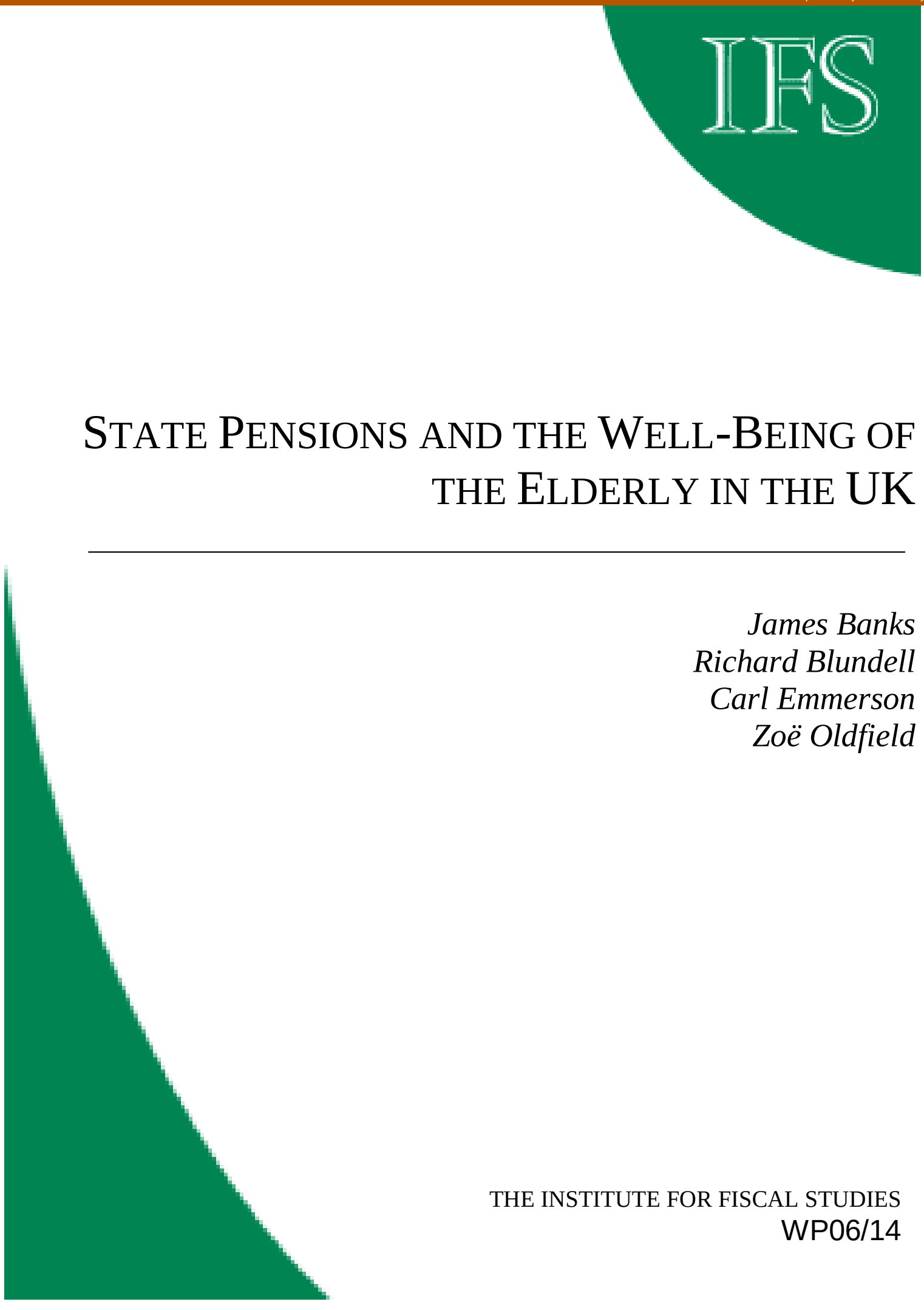

STATE PENSIONS AND THE WELL-BEING OF THE ELDERLY IN THE UK

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State Pensions and the Well-Being of the Elderly in the UK

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Abstract

This paper presents the trends seen over the last quarter of the 20th Century in various indicators of the well-being of the elderly alongside those seen for the young. Specifically we look at measures of both the level and distribution of income and expenditure, and self-reported measures of life satisfaction and health. We then exploit the substantial reforms to the UK pension system over this period to examine the impact of reforms to state pensions on these outcomes. We find that increases in the generosity of state pensions have led to increased incomes of the elderly and reductions in measures of both relative and absolute income poverty. We also find that increased state pensions have led to increased expenditure by the elderly. It is perhaps not surprising that in the UK the reforms to the generosity of state pensions have affected outcomes among the elderly (instead of being fully offset by individuals when they were younger) given that often very little (pre-retirement) notice was given, and that some of the reforms were of a substantial magnitude.

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1. Introduction

Since the mid 1970s there has been substantial reform to the UK state pension system. This began with legislation in 1975 which introduced the first pay-as-you-go earnings-related state pension of note in the UK (the State Earnings-Related Pension Scheme, SERPS).[1] This represented a large increase in the generosity of future state pensions. In response to the very large increase in future taxation that would have been required further reform soon followed. These reforms (legislated in 1980, 1986 and 1995) significantly scaled back the generosity, and hence the financial cost, of future state pensions. In contrast a more recent reform (legislated in 2000) has increased the generosity of future state pensions, although for many alive today the impact will be to slow the decline in generosity, rather than to increase the generosity of state pensions, over successive cohorts (Disney and Emmerson, 2005).

The state pension reforms since 1980 have improved the financial sustainability of the UK's public finances. However, unless fully offset through other changes (for example through increased private retirement saving or delayed retirement), they will also reduce the living standards enjoyed by the elderly. The objective of this paper is to evaluate the affect these reforms have had on a number of different potential indicators of the well-being of the elderly. Specifically we examine the impact of the reforms on the elderly in terms of the level of both family income and household expenditure, the proportion of elderly below different indicators of family income and household expenditure poverty, and also self-reported health status and life satisfaction.

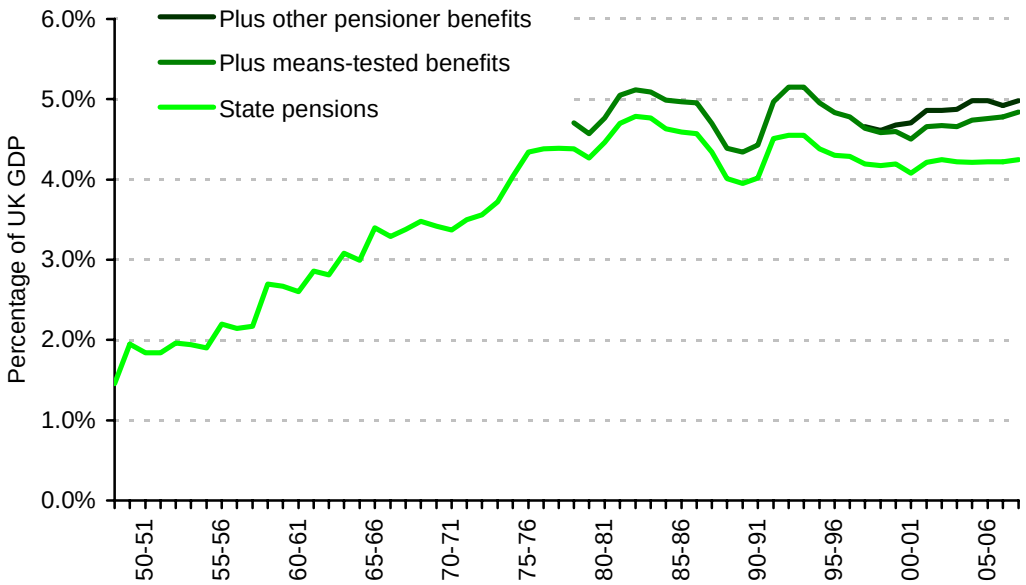
Section 2 provides a brief description of trends in financial state support for the elderly in the UK and the key reforms that took place in the last quarter of the 20th Century. Section 3 describes the data on potential indicators of well-being of the elderly used in the analysis. We present changes over time in selected potential indicators of the well-being of the population aged 55 and over alongside changes in the same measure among the population aged 25 to 49 (inclusive). Section 4 describes the empirical strategy employed, and provides details of our constructed simulated state pension income by age and cohort, and a comparison with the actual level of state pension income received. The results are presented in section 5. Section 6 concludes.

[1] The graduated pension was introduced by the 1959 National Insurance Act and covered those in employment but not contracted out into an occupational pension between 3rd April 1961 and 5th April 1975. Average payments under this scheme are relatively ungenerous, not least because entitlements were frozen in cash terms between April 1961 and November 1978 during which period prices

2. Financial state support for the elderly in the UK

Public spending on state pensions in the UK increased from just under 1.5% of national income in 1948–49 to 4.8% of national income in 1980–81. Since then, as shown in Figure 2.2, both public spending on state pensions, and total public spending on transfer payments to pensioners (i.e. including means-tested benefits and other payments such as annual winter fuel payments) has remained broadly constant as a share of national income.

Figure 2.1 State spending on financial transfers to pensioners in Great Britain, 1948–49 to 2007–08



Source: Emmerson, C., Tetlow, G. and Wakefield, M. (2005).

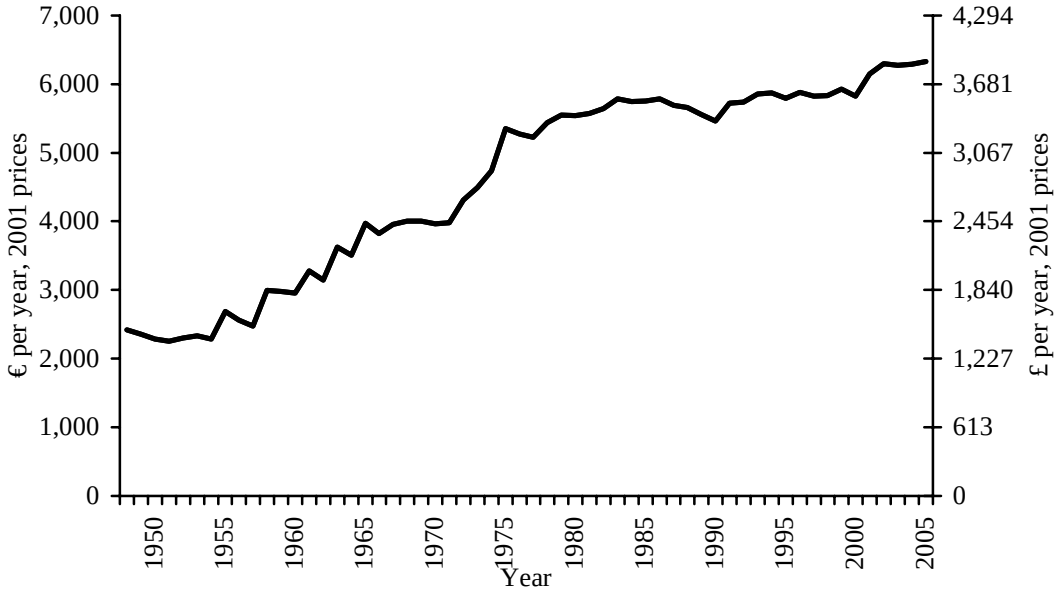
In the period since 1980 there have been two key factors which have helped prevent the financial cost of state transfer payments to pensioners in the UK from increasing as a share of national income. First, as a result of the increase in the birth rate that occurred after the end of World War II, the size of the pensioner population relative to the working-age population has been almost constant since 1980 (see figures 1.6 and 1.7 of Pensions Commission, 2004). Second the 1980 decision to formally index increases in the Basic State Pension (the flat rate contributory component of the UK system) with the growth in prices as opposed to the greater of growth in earnings or prices which had previously been the case. Despite adhoc above inflation increases in the

quadrupled. In September 2004 total payments cost the Government an annualised equivalent of £1.4 billion (0.1% of GDP).

Basic State Pension (for example in April 2001 and April 2002) its level has fallen relative to average wages (which in the UK, unlike the US, rose in real terms during the 1980s).

Figure 2.2 shows the annual value of a full Basic State Pension for a single pensioner in both 2001 Euros (left hand axis) and 2001 UK pounds (right hand axis) from its introduction in July 1948 through to April 2005. Over the 25 year period from 1980 to 2005 the value of the Basic State Pension was increased by 14% in real terms. This is in stark contrast to preceding 25 years from 1955 to 1980 when the (after inflation) value of the Basic State Pension more than doubled.

Figure 2.2 Annual value of the full Basic State Pension for a single pensioner, from 1948 to 2005.



Source: Value of Basic State Pension in £ per week taken from Table 5.1 of Department for Work and Pensions (2004), *Annual Abstract of Statistics* (http://www.dwp.gov.uk/asd/asd1/abstract/Abstract2004.pdf). Figures uprated to June 2001 prices using the Retail Price Index from the Office for National Statistics (http://www.statistics.gov.uk/articles/nojournal/1750CPI.pdf), and converted to Euros using an exchange rate of £1 = €1.63.

The broadly constant level of state spending on transfer payments to pensioners seen since 1980–81 is perhaps even more surprising given that SERPS, which was legislated for in 1975, was introduced from April 1978. However in addition to the falling generosity of a full Basic State Pension (relative to average earnings) the full financial cost of the original SERPS would not have been felt until 2030 as it took 20 years to build a full entitlement to the original scheme.[2]

[2] The 1975 Social Security Act also increased future Basic State Pension entitlements through the introduction of Home Responsibilities Protection which meant that from April 1978 periods spent

The *future* generosity of SERPS payments has since been radically scaled back[3], with the reforms announced in 1986 and 1995 reducing estimated spending in 2030 to around a quarter of what it would have been had the scheme been left unreformed (Emmerson and Johnson, 2002). These reductions to the generosity of SERPS have largely been through a combination of "parametric" reforms (Disney, 2000) to the formula used to calculate entitlements and through a pre-announced increase in the state pension age for women from 60 to 65.[4] Further details of these reforms are discussed below in Box 2.1 (which is taken from Attanasio, *et al*, 2004).

State spending on the Basic State Pension and SERPS (and its replacement the State Second Pension (S2P)) is now projected by the UK Department for Work and Pensions to fall slightly from 4.3% of national income in 2005–06 to 4.6% of national income in 2055–56.[5] Once spending on other transfer payments, and in particular the means-tested Pension Credit, is included total spending is forecast to rise from 6.3% of national income in 2004–05 to 8.0% of national income in 2055–56, with all of the forecast increase occurring in the last 20 years. Despite this the most recent projections by the European Commission suggest that the UK will continue to have a relatively low level of pension spending compared to many other EU countries.[6] Over this period the number of pensioners in the UK is forecast to increase from 11.3 million in 2005 to 18.2 million in and 2056, growth of some 62% despite the planned increase in the state pension age for women. Taken together these projections imply that state spending per pensioner as a share of national income is set to fall to approximately eighty percent of its current level over the next fifty years.

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without NI contributions but with formal caring responsibilities reduced the number of years of contributions required. Periods with formal caring responsibilities prior to April 1978 are not eligible. In addition the right of married women to pay reduced rate National Insurance Contributions in return for not receiving a Basic State Pension in their own right was ended in April 1977. Those already opted out were allowed to continue to pay this reduced rate. Hence the full impact of both of these changes on entitlements to state pensions will not be felt until the middle of the 21st Century.

[3] The financial costs of the original SERPS were only originally calculated through to 2000 and not through to 2030. When calculations were done (Hemming and Kay, 1980) the implied contribution rates were deemed unsustainably high.

[4] The female state pension age is set to be increased by 1 month every 2 months between 2010 and 2020.

[5] Figures from Table LT.3 of Department for Work and Pensions (2005) *Benefit Expenditure Tables, Long-Term Projections* (figures dated 5th December 2005) http://www.dwp.gov.uk/asd/asd4/long_term.asp These figures are not the same as those contained in figure 2.1 as these are for the UK whereas those in figure 2.1 are for Great Britain.

[6] See Table I.18 and Table 1.19 of European Commission (2005).

Box 2.1. Reforms to the UK state pension system, 1980 to present day

Reductions in generosity of the state system:

Social Security Act 1980	State pension payments to be increased by growth in prices instead of the greater of growth in prices or earnings.
Social Security Act 1986	Entitlement to SERPS to be calculated on the basis of earnings over entire working life (16 to state pension age) rather than across the best 20 years phased in for those reaching the state pension age from April 2000 onwards. The accrual factor on SERPS to be reduced from 25% to 20% of earnings between the lower and upper earnings limits. This is to be phased in for those reaching the state pension age between April 2000 and March 2008, although accrued entitlement from before April 1988 is protected. Surviving partners of those who die after April 2000 to inherit 50 percent of their spouse's state pension instead of 100 percent. (This change was later put back to October 2002 after the Department for Social Security failed to correctly inform some individuals of this change, and now relates to year reached state pension age rather than year died).
Social Security Act 1995	State pension age for women to be increased from 60 to 65 gradually between 2010 and 2020 (by 1 month every 2 months). Technical change made to the formula used to calculate SERPS entitlement. This reduced the generosity of SERPS to those reaching the state pension age after April 1999, with both retrospective and prospective SERPS rights reduced.

