FISCAL EFFECTS OF REFORMING THE UK STATE PENSION SYSTEM

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Abstract

The fiscal and distributive impacts of three reforms to the social security pension system in the UK are evaluated. All three reforms are designed to increase the retirement age by changing the incentive structure underlying the pension system. The first increases the state pension age by three years. The second introduces an actuarial adjustment to retirement both before and after age sixty five allowing deferral to age 70. The final reform adapts the second reform to include a cap and a floor so as to mirror more closely the existing state pension scheme in the UK. Using a transition model of retirement, the simulations show that increasing the state pension age leads to a lower level of expenditure on the state pension, which is only partially offset through increased state spending on both means-tested income support and disability benefit (invalidity benefit). Employee national insurance receipts are also directly increased through the increase in the state pension age. The increase in retirement ages would also lead to an increase in government revenues arising from increased income tax and employee and employer national insurance contributions. As a result there would be lower levels of government borrowing (or larger government surpluses) than under the base system.

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Executive Summary

The main focus of this paper is to evaluate the impact on the Governments finances of different social security reforms in the UK. Each of the reforms considered is designed to increase the retirement age by changing the incentive structure underlying the pension system. The analysis takes in to account both the mechanical fiscal effects of implementing the reforms without allowing for behavioural responses as well as the full effects that account additionally for individual's altering their retirement decisions in the light of the reformed pension system. To address the behavioural effects a transition model of retirement, based on micro data from the UK Retirement Survey, is used. This model is developed in Blundell, Meghir and Smith (2001) and their specification is adapted in this paper to provide simulations on individual data of three different pension reforms.

The first reform increases the state pension age by three years. This is estimated to lead to a lower level of expenditure on the state pension that is only partially offset through increased state spending on both means-tested income support and disability benefit (invalidity benefit). Employee national insurance receipts are also directly increased through the increase in the state pension age. The increase in retirement ages would also lead to an increase in government revenues arising from increased income tax and employee and employer national insurance contributions. As a result there would be lower levels of government borrowing (or larger government surpluses) than under the base system.

The second introduces an actuarial adjustment to retirement both before and after age sixty five allowing deferral to age 70, while the final reform adapts the second reform to include a cap and a floor so as to mirror more closely the existing state pension scheme in the UK. Both of these reforms lead to a large increase in expenditure on the state pension, which is only very partially offset by reductions in spending on income support and invalidity benefit. There is also a smaller increase in tax receipts under each of these reforms. As a result there would be larger levels of government borrowing (or smaller government surpluses) than under the base system.

The paper also assesses the distributional impact of each of the reforms. The distributional impact of increasing the state pension age depends on the specification of the retirement model. Under a smaller change in retirement ages many low pension wealth individuals will be compensated through receipt of income support. Reforms 2 and 3 are found to lead to large gains across all but the top two wealth quintiles. This is due to the increases in the state pension not being sufficiently large to compensate richer individuals for the assumed loss of their private pension.

1. Introduction

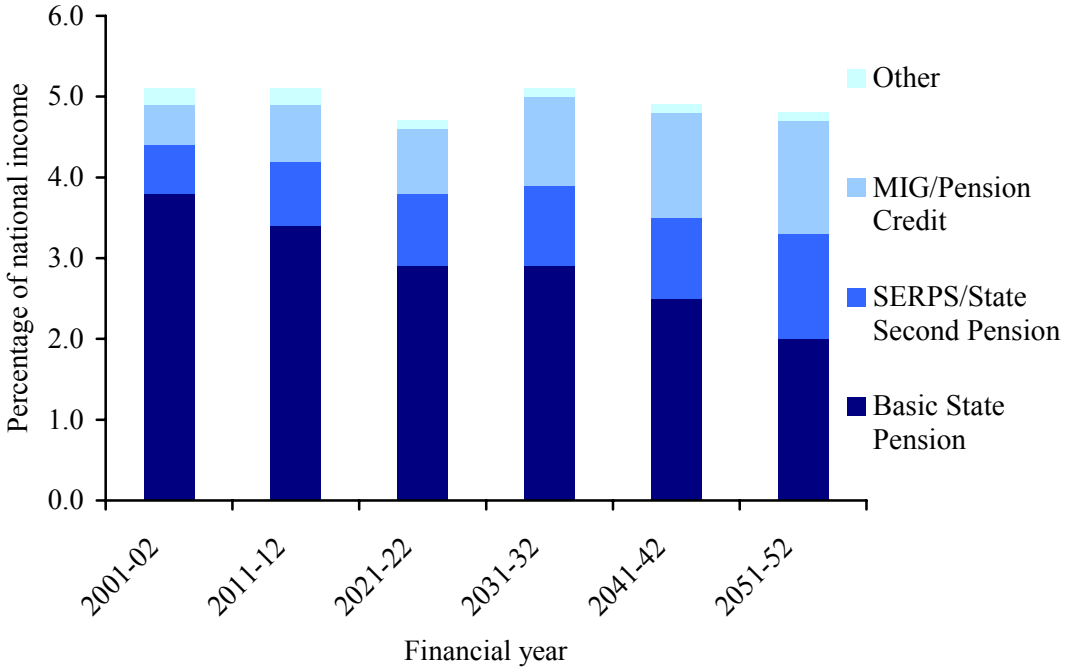
In this paper we evaluate the fiscal and distributive impact of social security reform in the UK. To examine this we consider three reforms to the state pension system that are all designed to increase the retirement age by changing the incentive structure underlying the pension system. We analyse both the mechanical fiscal effects of implementing the reforms without allowing for behavioural responses as well as the full effects that account additionally for individual's altering their retirement decisions in the light of the reformed pension system. To address the behavioural effects we use a transition model of retirement that is based on micro data from the UK Retirement Survey. This model is developed in Blundell, Meghir and Smith (2001) and we adapt that specification in this paper to provide simulations on individual data of pension reforms. Before describing the reforms and the simulation model we introduce this study with some background concerning the current situation regarding pension reform in the UK.

In line with other OECD countries, the UK will experience population ageing over the next few decades and a growth in the proportion of people aged 65 and over relative to the working-age population. However, this process is not likely to be as dramatic in the UK as it is predicted to be in Germany, Italy or Japan. The financial sustainability of the state pension system is not a substantive issue. Indeed, under current pension rules, the burden of state pensions is projected by the Government to fall slightly as a percentage of national income from 5.1% in 2001–02 to around 4.8% by 2050–51. Figure 1.1 also shows that expenditure on the basic state pension is forecast to fall as a share of national income. Expenditure on SERPS and the State Second Pension is forecast to rise, but by far less than would have been the case under the initial SERPS introduced in 1978. This is a consequence of a series of reforms to the pension system in the 1980s that dramatically reduced its generosity.[1] There is also an increase in forecast expenditure on the Minimum Income Guarantee and Pension Credit entitlement to both of which is means-tested.[2]

[1] See Emmerson and Johnson (2002) for more details.

[2] This is discussed further in Clark and Emmerson (2003).

Figure 1.1 Projected state spending on pensions in the UK



Source: Figure A3.1, Page 148 of Department for Work and Pensions (2002).

In contrast, the trend in the 1970s was towards a more generous state pension system. The main element of the state pension system, the basic state pension, was increased each year in line with earnings or prices or whichever was the greatest. In 1978 a new second-tier earnings-related pension (the State Earnings-Related Pension Scheme, SERPS) was introduced that was originally intended to pay a pension worth 25% of an individual's best 20 years of earnings. However, SERPS was never a universal scheme for all employees. Workers who belonged to a defined benefit occupational pension could opt out of SERPS (and pay lower rates of National Insurance) so long as their occupational scheme guaranteed at least the same pension as SERPS. (In fact until 1988 employers were allowed to make membership of their occupational pension scheme a condition of employment). At the time that SERPS was introduced more than half of all employees, and more than two-thirds of male employees were opted out of the state scheme.[3]

It is worth bearing in mind that spending on pensions represents only part of total Government spending on benefits for older non-workers. In the 1980s there was a very large increase in the number of older non-workers on disability benefits[4] (see

[3] For more details of the contracting out arrangements and their impact see, for example, Disney, Emmerson and Smith (2003).

[4] The main benefit was invalidity benefit, which was replaced by incapacity benefit in 1995.

Tanner, 1998) and spending on these benefits has more than doubled in real terms since 1990. As the level of the basic state pension is below the level of means-tested benefits for pensioners, many pensioners are eligible for means-tested benefits on top of their state pension. By April 2003 more than half of families with an individual aged 60 or over were entitled to means-tested benefits.[5] Means-testing is continuing to be increasingly important element in state provision for pensioners with the introduction of an earnings-indexed means-tested Pension Credit from October 2003.

Since the early 1980s successive reforms have cut back the generosity of state pension provision. The indexation of the basic state pension to earnings lasted only until 1982, since when it has been formally indexed to prices and has fallen relative to average earnings. Reforms to SERPS introduced in 1986 and 1995 have reduced its generosity for anyone reaching the state pension age after 2000. Also, the state pension age for women, currently 60, is set to increase to 65 by 2020. These reforms were coupled with further encouragement for individuals to make private provision for their pension. The most important change was to give individuals the choice to 'opt out' of SERPS into a defined contribution scheme from 1988 (or alternatively to leave their employers defined benefit scheme and join either a defined contribution pension or return to SERPS). In practice this meant a growth in individual retirement accounts (personal pensions) and the development of defined contribution occupational pensions. The growth in personal pensions was rapid. By the early 1990s they covered nearly one-quarter of employees and an even higher proportion of younger workers.

The UK government is currently considering further pension reform. While the UK does not have a public finance problem in terms of future expected state expenditures (at least under the current settlement), there is concern that some individuals might not be making sufficient private provision for their retirement. Rather than change the structure of state pensions the latest proposals are for a simplification of the tax treatment of private pensions, and greater provision of information to individuals, in the hope that this will enable more appropriate private saving decisions to be made. The Government has also highlighted that later retirement is also a possible solution to any shortfall in retirement saving.[6]

In fact, like many other OECD countries, the UK has been experiencing a trend towards earlier labour market exits among older, particularly male, workers. The percentage of men aged 60-64 in employment halved from 1968, when over 80 per

[5] See Table 4.2 of Banks, Blundell, Disney and Emmerson.

[6] The proposals are set out in Department for Work and Pensions (2002). For a discussion see, for example, Emmerson and Wakefield (2003).

cent were employed, to a little over 40% in 1996.[7] The fall in the proportion of older men who were in *full-time* employment was even greater than the fall in the proportion in any form of employment with a relative shift within the employed to self-employment and part-time employment. Female employment has not experienced the same downward trend – but this contrasts with rising participation among most other age groups of females across the same period.

Blundell, Meghir and Smith (2001) looked at the extent to which these labour market trends might be explained by the financial incentives in the pension system that people faced when making their retirement decisions. In doing so, they focused not only on the pensions provided by the state, but also on employer-provided pensions and on other state benefits such as invalidity benefit, both of which have played a crucial role in the UK. They found significant accrual and pension wealth effects, reflecting the substitution and wealth effects of pension systems on the incentive to retire.

Compared to many other European countries, the UK stands out as having a high level of coverage of private pensions and, at least in recent years, a trend towards less generous state pension provision. The models of retirement behaviour estimated in the Blundell, Meghir and Smith study fully account for the incentives underlying private occupational schemes and those estimates are used in this paper to analyse the fiscal impact of pension reform.

The plan of the paper is as follows. The next section describes the UK pension system and the key elements that are likely to affect retirement behaviour. Section 3 presents the basic empirical model we use to simulate the 'behavioural' effects of pension reform. Section 4 describes the simulation methodology and the set of policy reforms. In Sections 5 the simulation results from three policy reforms designed to reduce the incentives for early retirement in the current pension system are presented. Section 6 concludes.

