Healthy retirement or unhealthy inactivity: how important are financial incentives in explaining retirement?

James Banks*, Carl Emmerson** and Gemma Tetlow* [1]

January 2007

Abstract

We examine the extent to which changes in the labour market activity of men and women aged between 50 and the State Pension Age in England are determined by the financial incentives that they face. The UK is of particular interest as it has unique institutional arrangements. These have already led to large numbers of those around retirement having different types of second tier pension arrangements with private DB, private DC and membership of the state scheme all prevalent. Using the first two waves of the English Longitudinal Study of Ageing (2002–03 and 2004–05) we find that both pension accrual and pension wealth are important determinants of the retirement behaviour of men aged 50 to 59. Financial incentives also have a role in determining the retirement decisions of women of the same age although it is somewhat weaker. We find some evidence that the impact of pension accrual on retirement is only important for those in good health. In addition among those in physically demanding jobs we find that it is only men who are in poor health – as opposed to women or those in good health – who are more likely to retire early. We also find evidence that reaching the State Pension Age is most heavily associated with labour market exit for those in the middle of the wealth distribution.

Keywords: Retirement, Pensions.
JEL classification: J26

---

[1] * Institute for Fiscal Studies and University College London ; ** Institute for Fiscal Studies. Contact addresses: j.banks@ucl.ac.uk, carl_emmerson@ifs.org.uk or gemma_tetlow@ifs.org.uk.

Acknowledgements: We are grateful to the Economic and Social Research Council for funding through the research grant 'Late life work and retirement' (RES-000-23-0588) and for co-funding through the ESRC Centre for the Microeconomic Analysis of Public Policy at IFS (M544285003). The pension wealth and pension income calculations drew heavily on initial derivations financed by members of the IFS pensions and retirement saving consortium the membership of which comprised: the Actuarial Profession, the Association of British Insurers, the Bank of England, the Department for Work and Pensions, HM Revenue and Customs, HM Treasury and the Investment Management Association. Data from the English Longitudinal Study of Ageing (ELSA) were supplied by the ESRC Data Archive. We thank seminar participants at the Institute for Fiscal Studies, and Matthew Wakefield in particular, for useful comments. Responsibility for interpretation of the data, as well as for any errors, is the authors' alone.

1. Introduction

Increasing life expectancies have placed strain on pension arrangements around the world. In the UK successive reforms have reduced the generosity of state pensions while, at the same time, declining numbers of private sector employers are choosing to offer defined benefit pension arrangements and individuals with defined contribution schemes have been adversely affected through falling annuity rates.[2] Therefore, a key policy issue is the extent to which individuals will make appropriate adjustments to the changing pension environment. In particular when faced with the stark choice of consuming less while working, working for longer, or consuming less when retired there has been concern that too much of the adjustment might be made on the last margin.

In response to this concern the UK Government has announced a package of state pension reforms that, if implemented, would halt the decline in generosity of state pensions with the cost implications of an ageing population financed through a combination of an increased State Pension Age and higher taxation.[3] The implicit assumption is that, as a direct result of these reforms, individuals will now make better adjustments than would otherwise have been the case. A key aspect will be the extent to which retirement ages respond to both the changing private pension environment and also the payment of an earnings-indexed state pension from a higher state pension age.

---

[2] A brief outline of recent UK pension reforms can be found in Attanasio, *et al* (2004). The economic issues arising from the shift from defined benefit to defined contribution pensions are explored in, for example, Banks, Blundell and Emmerson (2005). Recent trends in retirement patterns, life expectancies and pension arrangements in the UK are described in Disney and Hawkes (2003), Banks and Blundell (2005) and Banks and Smith (2006).

[3] The proposed pension reforms are set out in Department for Work and Pensions (2006). A discussion of the impact of the reforms can be found in Emmerson, Tetlow and Wakefield (2006).

There is a body of international evidence on the importance of financial incentives on retirement behaviour.[4] However there is very little evidence of how individuals respond to the financial incentives to retire that are now present in the unique institutional arrangements seen in the UK. In this paper we use detailed new data to look at the extent to which individuals approaching retirement in England respond to financial incentives to retire by exploiting differences between the retirement incentives implicit in individuals' pension arrangements (state pensions, defined benefit and defined contribution schemes). The impact of the increasing prevalence of defined contribution pensions on retirement ages is of particular interest given that the trends seen in the UK have since begun elsewhere.