Increases in generosity of the state system:

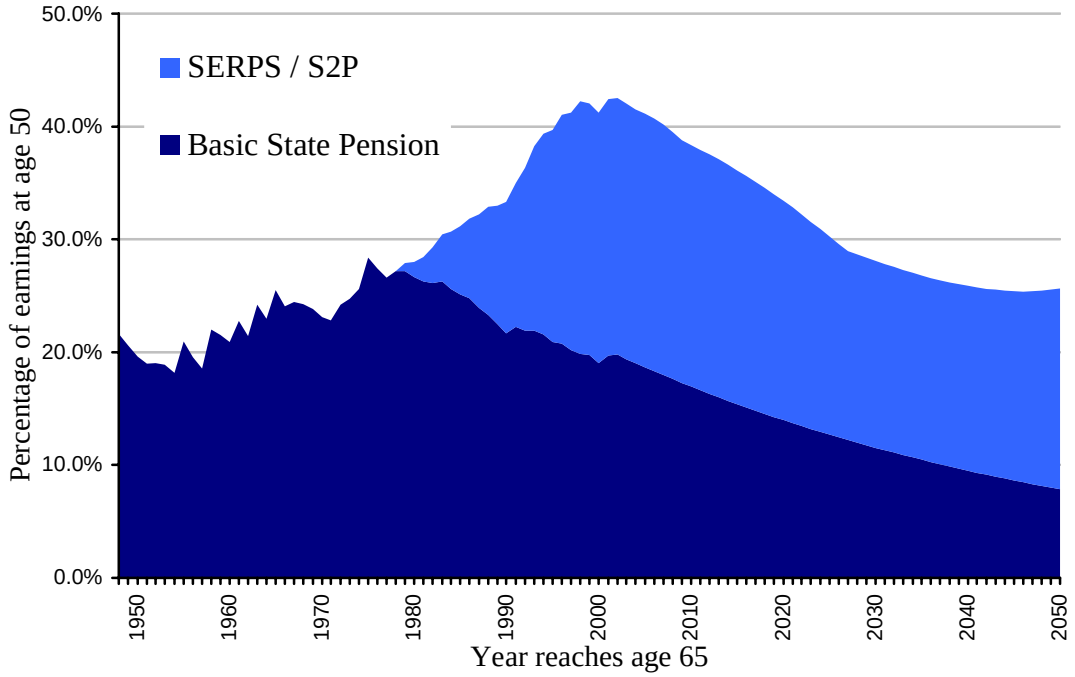
Child Support, Pensions and Social Security Act 2000	The State Second Pension to replace SERPS from April 2002 onwards. This is more generous to lower earners and to some individuals with caring responsibilities.

Source: Attanasio, *et al* (2004).

Figure 2.3 shows the replacement rate offered by the UK state pension system for men reaching the state pension age (age 65) between 1948 and 2050 who spend their entire working-age lives (16 to 65) in paid-employment at the (age-specific) median wage. Despite the fall in the generosity of the Basic State Pension relative to average earnings seen since 1980 the overall generosity of state pensions for this median earning individual, in the absence of further reforms, is found to have peaked (in terms of state pension as share of an individuals earnings at age 50) around the start of the 21st Century. This is due to the large increase in spending on SERPS from the 1975 legislation, and the fact that the subsequent substantial cuts legislated in 1986 and 1995 are only being phased in from April 2000 and April 1999 respectively (as described in Box 2.1). The

increase in spending arising from the replacement of SERPS with the more generous S2P will, for this type of individual at least, only slow the decline in generosity of the state system (although lower earners and those with certain formal caring responsibilities will benefit more from the reform, see Disney and Emmerson (2005) for more details).

Figure 2.3. State pension entitlement for male with median (age-specific) earnings, full employment history, 1948 to 2050.



Notes: Calculations for individuals with full contribution history with median male age specific earnings and 2% annual economy-wide real earnings growth.

Source: Disney and Emmerson (2005).

The next section presents changes over time in potential indicators of the well-being of those aged 55 and over alongside the same measures among the population aged 20 to 49.

3. Data on potential indicators of the well-being of the elderly

3.1 Data sources

Three different sources of data have been used for the analysis contained in this paper. For measures of income and expenditure over time we use data from the *Family Expenditure Survey*. For information on self-reported life satisfaction we use data from the *Eurobarometer* survey. For self-reported health status we use data from the *General Household Survey*. Table 3.1 sets out the years for which the relevant information is available and the overall sample sizes of those aged 55 or over.

Table 3.1 Data sources used for information on income, expenditure, life satisfaction and health.

Measure	Data source	Years available	Number of observations of those aged 55+
Income (both total and social security)	Family Expenditure Survey	1968–2000	146,202
Expenditure	Family Expenditure Survey	1974–2000	118,690
Life Satisfaction	Eurobarometer	1975–1995, 1997–2001	20,235
Health	General Household Survey	1975–1995, 1997–2001	145,605

Source: FES, GHS and Eurobarometer surveys, various years. All surveys contain individuals of all ages.

The Family Expenditure Survey (FES) is an annual survey of around 7,000 UK households. It has been running since 1957. Due to data discontinuities we use income data from 1968 onwards and expenditure data from 1974 onwards.[7] We measure income net of direct taxes and inclusive of all benefits, including housing benefit (which was introduced in April 1983. Expenditure is total household expenditure minus spending on housing. Data is currently available through to 2000 for both income and expenditure. Note that having information from before 1975 is particularly useful for the analysis since it allows us to include some of the period before the legislation introducing SERPS was passed.

The Eurobarometer is a survey of individuals in EU countries which is conducted at least twice a year and has been running since the early seventies. The annual sample size varies between around 2,500 and 7,000 individuals from the UK. We use the self-reported information on life satisfaction which is available for all years from 1975 to 2001 with the exception of 1996 when the information is not available. The question

[7] For information on the income and expenditure measures in the FES see Banks and Johnson, 1998.

asked is "On the whole, are you satisfied, fairly satisfied, not very satisfied, or not at all satisfied with the life you lead?" Unfortunately no information is available before 1975 which means that analysis of this outcome will not include any of the period before the legislation introducing SERPS was passed.

The General Household Survey (GHS), like the FES, is a survey of around 7,000 private UK households a year. It has been running since 1971, although there was no survey in either 1997–98 or 1999–2000. As a result for 1997 and 1999 individuals in the sample will all have been interviewed in the first quarter of the calendar year, while for 1998 and 2000 individuals will all have been interviewed in the last three quarters of the calendar year. The information that we use on self-reported general health status is only available from 1977 onwards. The question asked is "Over the last 12 months would you say your health has on the whole been good, fairly good, or not good?". As with the information on self-reported life satisfaction no information is available before 1975 which means that analysis of this outcome will not include any of the period before the legislation introducing SERPS was passed.

Table A.1 provides some basic descriptive statistics on the number of individuals aged 55 and over in each of the surveys used, by year. Due to improvements in health the average age of individuals aged 55 and over has increased over time. For example in the FES it has gone from 65.8 years in 1968 to 67.9 years in 2000. This increase in longevity has also led to a reduction in the percentage of those aged 55 and over who are female, which among respondents to the FES has fallen from 55.5% in 1968 to 54.2% in 2000. There is also an increase in the percentage of those aged 55 and over that are outright owner-occupiers from 36.5% in 1968 to 58.5% in 2000. In addition to older individuals being more likely to own their own home outright, later cohorts in the UK have also had an increased propensity to be owner occupiers (the age profiles for each cohort are shown in section 4 of Banks and Tanner, 1999).

3.2 Trends in potential indicators of well-being

Figure 3.1a presents mean family level income (equivalised for family size) among those aged 55 and over ('elderly') and those aged 20 to 49 ('young') from 1968 to 2000, with 1968 indexed to 100. Income is measured net of taxes and inclusive of all benefits. The 'young' have higher mean incomes than the 'elderly', although the latter group have seen very slightly faster growth in their incomes over this 33 year period. In addition, as expected, the incomes of the 'elderly' are slightly less correlated with business cycle than the 'young': the latter group experienced faster growth in the economic boom of the late

1980s and slower growth in incomes during the recessions of the early 1980s and the early 1990s. However mean incomes of both groups fell during the late 1970s – for the 'elderly' group this is despite the increase in the Basic State Pension during that period (both relative to prices and earnings as shown in Figures 2.2 and 2.3 respectively).

Figure 3.1b shows information on a measure of relative income poverty over the same period, again with 1968 indexed to 100. The poverty measure used here is the percentage of individuals with family incomes below forty percent of the median family income of those 'young' in the same year – i.e. the same relative poverty line is used for both the 'elderly' and for the 'young' within each year. Very few individuals, 'young' or 'elderly', fall below this relative income poverty line at the start of the period, although there is substantial growth in the poverty rates of both groups between 1984 and 1991.[8] Over the whole period there is greater growth in this measure of poverty among the 'young' than among the 'elderly, with the poverty rate of the 'young' being above that of the 'elderly' from 1972 onwards. Unsurprisingly the poverty rate of the 'elderly' is far more cyclical than that of the 'young' with a particularly large increase in the poverty rate among the 'elderly' during the boom of the late 1980s and a particularly large fall during the recession of the early 1990s. This poverty rate among the 'elderly' is also observed to fall between 1971 and 1975 (unlike that of the young) when, as shown in Figure 2.2 and Figure 2.3, the value of the Basic State Pension was increased both in real terms and relative to average earnings.

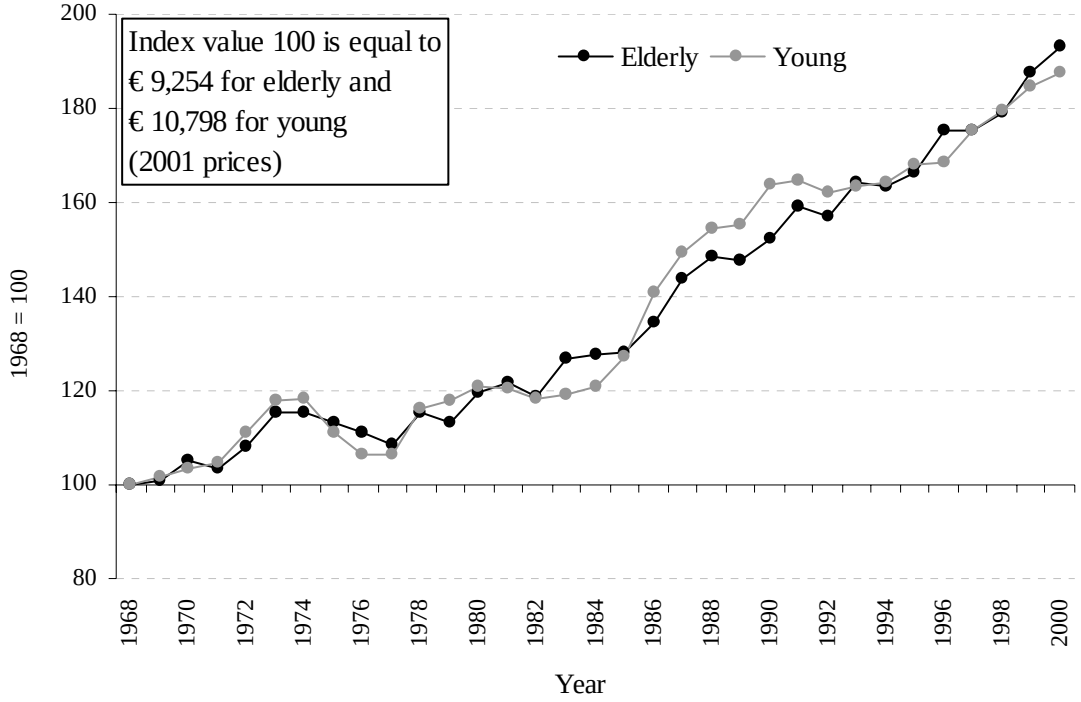
Figure 3.1c shows information on a measure of absolute income poverty over the same period, again with 1968 indexed to 100. The poverty measure is the percentage of individuals with incomes below forty percent of the median income of those 'young' in 1968 – i.e. the same absolute poverty line is used for both the 'elderly' and for the 'young' throughout this period. Very few individuals, young or elderly, fall below this absolute income poverty line at any point during the period.

Figure 3.1d presents information on the 10th, 50th and 90th percentile of family level income (equivalised for family size) among those aged 55 and over ('elderly') and alongside information on the 50th percentile among those aged 20 to 49 ('young') from 1968 to 2000, again with 1968 indexed to 100. Over the whole period growth, among these groups, has been highest among the 90th percentile of income among elderly families and second highest among the 50th percentile of income among elderly families,

[8] For more information on trends in poverty and inequality in the UK see Goodman, Johnson and Webb (1997) or Brewer, Goodman, Shaw and Shephard (2005).

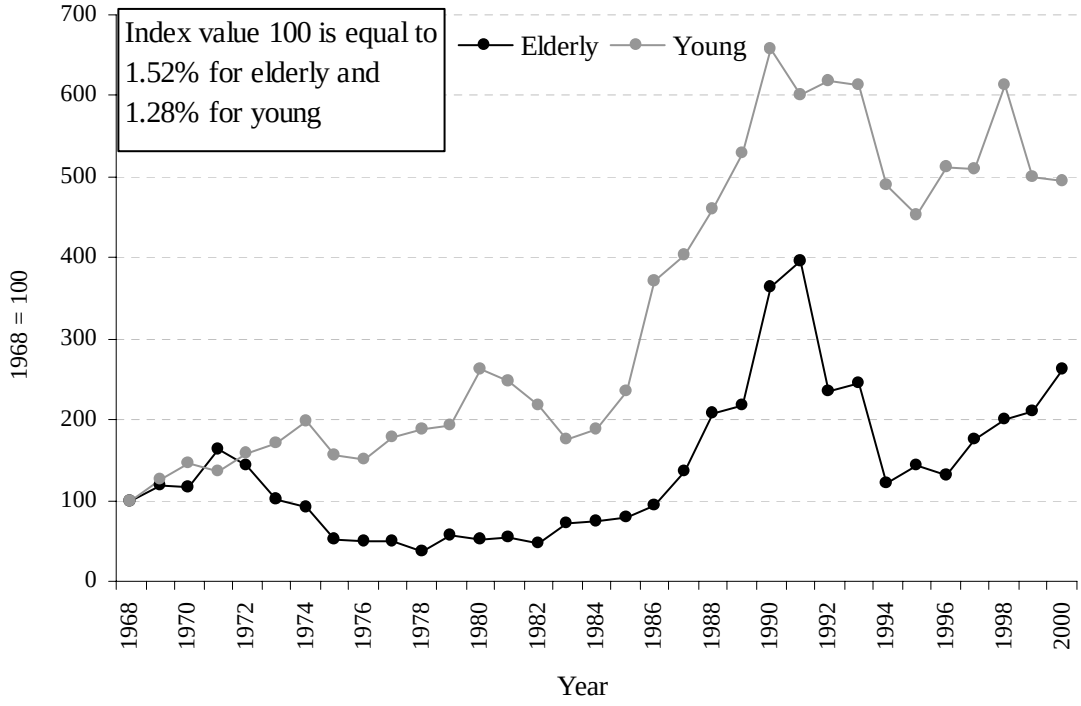
with lower (and similar) growth experienced by the 10th percentile of income among elderly families and the 50th percentile of income among young families. Relative to the median among elderly families the 10th percentile of family income among the elderly grew more strongly over the period from 1968 to 1986 and less strongly over the period from 1986 to 2000. Again relative to the median among elderly families the 90th percentile of family income among the elder grew relatively strongly between 1986 and 1991 and grew relatively weakly between 1991 and 1995.

Figure 3.1a Mean equivalised family income of 'elderly' and 'young' individuals, 1968 to 2000, 1968 indexed to 100.



