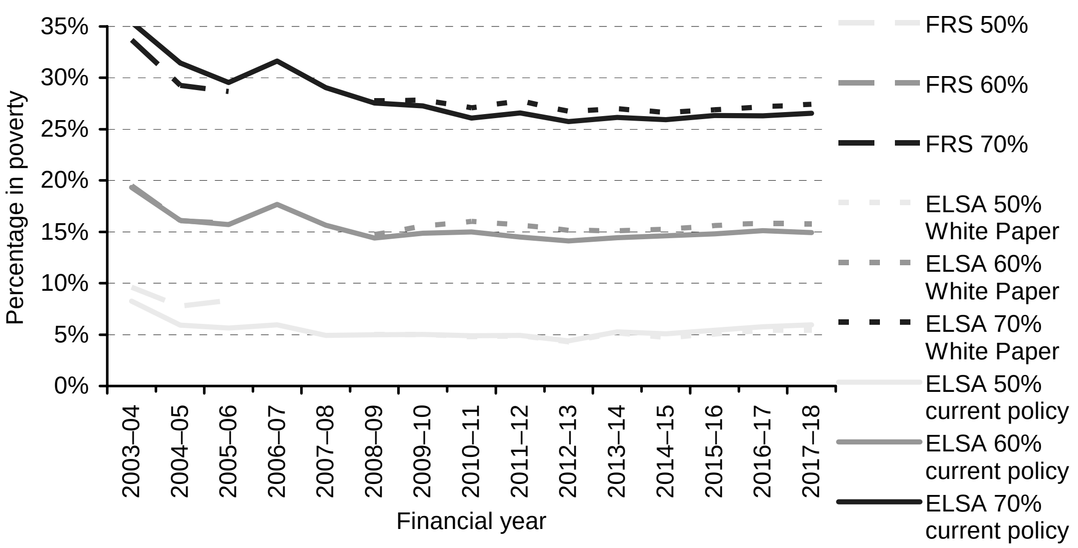
The average correction made to each cell from 2003–04 to 2005–06 is calculated when the simulation reaches 2006–07, and for future years to 2017–18 this average correction is made to the results of each year’s pilot simulation.

Appendix B. Alternative measures of income

B.1 After-housing-costs income

It has often been argued that an after-housing-costs (AHC) measure of income would be more appropriate for measuring pensioners' standards of living. The rationale used is that those who own their own homes are able to enjoy a higher standard of living than those still paying off mortgages or renting, but this is not reflected in the before-housing-costs (BHC) measure of income used so far in this report. While a better way to approach this issue would be to impute an income from owner-occupied housing, this could not be done with any degree of accuracy using the data at our disposal. The solution that has traditionally been used is to deduct housing costs from income to account for this difference in living standards. Another problem we have comparing ELSA and the official HBAI statistics is that in ELSA we have data at the family level on incomes and housing costs while the FRS, on which HBAI is based, only has housing costs at the household level. In order to create the median AHC income at the family level, we need to assign housing costs to individual benefit units in multi-benefit-unit households. We do this by splitting housing costs equally between benefit units. There is a clear inconsistency between FRS and ELSA, so therefore it should be stressed even more heavily here that the reader should not give much attention to the levels of poverty coming out of these simulations, although more attention can be paid to the trends over time. Our results in Figure B.1 show broadly the same picture as for poverty measured using income BHC.