Previous studies of the role of pension incentives in determining retirement behaviour in the UK have typically relied on the British Retirement Survey (BRS) which interviewed a sample of individuals aged between 55 and 69 in 1988–89, some of whom were followed up in 1994.[5] Meghir and Whitehouse (1997) used this to look at transitions out of paid work by men during the 1970s and 1980s and how this related to their pension arrangements at the time. Blundell, Meghir and Smith (2002) looked at transitions out of the labour market for men between the two waves.

This paper extends this existing literature in three main ways. First, neither of these studies examined the retirement behaviour of women.[6] Second, our study estimates the effects within the current institutional context, which is somewhat different to that in

---

[4] For example see Zabalaza, Pissarides, and Barton, (1980), Lazear (1986), Stock and Wise (1990a; 1990b), Gustman and Steinmeier (2002) and Gruber and Wise (2004).

[5] Details of the British Retirement Survey can be found in Disney, Grundy and Johnson (1997).

[6] Other UK studies include Disney, Meghir and Whitehouse (1994), Blundell and Johnson (1998), Tanner (1998), Disney and Smith (2002) and Disney, Emmerson and Wakefield (2006). While some (specifically Disney, Meghir and Whitehouse (1994) and Disney, Emmerson and Wakefield (2006)) do include women as well as men in their analysis none of these studies utilise panel data containing information on the pension incentives.

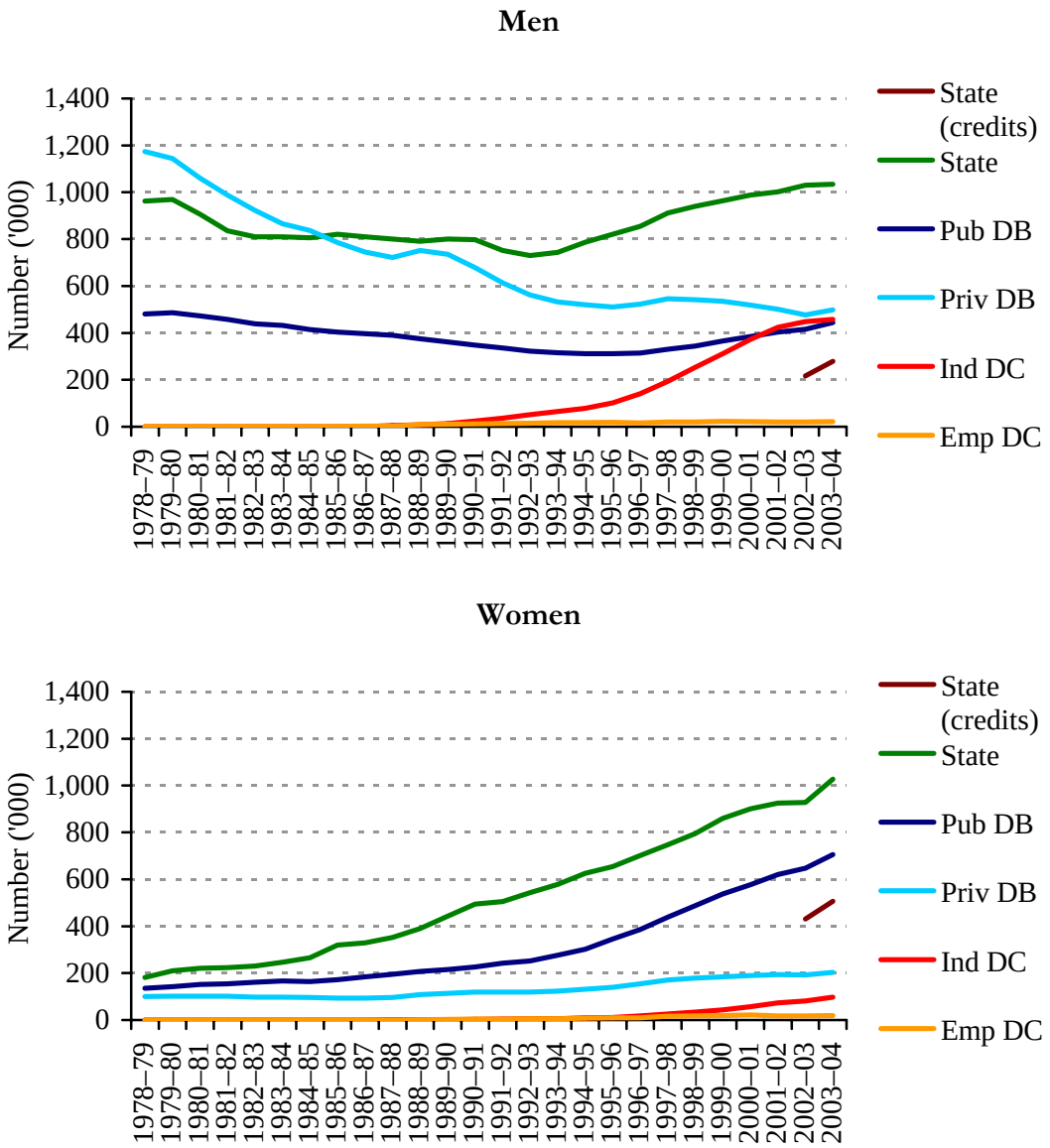
which the BRS was collected. Finally, we have considerably more detailed information on health and are able to better control for such factors in our model.