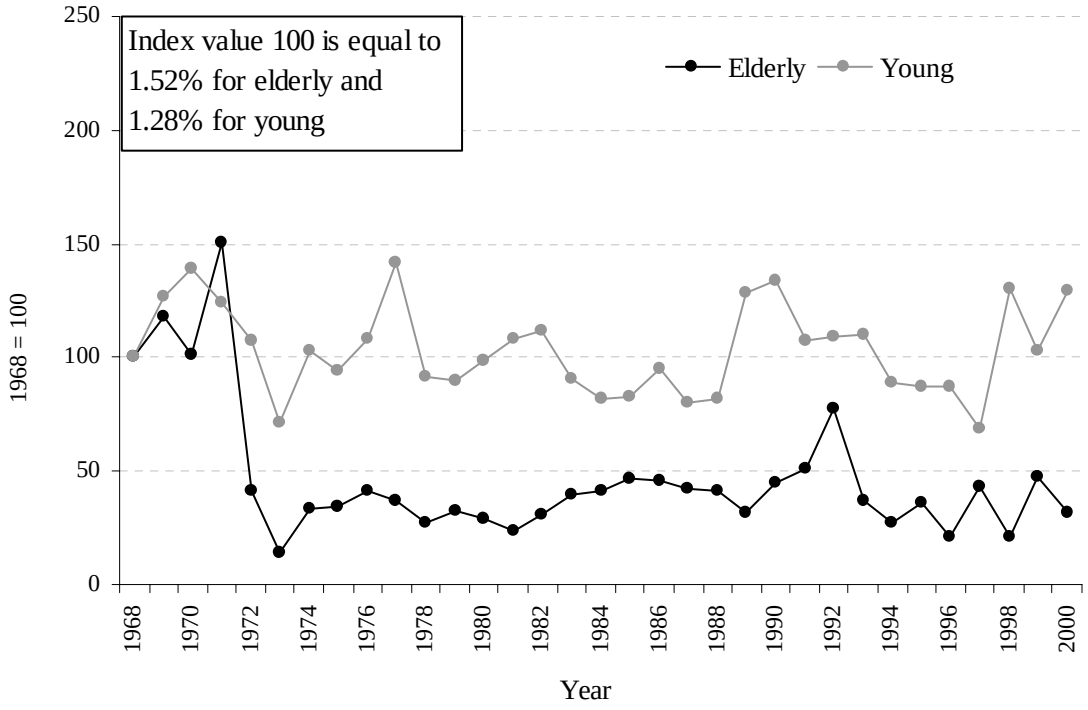
Source: Family Expenditure Survey, 1968 to 2000.

Figure 3.1b Mean relative income poverty rates of 'elderly' and 'young' individuals, 1968 to 2000, indexed to 100



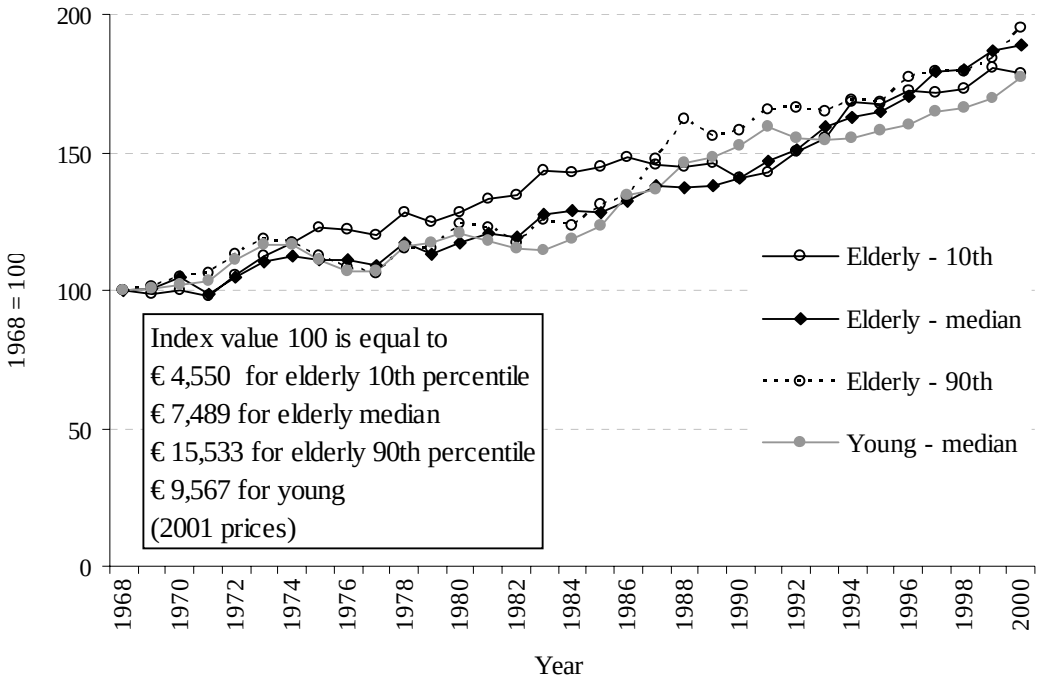
Source: Family Expenditure Survey, 1968 to 2000.

Figure 3.1c Mean absolute income poverty rates of 'elderly' and 'young' individuals, 1968 to 2000, indexed to 100



Source: Family Expenditure Survey, 1968 to 2000.

Figure 3.1d 10th percentile, median and 90th percentile of equivalised family income of 'elderly' and median equivalised family income of 'young' individuals, 1968 to 2000, 1968 indexed to 100.



Source: Family Expenditure Survey, 1968 to 2000.

Figure 3.2a presents mean total household expenditure net of housing and equivalised for household size among those aged 55 and over and those aged 20 to 49 from 1974 to 2000, with 1974 indexed to 100. As with income household expenditure of the 'elderly' is lower than that of the 'young' throughout the period from 1974 to 2000. Similarly spending grew slightly faster among the elderly (48.5%) than among the young (42.3%) over this period, although among both groups it grew by considerably less than the growth in income. As expected, changes in household expenditure over time are less cyclical than changes in income, with changes in household expenditure of the 'elderly' particularly smooth. Household expenditures of the 'young' still grow particularly quickly during the period of strong economic growth during the late 1980s (which at the time was widely believed to be a structural improvement in the economy, but this subsequently turned out not to be the case) and fell during the subsequent recession of the early 1990s.

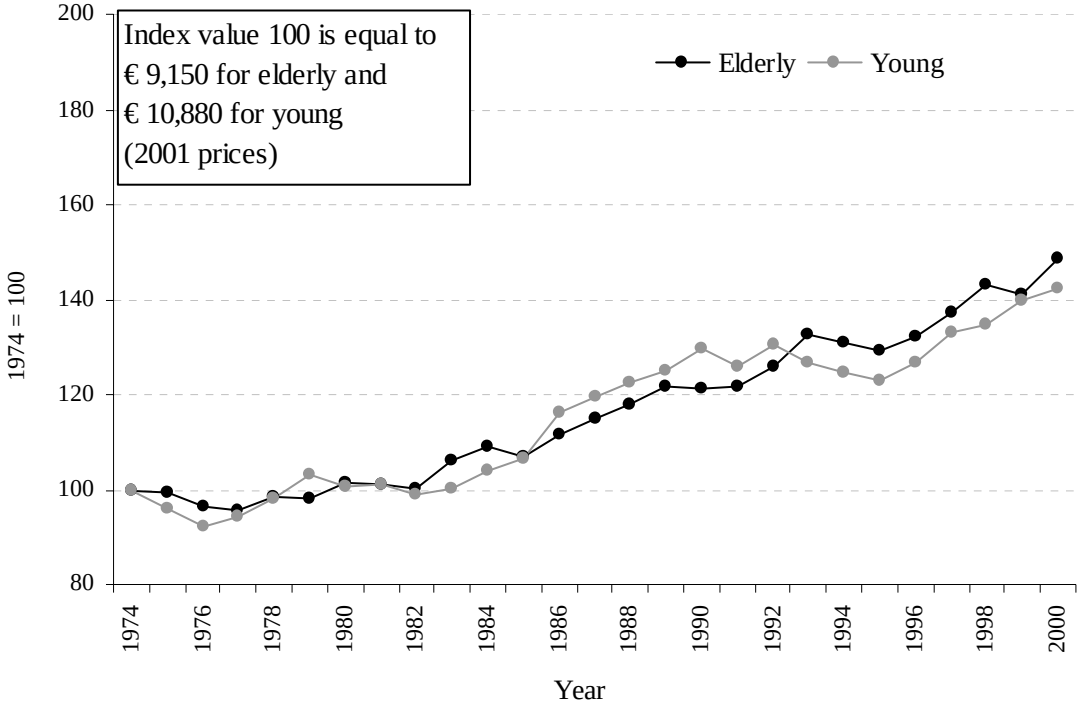
Figure 3.2b shows information on a measure of relative expenditure poverty over the same period, again with 1974 indexed to 100. The poverty measure is the percentage of individuals in households with expenditure below forty percent of the median household expenditure of those 'young' in the same year – i.e. the same relative expenditure poverty line is used for both the 'elderly' and for the 'young' within each year. In 1974 just 1.7% of the 'young' but 7.3% of the 'elderly' fall below this relative expenditure poverty line, despite having similar levels of poverty when measured using an income poverty line (shown in figure 3.1b). Over the period from 1974 to 2000 the percentage of 'young' below this relative expenditure poverty line increased steadily. The percentage of 'elderly' below this relative expenditure poverty line increased less over the whole period than that of the 'young', and also exhibited greater counter-cyclicality with declines in this measure of poverty during the recessions of the early 1980s and early 1990s and a rise during the economic boom of the late 1980s.

Figure 3.2c shows information on a measure of absolute expenditure poverty over the same period, again with 1974 indexed to 100. The poverty measure is the percentage of individuals in households with expenditures below forty percent of the median household expenditure of those 'young' in 1974 – i.e. the same absolute expenditure poverty line is used for both the 'elderly' and for the 'young' throughout this period. Different trends are seen for the 'young' and the 'elderly' with the former group experiencing an increase in the percentage falling below this absolute expenditure poverty measure while the latter group experiencing a fall. While in 1974 the 'elderly'

were 4.2 times more likely to have household expenditure below this absolute poverty line than the 'young', by 2000 this had fallen to 1.4 times more likely.

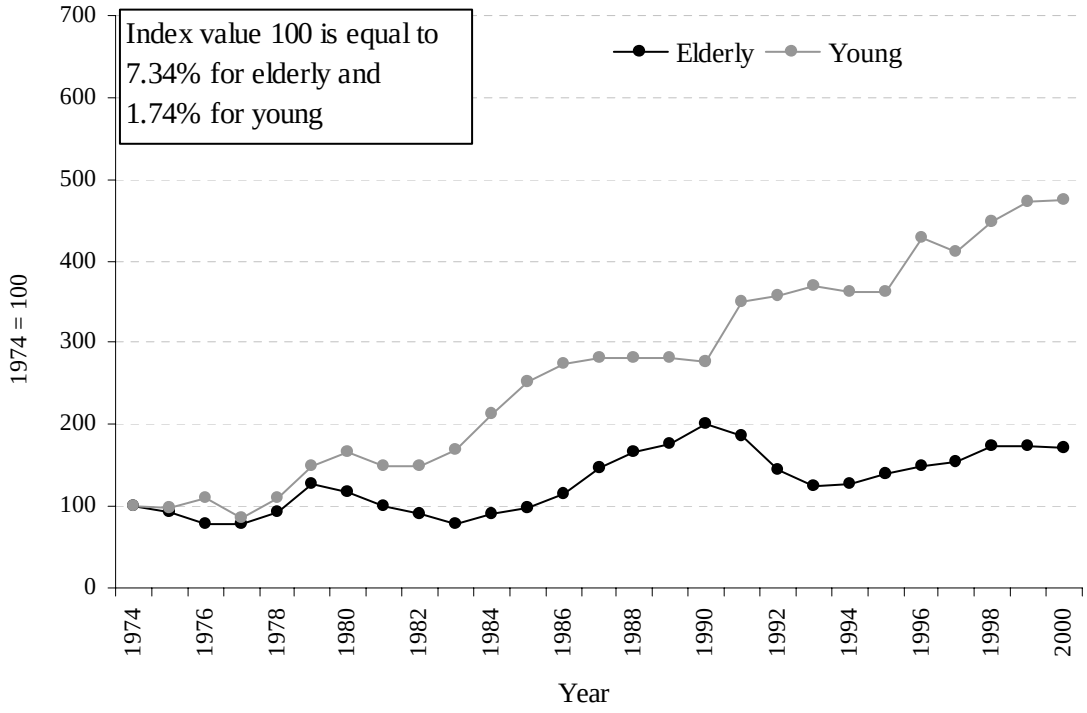
Figure 3.2d presents information on the 10th, 50th and 90th percentile of household level expenditure (net of housing and equivalised for family size) among those aged 55 and over ('elderly') and alongside information on the 50th percentile among those aged 20 to 49 ('young') from 1974 to 2000, again with 1974 indexed to 100. Over the whole period growth in median expenditure of elderly households has been very similar to growth in median expenditure of young households. Expenditure at the 90th percentile of elderly households has grown more quickly than expenditure at the median of elderly households, while expenditure at the 10th percentile of elderly households has grown less quickly than expenditure at the median of elderly households. In particular the period since 1986 has seen the 10th percentile of expenditure among elderly households grow by 16% in real terms which is less than half the 34% real increase in expenditure seen at the median.

Figure 3.2a Mean equivalised household expenditure of 'elderly' and 'young' individuals, 1974 to 2000, indexed to 100



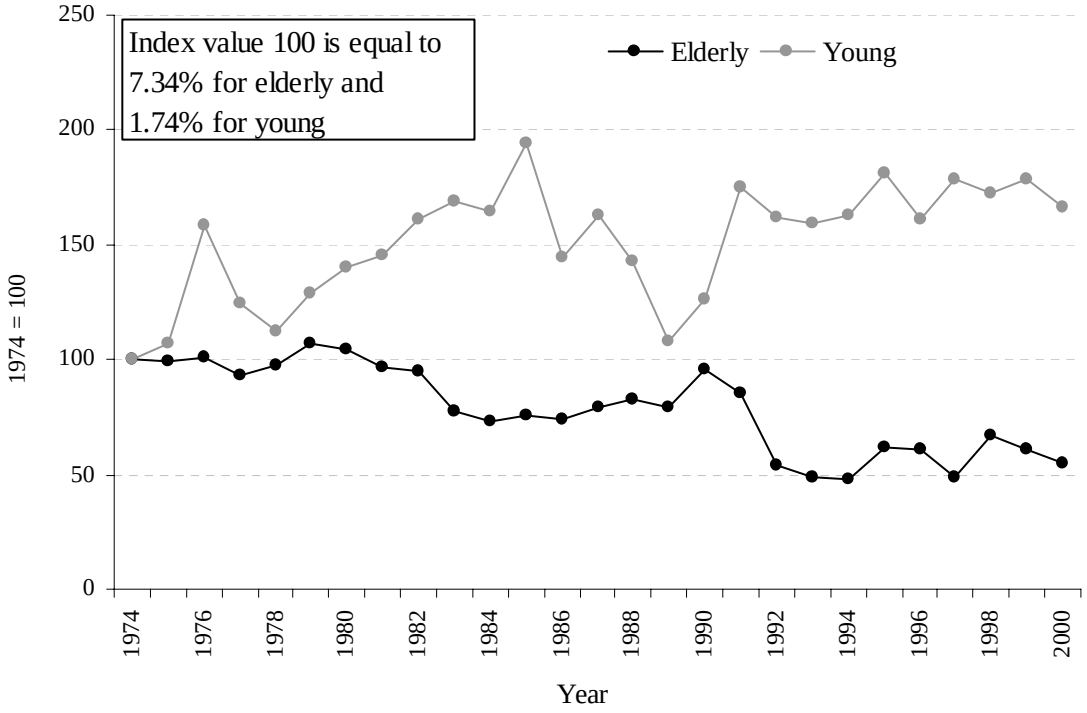
Source: Family Expenditure Survey, 1974 to 2000.

Figure 3.2b Mean household relative expenditure poverty rates of 'elderly' and 'young' individuals, 1974 to 2000, indexed to 100



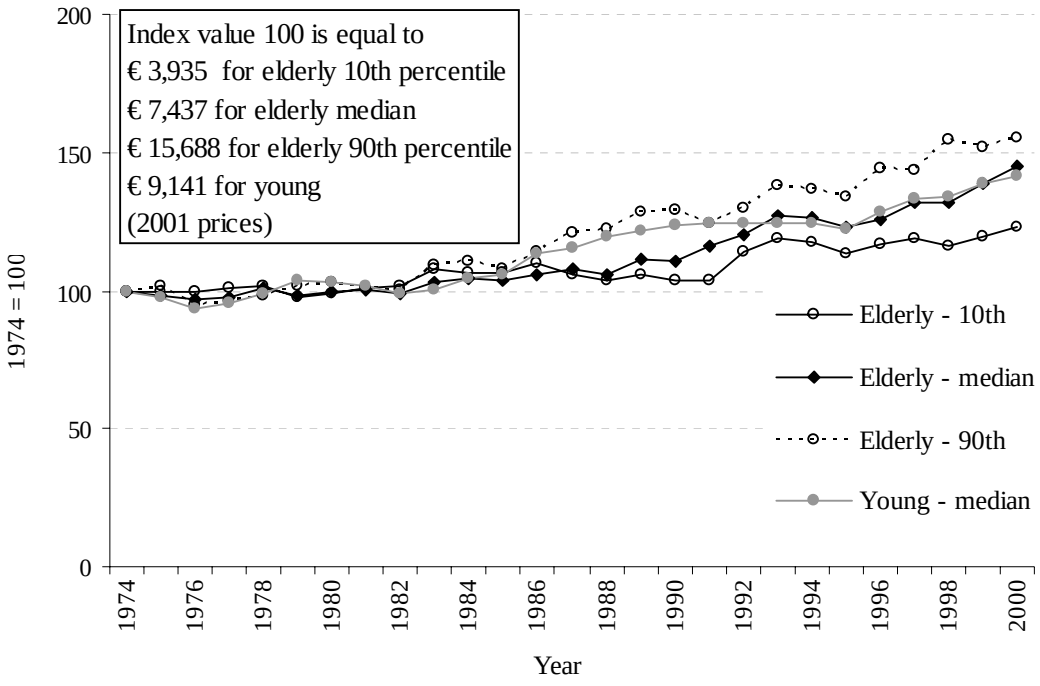
Source: Family Expenditure Survey, 1974 to 2000.