2. Institutional Features of the UK State Pension Scheme

The UK pension system is three-tiered. Figure 2.1 provides a summary diagram of these three tiers. A more detailed discussion can be found in, for example, Banks and Emmerson (2000). The first tier, provided by the state, consists of the basic state pension and a significant level of means-tested benefits (made more significant by the introduction of the Minimum Income Guarantee for those aged 60 and over in April 1999). The second tier, compulsory for all employees with earnings above a

[7] See Banks, Blundell, Disney and Emmerson (2002) or Disney and Hawkes (2003).

certain floor, is made up of the State Earnings-Related Pension Scheme (SERPS)[8] and a large and continually growing level of private provision. Finally, there is third tier consisting of additional voluntary contributions and other private insurance.

2.1 The Basic State Pension

The basic state pension is a flat-rate contributory benefit payable to people aged over the state pension age (65 for men and 60 for women[9]) who have made sufficient contributions throughout their working lives.[10] In April 2003 the basic state pension was worth £77.45 a week for a single pensioner. Prior to 1978 married women could opt to pay a reduced rate of National Insurance which meant they did not qualify for a basic state pension in their own right. Couples in which one partner does not qualify for the basic state pension receive a dependant addition, irrespective of whether they have ever worked or not. Since 1989 there has been no earnings test for receipt of the basic state pension.[11] Individuals who choose to defer their state pension currently receive an additional 1% for every seven weeks of deferral, and the Government has announced that this is set to be changed to 1% for every five weeks.

2.2 The State Earnings-Related Pension Scheme (SERPS)

The first part of the second tier of pension provision is the State Earnings-Related Pension Scheme (SERPS). Introduced in 1978, this pays a pension equal to a fraction of an individual's qualifying annual earnings (above a specified lower earnings limit) each year since 1978. When it was introduced, SERPS was intended to pay a pension worth one-quarter of an individual's best twenty years' earnings (up to a specified upper earnings limit). Subsequent reductions in the generosity of SERPS mean that it will eventually only be worth 20 per cent of average lifetime earnings. Married women who opted to pay reduced rate National Insurance contributions do not qualify for SERPS. Currently widows can claim their husbands' SERPS pensions in full if they receive no additional pension in their own right.[12] After retirement the SERPS pension is uprated each year in line with prices.

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[8] The State Second Pension replaced SERPS in April 2002. This is more generous to lower earners. For a discussion see, for example, Agulnik (1999) or Disney, Emmerson and Tanner (1999).

[9] The state pension age for women will be raised by six months each year from 2010 to 2020 so that equalisation is achieved in 2020.

[10] To qualify for the basic state pension, individuals need to have made or be credited with National Insurance contributions for 90 per cent of their working lives. Credits are available for periods of illness, disability or unemployment. Since the introduction of Home Responsibilities Protection in 1978 the number of years of contributions required can be reduced by time spent caring for children or another dependent.

[11] See Disney and Smith (2000) for a discussion of the effects of the abolition of the earnings test on labour supply.

[12] This was due to be reduced to half from April 2000. However the failure of the Government to properly inform individuals of the change in entitlement led to the reform being delayed.

2.3 Income Support and Invalidity Benefit

In addition to the basic state pension and SERPS, there are two other state benefits that are taken up widely by older non-workers – income support and incapacity benefit (formerly invalidity benefit). Income support is a flat rate, non-contributory means-tested benefit. It is payable to those aged 60 or over who are on low incomes and are not in paid employment. Unlike people in younger age groups, those aged 60 and over do not have to show that they are actively seeking work in order to qualify. From April 1999, income support for pensioners was renamed the Minimum Income Guarantee and made more generous with an increase in the level and a commitment to uprate in line with earnings, at least for the short-medium term. The generosity of means-tested benefits was extended further with the introduction of the pension credit in October 2003 which will be payable to lower income individuals aged 65 or over.[13]

Incapacity benefit (formerly invalidity benefit) is a contributory benefit paid to the long-term sick and disabled. In the case of invalidity benefit an individual qualified on the basis of medical certificates from their GP showing them to be incapable of work that was 'reasonable' to expect them to do (given their age, qualifications etc). With the introduction of incapacity benefit in 1995 this was changed to a stricter 'all work test' carried out by a doctor employed by the Benefits Agency Medical Service. The change from invalidity benefit to incapacity benefit was a response to very rapid growth in receipt during the 1980s. A key feature of incapacity benefit (and invalidity benefit) is that, before April 2001, it was not means-tested and could be received in conjunction with private pension income (unlike income support). Since April 2001, it has been means-tested against individual occupational pension income.

2.4 Occupational and Personal Pensions

Compared to most other European countries the UK has a high level of coverage of private pensions, including both occupational pensions and individual retirement accounts, known in the UK as Personal Pensions. Any employee can choose to contract out of SERPS, into one of these two types of secondary private pension. (From April 2001 people have also been able to choose to opt out into a stakeholder pension, which is effectively a benchmarked individual retirement account). Members of defined benefit and defined contribution occupational schemes pay a reduced rate of National Insurance, while those with personal or stakeholder pensions receive a National Insurance rebate paid directly into their fund.

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[13] For an explanation of the pension credit, its impact on savings incentives, and the implications of earnings indexation to eligibility over time see Clark and Emmerson (2003).

In 2000 occupational pensions covered 10.1 million individuals, down from 11 million in the mid 1980s. They are typically defined benefit schemes (see Table 2.1), although since 1988 employees have also been allowed to opt out into defined contribution occupational schemes and there has been a gradual shift from DB to DC schemes since then (see Disney and Stears, 1996). The decline in coverage of occupational pension plans is due to a number of factors. It reflects changing employment patterns and a shift to smaller employers. Also, it reflects increasing pension choice among individuals working for employers offering occupational pensions who, since 1988, can no longer be compelled to join the scheme.

Table 2.1 Occupational schemes, Defined benefit versus defined contribution

	private sector schemes	public sector schemes	all schemes
Number of members (million):			
Defined Benefit plans	4.6	4.5	9.1
Defined Contribution planes	0.9	—	0.9
Hybrid schemes	0.1	—	0.1
Total	*5.7*	*4.5*	*10.1*
% of members in each type:			
Defined Benefit plans	81	100	90
Defined Contribution planes	16	—	9
Hybrid schemes	2	—	1
Total	*100*	*100*	*100*

Source: Table 3.2 of Government Actuary's Department (2003).

Since 1988 individuals have been able to contract out of SERPS (and leave their occupational scheme) and take out a personal pension. To kick-start these schemes when they were introduced a bonus National Insurance contribution of 2 per cent was paid by the government, in addition to the contracted-out rebate. By the mid-1990s, around 6 million people (more than one-quarter of all employees) had taken out a personal pension. Take-up was higher among younger workers as would be expected. However, there is a serious issue over the number of older workers who were 'mis-sold' personal pensions by financial advisers who wrongly advised them that they would be better off leaving their occupational pension plan.

Table 2.2 Labour market participation and benefit receipt

	FT work	PT Work	Not working	Public pension	Private pension	Disab Benefits	DisBen+ Private	Other Benefits
Men								
50-54	0.6447	0.2053	0.1500	0.0000	0.0947	0.0737	0.0237	0.0658
55-59	0.4620	0.1881	0.3598	0.0000	0.3432	0.1386	0.0825	0.0728
60-64	0.2680	0.1787	0.5533	0.0000	0.5395	0.2096	0.1478	0.1237
65-69	0.0213	0.0816	0.8972	0.8121	0.7411	0.1667	0.1312	0.0532
Women								
50-54	0.4667	0.2427	0.2907	0.0507	0.1040	0.0400	0.0133	0.0480
55-59	0.2936	0.2385	0.4679	0.0975	0.1988	0.0398	0.0061	0.0520
60-64	0.0909	0.1394	0.7697	0.7970	0.3606	0.0242	0.0152	0.0485
65-69	0.0156	0.0688	0.9156	0.9594	0.4125	0.0000	0.0000	0.0469

Source: Family Expenditure Survey 1994-95

Table 2.2 summarises labour market participation and income receipt by age using data from the Family Expenditure Survey 1994-95 (corresponding to the second wave of the Retirement Survey). It shows relatively high rates of labour market withdrawal among men before the state pension age. The two most important sources of income before state pension age are income from private (predominantly occupational) pensions and disability benefit. It is important to stress that these two sources of income are not always alternative pre-retirement income sources, but are typically received together by the same people. The fact that disability benefit was not means-tested meant that it could be received in conjunction with other forms of income. Three-quarters of people in receipt of disability benefit income also received some money from a private pension.

3. The Basic Empirical Model

The simulated responses used in this paper are based on the retirement model presented in Blundell, Meghir and Smith (2002). This model was estimated using the UK Retirement Survey and in this section we briefly review the model and specification of pension incentives. We also present the estimated model that is used in the simulations.[14]

3.1 The data

The main data used for analysing retirement behaviour are drawn from the UK Retirement Survey (RS), a household panel survey collected by the Office for Population and Census Surveys on behalf of the Department for Social Security. This

[14] For other studies of retirement behaviour in the UK see, for example, Blundell and Johnson (1998, 1999), Disney, Meghir and Whitehouse (1994) and Tanner (1998).

is the first large-scale panel data set in the UK to focus on individuals around the time of retirement. Two waves of data were collected on a national random sample of individuals born between 1919-1933. The first wave of the survey was conducted between November 1988 – January 1989 and collected information on 3,543 'key respondents' (who were aged 55-69). The key respondents include spouses if they were in the relevant age range. In addition, information was also collected on 609 spouses outside this age range. About two-thirds of the original sample were re-interviewed in 1994. 11% of respondents disappeared in this interval due to mortality; the residual attrition is a combination of non-response and (perhaps) unreported mortality.[15]

The Retirement Survey offers a relatively large sample of people in the relevant age range, compared to more general panel surveys such as the British Household Panel Survey. It also offers very rich demographic, economic and health information on individuals – and their spouses – in both waves. And it has employment history information and private pension history information dating right back to individuals' first jobs.[16] However, compared to the administrative datasets available in other countries, the sample in the Retirement Survey is relatively small (and is reduced by the high attrition rate between the two waves). Also, the survey does not collect earnings history information which is needed to calculate exact pension entitlements for each individual. Instead, we impute earnings histories on the basis of employment history information.

3.2 The Pension Incentive Calculations

3.2.1 The basic state pension

Calculation of basic state pension entitlement is straightforward. It depends on the total number of years' contributions and, for a married woman, on whether she opted to pay reduced rate National Insurance contributions. This latter piece of information is known directly from the Retirement Survey.

Although the basic state pension is flat rate, total wealth will vary across individuals because of the dependant's allowance and because of the fact that widows not entitled to a pension in their own right can claim their former spouse's pension in full when their spouse dies. In these cases, we need to compute husbands' total pension wealth over the life of the couple, based on the age difference between the

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[15] The high attrition rate is largely due to the fact that the survey was not originally intended to be a panel survey. Hence, little attempt was made to keep in touch with respondents after the first wave. Attanasio and Emmerson (2003) use the retirement survey to look at the impact of wealth on morbidity and mortality and incorporate the possibility that attrition may be correlated with mortality.

[16] For a good overview of information in the Retirement Survey see Disney, Grundy and Johnson (1998)

spouses. Obviously, the larger the age difference between husband and wife, the greater the husband's total pension wealth.

3.2.2 State Earnings-Related Pension Scheme

The precise formula for calculating an individual's SERPS pension is given by:

$$SERPS = \sum_{t=1978}^{R} (\widetilde{W}_t \frac{Y_R}{Y_t} - LEL_{R-1}) \chi_{Rt}, \; where \;\; \widetilde{W}_t = \max[W_t, UEL_t]$$

Earnings up to the annual upper earnings limit (*UEL*) are re-valued to the year of reaching state pension age (*R*) using an index of economy-wide average earnings (Y_R/Y_t). The lower earnings limit (*LEL*) in the year prior to the individual reaching state pension age is deducted from each year's re-valued earnings figure and the net of LEL earnings are multiplied by an accrual factor (χ_{Rt}).[17] For people retiring before 2000 the accrual rate was 1.25% a year. Details of earnings factors, upper and lower earnings limits and accrual rates are given in Blundell, Meghir and Smith (2001). Having calculated earnings profiles for each individual in the Retirement Survey, their SERPS entitlements are fairly straightforward to calculate. We assume zero SERPS pension for people who are in occupational pension plans and for married women who have opted to pay reduced rate National Insurance contributions.