As Figure 1.1 highlights, the pension arrangements of those approaching retirement have changed considerably since the 1980s and early 1990s. Pension coverage amongst men has changed in two main ways. Following reforms implemented in April 1988, large numbers of individuals chose to contract out of SERPS into a defined contribution pension. Initially the rebate paid into an individual's pension fund was substantially more generous to younger employees than older employees. As a result large numbers of young individuals contracted out of the state scheme into defined contribution arrangements (Disney and Whitehouse, 1992). Since then the number of employees aged between 50 and 59 (i.e. those approaching retirement) who have second-tier pension coverage that is defined contribution in nature has been increasing gradually.

Figure 1.1 also shows that the number of men covered by private sector defined benefit pension arrangements has declined considerably since 1978–79. During the 1980s this was due to declining employment in primary industries which tended to offer these types of arrangements, and a shift towards smaller employers and self-employment where coverage of these schemes is lower. During the 1990s the reduction in coverage has been due to increasing numbers of employees in individual defined contribution pension arrangements (which may be arranged through an employer) and increasing numbers remaining in the state scheme.

Changes in pension coverage amongst women have been somewhat different. There have been growing numbers of women in all types of second tier pension arrangement over time, which is due to increasing numbers of women from later cohorts being in the labour market. Particularly large numbers of women are members of the state pension scheme and public sector defined pension pensions.

Figure 1.1. 2nd tier pension coverage among those aged 50 to 59, 1978–79 to 2003–04, by sex.



Source: Tables 4.2, 4.3, 6.0, 7.1a and 7.1b of Department for Work and Pensions, *Second Tier Pension Provision 1978/79 to 2003/04* (http://www.dwp.gov.uk/asd/asd1/dsu/second_tier/second_tier.asp).

This paper is organised as follows. Section 2 describes the retirement modelling methodology we follow, the institutional arrangements in the UK (to give more background to the trends seen in Figure 1.1) and differences in the retirement incentives faced by those making different pension choices. Section 3 describes the data used in the analysis – which will enable us to look at the subsequent retirement behaviour of men

aged between 50 and 64 and women aged between 50 and 59 in England in 2002–03. Section 4 presents the results, while section 5 concludes.

2. Methodology and institutional background

This section sets out the methodology used in the paper (section 2.1) and describes the key features of the UK pension system that are exploited in the retirement modelling (section 2.2).

2.1. Methodology

The model of retirement estimated in this paper is based on the option value retirement model (Stock and Wise, 1990a; 1990b), which assumes that individuals compare the value of retiring in the current period with the expected value of retiring at all possible points in the future.

In the option value model, the value to an individual of retiring today is assumed to depend on, among other things, the discounted utility he would derive from the stream of pension income that he would receive if he left the labour market and started drawing his pension immediately and continued to receive this until he died. The value of retiring at each possible point in the future is assumed to depend on, among other things, the discounted utility that he expects to derive from earnings up the point of retirement plus the discounted utility that he expects to derive from pension income he will receive from that retirement date until he dies.