Figure 3.2c Mean household absolute expenditure poverty rates of 'elderly' and 'young' individuals, 1974 to 2000, indexed to 100



Source: Family Expenditure Survey, 1974 to 2000.

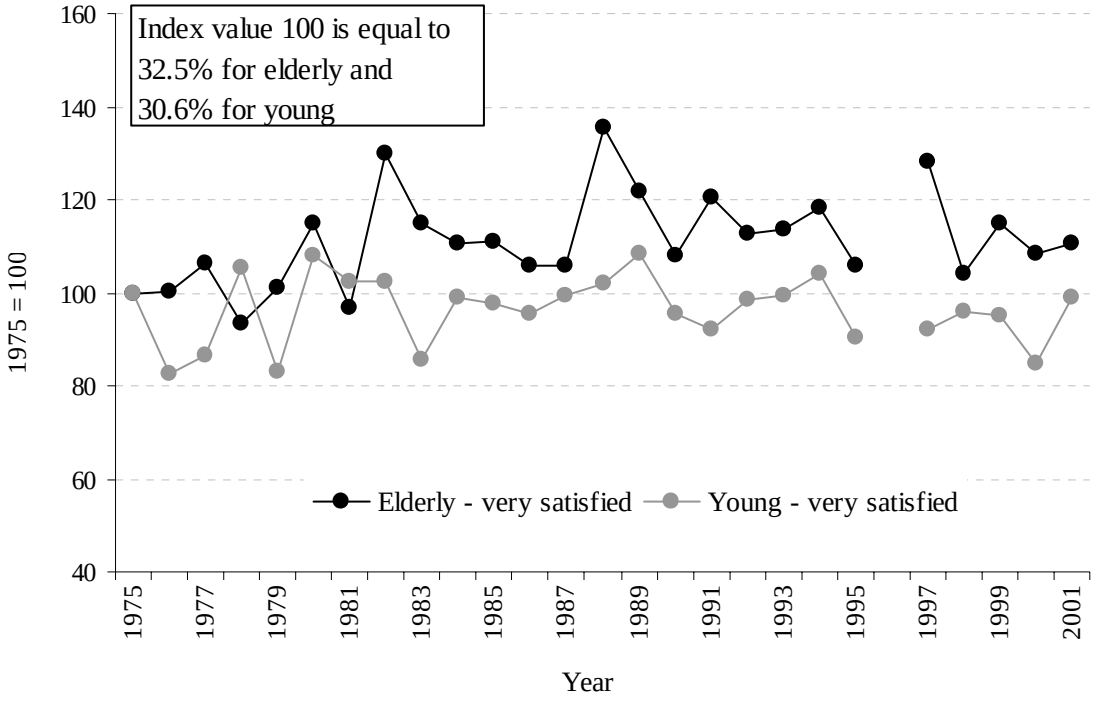
Figure 3.1d 10th percentile, median and 90th percentile of equivalised household expenditure of 'elderly' and median equivalised household expenditure of 'young' individuals, 1974 to 2000, 1974 indexed to 100.



Source: Family Expenditure Survey, 1974 to 2000.

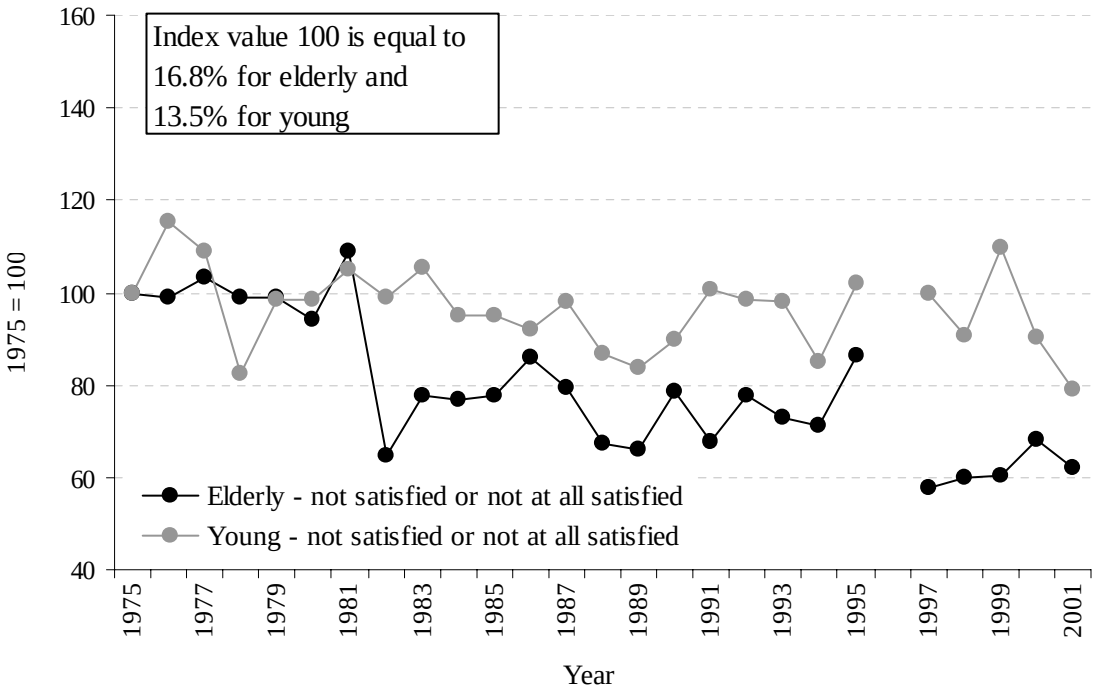
Figure 3.3a shows the percentage of 'elderly' and 'young' reporting themselves as being very satisfied with life from 1975 to 2001, while figure 3.3b shows the percentages who report themselves as being not very satisfied or not at all satisfied with life over the same period. In both figures 1975 is scaled to 100. At the start of this period a similar percentage of 'elderly' and 'young' report that they are satisfied with life, although a larger percentage of the 'elderly' than the 'young' report that that they are not very satisfied or not at all satisfied. Interestingly from 1982 onwards there is an increase in the proportion of the 'elderly' who report that they are satisfied with life and a decline in the proportion who report they are not very satisfied or not at all satisfied with life. In contrast there is no apparent break in the series for the 'young'.

Figure 3.3a Percentage of 'elderly' and 'young' individuals who report being very satisfied with life, 1975 to 2001, 1975 indexed to 100.



Source: Eurobarometer, 1975 to 1995 and 1997 to 2001.

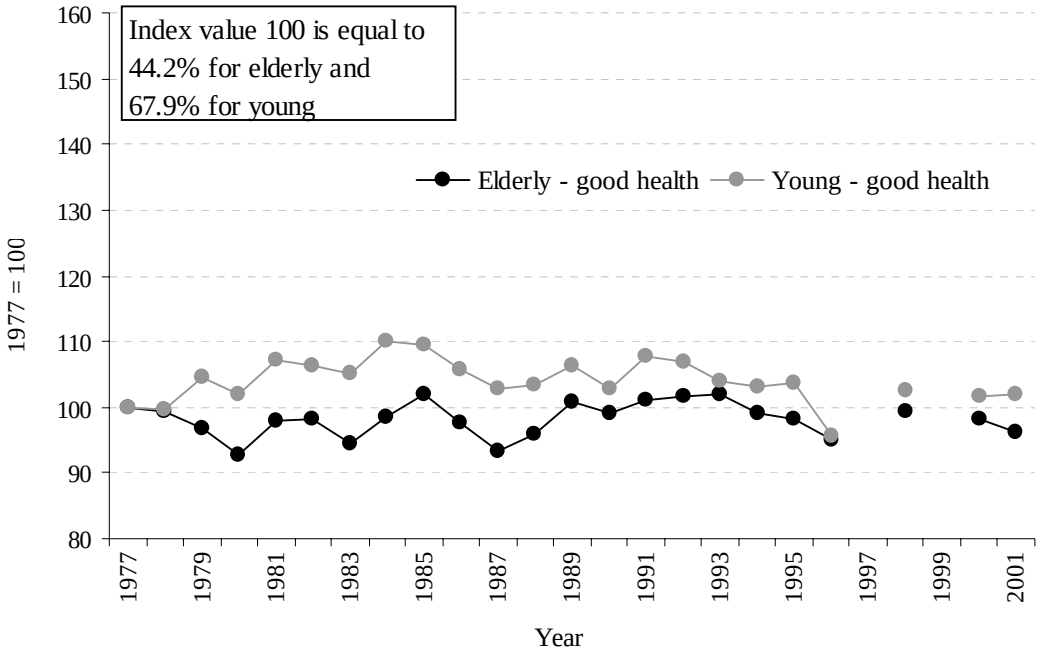
Figure 3.3b Percentage of 'elderly' and 'young' individuals who report being not very satisfied or not at all satisfied with life, 1975 to 2001, 1975 indexed to 100.



Source: Eurobarometer, 1975 to 1995 and 1997 to 2001.

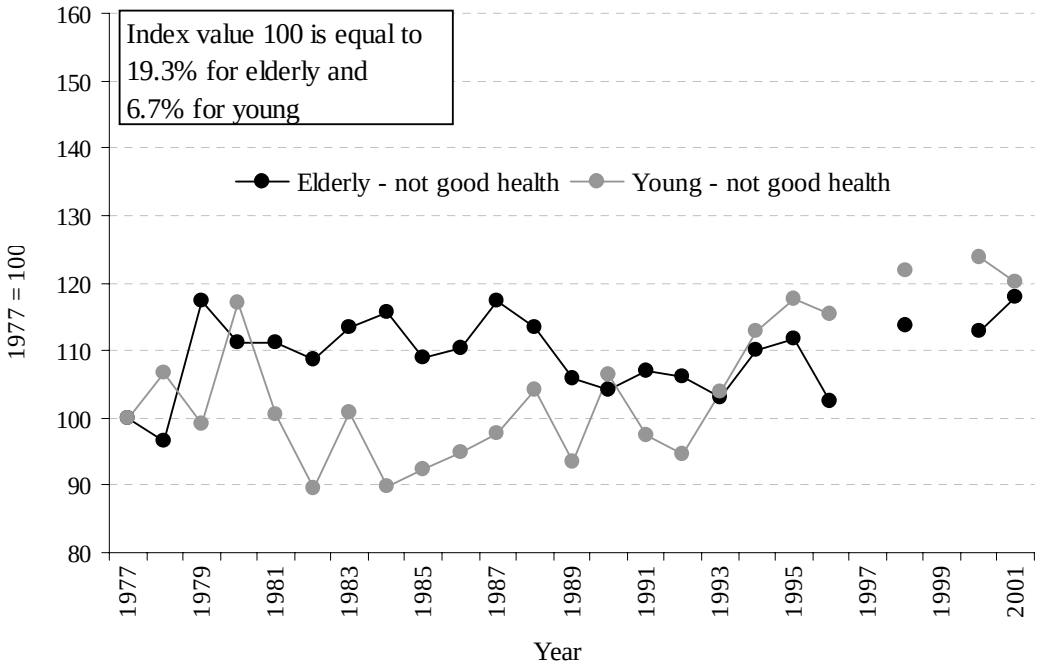
Figure 3.4a shows the percentage of 'elderly' and 'young' reporting themselves as being in good health from 1977 to 2001 (with 1997 and 1999 omitted due to data only being available from the 1st quarter), while figure 3.4b shows the percentages who report themselves as being in not good health over the same period. In both figures 1977 is scaled to 100. As expected the 'elderly' group are less likely to report themselves as being in good health and more likely to report themselves as being in not good health than the 'young'. Comparing 1977 to 2001 among the 'young' there is a similar percentage point increase in the percentage who report themselves as being in good health as being in not good health – i.e. the proportion who report neither has declined. A slightly different pattern is observed among the 'elderly' with a decline in the percentage who report being in good health and a larger percentage point increase in the percentage who report being in not good health.

Figure 3.4a Percentage of 'elderly' and 'young' individuals who report being in good health, 1977 to 2001, 1977 indexed to 100.



Source: General Household Survey, 1977 to 1996, 1998, 2000and 2001.

Figure 3.4b Percentage of 'elderly' and 'young' individuals who do not report being in good or fairly good health, 1977 to 2001, 1977 indexed to 100.



Source: General Household Survey, 1977 to 1996, 1998, 2000and 2001.

4. Empirical strategy and simulated state pension entitlement

4.1 Empirical strategy

The amount of state pension income received by an individual in retirement is not necessarily the impact that it has on their retirement income. This is because changes to the generosity of state pension arrangements might induce individuals to change their behaviour in ways which also affect their retirement income. For example in the face of a more generous state pension system working age individuals might choose to retire earlier (or reduce the amount of any part-time paid employment they undertake during their retirement) or to consume more (i.e. save less) while working. Gruber and Wise (1999; 2004) present cross-country evidence that more generous state retirement benefits indeed induce earlier retirement. Attanasio and Rohwedder (2003) examine the impact of the introduction of SERPS in the UK and found that middle-aged households offset around two-thirds of the increase in generosity of the pension system through increasing their consumption growth.

One potential way around the issue outlined above is to use a regression based approach with income (or indeed any of the other indicators of well-being described in section 3.2) as the dependent variable and receipt of state pension income as a regressor. This would be problematic if there were unobserved characteristics that were correlated with both the outcome of interest for an individual and their state pension income, which in practice is quite likely to be the case.

The methodology employed in this paper uses a simulated rather than actual measure of state pension income, which has the advantage of relying solely on policy decisions which change the generosity of the system. Causal inference is possible as long as there are no unobserved characteristics that are correlated with both outcomes in retirement and the reforms affecting the generosity of the state pension income. An example of a violation in the assumption would be an (unobserved) improvement in productivity that led to both an improvement in outcomes in retirement and to the Government choosing to enact a more generous state pension system (or to defer implementing a less generous one). In this case a positive correlation between the generosity of the state pension arrangements and the outcomes of individuals in retirement would be inferred wrongly.

In our calculations we simulate two different measures of state pension entitlement. The first model (which we refer to as "current benefits"), calculates the

amount of state pension income that an individual will get in the current year given a distribution of possible retirement ages. So the state pension income ($B_{A,k}$) received in a year by an individual currently aged A, born in cohort k with an earnings history e_k will be equal to:

$$E(B_{A,k}) = \sum_{a=50}^{A} p(r_{a,k}).b_{A,k}(e_k \mid r_{a,k}) \quad (1)$$

where $r_{(a,k)}$ is the probability that an individual from cohort k retires at age a, and we assume that no individual has retired before the age of 55.

This measure of simulated state pension income only looks at current income from the state, and therefore does not consider either income received in the past or income that is expected to be received in the future. As a result individuals who are aged below the state pension age (currently 60 for women and 65 for men) will have zero current state pension income regardless of their earnings and employment history (though note, that as described in section 4.2 was do incorporate an estimate of receipt of means-tested or disability related support in the analysis). This is because in the UK, unlike in many other countries, receipt of state pensions is conditional solely on having reached the state pension age, and in addition is not conditional on labour market status. Furthermore reforms can, and in the case of changes to the indexation of the Basic State Pension do, affect the state pension income of those already in retirement. Due to these differences we also use a second model (which we refer to as "lifetime benefits"). This estimates average expected annual state pension income from ages 55 to 84, i.e:

$$E(B_{A,k}) = \frac{\sum_{a=50}^{65} p(r_{a,k}).\sum_{j=55}^{84} E_A\left(b_{j,k}(e_k \mid r_{a,k})\right)}{(84-55)} \quad (2)$$

where we assume that all individuals live to die at age 85. For individuals who are older than the age at which we are considering state pension income we use the system that was in place at the time. When calculating $E_{65}(b_{60} \mid r_{58})$ for someone aged 65 we take the actual state pension income that that an individual born 65 years ago would have received at age 60 given they retired at 58. For individuals who are younger than the age at which we are considering state pension income (for example $E(b_{60} \mid r_{58})$ for someone aged 55) we would take the state pension income that that person would currently expect to receive at age 60 given they retired at age 58. We assume that individuals have full

knowledge over how current and past systems operate and that they do not anticipate any further reforms until they are legislated when forming these expectations.