Accrual rates have changed since 2000, but this reform will not affect the cohort of individuals in the Retirement Survey all of whom will have reached the state pension age before then. Finally, the fact that widows can claim their former husbands' SERPS pensions if they receive no pension in their own right means that, as with the basic state pension, a man's marital status, and the age difference between them and their spouse also affects their total pension wealth and accrual.

3.2.3 Invalidity benefit

One possible way to treat entitlement to invalidity benefit would be to assume that only individuals who received the benefit were eligible, and that all those who satisfied the eligibility conditions received the benefit. However, given the potential for subjective evaluation of 'incapacity for work' and 'reasonable work' and in the light of significant variation in the number of people receiving the benefit over time, as well as anecdotal evidence of differences between doctors in their willingness to certify individuals as being incapable of work, this assumption is inappropriate.

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[17] From April 2000 this formula changed. Instead of up-rating annual earnings and then subtracting the LEL from the year prior to retirement, the lower earnings limit from the year worked is subtracted from earnings first and then the difference is uprated in line with earnings growth. Since the LEL is annually uprated in line with the Basic State Pension, i.e. with prices, this has the effect of reducing the generosity of SERPS.

Instead, we calculate an individual's invalidity benefit wealth on the basis of an assigned probability that they will receive the benefit. These probabilities are derived in Blundell, Meghir and Smith (2001) from a probit model for receipt of invalidity benefit as a function of characteristics such as age, education, region, tenure, marital status and spouse's employment status, which we estimate using data drawn from the Family Expenditure Survey from April 1988 – March 1994. We impute probabilities for individuals in the Retirement Survey on the basis of matched characteristics.

3.2.4 Occupational pensions

The pension received in a defined benefit occupational pension plan is typically determined by a formula of the type:

$$P = \chi(PE_R — \beta LEL_{R-1})N$$

where P is the annual occupational pension, χ is the scheme-specific accrual rate, PE_R is 'pensionable earnings' at the time of retirement which are typically the individual's average earnings in the last year, or last few years, before retirement, β is the 'integration factor' and N is the number of years that the individual has belonged to the scheme. From information in the Retirement Survey, we know N, the number of years the individual has belonged to the scheme. However, we have to make reasonable assumptions about χ_{Rt}, PE_R and β.

The key distinction that we make is between individuals who work in the public sector versus those in the private sector. We assume that different typical schemes apply in the two sectors with different accrual rates, definitions of pensionable earnings and integration factors. We assume an accrual rate of 1/60th for private sector and 1/80th for public sector. For pensionable earnings we take the best three out of last ten years' earnings for individuals working in the private sector and the best year's earnings out of the last ten years for individuals working in the public sector. We assume an integration factor of 1 for private sector schemes and 0 for public sector schemes.

3.3 Total pension wealth and pension incentive measures

In the analysis of the incentive effects of pensions on retirement presented in Blundell, Meghir and Smith (2001), three different forward-looking measures of accrual were used. The first was simply the one-period accrual, i.e. how much an individual can add to their total pension wealth by working this period. The second was peak value. This represents the difference between total pension wealth accumulated by the start of the period and the maximum total pension wealth an individual could accumulate looking forward across all future years. This is a more appropriate measure if it is assumed that labour market exits by older workers are

irreversible. In this case, when someone leaves the labour market they are giving up all possible future additions to their pension and will therefore consider how much they could increase their pension by staying in the labour market not just this period, but in all future periods. By not retiring now, individuals retain an option to retire in the future and, thereby, to increase their pension. This is very similar in spirit to the option value (Stock and Wise, 1990a, 1990b), which is the third measure used.

In the option value model individuals are assumed to compare the value of retiring now to the maximum of the expected values of retiring at all future ages, where the value of retiring at future ages includes both possible pension additions and future earnings, i.e.

$$OV = V_t(r^*) - V_t(t) \text{ where } V_t(r) = \sum_{s=t}^{r-1} \beta^{s-t} Y_s^{\gamma} + \sum_{s=r}^{T} \beta^{s-t} (kB_s(r))^{\gamma}$$

where Y_s is earnings and B_s retirement benefits. The option value differs from the peak value by incorporating the future value of earnings until retirement and by incorporating utility parameters k, the differential value of income in leisure compared to earned income and γ, the coefficient of relative risk aversion. In our calculation of option values we assume $k = 1.5$ and $\gamma = 0.75$. We assume a discount factor, β, of 0.97 throughout.

3.4 The Retirement Probability Model

A summary of the estimated retirement model results are presented in Table 3.1. These are the estimated marginal effects from a Probit model of transitions into retirement. A full set of results are presented in Appendix A. This model specification includes both an option value accrual term as well as separate terms for pension wealth. The wealth terms relate to the discounted present value of pension wealth for the individual whose retirement we are modelling and that of his or her spouse. Two specifications are considered in the simulations reported here. The first relates to a model in which there is a separate dummy variable for each age. The second simply includes a linear age trend. The specification of age dummies in a retirement transition model is clearly important. These two specifications provide a range of specifications over which to compare our simulation results.

In each specification, the coefficients on these wealth are always strongly significant and suggest that the restrictions underlying the standard option value model need to be relaxed to allow saving and borrowing against future pension wealth. If these wealth variables are excluded the option value coefficient becomes much larger and significantly negative. For example the coefficient becomes –0.903 (0.275) for the first model that contains a full set of time dummies.

In all cases the pension wealth and option value variables are jointly significant. These results are consistent with the presence of both income and substitution effects in retirement decisions.[18] The positive coefficient on the total pension wealth variable points to an income effect, whereby individuals who accumulate a lot in earlier years retire earlier. The impact of the option value reflects foregone future opportunities from stopping working now; the negative coefficient on this term indicates that the greater those foregone opportunities, the less likely individuals are to retire. Since the incentive variables are measured in €100,000, the coefficient of –0.5145 on the option value for example, implies that a €10,000 rise in the option values (leaving pension wealth unaffected) reduces the probability of retirement by a little over five percentage points.[19]

The behavioural adjustments in the counterfactual simulations presented in the next section reflect these estimated marginal effects.

Table 3.1: Estimated retirement transition models, with a full set of time dummies and with a linear time trend only.

	Full set of time dummies	*Linear time trend only*
Total wealth	0.0608 ***	0.0631 ***
	(0.0164)	(0.0163)
Option value	–0.5145	–0.4446
	(0.3476)	(0.3426)
Spouse pension wealth	0.0280 ***	0.0269 **
	(0.0108)	(0.0107)
Number of observations	*1,998*	*1,998*
Pseudo R^2	*0.197*	*0.153*
Log likelihood	*–661.525*	*–697.758*

Notes: Marginal effects are report. Standard errors in parenthesis. Statistical significance denoted by *** = 1% level, ** = 5% level, *=10% level.
The full set of demographic controls include earnings (and earnings squared), education, health, job tenure, industry, proportion of time spent in full-time employment, whether individual has an occupational pension, housing tenure, financial wealth, age difference within couples, spouse's earnings, spouse's health and whether spouse is retired. See Table A.1.

[18] The option value and total pension wealth measures are in €100,000s while net earnings are in €1,000s.

[19] It is worth noting that the option value is significant and slightly larger in size for men as is also shown in the Blundell, Meghir and Smith (2001) study. However, it is much less precisely estimated for women. In our simulations we chose to use the combined sample results as presented in Table 3.1.

4. The Pension Policy Reforms and Simulation Methodology

As we have seen each individual's total pension wealth and pension accrual measures are built up from combining four separate elements of the pension system – the basic state pension, the State Earnings-Related Pension Scheme (SERPS), occupational pensions and disability benefit (invalidity benefit).[20] Here we outline the nature of the pension reforms and the methodology used for simulation.

4.1 Reform 1 (Increased state pension age)

The first reform concerns an increase the state pension age for everyone by three years. Hence under this reform the state pension age is 68 for men and 63 for women. We also augment the normal occupational pension retirement ages by three years. There is clearly a correspondence in practice between the state pension ages and the normal retirement ages in occupational pension plans, so increasing the state pension could be expected to have such a knock-on effect on occupational pension plans. Moreover, the increases in life expectancy that, in part, might cause the government to reduce the generosity of the state pension system could have a similar effect on occupational schemes.

4.2 Reform 2 (Common reform)

The second reform assumes a pension system of the following five components: (a) An early entitlement age of 60; (b) A normal retirement age of 65; (c) A 60% replacement rate at age 65; (d) A 6% actuarial adjustment from 60 to 70: and (e) No other pathways to retirement.

This system is considerably more expensive to the exchequer than the existing UK state pension system. This can be shown by the fact that entitlement to a full basic state pension is worth approximately 15% of average earnings with entitlement to the State Earnings-Related Pension Scheme (SERPS) at most around 30% of average earnings (since it provides 20% of earnings between the a lower and an upper threshold, with the former worth about 15% of average earnings and the latter set at around 150% of average earnings[21]). However, it should be noted that this reformed system is not more generous to all individuals. This is because it removes the possibility of 'retiring' onto means-tested income support or disability benefit (invalidity benefit). In the base system those who reach retirement with no or little

[20] We ignore income support since it is a universal benefit.

[21] These are known as the Lower Earnings Limit (LEL) and the Upper Earnings Limit (UEL) respectively.

other income will be eligible for means-tested income support, which essentially tops-up their income to that of the social security safety net. In addition those able to meet the health criteria will be able to receive the flat rate invalidity benefit (which prior to April 2001 was not means-tested) on top of any other occupational pension income that they might have.

In addition higher income individuals might also lose from this reformed system since it is assumed that the more generous state system will replace occupational pensions (both public and private). Hence those whose occupational pension plan provides a replacement rate more generous than this reformed state scheme will lose out. For example those in a private sector occupational pension plan are assumed to have an accrual rate of 1/60 – hence someone with 40 years of service would receive a replacement rate of 40/60 = 2/3rds (integrated with the basic state pension) which is greater than the 60% offered at 65 under reform 2. Those who retire before 65 will be entitled to even less under the reformed system. Those in public sector occupational pension plans were assumed to have an accrual rate of 1/80, but not integrated with the basic state pension. This means that whether or not someone with 40 years of service is better of under the reformed system will depend on whether the 60% replacement rate is greater than 50% of their final salary (i.e. 40/80) plus the basic state pension.

4.3 Reform 3 (Modified common reform)

Reform 2 is strongly based on reform 2, but modified to bring it slightly more into line with the base UK pension system. Under this reform the state pension system still offers a replacement rate of 60% at age 65 (with the same accrual structure as under reform 2), but it also has a floor on benefits equal to the basic state pension, and a ceiling set at the higher threshold above which additional employee National Insurance Contributions are not paid.[22] In addition both means-tested income support and disability benefit (invalidity benefit) are retained until age 60. As a result only high income individuals can be worse off under reform 3 compared to reform 2 (due to the fact that under reform 3 maximum pension income is capped). Furthermore the retention of means-tested income support will mean that low income individuals cannot be worse off under reform 3 than they are under the base system, since retired low income individuals will be able to receive means-tested income support until age 60 and then a state pension worth at least the basic state pension from this age onwards.

[22] Known in UK parlance as the Upper Earnings Limit.

5. Effect of Policy Reforms

This section uses the estimated retirement transition models described in section 3 to model the impact of each of the reforms set out in sections 4.1,4.2 and 4.3 on retirement ages and the government's finances. This impact is then separated into the 'mechanical' impact of the reform, namely that would arise if retirement ages were fixed, and the 'behavioural' impact of the reform, that is the fiscal implications of any modelled change in retirement ages. We then turn to examine the distributional impact of each of the reforms.