This is set out in equation (1). The option value at time t is the difference between the maximum utility ($v_t(r^*)$) that can be derived from retirement in the future and the utility that can be derived from retirement in the current period ($v_t(t)$). $U_w(Y_s)$ is the utility received from earned income when working and $U_r(B_s(r))$ is the utility received from pension income ($B_s(r)$) when retired (which depends on retirement age r). Future utility is discounted by the discount factor β. The individual dies in period S.

(1) $$OV_t = v_t(r^*) - v_t(t), \text{ where } v_t = \sum_{s=t}^{r-1} \beta^{s-t} U_w(Y_s) + \sum_{s=r}^{S} \beta^{s-t} U_r(B_s(r))$$

The option value model assumes that there is no uncertainty over future earnings, pension accrual or longevity. Furthermore the decision to retire is assumed to be irreversible, which is what gives the model its name: by remaining in paid work individuals retain the option to move out of the labour market in the future. It is also implicit in the model that, apart from through pensions, individuals consume income when it is received (in other words, they do not borrow or save in non-pension forms).

The utility function assumed in the option value by Stock and Wise (1990a; 1990b) is set out in equation 2. It is assumed that, due to the disutility of work, utility from a unit of retirement income is higher than the utility from a unit of earned income – so k takes a value greater than one. γ, the co-efficient of relative risk aversion, which by assumption is less than one, picks up diminishing marginal utility with respect to additional pension income or earnings.

(2) $$U_w(Y_s) = Y_s^{\gamma} + w_s \text{ and } U_r(B_s) = (\mathrm{k}B_s(r))^{\gamma} + \varepsilon_s$$

In this paper we use a peak value model, which is a specific version of the option value model that has been commonly used in the literature (Coile and Gruber, 2004; Asch, Haider and Zissimopoulos, 2005). This assumes that there is no disutility from work (k=1) and that the co-efficient of relative risk aversion is equal to one. Under these assumptions the value function becomes a 'revenue function' (in other words, individuals compare the total discounted income that they would receive today to the total discounted income that they would receive from retiring at all possible points in the future). This is set out below in equation 3.

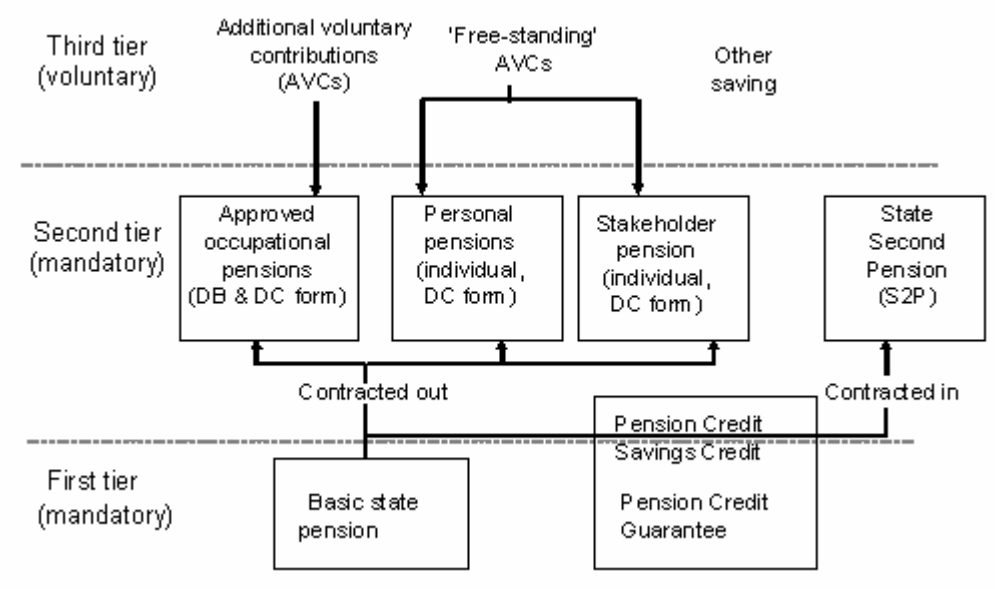
$$(3) \qquad PV_t(r^*) = \sum_{s=r^*}^{S} \beta^{s-t} E_t(B_s(r^*)) - \sum_{s=t}^{S} \beta^{s-t} E_t(B_s(t))$$