An important UK specific issue therefore arises with how to calculate state pension income for those who have chosen to contract out of SERPS. When SERPS was introduced in April 1978 only individuals who were not a member of an employers defined benefit pension plan had to join. In return for having 'contracted out' of SERPS benefits those who were in a defined benefit pension were charged a lower rate of National Insurance Contribution. From April 1988 individuals were also allowed to 'contract out' of SERPS into an employers defined contribution pension plan (again in return for lower National Insurance Contributions), or an individually arranged private pension plan (in return for which part of the individual's National Insurance Contribution would be paid into their own pension fund). Modelling retirement income that specifically comes from the state would require different calculations for those who were contracted out in a given year (who would not accrue any entitlement to SERPS in that year) to those who had not contracted out in a given year (who could accrue an entitlement to SERPS in that year). However the contracting out arrangements were designed so that those who contracted out of SERPS were allowed to do so on the basis that they would accrue a private pension that would be worth at least as much as SERPS. Therefore our simulations are based on the assumption that everyone is contracted into SERPS – which means that our simulated state pension measures will, in theory at least, estimate the minimum amount of pension income that individuals had to have accrued. This is more appropriate given that it is the impact of compulsory retirement income, rather than the way in which that income is financed (i.e. pay-as-you-go or funded), that is of primary interest in this paper.

For both constructed measures of simulated state pension income we estimate two different values. The first uses the same retirement probabilities for each cohort. This is described as the "fully simulated" model. The second uses cohort specific retirement probabilities. This is described as the "partially simulated" model. For all 4 of these measures of simulated state pension income we use the same earnings profile, although, as described in section 4.2, each cohort is 2% richer than its predecessor as a result of our assumptions on economy-wide productivity growth.

The measure of simulated benefits which is more appropriate to use will depend whether the measure of well-being being considered is influenced by past and future state pension income, or just by current state pension income. For example if the well-being

measure of interest is current income then the "current benefits" model is likely to be more appropriate. This is because while there are good reasons to believe that current state pension income might impact on current income there is less reason to believe that past or future state pension income will impact on current income.[9] However whether "current benefits" or "lifetime benefits" is the more appropriate measure when considering current expenditure will depend on the extent to which individuals are myopic or forward-looking in their expenditure choices. Similarly past or future state pension income could, in principle at least, affect the measures of both current life satisfaction and of current health. Hence in section 5 while we use the "current benefits" model in the analysis of the incomes of the elderly, we use both the "current benefits" model and the "lifetime benefits" model in the analysis of expenditure, life satisfaction and health.

Before turning to the results section 4.2 provides more details of the calculation of both the "current benefits" and the "lifetime benefits" models while section 4.3 highlights the extent to which the reforms to the UK pension system generate variation that we can exploit.

4.2 Earnings and employment probabilities used in the simulations

Unlike many other countries in this volume the UK does not have a long panel data survey of employment and earnings, nor does it typically allow access to the official government registers for research purposes. Hence constructing a set of individual earnings histories on which to base our cohort calculations is not straightforward. In all the calculations of simulated state pension income we use earnings profiles estimated from data on the same cohort of individuals drawn from successive years of our time series of cross sections. For those aged between 45 and 65 this is constructed using earnings across individuals born between 1921 and 1925 (inclusive) in the FES from 1968 onwards. So, for example, earnings at age 45 is estimated from the earnings of those born between 1921 and 1925 in 1968 (and therefore actually aged between 43 and 47 inclusive), while earnings at age 46 comes from individuals born in the same years but observed in the FES in 1969. As we do not have consistent FES data for years prior to 1968 for earnings between 16 and 42 we assume that real growth in earnings for this cohort is the same as that observed in the FES for those born between 1951 and 1955.

[9] Possible mechanisms do exist. First labour supply decisions could be affected by a lifetime wealth effect. Second, current interest or dividend income (or receipt of capital gains) could be affected by

These earnings are estimated separately by gender but not by education group (since we do not have information on educational achievement in the FES prior to 1978). For each age we estimate 9 different earnings levels each corresponding to the 10^{th}, 20^{th}, 30^{th}, …, 80^{th} and 90^{th} percentile of the earnings observed in the data in that year.

Figure 4.1 shows the assumed path for median earnings, in 2001 prices, for men and women born in 1923. No attempt is made to control for non-random selection out of the labour market (i.e. the deciles of earnings are calculated only across those who are in paid employment). As a result this will only be the correct median earnings-profile if movement in and out of the labour market occurs in equal proportions among those who would have earned below median earnings and those who would have earned above the median. The lower average earnings of women is in part due to the fact that many women (and few men) in the UK are in part-time paid employment. For earlier and later cohorts we assume real earnings growth of 2% a year, which is in-line with the productivity growth seen on average in recent years.[10]

In order to capture further some of the non-linearities in the reforms to the state pension system we assume that (married and single) men and single women are in work from 16 through to retirement, but that married women are out of the labour market from age 26 to 40 (inclusive).[11] In particular this will help us to pick up the increase in generosity arising from the introduction of Home Responsibilities Protection (HRP, legislated in the Social Security Act of 1975) which meant that periods of formal caring (defined as earning below the Lower Earnings Level and being in receipt of certain benefits such as child benefit which is paid to those with a child aged 16 or under, or aged 17 or 18 and in full-time education) from April 1978 onwards reduce the number of years of contributions required to qualify for a certain level of Basic State Pension. We assume that from April 1978 married women qualify for HRP between the age of 26 and 40 when they are assumed to be out of the labour market.

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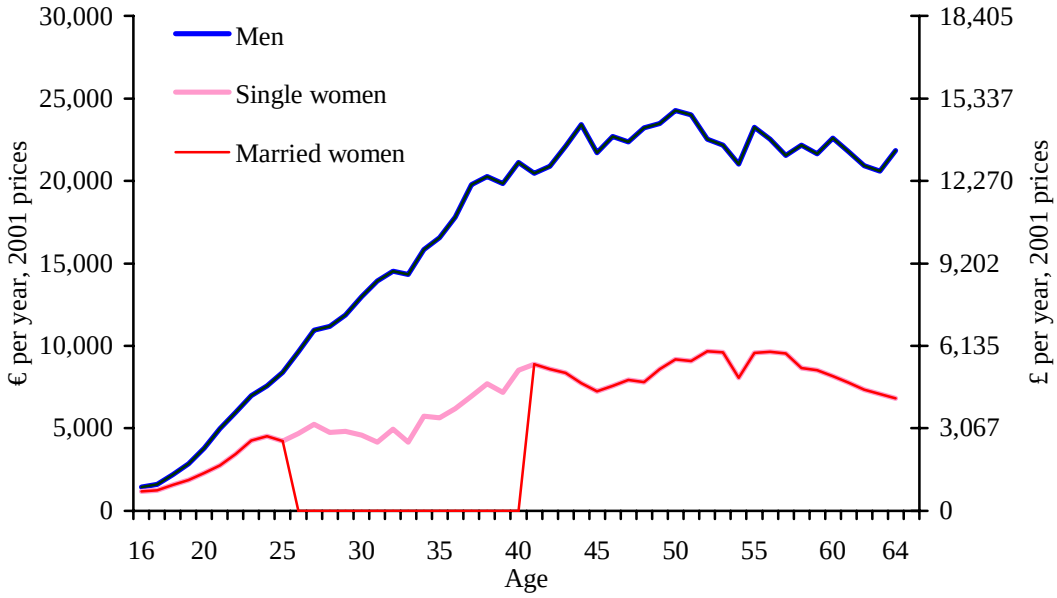
individuals changing either their saving levels or investment portfolio choices.

[10] Table 1.1 of HM Treasury (2000) estimates that underlying productivity growth over the period from 1990Q4 to 1997H1 was 2.0% a year.

[11] Many single women in the data will in fact have been previously been married. Unfortunately for much of the data we are not able to separate out single never married women from those who are widowed or divorced. While the employment histories of widowed and divorced women are more likely to resemble those of married women than never-married women it is far from clear that we will

Figure 4.1. Assumed median earnings for those born in 1923, taken from the median of those born between 1921 and 1925 – with a 15 year absence from the labour market for married women, by age and gender



Source: Family Expenditure Survey 1968 to 1989. Figures uprated to June 2001 prices using the Retail Price Index from the Office for National Statistics (http://www.statistics.gov.uk/articles/nojournal/1750CPI.pdf), and converted to Euros using an exchange rate of £1 = €1.63.

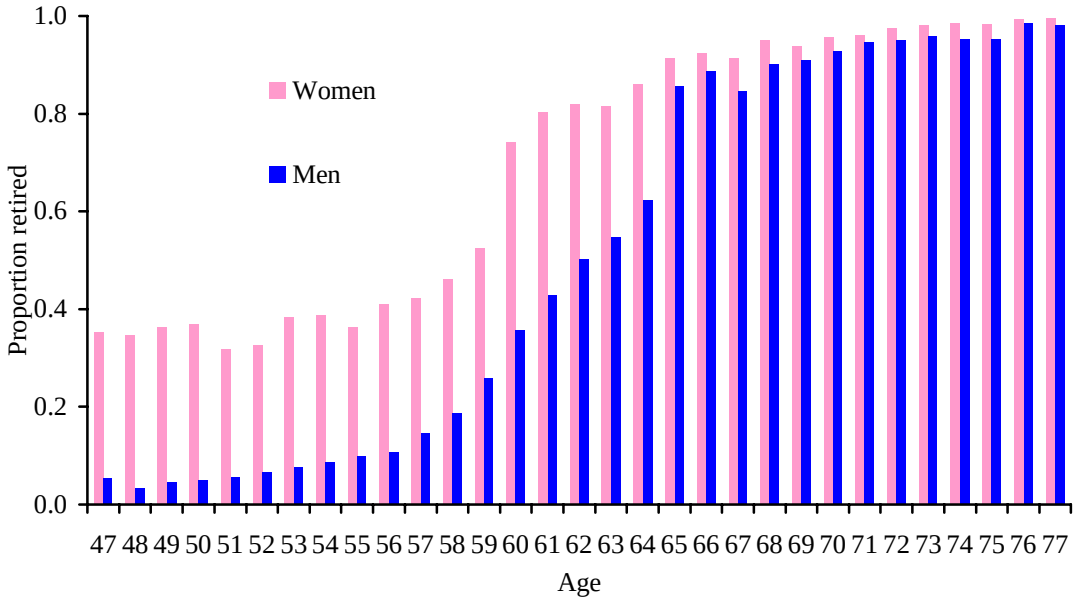
For the "fully simulated" estimates of state pension income we use retirement probabilities constructed from data on those born between 1922 and 1924 (inclusive). The percentage of this central cohort 'retired' (as defined by not currently being in employment or self-employment) at each age is shown in figure 4.2. A large increase in the proportion not in paid employment is observed at the respective state pension ages for women (60) and men (65). Despite this the majority of men and women are out of the labour market before they reach the state pension age – 53% of women in this cohort were retired at age 59 and 63% of men were retired at age 64. For the purposes of the simulations we assume that no-one is retired before the age of 55 and then take the probability of retiring at any age as being the difference between the percentage retired at that age and the percentage retired at the previous age.[12] From the state pension age and beyond we set the retirement probability to be 1.0 (and therefore the probability of retiring after the state pension age to be zero) – since even those who are still in paid

be over-estimating state pension receipt since in practice many of these women will be receiving state pensions on the basis of the contributions made by their deceased or divorced partner.

[12] In the small number of cases where this would lead to a negative value we change the probability of being retired to be the same as that at one year earlier.

employment can receive state pension benefits, and no further entitlement to SERPS can be accrued through remaining in employment after the state pension age.

Figure 4.2. Average retirement probabilities for those born between 1922 and 1924 (inclusive), by age and gender.



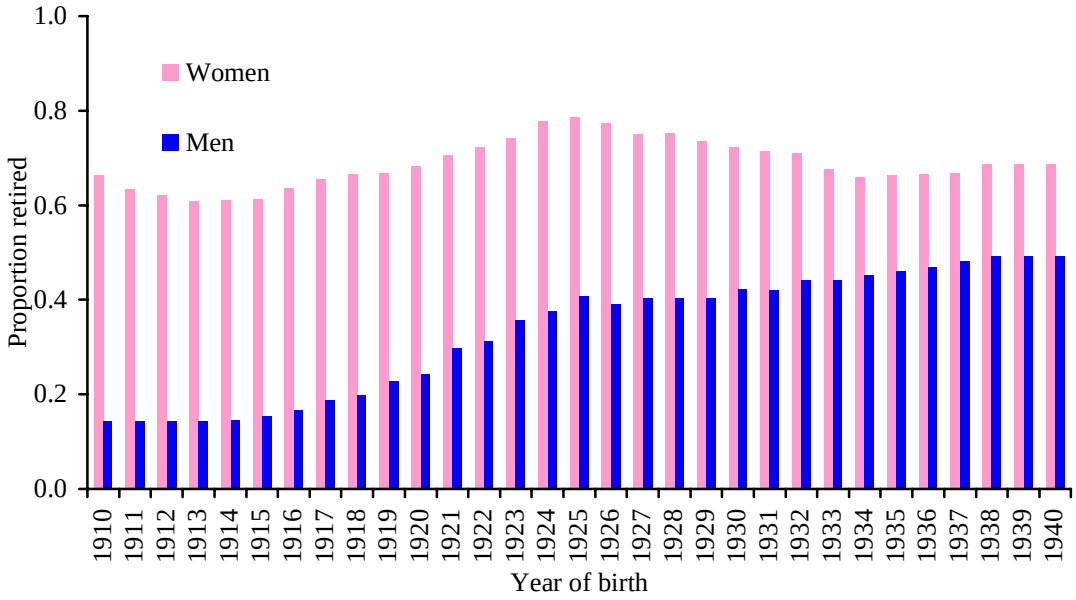
Source: Family Expenditure Survey 1968 to 2000.

For the "partially simulated" estimates we allow the retirement probabilities to vary across cohorts. For some cohorts we only have partial information on the true retirement outcomes since retirement probabilities at some ages (either young ages for the older cohorts or older ages for the younger ages) are not observed in the time span of our data. For these cohorts, for the retirement probabilities that we do not observe, we assume the change in retirement probability between ages was the same as seen in the most recent cohort for which we do have information.

The extent to which the "fully simulated" and the "partially simulated" estimates vary will depend on whether retirement probabilities have been changing across cohorts (and the extent to which state pension benefits depend on an individuals retirement age, which will be stronger when considering periods where individuals are able to accrue an entitlement to SERPS) Figure 4.3 gives some indication of this by showing the percentage of men and women aged 60 who are not in paid employment by year of birth. For men a trend towards earlier retirement is apparent, with later year of birth cohorts having a larger percentage of individuals out of the labour market at age 60. In contrast the percentage of women out of the labour market at age 60 has not exhibited any trend increase or decline over the period, perhaps suggesting that cohort effects (the increased

labour market attachment among women born later) and time effects (the fall in employment rates seen among older men between 1975 and 1995) have broadly cancelled out.

Figure 4.3. Average retirement probabilities for those aged 60, by year of birth and gender.



Source: Family Expenditure Survey 1968 to 2000.

As shown in figure 4.2 a large proportion of individuals in the UK have left the labour market before they reach the state pension age. While unable to receive state pension income in practice many qualify for either income-tested or health-related support for the Government such as Income Support or Invalidity/Incapacity Benefit.[13] While modelling entitlements to these benefits is difficult to do accurately, ignoring them would mean that assuming individuals retiring before the state pension age have no social security income. Therefore we attempt to take this into account by giving those who retire before they reach the state pension age state benefit income equal to 50% of the Basic State Pension. Under the (not unrealistic) assumption that half of early retirees qualify for either Income Support or Invalidity/Incapacity Benefit (both of which are set at a value not too dissimilar to the full Basic State Pension) on average this should not be too inaccurate.