5.1 Retirement ages and fiscal implications of reform 1, using a retirement model with a full set of age dummies

The effect of raising the state pension age is to reduce the median level of total pension wealth and to increase option values, compared to the existing pension system. The income and substitution effects work in the same direction and the combined effect is to reduce the conditional probability of retirement at younger ages. The precise magnitude of the effect of reforming the state pension system depends on which specification is used. When a full set of age dummies is included these tend to dominate any of the pension wealth and accrual incentives and the effect of reforming the pension system appears to be very small. To the extent that the age dummies pick up the incentive effects, these would need to be adjusted to reflect the pivotal ages in the new system. Under the base system, with a full set of age dummies included, the mean retirement age is estimated at 63.1.

The first reform, which increases the state pension age for both men and women by three years, is estimated to increase this to 63.5 if the estimated age effects are assumed to be unchanged by the reform. Under the alternative assumption, that the reformed system would lead directly to a shift in the estimated age effects this rises to 64.9. Figure 5.1a shows the estimated distribution of retirement ages under both of these assumptions compared to the estimated distribution in the base pension system. This shows that the distribution of retirement ages under the base system and under reform 1 when the estimated age effects are held constant are very similar, although the reform does lead to slightly fewer retirements between 56 and 60 (inclusive) and more retirements occurring between 62 and 70 (inclusive). As expected when the reform is also assumed to shift the estimated age effects this leads to larger differences in the distribution of retirement ages. The spikes in the base system that occurred at 60 and 65 (which are the state pension ages for women and men respectively) now occur at 63 and 68.

Increasing the state pension age would lead to a lower level of expenditure on the state pension. The increase in retirement ages would also lead to an increase in government revenues arising from increased income tax and national insurance

contributions. Both of these would lead to lower levels of government borrowing (or larger government surpluses) than under the base system. At least in part this impact will be offset by increased state spending on both means-tested income support and disability benefit (invalidity benefit). Estimates of the government expenditure and government revenues from these sources under both the base system and under reform 1 are presented in table 5.1. Under the base system expenditure on the state pension to this cohort of individuals is estimated to be €24.7bn. Under the reformed system (assuming no change in the estimated age effects) this is reduced by 24.2% to €18.7bn. As we will show later (in section 5.4) this comprises a slightly larger 'mechanical' effect arising from the increase in the state pension age, offset slightly by an increase in some individuals entitlements to the State Earnings-Related Pension Scheme (SERPS) arising from the increased retirement age. Reduced spending on the state pension is partially offset by a large increase in expenditure on disability benefit (invalidity benefit) of 40.7% and a tripling in expenditure on means-tested income support (increase of 200.3%). Overall state expenditures are still reduced by 12.1%. Under the alternative assumption, that the increase in the increase in the state pension age also shifts the estimated age effects, the savings from reduced expenditure on the state pension are reduced. This is because the larger upwards shift in retirement ages leads to higher expenditure on the State Earnings-Related Pension Scheme (SERPS) than when the age effects are held fixed. This increase in state pension spending is almost entirely offset by a reduction in expenditure on means-tested income support. Overall expenditure under the model with the shift in age effects is 11.5% lower than under the base case compared to the 12.1% lower found when the age effects are held constant.

Turning to the impact of increasing the state pension age on government receipts this reform will also have both a direct impact and an indirect impact. The direct impact will be through increased employee national insurance contributions on earnings as these will now be paid up to the higher state pension age. (There is no corresponding direct impact on employers national insurance contributions as these are levied on the earnings of individuals aged both below and above the state pension age). There will also be a direct effect leading to reduced income tax receipts levied on both state and private pension income due to increase in the pension age. The indirect impact of reform 1 arises as a result of the increased average retirement age. This will increase income tax and employees and employers national insurance contributions. Table 5.1 shows that in the base system total government receipts from these taxes are estimated at €40.6bn. This estimated comprises of employee national insurance contributions of €5.4bn, employers national insurance contributions of €7.0bn and income tax receipts of €28.2bn. The table shows that total revenues from these three taxes exceeds total spending on means-tested income support, invalidity benefit and state pension. This means that the 'excess' revenues are essentially being used to pay for other items of public expenditure or to reduce public debt.

We find that under reform 1, assuming no change in the estimated age effects, employee national insurance is increased by 20.0%. The increases in employer national insurance is smaller at 5.8%, which is not surprising since this is only from the indirect impact of an increased average retirement age discussed above. The increase in income tax receipts is smaller still at 5.7%. Increased income tax receipts under reform 1 shows that the direct impact of lower receipts on pension income is more than offset by the impact of an increased average retirement age. Overall income tax and national insurance revenues are estimated to be 7.6% higher.

Under the alternative assumption that the increase in the state pension age would also shift the estimated age effects by a full three years we find that government revenues from each of these three sources would be increased further. This is due to the larger increase in average retirement ages that occurs under this assumption. Overall tax and national insurance revenues would be 18.7% higher than under the base system, compared to the 7.6% found above.

The overall impact on the Government's finances from the items modelled is also presented in table 5.1. Under the base system there is a net surplus of €12.4bn. This is increased by 52.1% to €18.9bn under the model where the age effects are held fixed. It is increased by 87.1% to €23.3bn under the model where age effects are, by assumption, fully shifted by 3 years. In part these percentages are inflated by the fact that they are being compared to the net surplus. However the fiscal gains to the exchequer are also large when compared to gross expenditures. Under the model with no shift in the estimated age effects the increase in the net surplus of €6.5bn represents 26.2% of gross expenditure. Under the model with a full three-year shift in the estimated age effects the increase in the net surplus of €10.8bn represents 43.5% of gross expenditure.

The reduction in net expenditure (increase in net surplus) disaggregated by age of retirement is shown in figure 5.1b. Under the base system there is an overall net expenditure from the state on those who retire before age 59. This is because the expenditure and revenues are calculated over ages 56 to 77 and therefore taxes on earnings from those who retire this early will often be low (or for those who retire at 56 zero). Net expenditure peaks at age 65 – this is not due to those retiring at this age being particularly expensive to the state but due to the fact that 65 is the most common retirement age (as shown in figure 5.1a). Under reform 1 the pattern of net expenditures varies by the assumption that is made to the interpretation of the age effects. Under the assumption that there is no shift in the estimated age effects the pattern of net expenditure is quite similar to that observed in the base system although there is unsurprisingly a particularly large reduction in net expenditure (i.e. an increase in the net surplus) among those who retire at age 65. Under the assumption that the estimated age effects are shifted by the full three years the spike at 65 is shifted to age 68.

The estimated impact on the exchequer of an increase in the state pension age can also be disaggregated into the impact on gross expenditures and the impact on gross government revenues. This is shown in figures 5.1c and 5.1d. The spike in gross expenditures occurring at age 65 is reduced under the assumption that the age effects are fixed, and is reduced and moved to age 68 under the assumption that reform leads to a shift in the age effects by three years. Turning to government revenues – under the first assumption the revenue received from those retiring at age 65 is increased, and under the second assumption it is both increased and shifted to age 68.

Table 5.1. Total fiscal impact of reform 1, option value model with a full set of age dummies.

	€ (million)			% change on base system	
	Base	Reform 1 (no age shift)	Reform1 (age shift)	Reform 1 (no age shift)	Reform1 (age shift)
State pension	€ 24,733	€ 18,741	€ 19,739	–24.2%	–20.2%
Invalidity Benefit	€ 2,619	€ 3,685	€ 3,671	40.7%	40.2%
Income Support	€ 765	€ 2,297	€ 1,470	200.3%	92.2%
Total spending	*€ 28,117*	*€ 24,723*	*€ 24,881*	*–12.1%*	*–11.5%*
Employee NI	€ 5,354	€ 6,427	€ 6,758	20.0%	26.2%
Employer NI	€ 7,045	€ 7,457	€ 8,261	5.8%	17.3%
Income Tax	€ 28,156	€ 29,755	€ 33,130	5.7%	17.7%
Total Tax	*€ 40,555*	*€ 43,639*	*€ 48,150*	*7.6%*	*18.7%*
Net expenditure	**–€ 12,438**	**–€ 18,916**	**–€ 23,269**	**52.1%**	**87.1%**

Note: For details of the specification of the retirement model see section 3.

Table 5.2. Total fiscal impact of reforms 2 and 3, option value model with a full set of age dummies.

	€ (million)			*% change on base system*	
	Base	*Reform 2*	*Reform3*	*Reform 2*	*Reform3*
State pension	€ 24,733	€ 73,498	€ 80,087	197.2%	223.8%
Invalidity Benefit	€ 2,619	€ 0	€ 731	–100.0%	–72.1%
Income Support	€ 765	€ 0	€ 954	–100.0%	24.7%
Total spending	*€ 28,117*	*€ 73,498*	*€ 81,772*	*161.4%*	*190.8%*
Employee NI	€ 5,354	€ 6,828	€ 6,561	27.5%	22.6%
Employer NI	€ 7,045	€ 8,546	€ 8,128	21.3%	15.4%
Income Tax	€ 28,156	€ 41,769	€ 40,590	48.3%	44.2%
Total Tax	*€ 40,555*	*€ 57,143*	*€ 55,279*	*40.9%*	*36.3%*
Net expenditure	**–€ 12,438**	**€ 16,355**	**€ 26,494**	**n/a**	**n/a**

Note: For details of the specification of the retirement model see section 3; Given the move from net surplus to a net deficit under reforms 2 and reform 3 it is not possible to express the change in net expenditure as a percentage.

5.2 Retirement ages and fiscal implications of reforms 2 and 3, using a retirement model with a full set of age dummies

Under both reform 2 and reform 3 median level of total pension wealth is increased. The income effect from these reforms will therefore tend to reduce retirement ages. The substitution effect will tend to work in the opposite direction with state pension rights being increased by 6% for each year of additional work between 60 and 70. This is in contrast to under the base system where the basic state pension and the State Earnings-Related Pension Scheme (SERPS) become payable at the state pension age regardless of whether an individual has actually retired. The option value effect is reinforced in reform 2 by the absence of any non-pension benefits (such as disability benefits) before retirement age under the simulated reform that increases the incentive to stay in work. In both reform 2 and reform 3 the overall effect on retirement behaviour is to lead to an increase in the average retirement age. Under the base system this is estimated to be 63.1, under reform 2 it is estimated to be 64.6 and under reform 3 it is estimated to be 63.9. The fact that average retirement ages are closer in reform 3 to the base system than there are in reform 2 is perhaps not surprising as the reform 3 system is, by design, closer to the base system.

The estimated distribution of retirement ages under both reform 2 and reform 3 are shown in figure 5.2a alongside those arising from the base system. Under all three systems the most common retirement ages are 60 and 65. This corresponds to the state pension ages for women and men respectively in the base pension system. These spikes are the result of the estimated age effects from the base pension system and therefore could be expected to change under the reformed system. Reform 2 leads to lower retirement rates at all ages up to 63 (inclusive) and correspondingly higher retirement rates up to age 76. The large fall in retirements prior to age 60 is unsurprising as under reform 2 they would receive no pension income until they reached 60. Turning to reform 3: for all ages between 56 and 73 the retirement rates under reform 3 are estimated to be between those under the base system and those under reform 2. Again this is to be expected given the design of the system.

Both reform 2 and reform 3 represent more generous and therefore expensive state pension systems than the existing UK pension system. This is shown in table 5.2. Total state expenditure is estimated to be €73.5bn under reform 2 and €81.8bn under reform 3 compared to €28.1bn under the base system. Under reform 2 this increase in spending is due to a large increase in spending on the state pension, which is partially offset by the fact that there is no spending on means-tested income support or disability benefit (invalidity benefit). Under reform 3 spending on state pensions is even higher than under reform 2. This shows that the cap on state pension income under reform 3 does not reduce spending sufficiently to finance the (re-) introduction of a floor on pension benefits equal to the basic state pension. In addition under reform 3 disability benefit (invalidity benefit) and means-tested income support are retained for those who retire before age 60. This leads to lower invalidity benefit expenditure than in the base system (as under reform 3 men aged 60 to 64 will no longer be able to claim it) but higher levels of means-tested income support spending (which is due to those retiring before 60 having no other pension income and therefore falling onto income support being enough to more than offset the fact that people will not be eligible from 60 onwards).