Figure B.1. Relative poverty rates under current policy and White Paper, AHC



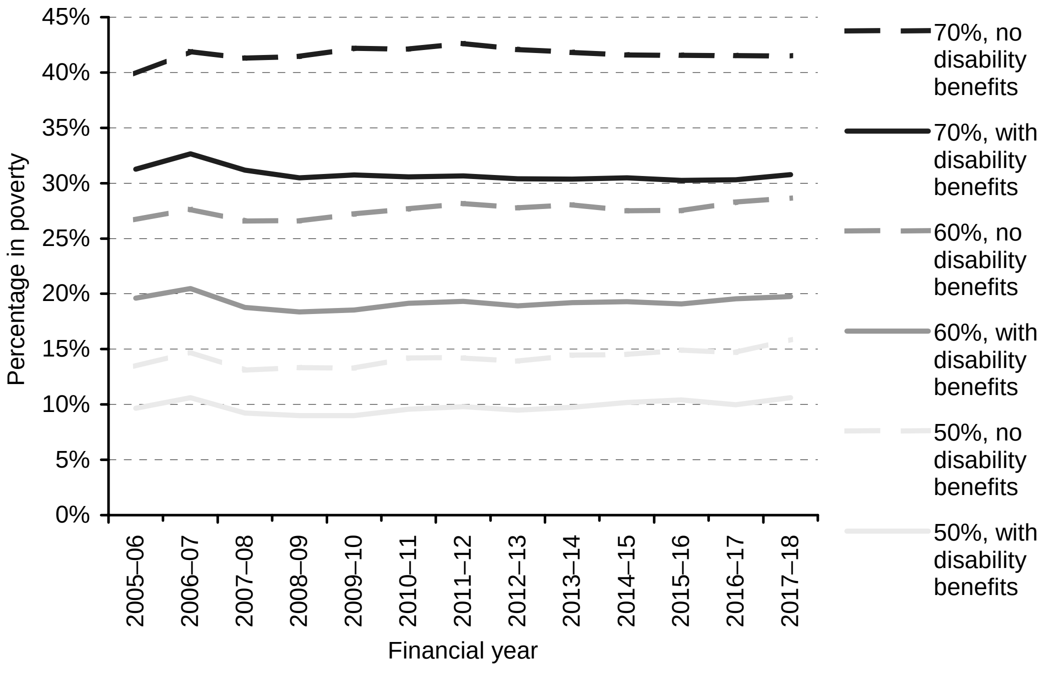
Note: Poverty lines increase by 1.8 per cent per year in real terms from 2005–06.
Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

B.2 Income measured without disability benefits

Given that disability benefits are presumably intended to compensate individuals for health-related costs, it is debatable whether they should be included in the measure of income used for poverty statistics. This is because we would not necessarily think that a person with disabilities receiving benefits to pay for health-related costs had a higher standard of living than an otherwise identical person without disabilities who was not eligible for these benefits but also did not have the same health-related spending needs.[39] If more people receive disability benefits, increasing their incomes, then income poverty, as normally measured, is reduced. The results in this section examine the extent to which the trends in poverty observed are the result of trends in receipt of disability benefits, by excluding these benefits (disability living allowance, incapacity benefit, attendance allowance and disability premiums in income support) from the measure of income.

Figure B.2 shows poverty rates for a variety of poverty thresholds, both with and without disability benefits included in the definition of income. The figure makes clear that excluding disability benefits has a significant impact on levels of poverty – though this is not surprising, since we are excluding a chunk of income and have not amended the poverty line to take into account this change in the definition of income. For this reason, attention should be given to the trends in poverty over time under this income measure rather than the absolute levels.

Figure B.2. Poverty using income measures with and without disability benefits



Notes: Poverty lines increase by 1.8 per cent per year in real terms. Graph shows poverty rates for poverty thresholds at 50 per cent, 60 per cent and 70 per cent of median BHC income, both when disability benefits are included in income (as they are in the main analysis) and when they are excluded.
Source: Authors' calculations using ELSA, TAXBEN and various assumptions specified in the text.

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[39] Of course, a more appropriate way of taking this into account would be to increase the equivalence scale for those with disabilities in recognition of the fact that the amount of income they needed to maintain a particular standard of living was higher. This does not happen at present in the OECD equivalence scale, however.

Figure B.2 shows that excluding disability benefits does have a significant impact on trends in poverty – perhaps not surprisingly, given that we are projecting increased claims of these benefits among the population aged 65 and over. For the poverty thresholds at 50 per cent and 60 per cent of median income, the exclusion of disability benefits turns a small rise in pensioner poverty (less than 1 percentage point in both cases) into a more significant increase of around 2 percentage points. For the poverty threshold at 70 per cent of median income, excluding disability benefits turns the modest fall in poverty (½ a percentage point) into an increase of around 1½ percentage points.