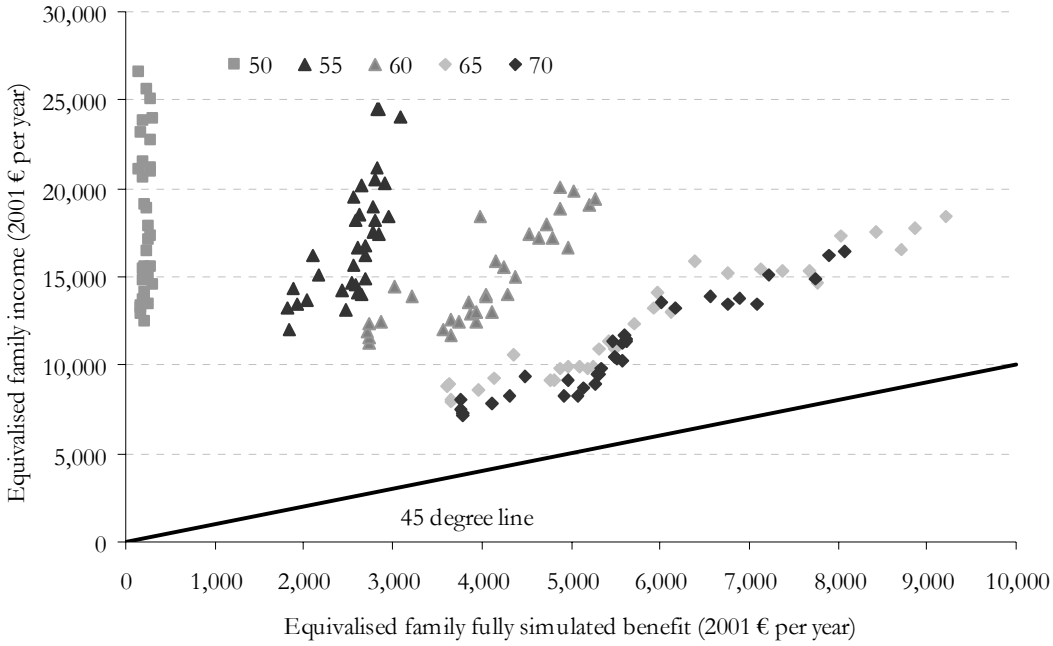
4.3 Simulated state pension entitlements

Using the earnings and retirement profiles set out above, and the rules determining eligibility for state pension income, we calculate the simulated state pension estimates under the "current benefits" and the "lifetime benefits" methodology set out above. These simulated benefits are then allocated to individuals on the basis of their year of birth and whether they are a man, a single woman or a married woman. This gives nine values of simulated benefits for each individual (corresponding to the nine decile points of the earnings distribution (which as set out in section 4.2 also varies by whether a man, a single woman or a married woman)). We then attribute four values of simulated benefits to each individual: those corresponding to the 10th, the 50th and the 90th percentiles of the earnings distribution and one which corresponds to the mean of the nine decile points. We then sum each of these simulated state pension incomes across individuals within a family and equivalise to get four measures of simulated family state pension entitlement (corresponding to the 10th percentile, 50th percentile, 90th percentile and the mean of the nine decile points). This is done for each of the four measures of simulated state pension income (i.e. both "fully simulated" and "partially simulated" estimates of "current benefits" and the "lifetime benefits"). We then collapse all of the data (containing both benefits and different potential indicators of well-being) into age by year of birth cells.

Figure 4.4a takes the estimates obtained by taking the mean of the nine decile points of simulated benefits using the "current benefits" methodology and plots these against current family income. As expected the simulated state pension income for those aged 50 is very low (no individual is assumed to retire before age 55), although not precisely zero since some of the non-retired individuals will be married to someone who is older and retired (and is therefore in receipt of either our estimate of their state pension entitlement if they are over the state pension age or our estimate of means-tested or disability related support if they are aged between 55 and the state pension age). At older ages there is a much clearer positive correlation between simulated state pension income and current total income. The correlation between the two series is closer to 1 for those aged 65 and over (i.e. a line of best fit would have a slope closer to that of the 45 degree line).

[13] See, for example, Blundell and Johnson (1998).

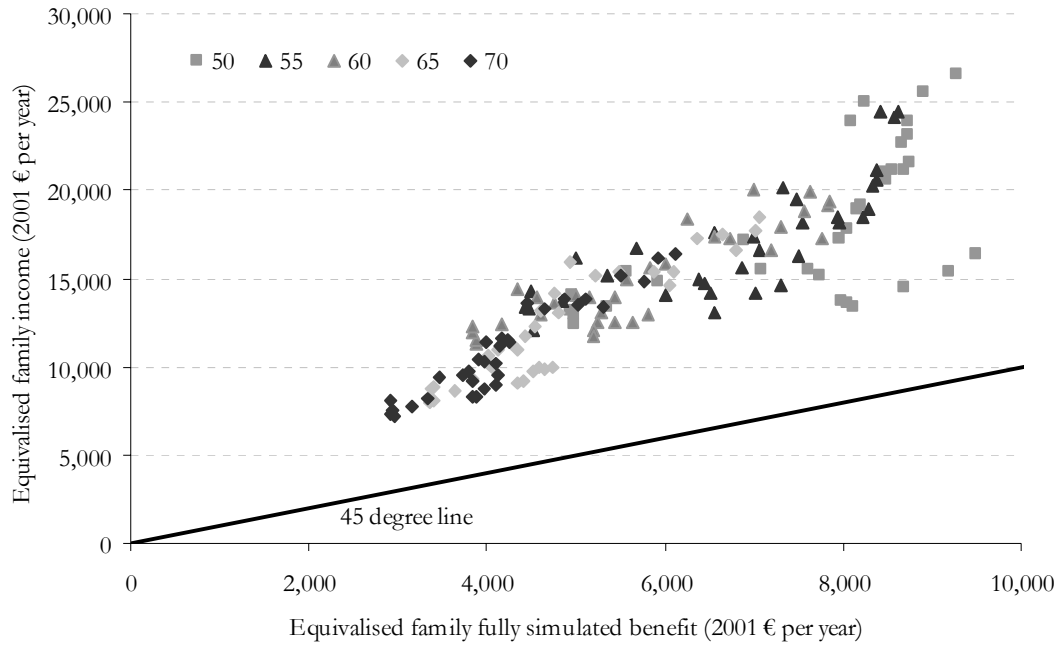
Figure 4.4a. Equivalised family level fully-simulated state pension benefits, "current benefits" model and equivalised family current income.



Source: Family income from Family Expenditure Survey 1968 to 2000. Figures uprated to June 2001 prices using the Retail Price Index from the Office for National Statistics (http://www.statistics.gov.uk/articles/nojournal/1750CPI.pdf), and converted to Euros using an exchange rate of £1 = €1.63.

Figure 4.4b shows the equivalent estimates for the "lifetime benefits" methodology. Since this is actual or expected state pension income between the ages of 55 an 84 it is never zero, even for those aged 50 who by assumption have not yet retired. For this reason the average values of this measure of simulated benefits are much higher than those for "current benefits" shown in figure 4.4a.

Figure 4.4b. Equivalised family level fully-simulated state pension benefits, "past and future benefits" model and equivalised family current income.



Source: Family income from Family Expenditure Survey 1968 to 2000. Figures uprated to June 2001 prices using the Retail Price Index from the Office for National Statistics (http://www.statistics.gov.uk/articles/nojournal/1750CPI.pdf), and converted to Euros using an exchange rate of £1 = €1.63.

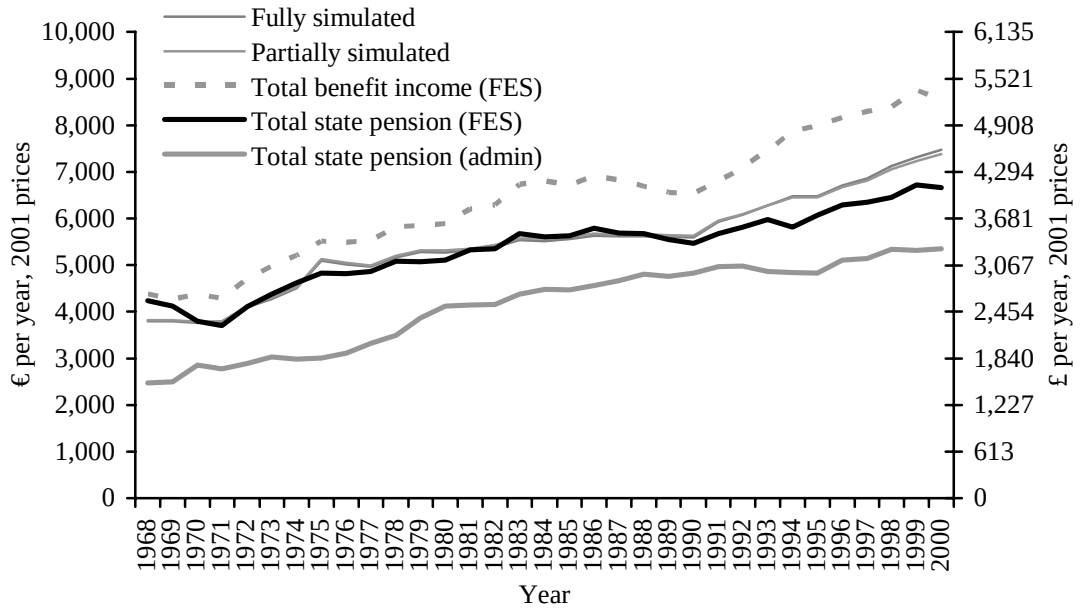
Figure 4.5a plots both partially and full-simulated "current benefits" for those aged 65 and over from 1968 to 2000. There is very little difference between the fully and partially simulated benefit receipt lines. This mainly reflects the fact that SERPS was only introduced in April 1978 and that individuals had to have made contributions during their working lives to be entitled – so that even by the late 1980s many of those in retirement would not have been entitled to any SERPS. Furthermore for women at least, as shown in figure 4.3, there is no trend towards earlier or later retirement over the period (and differences between the fully and partially simulated methodologies will only arise if there are differences in retirement ages by year of birth).

Also shown in Figure 4.5a are three other measures of transfer payments from the state. Income from state pensions and also total income from the state (which also includes other income related and health contingent benefits for example Income Support, Housing Benefit, Invalidity Benefit and Incapacity Benefit and Council Tax Benefits) are taken from the FES. In addition the figure contains a series constructed from administrational data on total state pension spending and the number of individuals

aged over the state pension age. Note that while the former series is constructed in the same way as our simulated benefit series (i.e. it is for individuals aged 65 and over, and incomes are equivalised in the same way) the series from administrational data includes women aged 60 to 64 and, more importantly, implicitly uses an equivalence scale of 2.0 for couples.

Both the simulated "current benefits" series are found to track the state pension series from the FES relatively closely, with the correlation co-efficient between actual benefits and fully simulated benefits being 0.977 while the correlation co-efficient between actual benefits and partially simulated benefits it is 0.980. The series of state pension income from administrational data sources, while being at a lower level due to the different equivalence scale implicitly being used, also tracks both the simulated benefit series relatively closely (correlation co-efficients of 0.928 and 0.934 for fully and partially simulated benefits respectively). From around 1990 onwards it is noticeable that both the simulated series increase more quickly than either state pension income from the FES or from administrational data. This is probably due to the role of contracting out with part of compulsory pension income (which, as described in section 4.1, is essentially what is being modelled with the simulated benefits series) not appearing as state pension income in retirement but instead as income from private sources. Unfortunately neither the FES nor administrational data allows us to calculate a measure of income that includes that from contracted-out pensions that substitute for state pensions. The total benefit income series, while being at a higher level (due to the inclusion of other transfer payments), also tracks the two simulated benefit series relatively closely.

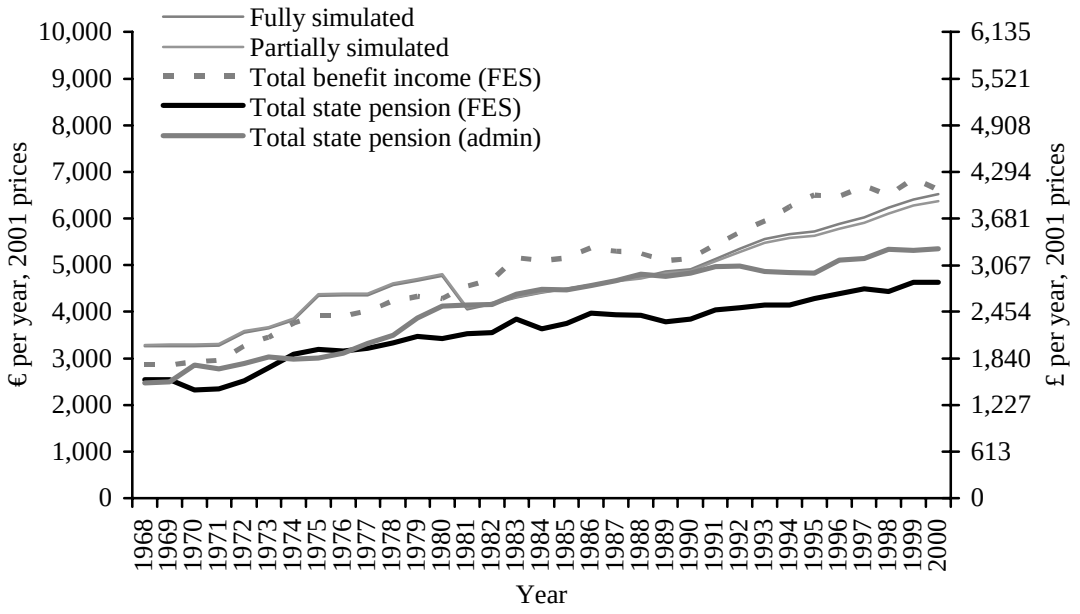
Figure 4.5a. Fully and partially simulated "Current benefits" model and actual benefit receipt, 1968 to 2000, those aged 65 and over only.



Source: 'Total benefit income (FES)' and 'Total state pension (FES)' from Family Expenditure Survey 1968 to 2000; Actual benefits (admin) calculated using figures on total state pension expenditure from the Department for Work and Pensions and figures on the population aged at the state pension age and above. Note that this latter series includes women aged 60 to 64 and implicitly uses an equivalence scale of 1.0 for each pensioner in a pensioner couple. Figures uprated to June 2001 prices using the Retail Price Index from the Office for National Statistics (http://www.statistics.gov.uk/articles/nojournal/1750CPI.pdf), and converted to Euros using an exchange rate of £1 = €1.63.

Figure 4.5b plots both partially and fully-simulated "lifetime benefits" alongside the two FES series on income from state transfers for those aged 55 and over and the same series from administrational as shown in figure 4.5a, again from 1968 to 2000. Again there is little difference between the partially and fully simulated models (although the divergence caused by the introduction of SERPS is observed 'earlier' as individuals are looking forwards to the state pension they will receive in the future). It is clear that the "lifetime benefits" model is not as highly corrected with the state pension income series from the FES as the "current benefits" model shown in figure 4.5a. The correlation co-efficient between both fully simulated benefits and partially simulated benefits with this series is 0.941. As discussion in section 4.1 this is not surprising. For example the drop in "lifetime benefits" in 1981 is caused by the announced change in planned indexation which will actually have led to declining social security benefit receipt over time rather than a one-off decline.

Figure 4.5b. Fully and partially simulated "Lifetime benefits" model and actual benefit receipt, 1968 to 2000, those aged 55 and over only.

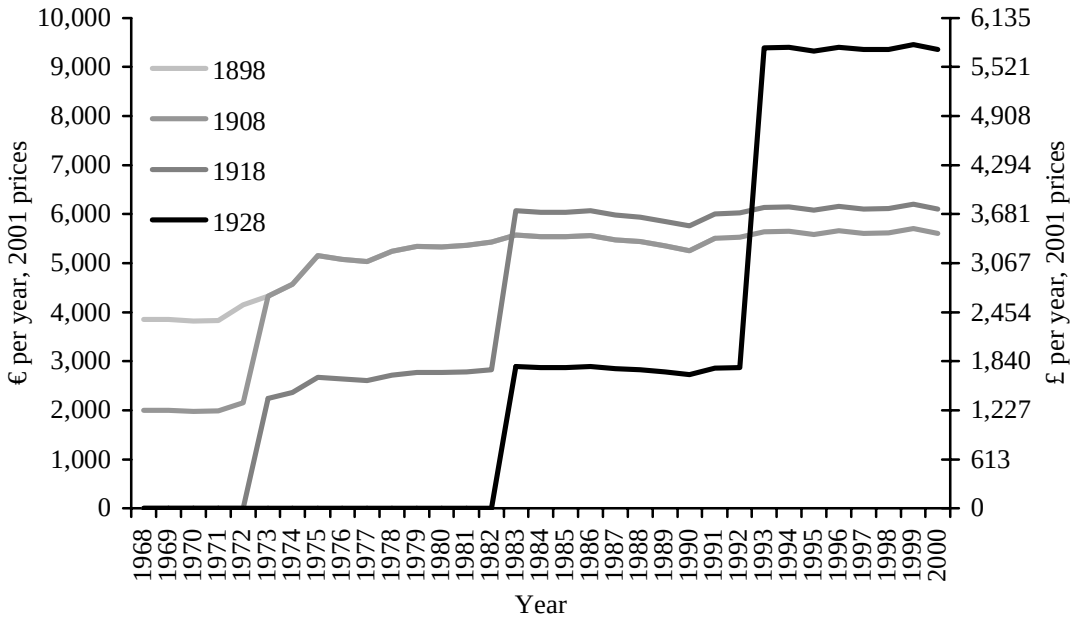


Source: 'Total benefit income (FES)' and 'Total state pension (FES)' from Family Expenditure Survey 1968 to 2000; Actual benefits (admin) calculated using figures on total state pension expenditure from the Department for Work and Pensions and figures on the population aged at the state pension age and above. Note that this latter series includes women aged 60 to 64 and implicitly uses an equivalence scale of 1.0 for each pensioner in a pensioner couple. Figures uprated to June 2001 prices using the Retail Price Index from the Office for National Statistics (http://www.statistics.gov.uk/articles/nojournal/1750CPI.pdf), and converted to Euros using an exchange rate of £1 = €1.63.