Turning to government revenues both reform 2 and reform 3 lead to higher levels of government receipts. Revenues from employers national insurance are increased by 15.4% as a result of the increase in average retirement ages. Employee's national insurance receipts are increased by 22.6%. This is higher than the estimated increase in employers national insurance receipts because of women in paid employment having to pay employees national insurance contributions through to age 65 under the reformed systems (compared to the state pension age for women of 60 under the base system). Income tax receipts are increased even more substantially – this larger increase being due to more income tax being paid on the more generous state pension system. The increase in revenues under reform 2 is larger than the increase under reform 3. This is due to the earlier average retirement age under reform

3 and the fact that the ceiling on taxable state pension benefits reduces receipts. The re-introduction of disability benefit (invalidity benefit) and means-tested income support does not increase income tax receipts as these sources of income are not taxable, while those who only receive a pension income equal to the floor of the basic state pension will also not have to pay any income tax. (This is because their income will not be sufficient to take them above the income tax personal allowance).

The overall impact on the Government's finances from the items modelled is also presented in table 5.2. Under the base system there is a net surplus of €12.4bn. Under reform 2 this leads to a net deficit of €16.4bn and under reform 3 this would be even higher at €26.5bn. The cost to the exchequer of reform 2 would be €28.8bn, or 39.2% of gross expenditure. The cost of reform 3 would be €38.9bn, or 47.6% of gross expenditure.

A breakdown of net expenditure by the age at which individuals retire is provided in figure 5.2b. Comparing reform 2 to the base system we see that that the reformed system is more expensive to the exchequer at all retirement ages prior to age 67 and with net expenditure being similar thereafter. Reform 2 is particularly more expensive at ages 60 and 65, as shown by the difference between the reform 2 and base system bars at these points. These are the modal retirement ages for women and men respectively. Figure 5.2b also shows that reform 3 has a greater exchequer cost than reform 2 at all retirement ages.

5.3 Retirement ages and fiscal implications of reforms 1, 2 and 3, using a retirement model with a linear age model

All of the analysis so far has looked at retirement ages and the fiscal impact of different reforms using a retirement model containing a full set of age dummies. This section performs the same analysis but with the more parsimonious retirement model that only allows for a linear age trend. The estimated retirement ages under the base system, and each of the three reforms is shown in figure 5.3a. Under the base system the modal retirement age is estimated to be 63 and the pattern of retirement ages differs substantially from the more flexible model that used a full set of age dummies (and was shown in figure 5.1a). The changes in retirement ages caused by each of the reforms are all in the same direction as estimated in the model using a full set of age dummies. Under the base system the average retirement age is estimated to be 63.2 years (compared to 63.1 found under the model with a full set of age dummies). Reform 1 leads to an increase in average retirement ages to 63.5, which is exactly the same as found using the previous model with no shift in the estimated age effects (with an age shift led to an increase to 64.9 years). Reform 2 is estimated to increase the average retirement age to 64.2 while reform 3 is estimated to lead to a slightly smaller increase to 63.7. These compare to the 64.6 and 63.9 found using the first retirement model.

The fiscal impact of these reforms, using the linear age retirement model, is summarised in table 5.3. Despite the very different distribution of retirement ages shown in figure 5.3a compared to 5.1a and 5.2a the estimated fiscal impacts are very similar to those obtained when using the retirement model with a full set of age dummies. Reform 1 is estimated to reduce total state spending by 13.4% and increase government revenues by 6.2%. This compares to a saving of 12.1% and an increase of 7.6% found using a full set of age dummies and not shifting the age effects (presented in table 5.1). Under reform 2 expenditures are estimated to increase by 167.1% and tax revenues by 33.0% (compared to 161.4% and 40.9% shown in table 5.2) while under reform 3 expenditures are estimated to increase by 195.7% and tax revenues by 30.0% (compared to 190.8% and 36.3% shown in table 5.2)

Table 5.3. Total fiscal impact of reforms 1, 2 and 3, option value model with a linear age trend only.

	% change on base system		
	Reform 1	*Reform 2*	*Reform3*
State pension	–24.0%	194.7%	220.1%
Invalidity Benefit	48.6%	–100.0%	–75.0%
Income Support	171.7%	–100.0%	32.2%
Total spending	*–13.4%*	*167.1%*	*195.7%*
Employee NI	18.9%	20.8%	17.4%
Employer NI	4.4%	14.6%	10.3%
Income Tax	4.2%	40.0%	37.4%
Total Tax	*6.2%*	*33.0%*	*30.0%*
Net expenditure	**42.3%**	**n/a**	**n/a**

Note: Given the move from net surplus to a net deficit under reforms 2 and reform 3 it is not possible to express the percentage change in net expenditure.

Table 5.4 Decomposition of the Total Effect of Reform 1

	Mechanical	Behavioural	Total
Full age dummies, no age shift			
Total expenditure	–€ 3,894	€ 500	–€ 3,394
Total taxes	€ 599	€ 2,485	€ 3,084
Net change	–€ 4,494	–€ 1,985	–€ 6,478
Net change as % of net base benefits	*36.1%*	*16.0%*	*52.1%*
Net change as % of gross base benefits	*–16.0%*	*–7.1%*	*–23.0%*
Full age dummies, with age shift			
Total expenditure	–€ 3,894	€ 658	–€ 3,236
Total taxes	€ 599	€ 6,996	€ 7,595
Net change	–€ 4,494	–€ 6,338	–€ 10,831
Net change as % of net base benefits	*36.1%*	*51.0%*	*87.1%*
Net change as % of gross base benefits	*–16.0%*	*–22.5%*	*–38.5%*
With linear age trend			
Total expenditure	–€ 3,976	€ 247	–€ 3,729
Total taxes	€ 653	€ 2,001	€ 2,654
Net change	–€ 4,629	–€ 1,753	–€ 6,383
Net change as % of net base benefits	*30.7%*	*11.6%*	*42.3%*
Net change as % of gross base benefits	*–16.7%*	*–6.3%*	*–23.0%*

Note: For details of the specification of the retirement model see Section 3.

Figure 5.3b breaks down this net expenditure by the age of retirement. This does give a very different picture to that shown for reform 1 in figure 5.1b and reforms 2 and 3 in figure 5.2b. This is caused by the very different pattern of retirement ages estimated using a linear age trend (and shown in figure 5.3a) compared to those found when using a full set of age dummies (and shown in figures 5.1a and 5.2b). The large cost of reforms 2 and 3 still arises from those retiring before age 67.

5.4 Decomposing the fiscal implications of reforms 1, 2 and 3

The fiscal impact of each of the reforms that has been described in sections 5.1 to 5.3 can be broken down into two components. First the fiscal impact that would arise if the reformed system were introduced but individuals did not change their retirement behaviour (hereon referred to as the 'mechanical' effect). Second the fiscal impact that arises due to individuals changing their retirement behaviour (hereon referred to as the 'behavioural' effect). This section presents these two breakdowns for each of the 3 reforms and each of the 2 retirement models discussed so far.

The fiscal impact of the first reform is decomposed into these two effects in table 5.4. The first set of rows takes the retirement model with a full set of age dummies and where the estimated age effects are held fixed. Under this model reform 1 was estimated to reduce state expenditure by €3.4bn. The mechanical effect is found to reduce spending by €3.9bn, with the increase in retirement ages leading to a relatively small offset in expenditure of €0.5bn. This small increase is mainly due to an increase in state pension spending, as individuals retire later and therefore accrue a larger entitlement to the State Earnings-Related Pension Scheme (SERPS). On tax receipts it is the mechanical effect of the reform that is relatively small at €0.6bn. This is due to increase employee national insurance receipts arising from the increase in the state pension age which is slightly offset by lower income tax receipts on the reduced state pension benefits. The behavioural part of the fiscal impact works in the same direction as the mechanical effect, due to increased tax receipts from the increase in average retirement ages. This is estimated to increase revenues by €2.5bn.

The second set of rows show the mechanical and behavioural effects using the retirement model with the full set of age dummies and shifting the estimated age effects by the full three years. By definition the mechanical effect of this reform is exactly the same as under the previous model. The larger increase in retirement ages leads to larger behavioural effects. The increase in state expenditures from the behavioural response to the reform is still relatively small at just €0.7bn. This is due to the fact that for many individuals extra years of employment will not increase their entitlement to state pensions – for example because they are opted out of the State Earnings-Related Pension Scheme (SERPS), or if the extra years of work do not add to their best 20 years. The behavioural component of the fiscal impact is estimated to be larger on tax receipts. This is because the larger increase in retirement ages increases receipts from national insurance contributions and income tax revenues. The third set of rows of table 5.4 show the decomposition using the retirement model with a linear age trend. These are quite similar to the model with no shift in the estimated age effects.

The decomposition of the fiscal impact of reforms 2 and 3 under each of the retirement models is presented in table 5.5. As with reform 1 the behavioural impact of the reforms is found to be relatively larger in the retirement model with the full set of age dummies than in the model that uses just a linear age trend. This is due to the estimated increase in retirement ages accruing under reforms 2 and 3 being larger in the former model.

Looking at state expenditure under reform 2 it is clear that the mechanical impact of the reform is only very slightly offset by the behavioural impact of the reform. The fact that the very large increase in generosity of the state system implied by this reform is only slightly offset by individuals retiring slightly later is unsurprising. With tax receipts the behavioural impact of the reforms is found to be

relatively more important, and as with reform 1 they are found to both operate in the same direction – namely to increase revenues.

Under reform 3 the mechanical component of the fiscal effect of the reform on both state spending and tax receipts are estimated to be larger than under reform 2. This reflects the fact that reform 3 is, on average, more generous than reform 2. The behavioural component of the fiscal effect on both state spending and tax receipts is estimated to be smaller. This reflects the smaller increase in average retirement ages occurring as a result of reform 3. Hence with regards to state expenditures the behavioural components of the fiscal effect of reform 3 are very small relative to the mechanical component. On tax receipts both effects are still very important, and continue to operate in the same direction.

5.5 Distributional impact of reforms 1,2 and 3

The micro data used in this analysis can also be used to examine the distributional impact of each of these potential reforms. These are calculating each individuals total expected pension wealth under the base system and each of the three reforms. An alternative calculation would be to take the individuals incomes in each of the three reforms. However this seems inappropriate since a reform, such as an increase in the state pension age, might lead to individuals remaining in work for longer and therefore receiving a higher income but they would have preferred the unreformed system in which they could have retired earlier.

Individuals are then placed in wealth quintiles on the basis of the wealth in the base system according to two different equivalence scales. The first assumes that to have the same standard of living couples need 2/3rds more wealth than a single individual. The second simply places one-fifth of single and one-fifth of couples in each quintile. Essentially this latter equivalence scale assumes that a couple at the 80^{th} percentile of the wealth distribution of couples is as well of as a single person at the 80^{th} percentile of the wealth distribution of single individuals.