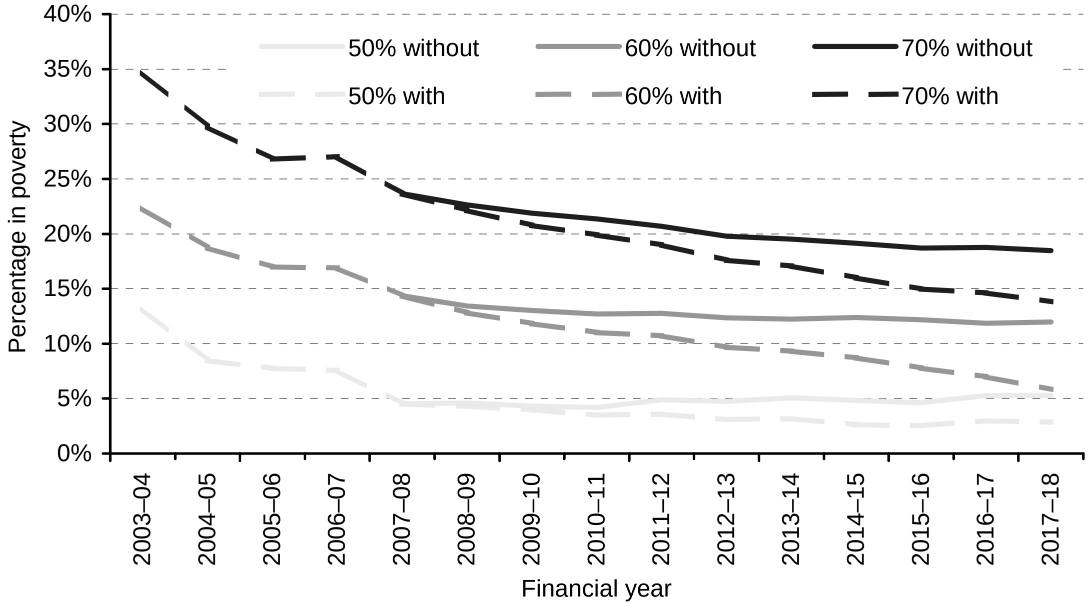
What is clear no matter which measure we use, however, is that the substantial falls in pensioner poverty seen over the past decade are not expected to continue.

B.3 Absolute poverty measures under our baseline

Absolute poverty measures give us an indication of what proportion of those aged 65 or over have incomes that fall below a fixed threshold that does not change as incomes more generally in society increase over time.

Figure B.3 shows the difference that earnings indexation of the pension credit guarantee makes to the living standards of the poor over time. We see that keeping the pension credit guarantee at its current level is not sufficient to enable absolute poverty rates to continue to fall at a similar rate to that over the last few years. If the pension credit guarantee is just kept constant in real terms, absolute poverty will fall much less quickly, by 5 percentage points rather than 10 at the 70 per cent level and by 2 percentage points rather than 8½ at the 60 per cent level.

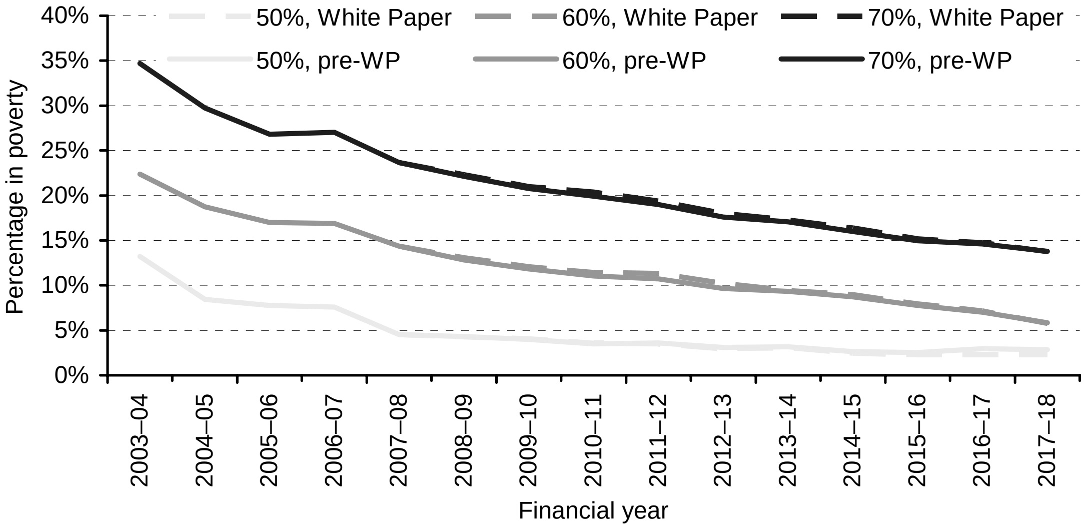
Figure B.3. Absolute poverty rates under pre-White-Paper policy, with and without earnings indexation of pension credit guarantee



Note: Poverty line remains at 2003–04 real value.
Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

Figure B.4 shows that the additional components of the White Paper do not have any further effect on absolute poverty rates, just as we saw with relative poverty.