Variation in the fully-simulated "current benefits" model is shown for selected cohorts across time in figure 4.6a. For simplicity we show fully simulated benefits for single men as this enables the impact of the reforms to be highlighted more cleanly.[14] Benefits are zero before age 55 (as by assumption no-one has retired). At the age of 55 they jump to be equal to half of the value of the Basic State Pension. At age 65 "current benefits" jump again to be equal to estimated entitlement to both the Basic State Pension and SERPS. The height of this jump at age 65 varies across cohorts since their SERPS entitlements depends on years of contributions made since April 1978. Hence both the 1898 and 1908 cohorts have no entitlements, while the 1918 cohort have a small SERPS entitlement and the 1928 cohort a larger SERPS entitlement. It should be noted that in the regression analysis of this model in section 5 we restrict the sample to those aged 55 and over only, which restricts the analysis to the amount of variation presented in figure 4.6b (which is still considerable).

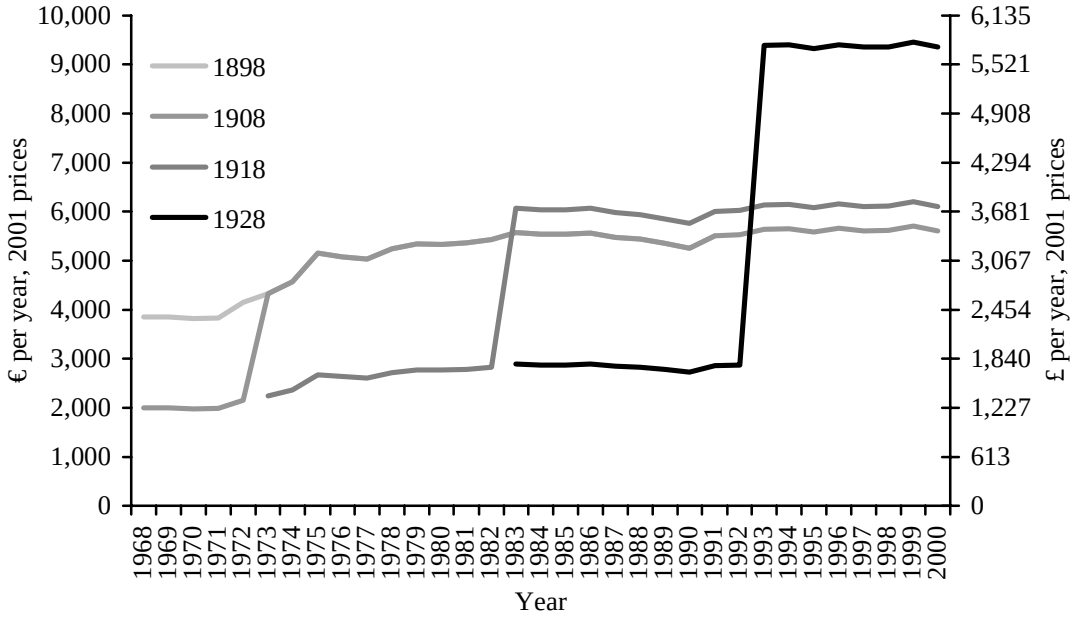
[14] This will miss out the additional variation created by the introduction of HRP (from April 1978) which benefits married women. Note though that under the assumption married women qualify for

Figure 4.6a. Variation in full-simulated "Current benefits" model explaining income by selected cohorts and year, men only.



Source: Figures uprated to June 2001 prices using the Retail Price Index from the Office for National Statistics (http://www.statistics.gov.uk/articles/nojournal/1750CPI.pdf), and converted to Euros using an exchange rate of £1 = €1.63.

Figure 4.6b. Variation in full-simulated "Current benefits" model explaining income by selected cohorts and year, men aged 55 and over only.



Source: Figures uprated to June 2001 prices using the Retail Price Index from the Office for National Statistics (http://www.statistics.gov.uk/articles/nojournal/1750CPI.pdf), and converted to Euros using an exchange rate of £1 = €1.63.

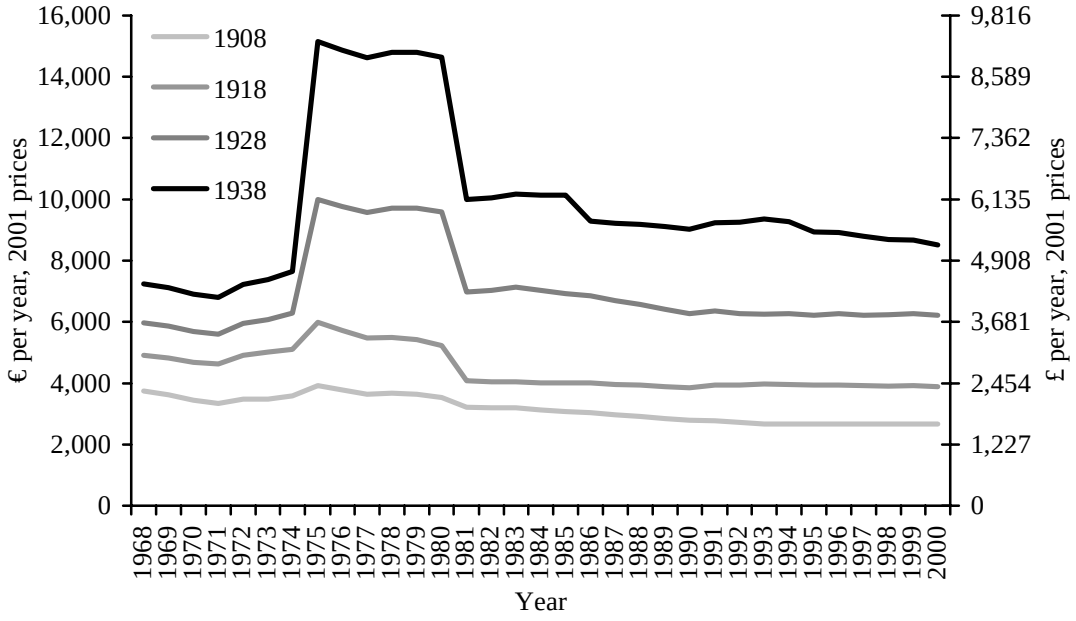
HRP between the ages of 26 and 40 the first women to receive additional state pension income from this will have been 39 in 1978 and therefore will not reach the state pension age of 60 until 1999.

Variation in the fully-simulated "lifetime benefits" model is shown for selected cohorts across time in figure 4.7a. Again for simplicity we show fully simulated benefits for single men in order to highlight the impact of reforms more cleanly.[15] Prior to 1975 (i.e. before the introduction of SERPS) successive cohorts expect higher Basic State Pension entitlement due to it being indexed in line with average earnings. In 1975 expected entitlements jump due to the introduction of SERPS, with the size of the increase varying by year of birth since this affects the amount of contributions that will be made post April 1978. In 1980 expected state pension income is reduced as individuals now expect the Basic State Pension to be indexed in line with prices and not earnings. Losses from this reform are greater for individuals born later since they will have lost more years of earnings indexation before they die. Of the cohorts shown in the figure the impact of the 1986 cut can be seen to only affect those born in 1938, and they also lose from the 1995 reform although this has a smaller impact. Again while this might appear to be a considerable amount of variation it should be noted that in the regression analysis of this model in section 5 we restrict the sample to those aged 55 and over only. This restricts the analysis (considerably) to the amount of variation presented in figure 4.7b.

We now turn to section 5 which presents the results.

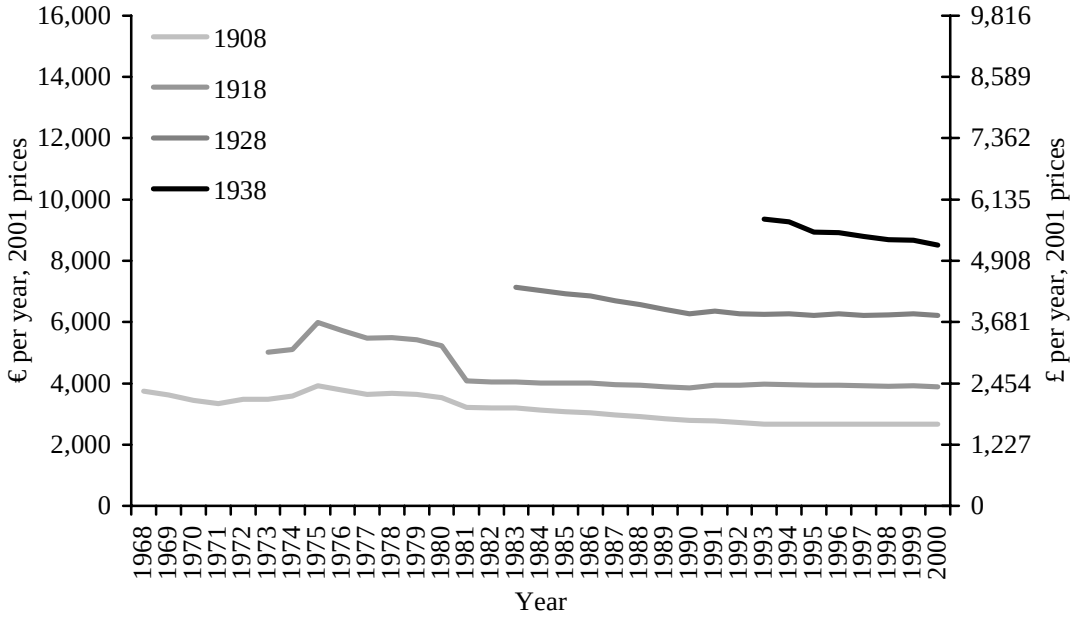
[15] Again this will miss out on the additional variation caused by the introduction of HRP which was legislated in 1975. Hence married women who are between the ages of 25 and 40 after April 1978 (when HRP started to be given) will, by assumption, receive a larger increase in their expected state pension in 1975.

Figure 4.7a. Variation in full-simulated "Lifetime benefits" model explaining income by selected cohorts and year, men only.



Source: Figures uprated to June 2001 prices using the Retail Price Index from the Office for National Statistics (http://www.statistics.gov.uk/articles/nojournal/1750CPI.pdf), and converted to Euros using an exchange rate of £1 = €1.63.

Figure 4.7b. Variation in full-simulated "Lifetime benefits" model explaining income by selected cohorts and year, men aged 55 and over only.



Source: Figures uprated to June 2001 prices using the Retail Price Index from the Office for National Statistics (http://www.statistics.gov.uk/articles/nojournal/1750CPI.pdf), and converted to Euros using an exchange rate of £1 = €1.63.

5. Results

We now turn to the results of the multivariate analysis which attempts to pin down the causal impact of changes in the generosity of state pension arrangements on the various outcomes of interest. Section 5.1 presents the results from the "current benefits" measure of state pension generosity while section 5.2 presents the results from the "lifetime benefits" approach.

5.1 "Current benefits"

Since the "current benefits" measure is, as expected, positively correlated with actual state pension income, in the main analysis that follows we use this as an instrument to examine the exogenous impact of increased state pension income on the various outcomes of interest.

The precise measure of both actual and simulated state pension income that we use varies with the particular outcome of interest. In total we use four different measures of actual state pension income and four different measures of simulated state pension income to examine the impact of state pensions on sixteen different outcomes of interest. These are set out in Table 5.1. When examining the mean level of total income, the mean level of total expenditure, and reported levels of life satisfaction or health we use the mean level of actual state pension income as the right hand side variable of interest. This is instrumented by taking mean "current benefits" from the nine decile points of the earnings distribution as described in Section 4.3. For the other outcomes of interest we take both actual and simulated benefits from more relevant parts of the income distribution. So, for example, when examining the impact of state pensions on the incomes of those at the 10^{th} percentile of the income distribution we take the mean level of state pension income observed among those between the 5^{th} and the 15^{th} percentile of the income distribution. This is instrumented using the "current benefits" measure of simulated benefits for an individual at the 10^{th} percentile of the earnings distribution.

Table 5.1 Well-being outcomes examined and the specific measure of actual benefits and instrument used in each case.

Well-being measure	Actual benefits measure	"Current benefits" instrument
Mean income Mean expenditure % very satisfied % unsatisfied % good health % poor health	Mean state pension income	Mean simulated benefits from 9 decile points of earnings distribution
Median income Median expenditure	Mean state pension income of those between 45th and 55th percentile of income distribution	Simulated benefits of median earner
10th percentile of income Relative income poverty Absolute income poverty 10th percentile of expenditure Relative expenditure poverty Absolute expenditure poverty	Mean state pension income of those between 5th and 15th percentile of income distribution	Simulated benefits from 10th percentile of earnings distribution
90th percentile of income 90th percentile of expenditure	Mean state pension income of those between 85th and 95th percentile of income distribution	Simulated benefits from 90th percentile of earnings distribution

The first stage results – i.e. from the regressions with the specific measure of actual benefits as the dependent variable and the relevant instrument (along with a set of controls) on the right hand side – are presented in Table 5.2a. As expected in each of these cases higher levels of simulated "current benefits" are associated with higher levels of actual state pension income. In each case we find that a slightly stronger correlation between the simulated benefits measure and actual state pension income when using the fully simulated methodology than when we apply the partially simulated methodology. This is consistent with the idea that increases (reductions) in the generosity of state pension arrangements lead to individuals retiring earlier (later) and therefore slightly reducing (increasing) the level of state pension to which they are entitled.

The other finding of note is that we find a much stronger correlation when examining the state pension income of those on lower incomes (co-efficients of 1.085 and 1.009 for the partially and fully simulated methodologies respectively) than when we

look at state pension incomes of those further up the income distribution. This is not surprising as higher earners were more likely to contract out of SERPS than lower earners. Therefore, as discussed in section 4.1, the simulated "current benefits" methodology (which includes all mandatory pension income in retirement) would be expected to be less correlated with state pension income (which does not include mandatory pension income from private sources).

Table 5.2a First stage regression results – 'current benefits' model.

	Dependent variable	Mean of dependent variable (€ per year)	Partially simulated	Fully simulated
1)	Mean state pension income	3,584	0.517	0.469
			(0.013)	(0.012)
2)	Mean state pension income for the 5th to the 15th percentile of the income distribution	3,856	1.085	1.009
			(0.049)	(0.046)
3)	Mean state pension income for the 45th to the 55th percentile of the income distribution	3,635	0.440	0.402
			(0.021)	(0.020)
4)	Mean state pension income for the 85th to the 95th percentile of the income distribution	3,322	0.455	0.422
			(0.013)	(0.012)

Note: Number of observations = 1,398. Controls for the percentage of the cohort who are male and the percentage of the cohort who are married and a full set of year and age dummies also included. Age and year cells weighted to take into account the number of individuals in each cell. In each equation the key dependent variable is: (1) the mean of the simulated state pension entitlement from each of the nine decile points of the earnings distribution; (2) the simulated state pension entitlement for an individual at the 10th percentile; (3) the simulated state pension entitlement for an individual at the 50th percentile; and (4) the simulated state pension entitlement for an individual at the 90th percentile.

The measured effect of changes in state pension income on each of the sixteen outcomes of interest is presented in Table 5.2b. The "reduced form" column presents the co-efficient of interest from analysis where the outcome of interest is regressed on the relevant "current benefits" measure of simulated state pension income. This is done for both the partially and the fully simulated measures of benefits. The "IV" column presents the results from an equivalent set of regressions where the relevant measure of actual benefits is included on the right hand side, but instrumented with the relevant

measure of "current benefits" using the first stage regression results reported in Table 5.2a.[16]

Table 5.2b Reduced form and IV regression results – 'current benefits' model.