2.2. Institutional features important for the retirement modelling

The current structure of the UK pension system is set out in Figure 2.1. Employees who earn above the lower earnings limit (currently set at £87 per week) accrue entitlement to the flat rate, pay-as-you-go financed, Basic State Pension (BSP). Further retirement saving is compulsory for these employees, but they have considerable choice over the form of that saving. The default is to remain in the State Second Pension (S2P) – an earnings-related, pay-as-you-go financed, pension.[7] Those employees who are offered the chance to join an occupational pension (which can be defined benefit or defined contribution in nature) are, if it meets certain minimum requirements, allowed to join this scheme and 'contract out' of the 2nd tier of state provision. In return for forgoing the entitlement to S2P that they would have accrued both they and their employer pay reduced National Insurance Contributions (NICs).

[7] This replaced the State Earnings-Related Pension Scheme (SERPS) from April 2002 and is relatively more generous to lower earners.

Figure 2.1. UK pension system, 2007–08.



Source: Adapted from Disney, Emmerson and Tanner (1999).

Alternatively employees can choose to join an individually arranged defined contribution pension – known as an approved personal pension or a stakeholder pension. If they take this route then the Department for Work and Pensions pays a contribution (which has been related to age and earnings since April 1997) to their fund each year as compensation for S2P that they would have otherwise accrued. Any additional private retirement saving is voluntary. There is also a means-tested system of support, which has become relatively more generous since April 1999 as the Government has attempted to focus additional public spending on lower-income pensioners in order to reduce relative income poverty: this is the Pension Credit Guarantee and the Pension Credit Savings Credit shown in Figure 2.1.

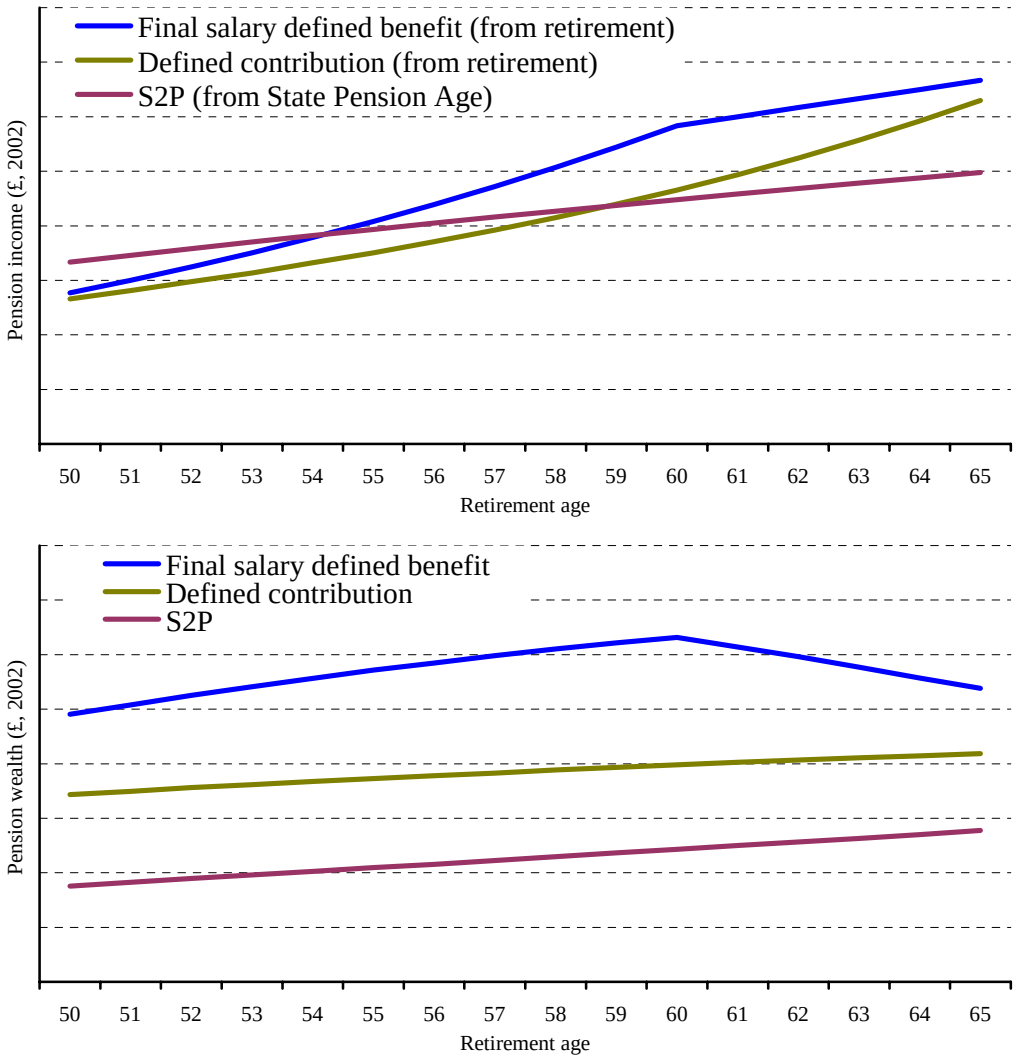
As was set out in Figure 1.1 not only are there large numbers of individuals in each of these arrangements, this has changed considerably over the last twenty-five years. This is due to the fact that between 1978 and 1988 individuals were only able to contract out of the state scheme into approved employer provided defined benefit schemes, whereas since 1988 individuals have also been allowed to opt out into approved defined contribution arrangements.