Figure B.4. Absolute poverty rates under White-Paper and pre-White-Paper policy with earnings indexation of pension credit guarantee

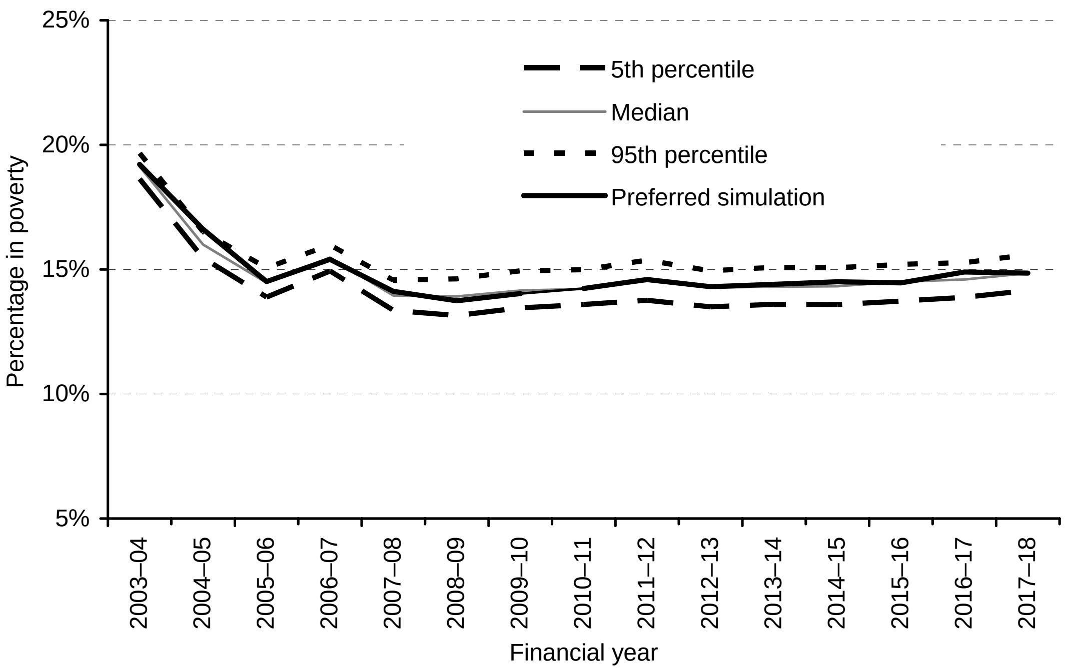


Note: Poverty line remains at 2003–04 real value.
Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

Appendix C. Choosing our preferred simulation

The demographic simulation involves some degree of randomness in choosing which members of our sample have their characteristics changed, and different choices of random numbers can lead to significant differences in the poverty rates coming out of our model. Figure C.1 shows the median poverty rate as well as the 5th and 95th percentiles of 250 repetitions coming out of the demographic simulation. For the detailed results presented elsewhere in this report, we use the simulation that has the least squared deviation from the median poverty rate on average over the 15 years. This is the 'preferred simulation' in Figure C.1. It should be noted that it has somewhat higher-than-average poverty rates in 2004–05 and 2016–17 relative to the other simulations.

Figure C.1. The range of poverty estimates (White Paper baseline)



Notes: Poverty line increases by 1.8 per cent per year in real terms. Graph shows the p5, p50 and p95 poverty rate (60 per cent median BHC income) in each year from 250 replications, along with the series used in the main analysis.
Source: Authors' calculations using TAXBEN and various assumptions specified in the text.