Table 5.5 Decomposition of the Total Effect of Reforms 2 and 3

	Mechanical	Behavioural	Total
Reform 2, full age dummies			
Total expenditure	47,807	–€ 2,426	€ 45,381
Total taxes	€ 7,080	€ 9,508	€ 16,588
Net change	€ 40,727	–€ 11,934	€ 28,793
Net change as % of net base benefits	*–327.4%*	*95.9%*	*–231.5%*
Net change as % of gross base benefits	*144.8%*	*–42.4%*	*102.4%*
Reform 2, with linear age trend			
Total expenditure	€ 47,994	–€ 1,651	€ 46,343
Total taxes	€ 7,293	€ 6,847	€ 14,140
Net change	€ 40,701	–€ 8,499	€ 32,202
Net change as % of net base benefits	*–269.7%*	*56.3%*	*–213.4%*
Net change as % of gross base benefits	*146.7%*	*–30.6%*	*116.1%*
Reform 3, full age dummies			
Total expenditure	€ 54,374	–€ 719	€ 53,655
Total taxes	€ 8,009	€ 6,714	€ 14,724
Net change	€ 46,364	–€ 7,433	€ 38,932
Net change as % of net base benefits	*–372.8%*	*59.8%*	*–313.0%*
Net change as % of gross base benefits	*164.9%*	*–26.4%*	*138.5%*
Reform 3, with linear age trend			
Total expenditure	€ 54,381	–€ 111	€ 54,270
Total taxes	€ 8,238	€ 4,627	€ 12,866
Net change	€ 46,143	–€ 4,738	€ 41,405
Net change as % of net base benefits	*–305.8%*	*31.4%*	*–274.4%*
Net change as % of gross base benefits	*166.4%*	*–17.1%*	*149.3%*

Note: For details of the specification of the retirement model see Section 3.

Table 5.6. Distributional impact of the reforms, measured by the % change in pension wealth, using a simple equivalence scale.

System & retirement model	*Quintile*					*All*
	Poorest	*2*	*3*	*4*	*Richest*	
Reform 1:						
Full age dummies, no age shift	–0.2%	0.4%	–5.3%	–10.4%	–6.7%	–5.9%
Full age dummies, with age shift	–13.5%	–14.1%	–13.6%	–13.6%	–9.9%	–12.2%
Linear age trend only	12.6%	7.8%	0.2%	–8.0%	–5.5%	–2.2%
Reform 2						
Full age dummies	202.8%	35.3%	19.2%	–19.6%	–5.9%	13.7%
Linear age trend only	209.7%	48.3%	18.9%	–18.5%	–8.0%	15.0%
Reform 3						
Full age dummies	261.0%	65.1%	38.4%	5.2%	–1.5%	32.1%
Linear age trend only	268.0%	76.5%	41.0%	5.4%	–3.3%	33.6%

Note: For details of the specification of the retirement model see Section 3.

Table 5.7. Distributional impact of the reforms, measured by the % change in pension wealth, keeping one-fifth of singles and couples in each quintile.

System & retirement model	*Quintile*					*All*
	Poorest	*2*	*3*	*4*	*Richest*	
Reform 1:						
Full age dummies, no age shift	0.9%	–1.0%	–4.6%	–9.8%	–7.0%	–5.9%
Full age dummies, with age shift	–14.4%	–14.4%	–12.9%	–12.7%	–10.5%	–12.2%
Linear age trend only	12.6%	6.9%	0.6%	–7.8%	–5.7%	–2.2%
Reform 2						
Full age dummies	188.6%	37.3%	16.9%	–18.5%	–6.9%	13.7%
Linear age trend only	199.3%	44.6%	18.6%	–19.0%	–7.8%	15.0%
Reform 3						
Full age dummies	239.2%	68.2%	36.3%	6.0%	–2.1%	32.1%
Linear age trend only	248.5%	76.7%	40.0%	4.5%	–2.7%	33.6%

Note: For details of the specification of the retirement model see Section 3.

The concern with this latter equivalence scale is that it might overstate the well being of single individuals since we know that on average older single people are poorer than older couples. However as this section will show the distributional results do not seem to be sensitive to the choice of either of these equivalence scales. Once individuals are placed in wealth quintiles according to their wealth and family size under the base system the total amount of wealth in each quintile is estimated. This is then compared to the total amount of wealth in each base quintile under each of the reformed systems. Working out the distributional impact in this way, rather than taking the average change in wealth observed across individuals, is designed to make our results less sensitive to any outliers which is a particular concern given our relatively small sample sizes.

The distributional impact of each of the reforms using the simple equivalence scale is presented in table 5.6. Table 5.7 shows the distributional results assuming that one-fifth of single individuals and one-fifth of couples are in each quintile.

Reform 1, which increases the state pension age, unsurprisingly leads to lower levels of average pension wealth. Under the retirement model with a full set of age dummies without any shift in the estimated age effects the reform leads to average losses across the top 3 wealth quintiles. This compares to no average loss in the poorest 2 wealth quintiles. This is caused by the availability of means-tested income support and disability benefit (invalidity benefit) compensating many of those who are out of work who do not have a private pension.

Shifting the age effects leads to quite different distributional effects with those in the poorest two quintiles suffering average loses. This is because many individuals are now assumed to retire later as a result of the reform. This means that entitlements to means-tested income support and disability benefit (invalidity benefit) will be reduced (which are included in the estimates of pension wealth, whereas earnings are not). The results from the retirement model that includes only a linear age trend are quite different. These suggest that in fact on average those in the poorest two wealth quintiles will gain from the reform. However this feature simply arises from the fact that under this model many of these individuals estimated to be in employment and under the reformed system will be able to continue to accrue an additional entitlements to the State Earnings-Related Pension Scheme (SERPS) when the state pension is increased. In practice this seems is an unreasonable estimate. This is demonstrated by the difference in estimated retirement rates shown in figures 5.1a and 5.3a.

Table 5.6 and table 5.7 also show that under reform 2 individuals are, on average, better off than under the base system. This is due to large increases in the pension wealth of those in the poorest 3 wealth quintiles, and in particular very large gains among those in the poorest quintile. Those in the top 2 wealth quintiles actually

lose on average. These differences are caused by the fact that those individuals with higher pension wealth under the base system will be more likely to have a private pension, which they will lose under the reformed system. These distributional results are invariant to the choice of retirement model.

Under reform 3 the average gains across the whole population is larger than under reform 2. On average all of the quintiles gain from this reform compared to reform 2. This is because the retention of the basic state pension, means-tested income support and disability benefit (invalidity benefit) are worth more to each quintile than the fact that the earnings related component of the state pension is now capped. Compared to the base system the richest quintile still loses on average. Again these distributional results are invariant to the choice of retirement model.

6. Summary and Conclusions

The focus of this paper has been the evaluation of the fiscal and distributive impact of social security pension reform in the UK. We have considered three reforms to the state pension system that are all designed to increase the retirement age by changing the incentive structure underlying the pension system. The first increased the pension age by three years, the second introduced an actual adjustment to retirement before 65 and after sixty five allowing deferral to age 70. It also eliminated all other pathways to retirement. The final reform adapted the second reform to include a cap and a floor so as to mirror more closely the existing state pension scheme in the UK

The simulations show that increasing the state pension age would lead to a lower level of expenditure on the state pension. The increase in retirement ages would also lead to an increase in government revenues arising from increased income tax and national insurance contributions. In particular employee national insurance receipts would increase since they would payable to new increased state pensions age. The increase in receipts and reduction in state spending would lead to lower levels of government borrowing (or larger government surpluses) than under the base system. At least in part this impact will be offset by increased state spending on both means-tested income support and disability benefit (invalidity benefit).

As age effects are so central to any microeconometric model of retirement transitions, the detailed simulation results were presented for different specifications. For reform 1 in which the state pension age is increased, the important contrast in these different specifications was whether the age dummies were held fixed or allowed to shift in line with the reform. For the first reform the overall expenditure under the model with the shift in age effects is 11.5% lower than under the base case compared to the 12.1% lower found when the age effects are held constant. We also find that, assuming no change in the estimated age effects, employee national

insurance is increased by 20.0%. Overall income tax and national insurance revenues are estimated to be 7.6% higher. Under the alternative assumption that the increase in the state pension age would also shift the estimated age effects by a full three years we find that government revenues from each of these sources would be increased further. This is due to the larger increase in average retirement ages that occurs under this assumption. Overall tax and national insurance revenues would be 18.7% higher than under the base system, compared to the 7.6%.

Both reform 2 and reform 3 represent considerably more generous and therefore expensive state pension systems than the existing UK pension system. Under reform 2 this increase in spending is due to a large increase in spending on the state pension, which is partially offset by the fact that there is no spending on means-tested income support or disability benefit (invalidity benefit). Under reform 3 spending on state pensions is even higher than under reform 2. This shows that the cap on state pension income under reform 3 does not reduce spending sufficiently to finance the (re-) introduction of a floor on pension benefits equal to the basic state pension. In terms of government revenues both reform 2 and reform 3 lead to higher levels of government receipts.

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Appendix A: Table A.1 Retirement transition models, with a full set of time dummies and with a linear time trend only.

	Full set of time dummies		Linear time trend only	
	Men	Women	Men	Women
Total wealth	0.0608		0.0631	
	(0.0164)		(0.0163)	
Option value	–0.5145		–0.4446	
	(0.3476)		(0.3426)	
Spouse pension wealth	0.0280		0.0269	
	(0.0108)		(0.0107)	
Net earnings	–0.0039		–0.0021	
	(0.0047)		(0.0046)	
Net earnings^2	0.0001		0.0001	
	(0.0001)		(0.0001)	
Partners net earnings	–0.0066		–0.0068	
	(0.0029)		(0.0029)	
Partners net earnings^2	0.0002		0.0002	
	(0.0001)		(0.0001)	
Female dummy		0.1252		0.9176
		(0.1611		(0.2186)
Age difference	–0.0042	–0.0065	–0.0038	–0.0064
	(0.0023)	(0.0039)	(0.0022)	(0.0039)
Job tenure	0.0000	0.0028	0.0005	0.0028
	(0.0014)	(0.0015)	(0.0014)	(0.0015)
% FT employment	0.0535	0.0214	0.0461	0.0284
	(0.0380)	(0.0403)	(0.0377)	(0.0405)
Education dummy	–0.0210	–0.0088	–0.0188	–0.0191
	(0.0196)	(0.0248)	(0.0199)	(0.0235)
Health score	0.0228	0.0230	0.0196	0.0206
	(0.0094)	(0.0106)	(0.0095)	(0.0107)
Partners health score	–0.0090	–0.0201	–0.0110	–0.0176
	(0.0067)	(0.0123)	(0.0068)	(0.0122)
Renter	–0.0177	–0.0053	–0.0165	–0.0057
	(0.0223)	(0.0306)	(0.0225)	(0.0306)
Mortgage	–0.0357	–0.0293	–0.0366	–0.0289
	(0.0202)	(0.0226)	(0.0203)	(0.0229)
Industry = engineering	0.0525	–0.0382	0.0482	–0.0439
	(0.0433)	(0.0438)	(0.0423)	(0.0415)
Industry = manufacturing	–0.0006	n/a	0.0039	n/a
	(0.0373)	n/a	(0.0379)	n/a
Industry = distribution	–0.0053	0.0398	0.0059	0.0328
	(0.0343)	(0.0704)	(0.0365)	(0.0675)
Industry = services	–0.0540	–0.0310	–0.0500	–0.0400
	(0.0246)	(0.0446)	(0.0259)	(0.0429)
Industry = government	–0.0122	–0.0070	0.0090	–0.0176
	(0.0407)	(0.0597)	(0.0467)	(0.0551)
Spouse retired	0.0688	0.1170	0.0756	0.1069
	(0.0395)	(0.0550)	(0.0396)	(0.0534)
Occupational pension	0.0649	0.0290	0.0606	0.0148