Dependent variable	Mean	Obs	Reduced form		IV	
			Partially simulated	Fully simulated	Partially simulated	Fully simulated
Income						
Mean	€12,489	1,398	0.133	0.122	0.258	0.259
			(0.067)	*(0.062)*	*(0.130)*	*(0.133)*
Relative poverty[a]	2.1%	1,398	–0.019	–0.018	–0.017	–0.018
			(0.002)	*(0.002)*	*(0.002)*	*(0.002)*
Absolute poverty[a]	0.7%	1,398	–0.006	–0.005	–0.005	–0.005
			(0.001)	*(0.001)*	*(0.001)*	*(0.001)*
10th percentile	€6,409	1,398	0.959	0.886	0.884	0.878
			(0.074)	*(0.069)*	*(0.079)*	*(0.079)*
Median	€10,585	1,398	0.311	0.287	0.708	0.715
			(0.052)	*(0.048)*	*(0.126)*	*(0.128)*
90th percentile	€20,212	1,398	–0.050	–0.038	–0.109	–0.091
			(0.091)	*(0.085)*	*(0.199)*	*(0.201)*
Expenditure						
Mean	€10,572	1,154	0.470	0.428	1.053	1.063
			(0.083)	*(0.076)*	*(0.190)*	*(0.194)*
Relative poverty[a]	9.4%	1,154	–0.019	–0.018	–0.017	–0.018
			(0.007)	*(0.007)*	*(0.007)*	*(0.007)*
Absolute poverty[a]	5.8%	1,154	0.000	0.000	0.000	0.000
			(0.006)	*(0.006)*	*(0.006)*	*(0.006)*
10th percentile	€4,577	1,154	0.328	0.280	0.292	0.283
			(0.145)	*(0.130)*	*(0.129)*	*(0.132)*
Median	€8,492	1,154	0.375	0.341	1.030	1.035
			(0.071)	*(0.065)*	*(0.205)*	*(0.208)*
90th percentile	€18,267	1,154	0.401	0.372	1.021	1.024
			(0.117)	*(0.108)*	*(0.298)*	*(0.300)*
Life satisfaction						
Very satisfied[a]	36.1%	896	0.000	0.000	0.000	0.001
			(0.011)	*(0.010)*	*(0.026)*	*(0.027)*
Unsatisfied[a]	13.5%	896	–0.011	–0.009	–0.024	–0.024
			(0.008)	*(0.007)*	*(0.018)*	*(0.019)*
Health						
Good health[a]	43.6%	996	0.009	0.009	0.021	0.022
			(0.004)	*(0.004)*	*(0.010)*	*(0.010)*
Poor health[a]	20.8%	996	–0.004	–0.004	–0.010	–0.011
			(0.004)	*(0.003)*	*(0.008)*	*(0.008)*

Note: [a]Dummy variables are multiplied by 1,000 for regression results but not for reported means; Controls for the percentage of the cohort who are male and the percentage of the cohort who are married and a full set of year and age dummies also included. Age and year cells weighted to take into account the number of individuals in each cell. Figures in € are Euros per year in 2001 prices.

[16] For expenditure, life satisfaction and health the first stage regression differs from that reported in Table 5.2a since the first stage is estimated across only the periods for which outcome data is available. See Table 3.1 for more details.

The reduced form and the IV estimates suggest that increased state pension entitlements increase net retirement incomes and reduce both relative and absolute income poverty. There is also some evidence that the impact of increased state pension entitlements on actual retirement income is higher at the median and the 10th percentile of the income distribution than it is for either mean incomes or the incomes of those at the 90th percentile of the income distribution. This is consistent with the idea that those who are further up the income distribution are more able to offset changes in the generosity of state pensions – for example by increasing consumption during working life. The potential bias introduced by the contracting out arrangements strengthens this finding since this will tend to bias upwards the magnitude of the IV estimates with a bigger bias for higher earners since these are more likely to have been contracted out. The co-efficients on relative and absolute income poverty appear to be of a reasonable magnitude: they imply that €1,000 a year (in 2001 prices) additional state pension income would reduce relative income poverty by around 1.8ppt and absolute income poverty by 0.5ppt.

Turning to the estimates for expenditure the results suggest that increased state pensions lead to increases in mean retirement expenditure and reduces relative expenditure poverty, although there is no evidence of a reduction in absolute expenditure poverty. The estimated impact on relative expenditure poverty is the same as the estimated impact on relative income poverty (€1,000 of state pension income reducing poverty by 1.8ppt). The estimated impacts on expenditure at different parts of the distribution are somewhat surprising since they imply a larger impact on spending at the top of the expenditure distribution than at the bottom of the expenditure distribution. This could be due to those individuals who were still in work choosing to save more in response to cuts to state pensions – so we might not observe a change in their current income but could observe a reduction in their current spending. Another possibility is that the impact of a reform on current state pension income could be much smaller than the impact on future state pension income, which could rationally lead to larger changes in current expenditure than in current income. The obvious example of a reform of this type is the 1980 reform to index state pensions in line with inflation rather than in line with the greater of growth in prices or earnings. An alternative explanation is that the impacts at different parts of the income and expenditure distribution might not be the same since they are not the same individuals. This is explored further in Table 5.3. The

final two panels of Table 5.2b suggest that, if anything, increases in State Pensions lead to both increased reported life satisfaction and increased reported health.

Further evidence on the impact of state pensions on the income and expenditure of individuals at different parts of the income and expenditure distribution are presented in Table 5.3. This looks at the mean of income and expenditure among individuals taken from different parts of the income distribution to ensure that comparisons are made between the same individuals. As was the case in Table 5.2b the estimated impact on income on those towards the bottom of the income distribution are larger than those around the middle of the distribution, and there is no statistically significant effect on the income of those towards the top of the income distribution.

For expenditure a slight puzzle remains. As we would expect the estimated impacts on spending are very similar to those for income among individuals towards the bottom of the income distribution. However there is still some evidence that the expenditure of those towards the top of the income distribution is affected by state pensions, despite their income not being affected. Again this could be due to younger individuals who are in work choosing to save more to compensate for lower state pensions, which would have no impact on their current income but would reduce their current expenditure. Alternatively it could be that reforms which changed the growth rate of future benefits might be expected to only have a small impact on current income but could have a large impact on future income and therefore potentially on the appropriate level of expenditure.

Table 5.3 Reduced form and IV regression results – 'current benefits' model: estimated impact on income and expenditure at different parts of the income distribution.

Dependent variable	Mean	Obs	Reduced form: Partially simulated	Reduced form: Fully simulated
15th to 25th pctile of the income distribution				
Mean income	€7,481	1,398	0.809	0.744
			(0.037)	*(0.034)*
Mean expenditure	€7,362	1,154	0.896	0.806
			(0.122)	*(0.110)*
45th to 55th pctile of the income distribution				
Mean income	€10,567	1,398	0.279	0.258
			(0.033)	*(0.031)*
Mean expenditure	€9,308	1,154	0.488	0.522
			(0.072)	*(0.079)*
75th to 85th pctile of the income distribution				
Mean income	€15,802	1,398	–0.048	–0.042
			(0.038)	*(0.035)*
Mean expenditure	€12,893	1,154	0.525	0.485
			(0.073)	*(0.068)*

Note: Controls for the percentage of the cohort who are male and the percentage of the cohort who are married and a full set of year and age dummies also included. Age and year cells weighted to take into account the number of individuals in each cell. Figures in € are Euros per year in 2001 prices.

5.2 "Lifetime benefits"

The reduced form results from the "lifetime benefits" model are reported for those aged 55 and over in Table 5.4a. The magnitude of the co-efficients here are more difficult to interpret since they are sensitive to how past and future benefit entitlement is discounted. In these calculations presented below, for simplicity, we give equal weight to past and future state pension payments (i.e. no discounting). Since future entitlements to state pension might be worth less than current entitlements Table 5.4b presents results from examining just those aged 65 and over. As was the case for the "current benefits" methodology in all of the results we find marginally larger co-efficients on the "partially simulated" model than in the "fully simulated model".

Table 5.4a Reduced form results – 'lifetime benefits' – all 55 and over

Dependent variable	Mean	Obs	Partially simulated	Fully simulated
Expenditure				
Mean	€10,572	1,154	0.340	0.340
			(0.151)	*(0.143)*
Relative poverty[a]	9.4%	1,154	0.005	0.004
			(0.006)	*(0.006)*
Absolute poverty[a]	5.8%	1,154	–0.011	–0.010
			(0.005)	*(0.005)*
10th percentile	€4,577	1,154	0.098	0.092
			(0.116)	*(0.119)*
Median	€8,492	1,154	0.234	0.223
			(0.122)	*(0.117)*
90th percentile	€18,267	1,154	0.289	0.265
			(0.226)	*(0.205)*
Life satisfaction				
Very satisfied[a]	36.1%	896	0.034	0.033
			(0.021)	*(0.020)*
Unsatisfied[a]	13.5%	896	–0.012	–0.009
			(0.015)	*(0.014)*
Health				
Good health[a]	43.6%	996	–0.004	–0.001
			(0.007)	*(0.007)*
Poor health[a]	20.8%	996	0.010	0.009
			(0.006)	*(0.006)*

Note: [a]Dummy variables are multiplied by 1,000 for regression results but not for reported means; Controls for the percentage of the cohort who are male and the percentage of the cohort who are married and a full set of year and age dummies also included. Age and year cells weighted to take into account the number of individuals in each cell. Figures in € are Euros per year in 2001 prices.

For both those aged 55 and over and those aged 65 and over we find evidence that increases in the generosity of state pensions lead to increased expenditure by the elderly. There is also some evidence that the impact is larger for those aged 65 and over than it is for those aged 55 and over. There is no statistically significant evidence of changes in this measure of the generosity of state pensions affecting expenditure poverty. Similarly we find no statistically significant evidence of any effect of this measure of state pensions on either life satisfaction or health – although the co-efficients on life satisfaction for both those aged 55 and over and those aged 65 and over have the expected signs.

Table 5.4b Reduced form results – 'lifetime benefits' – all 65 and over

Dependent variable	Mean	Obs	Partially simulated	Fully simulated
Expenditure				
Mean	€9,001	884	0.559	0.552
			(0.248	*(0.231)*
Relative poverty[a]	13.5%	884	0.012	0.004
			(0.013)	*(0.006)*
Absolute poverty[a]	8.6%	884	–0.013	–0.011
			(0.011)	*(0.011)*
10th percentile	€3,997	884	0.039	0.055
			(0.253)	*(0.254)*
Median	€7,119	884	0.318	0.357
			(0.210)	*(0.197)*
90th percentile	€15,620	884	0.984	0.884
			(0.387)	*(0.349)*
Life satisfaction				
Very satisfied[a]	37.9%	646	0.039	0.037
			(0.037)	*(0.034)*
Unsatisfied[a]	12.6%	646	–0.024	–0.020
			(0.025)	*(0.024)*
Health				
Good health[a]	38.9%	756	0.007	0.007
			(0.012)	*(0.012)*
Poor health[a]	22.9%	756	0.014	0.013
			(0.011)	*(0.010)*

Note: [a]Dummy variables are multiplied by 1,000 for regression results but not for reported means; Controls for the percentage of the cohort who are male and the percentage of the cohort who are married and a full set of year and age dummies also included. Age and year cells weighted to take into account the number of individuals in each cell. Figures in € are Euros per year in 2001 prices.

6. Conclusions

This paper has presented the trends seen over the last quarter of the 20th Century in various indicators of the well-being of the elderly – both the level and distribution of income and expenditure, and self-reported measures of life satisfaction and health – alongside those seen for the young. Two methods of calculating the effects of pension reforms are utilised. One is similar to the analysis in the other chapters of this volume and calculates the effects of reform on state pension income in the first year of retirement. The second takes a different perspective and looks at the change in the present discounted of the future stream of lifetime benefits that arises from the reform, which one might expect to be a more relevant variable for consumption in particular.

The frequent and often substantial reforms to the UK pension system over this period provide large variation in individuals' state pension incomes that varies by age, year and cohort. Using this variation, and taking into account both age and year effects, increases in the generosity of state pensions can be seen to have led to increased incomes of the elderly and reductions in measures of both relative and absolute income poverty. State pensions have led to increased levels of consumption expenditures by the elderly.

The fact that these reforms have affected the outcomes of the elderly – rather than being fully offset by changing savings behaviour of individuals prior to retirement, or changes in retirement decisions – is not surprising for two reasons. First, and perhaps most crucially, often very little (pre-retirement) notice was given. Second some of the reforms were substantial and, as shown by Attanasio and Rohwedder (2003), who looked at contemporaneous consumption changes at the time of the reform, full offset did not take place. The clearest example of both of these facts is the move to index state pensions in payment to growth in prices rather than to the greater of growth in prices or earnings. This came into action from November 1980 and yet was only legislated for earlier that same year and represented a large cut in the generosity of state pensions for many individuals who had already moved out of the labour market.

Our estimates of the responsiveness of retirement incomes and retirement expenditure to changes in the generosity of state pensions appear to be most consistent at the median of the income and expenditure distribution: our fully-simulated, instrumental variables, estimate for the impact of a 1 unit increase in state pensions is to boost retirement incomes by 0.715 units and retirement expenditure by 1.035 units, with standard errors of 0.128 and 0.208 respectively.

Around the tails of the income distribution the results for the effects on income and expenditure are less consistent with each other. At the 10th percentile of the income distribution this seems to be explained by individuals with temporarily low incomes – our analysis of those between the 15th and the 25th percentile of the income distribution (i.e. those slightly further up the income distribution) suggests a similar impact of state pension reforms on both retirement incomes and retirement expenditure. This in turn suggests that not only did these low income individuals not have time to offset the impact of these reforms fully, but that their expenditure also, to some extent at least, tracks their income. For those towards the top of the income distribution our estimates suggest that state pension reforms have had little impact on retirement incomes. Somewhat surprisingly though there is a detectable impact on expenditure for those at the top of the income *and* consumption distributions. We leave this puzzle for future research.

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Table A.1 Annual sample sizes and basic summary statistics from FES, Eurobarometer and GHS surveys, those aged 55 and over only.

	Family Expenditure Survey				Eurobarometer Survey			General Household Survey		
Year	Mean age	% female	% owner occupier	Sample size	Mean age	% female	Sample size	Mean age	% female	Sample size
1968	65.8	55.5	36.5	4,679	n/a	n/a	n/a	n/a	n/a	n/a
1969	66.0	55.5	35.8	4,644	n/a	n/a	n/a	n/a	n/a	n/a
1970	65.9	55.4	35.7	4,181	n/a	n/a	n/a	n/a	n/a	n/a
1971	66.2	56.3	35.5	4,778	n/a	n/a	n/a	n/a	n/a	n/a
1972	66.1	55.4	35.4	4,470	n/a	n/a	n/a	n/a	n/a	n/a
1973	66.5	55.5	37.0	4,760	n/a	n/a	n/a	n/a	n/a	n/a
1974	66.8	55.6	37.8	4,360	n/a	n/a	n/a	n/a	n/a	n/a
1975	66.8	56.3	38.5	4,630	65.5	55.6	825	n/a	n/a	n/a
1976	66.7	56.0	39.2	4,818	65.6	54.8	755	n/a	n/a	n/a
1977	66.7	56.7	38.2	4,757	66.0	55.4	816	66.8	57.4	7,871
1978	66.7	56.2	39.6	4,554	65.5	54.2	810	66.8	57.8	7,698
1979	67.0	56.3	39.3	4,397	66.2	54.0	378	66.9	57.0	7,506
1980	66.8	56.3	39.7	4,484	66.0	53.4	423	66.8	57.6	7,721
1981	66.8	56.0	40.6	4,927	65.6	54.3	414	67.0	57.0	7,804
1982	66.9	55.1	40.3	4,697	66.6	53.1	754	67.2	57.0	6,906
1983	67.1	56.3	44.8	4,450	66.2	52.8	795	67.3	57.3	6,735
1984	67.0	55.2	42.8	4,659	66.7	52.9	820	67.8	56.9	6,219
1985	67.2	55.3	43.0	4,495	66.7	50.2	885	67.4	56.8	6,297
1986	67.4	55.8	43.5	4,504	66.7	50.8	835	67.6	57.0	6,485
1987	67.4	55.8	46.0	4,637	67.1	48.6	743	67.6	56.7	6,499
1988	67.7	54.3	48.0	4,572	67.3	52.8	405	68.2	56.7	4,894
1989	67.5	54.8	50.7	4,634	67.8	52.9	1,481	67.9	55.9	6,269
1990	67.9	54.6	49.0	4,390	67.2	55.5	1,252	67.9	55.9	6,033
1991	68.1	55.9	49.5	4,362	67.3	55.7	849	68.0	55.6	6,136
1992	67.9	54.8	51.3	4,510	66.8	55.5	1,676	68.2	55.2	6,160
1993	68.0	54.6	53.0	4,258	66.8	54.8	838	68.3	56.1	6,022
1994	68.2	55.0	51.4	4,115	67.3	53.3	836	68.4	56.2	5,760
1995	68.3	54.9	51.8	3,970	66.8	53.9	419	68.3	55.6	5,742
1996	68.4	54.4	52.6	3,746	n/a	n/a	n/a	68.4	55.0	5,391
1997	68.4	53.6	53.4	3,688	67.0	48.3	379	68.2	55.2	1,375
1998	67.9	53.5	56.0	3,812	66.6	50.4	387	68.3	54.9	3,790
1999	68.0	53.9	53.4	4,148	67.7	48.7	809	68.0	54.9	1,278
2000	67.9	54.2	58.5	4,116	66.9	48.8	846	68.0	53.4	3,606
2001	n/a	n/a	n/a	n/a	66.7	49.9	805	68.0	54.8	5,413
All years	*67.2*	*55.3*	44.1	*146,202*	*66.7*	53.0	*20,235*	*67.6*	*56.4*	*145,610*

Source: FES, GHS and Eurobarometer surveys, various years.