Appendix D. Measuring income in 2002–03

D.1 Imputation of missing data on private income

Each financial variable in ELSA (such as income from different sources and value of pension funds) was collected by first requesting an exact answer and then following up with a series of what are referred to as ‘unfolding brackets’. Unfolding brackets operate by asking respondents who are unable or refuse to give an exact answer a series of follow-up questions designed to elicit a minimum and maximum number defining a range within which the value lies. Unfolding brackets significantly reduce the number of observations for which we have no information at all on any one source of income or wealth. For any measures of income or wealth in pension funds for which an individual did not give an exact figure, imputation is used to obtain a value within the range elicited by the unfolding brackets.

The imputation procedure used is known as the ‘conditional hot-deck’. For each missing or banded case, this involves choosing a random observation from all observations with matching characteristics in a number of dimensions (the conditioning variables) and, where we have banded information, with income or wealth within the same range. The level of wealth or income from the observation that is picked at random is then assigned to the missing case. The advantage of this method over (for example) choosing the median value amongst the matching group is that it maintains the variance properties of the original sample. Table D.1 shows the conditioning variables used when imputing each of the financial variables.

Table D.1. Conditioning variables used to impute missing values of financial variables

Financial variable to be imputed	**Conditioning variables**
Earnings	Age band Sex Marital status
Self-employment income	Education level
Income from financial assets and property	Age band Benefit-unit type (couple / single man / single woman)
Pension fund value	Current earnings Pension tenure

D.2 Possible misreporting of state pension income and benefits

A common problem amongst household surveys is that pensioners incorrectly report means-tested and health-related benefits (such as pension credit) as being state pension income rather than benefit income (see Hancock and Barker (2003)). Looking at reported state pension receipt in the ELSA data, it appears that this problem is also an issue with these data. For example, reported receipt of state pension income seems to exhibit spikes at the level of the pension credit for singles and couples. Whilst an individual could have been entitled to BSP and SERPS that happened to exactly equal the level of the MIG, there is no reason to expect many individuals to cluster at these points. Table D.2 shows points in the distribution of reported state pension income where an unexpectedly high number of respondents clustered. The second column of Table D.2 gives a suggestion of which benefits may have been misreported as state pension income in order for respondents to have clustered at these precise points. The data were 'cleaned' accordingly to correct for these suspected errors in reporting.

Table D.2. Suspected misreporting of income from benefits as state pension income

Mass point in reported state pension income	**Suspected misreporting**
£90	Full BSP (£75.50) plus DLA care or mobility (low) amount (£14.90).
£96–£100	MIG for single pensioner (£98.15).
£113–£114	MIG for single pensioner (£98.15) plus DLA of £14.90.
£140	Single pensioner's MIG with severe disability premium (£140.40).
£150	Either two full BSPs reported in one person's record or couple's MIG of £149.80. If couple had no private pension income, state pension income assumed to be £75.50, plus £74.30 (i.e. £149.80 – £75.50) of MIG. If couple had some private income, assume both receive full BSP (£75.50 each).
£178	MIG with severe disability premium plus lower rate of AA.

Abbreviations: AA – attendance allowance; BSP – basic state pension; DLA – disability living allowance; MIG – minimum income guarantee.

A small number of other cases were also 'cleaned' where individuals reported receiving benefits which, by the rules of these benefits, either cannot be received together or cannot be received by individuals of a certain age. Table D.3 lists the conflicting benefits and the assumption made to correct for the apparent conflict.

Table D.3. Corrections made for reporting of incompatible benefits

Benefits reported	Reason for incompatibility	Correction made
Retirement pension and widow's pension	Widow's pension received by those under 65; those aged 65 and over receive retirement pension.	If same benefit being double-counted, delete age-inappropriate benefit. If amounts reported in each were significantly different, add together reported amounts.
AA and DLA care component	DLA care component cannot be received in conjunction with AA, though DLA mobility component can be.	Assume any DLA reported is 'mobility' rather than 'care' component.
Long-term IB reported by those aged over SPA	Cannot be received by individuals over SPA.	Assume this is in fact DLA.
AA reported by those aged under 65	Cannot be received by anyone under age 65.	Where this report is double-counting DLA, delete AA record. Assume it is ICA if amount is right (£42–£43). Otherwise, call it DLA.

Abbreviations: AA – attendance allowance; DLA – disability living allowance; IB – incapacity benefit; ICA – invalid care allowance (the predecessor to carer's allowance); SPA – state pension age.