	(0.0252)	(0.0372)	(0.0245)	(0.0350)
£1 – £3,000 wealth	0.0235	–0.0119	0.0246	–0.0016
	(0.0302)	(0.0307)	(0.0302)	(0.0328)
£3,000 – £10,000 wealth	0.0358	0.0339	0.0361	0.0435
	(0.0371)	(0.0457)	(0.0369)	(0.0480)
>£10,000 wealth	0.0233	–0.0326	0.0325	–0.0226
	(0.0390)	(0.0330)	(0.0403)	(0.0366)
Missing wealth	0.0414	–0.0480	0.0672	–0.0445
	(0.0613)	(0.0373)	(0.0659)	(0.0401)
Linear age term	n/a	n/a	0.0305	0.0211
	n/a	n/a	(0.0042)	(0.0054)
Age = 57	0.0298	–0.0218	n/a	n/a
	(0.1187)	(0.0590)	n/a	n/a
Age = 58	0.0003	0.0010	n/a	n/a
	(0.0956)	(0.0642)	n/a	n/a
Age = 59	0.0134	–0.0096	n/a	n/a
	(0.1013)	(0.0592)	n/a	n/a
Age = 60	–0.0031	0.1961	n/a	n/a
	(0.0916)	(0.1102)	n/a	n/a
Age = 61	0.0124	0.1247	n/a	n/a
	(0.1001)	(0.1010)	n/a	n/a
Age = 62	0.0142	0.0713	n/a	n/a
	(0.1016)	(0.0937)	n/a	n/a
Age = 63	0.0980	0.1270	n/a	n/a
	(0.1420)	(0.1182)	n/a	n/a
Age = 64	0.1365	0.0997	n/a	n/a
	(0.1595)	(0.1256)	n/a	n/a
Age = 65	0.5369	0.4000	n/a	n/a
	(0.2002)	(0.1816)	n/a	n/a
Age = 66	0.2555	0.5152	n/a	n/a
	(0.2157)	(0.3772)	n/a	n/a
Age = 67	0.3585	n/a	n/a	n/a
	(0.2382)	n/a	n/a	n/a
Age = 68	0.2615	n/a	n/a	n/a
	(0.2455)	n/a	n/a	n/a
Age = 69	0.4353	n/a	n/a	n/a
	(0.2655)	n/a	n/a	n/a
Age = 70	0.7241	n/a	n/a	n/a
	(0.2226)	n/a	n/a	n/a
Number of observations	*1,998*		*1,998*	
Pseudo R2	*0.197*		*0.153*	
Log likelihood	*–661.525*		*–697.758*	

Note: Marginal effects are report. Standard errors in parenthesis. Statistical significance denoted by *** = 1% level, ** = 5% level, *=10% level.

FIGURES

Figure 2.1: The UK Pension system, 1990

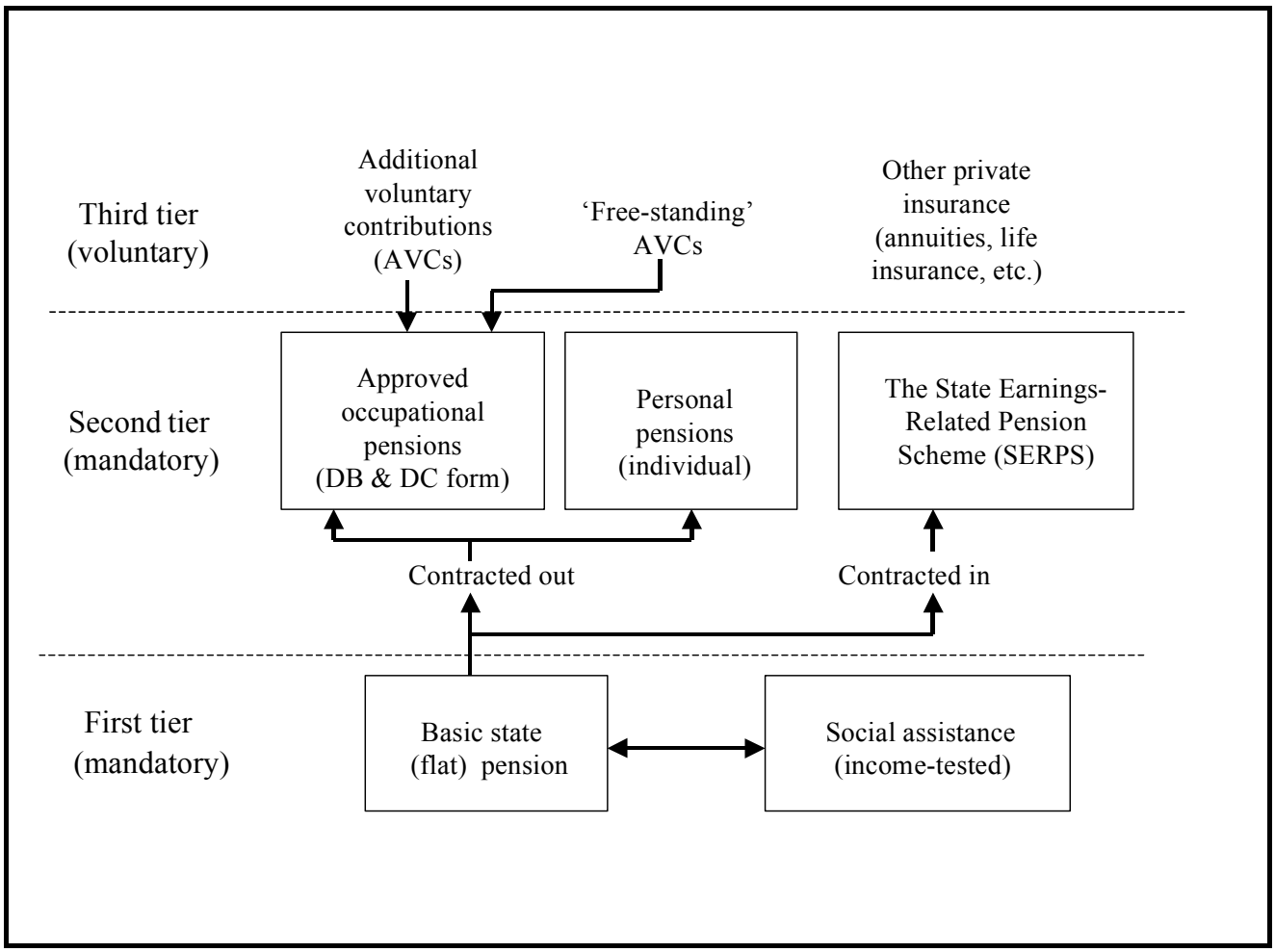
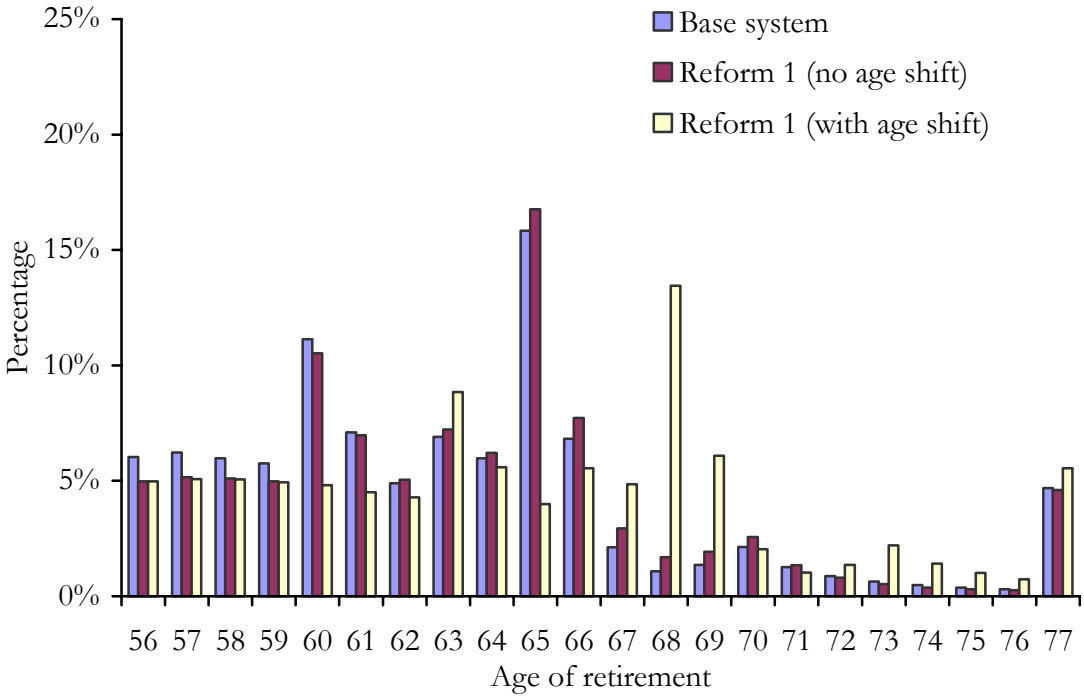


Figure 5.1a. The distribution of retirement ages under the base system and reform 1, using an option value model and a full set of age dummies.



Note: For details of the specification of the retirement model see Section 3.

Figure 5.1b. Net expenditure under the base system and reform 1, by age of retirement, using an option value model and a full set of age dummies.

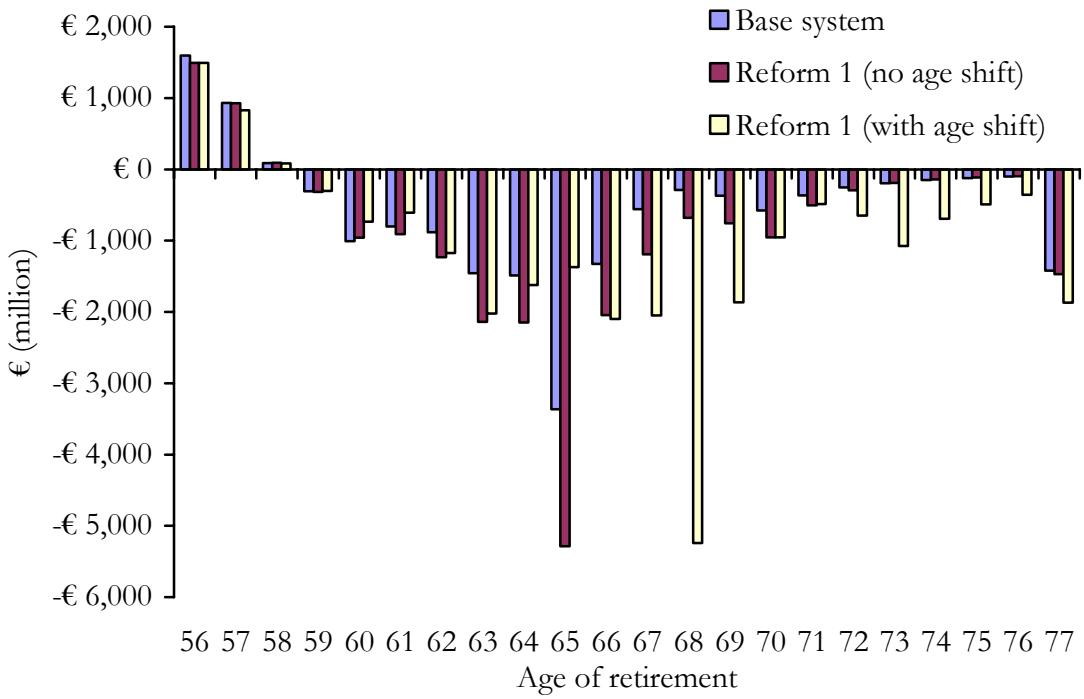


Figure 5.1c. Gross expenditure under the base system and reform 1, by age of retirement, using an option value model and a full set of age dummies.