Appendix E. Uprating rules and conventions and take-up rates

Table E.1. Uprating rules and conventions

Rule	What it is used for
In line with RPI to previous September, rounded to nearest 5p	Child benefit Severely disabled premiums in income support and housing benefit Incapacity benefit Carer's allowance Disability living allowance Attendance allowance Severe disablement allowance Basic state pension (only until 2011–12 under White Paper baseline)
In line with RPI to previous September, rounded to nearest £5	All working tax credit amounts Disabled and severely disabled elements of child tax credit Per-child element of child tax credit (from 2010–11) National Insurance upper earnings limit
In line with RPI to previous September, increase rounded up to nearest £10	Income tax personal allowances Income tax starting-rate limit Income tax married couple's allowances National Insurance small earnings exemption
In line with RPI to previous September, increase rounded up to nearest £100	Income tax basic-rate limit Threshold for withdrawal of older person's income tax allowances
In line with ROSSI to previous September, rounded to nearest 5p	Most income support rates Most housing benefit applicable amounts Non-dependent deductions for income support, housing benefit and second adult council tax rebate
In line with ROSSI to previous September, rounded to nearest £1	Thresholds for non-dependent deductions for income support, housing benefit and second adult council tax rebate
In line with average earnings index to previous September, rounded to nearest 5p	Pension credit guarantee amounts Basic state pension (from 2012–13 under White Paper baseline) Savings credit taper threshold (from 2008–09 to 2014–15 under White Paper baseline)
In line with average earnings index to previous September, rounded to nearest £5	Per-child element of child tax credit (until 2009–10)
Frozen	Winter fuel payments to pensioners Income support and housing benefit disregards Family element of child tax credit Tax credit thresholds

Notes: Parameters in the tax and benefit system that are calculated as a function of other parameters continue to be calculated in the same manner. An exception to this rule is the savings credit taper threshold, which under the White Paper baseline is first earnings-indexed from 2008–09 to 2014–15 and is then uprated such that the maximum amount of savings credit (which equals 60 per cent of the difference between the savings credit taper threshold and the pension credit guarantee) remains constant in real terms. Details of how this is done are available from the authors on request.

Table E.2. Pension credit take-up rates used in our analysis

Amount of entitlement	Single male pensioners	Single female pensioners	Couple pensioners
Guarantee credit only	82%	86%	66%
Guarantee credit and savings credit	76.5%	80%	79.5%
Savings credit only	52%	52%	47%

Source: Department for Work and Pensions, 2006c.

Table E.3. Other means-tested benefit take-up rates used in our analysis

Benefit	All pensioners
Housing benefit	88.5%
Council tax benefit	58.5%

Source: Department for Work and Pensions, 2006c.

Table E.4. Tax credit take-up rates used in our analysis

Level of entitlement	All pensioners
Child tax credit, out of work	89%
Child tax credit and working tax credit	90%
Child tax credit, more than family element	86%
Family element of child tax credit or less	71%
Working tax credit for those without children – singles	21%
Working tax credit for those without children – couples	13%

Source: HM Revenue and Customs, 2006.

Glossary

AA	attendance allowance
AHC	after housing costs
BHC	before housing costs
BHPS	British Household Panel Survey
BSP	basic state pension
CA	carer’s allowance
CTB	council tax benefit
DB	defined benefit
DC	defined contribution
DLA	disability living allowance
DWP	Department for Work and Pensions
ELSA	English Longitudinal Study of Ageing
FRS	Family Resources Survey
GAD	Government Actuary’s Department
GC	pension credit guarantee credit
HB	housing benefit
HBAI	Households Below Average Incomes (data-set)
HRP	home responsibilities protection
IB	incapacity benefit
ICA	invalid care allowance (predecessor to carer’s allowance)
LEL	lower earnings limit
LS	ONS Longitudinal Study
MIG	minimum income guarantee (predecessor to pension credit)
MTB	means-tested benefit
NI	National Insurance
NRA	normal retirement age
OfA	*Opportunity for All* (DWP’s annual report on its anti-poverty policies)
ONS	Office for National Statistics
PC	pension credit
PCG	pension credit guarantee credit
S2P	State Second Pension
SC	pension credit savings credit
SDA	severe disablement allowance
SERPS	State Earnings-Related Pension Scheme (predecessor to State Second Pension)
SPA	state pension age
UEL	upper earnings limit

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