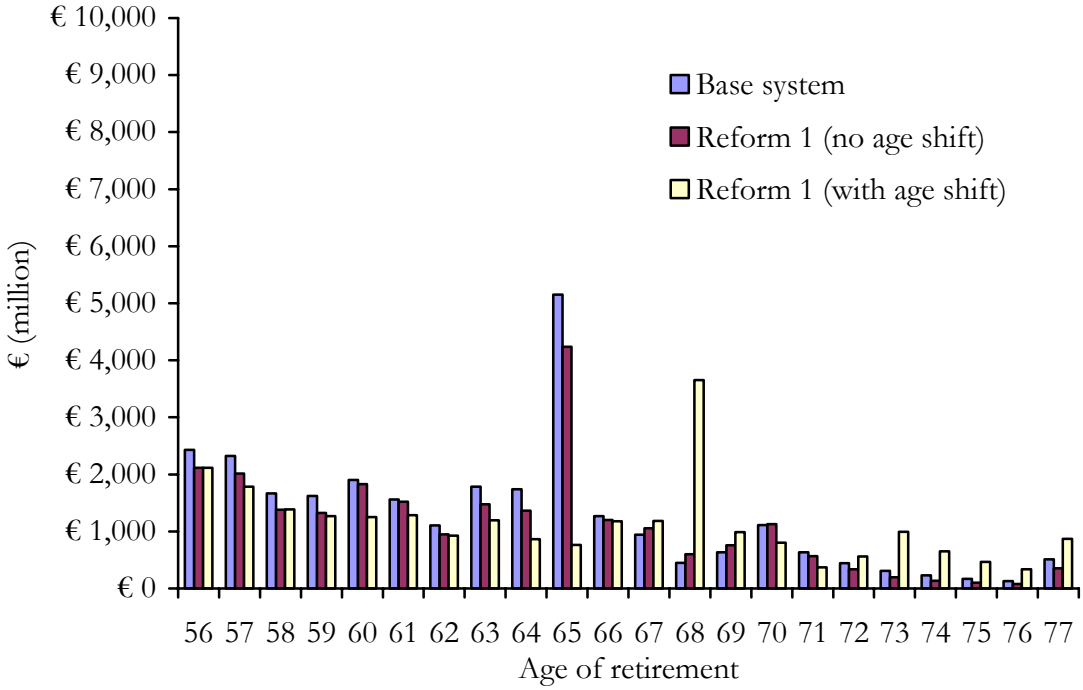


Figure 5.1d. Income Tax and National Insurance Contribution receipts under the base system and reform 1, by age of retirement, using an option value model and a full set of age dummies.

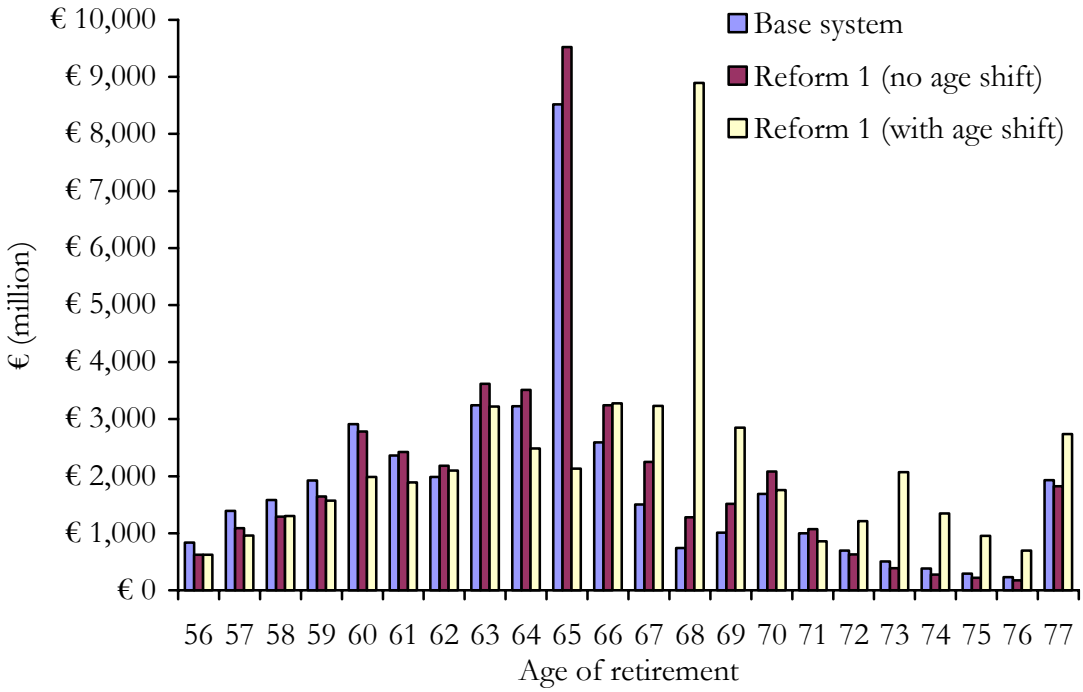


Figure 5.2a. The distribution of retirement ages under the base system, reform 2 and reform 3, using an option value model and a full set of age dummies.

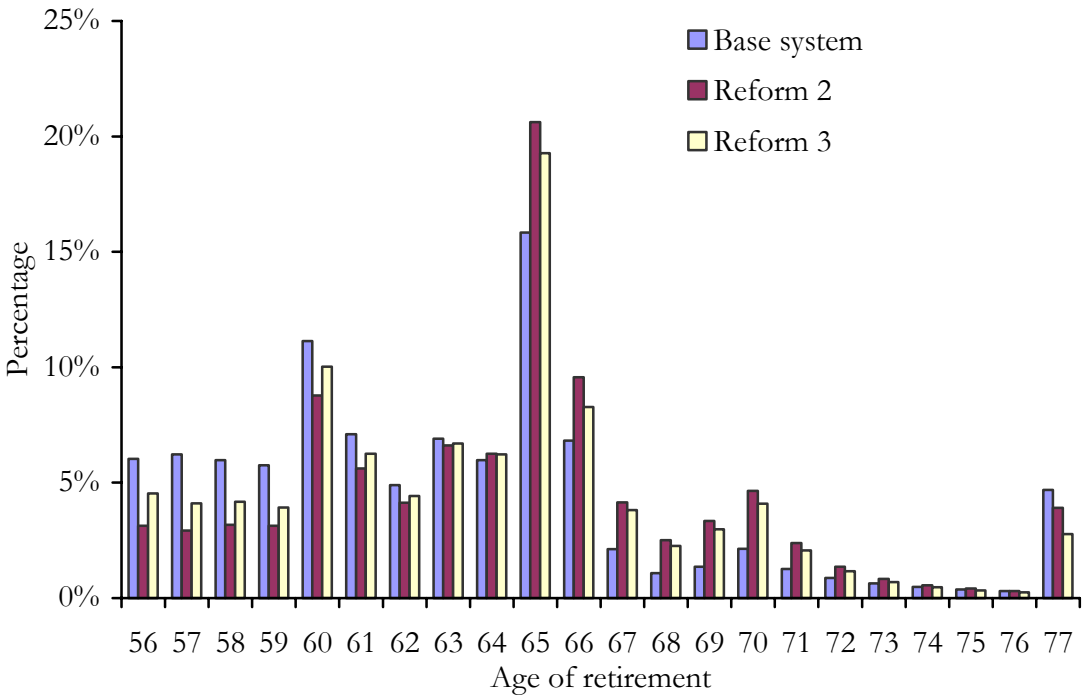


Figure 5.2b. Net expenditure under the base system, reform 2 and reform 3, by age of retirement, using an option value model and a full set of age dummies.

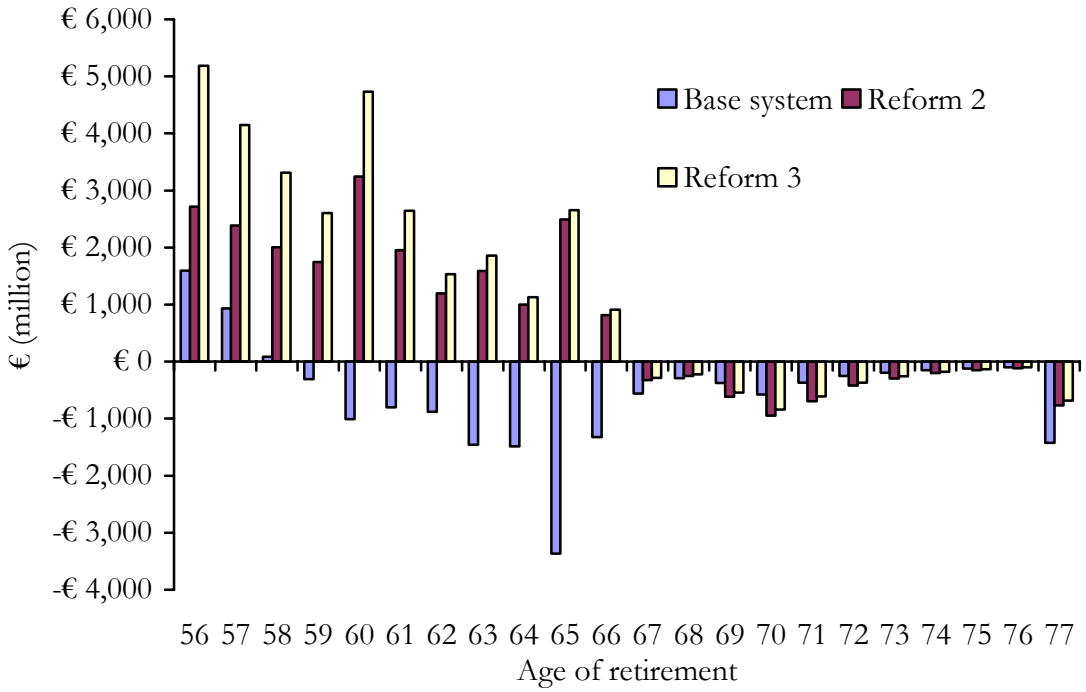


Figure 5.3a. The distribution of retirement ages under the base system, reform 1, reform 2 and reform 3, using an option value model and a linear age term.

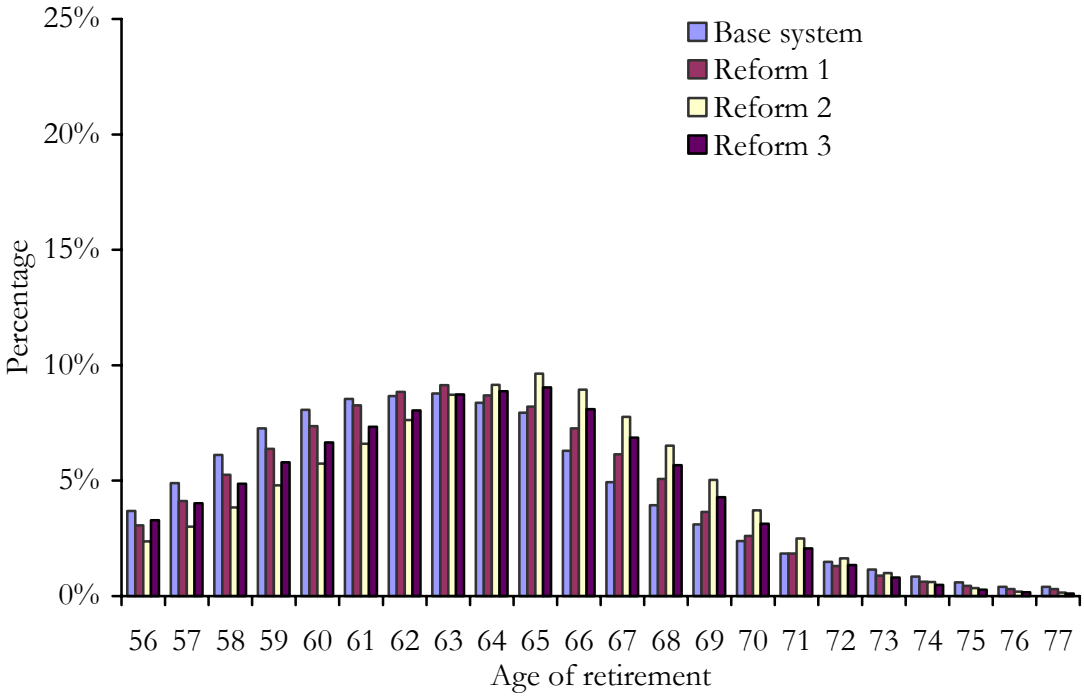


Figure 5.3b. Net expenditure under the base system and reform 1, by age of retirement, using an option value model and a linear age term.