The retirement incentives faced by individuals differ considerably between those in defined benefit occupational pension schemes (which in the UK are typically based on final salary, or at least a measure of salary close to retirement), those in defined contribution arrangements (both occupational and individual based) and those who remain in the state system (which is a defined benefit scheme based on a measure of average rather than final salary). These are shown for three stylised individuals in Figure 2.2.

The top panel shows how pension income would change with retirement age for three example employees: one currently contributing to a final salary defined benefit scheme, one contributing to a defined contribution pension scheme and one who has not contracted out of S2P.

For all three of these example individuals deferring retirement would lead to a higher pension income. For retirement ages under 60 the pension income rises fastest for the final salary scheme and slowest for those in S2P. This is because the final salary schemes shown in the example has a Normal Retirement Age (NRA) of 60. Beyond age 60 the growth in pension income from remaining in work for one more year is highest in the defined contribution arrangement, and comparable among those in final salary schemes and S2P.

Figure 2.2 Pension income and pension wealth for stylised example, by pension type



Note: Profiles shown for a fifty year old man who (a) joined at final salary defined benefit scheme at age 25, currently earns £20,000 a year, receives pay increases in line with inflation, pension scheme has a Normal Retirement Age of 60 and an accrual rate of 1/60th (b) has a defined contribution pension currently worth £100,000, receives a 5% nominal investment return, currently earns £18,400, receives pay increases in line with inflation and contributes 10% of earnings to his pension and annuitises his fund on retirement at the second best age- and gender-specific annuity rate[8] (c) aged 50 in 2002, has remained contracted in to the state pension system since joining the labour market at age 16 and always earns at or above the Upper Earnings Limit (UEL).

In S2P rising pension income with retirement age is sufficient for the present discounted value of that pension income, pension wealth, to rise. This is because the pension income is received from the State Pension Age (currently 60 for women and 65 for men)

[8] Annuity rates from FSA, January 2005.

regardless of when the individual actually retires.[9] However in private schemes, prior to April 2006, individuals were not able to start drawing their occupational pension while still working for that same employer. In these schemes whether or not pension wealth increases as a result of remaining in work will, therefore, depend on whether or not the boost to pension income from delaying retirement is sufficient to outweigh the fact that the pension would be received for one fewer years (assuming that retirement age does not impact on mortality). The example given in the bottom panel of Figure 2.2 shows an example where those in final salary schemes see a large positive boost to their pension wealth from remaining in paid work until the NRA, but a fall in their pension wealth if they choose to remain in paid work beyond the NRA. This is because while schemes punish individuals for leaving prior to the NRA there is typically no bonus for remaining in the scheme beyond the NRA.

A different pattern is typically seen for those accruing entitlements to defined contribution pension arrangements. In these schemes there is no 'Normal Retirement Age' so pension income, and therefore pension wealth, accrues in a smooth way. Moreover, as shown in the bottom panel of Figure 2.2 individuals might see their pension wealth increase continuously if they remain in the scheme. This will be the case if the return on the accumulated fund, plus the value of additional contributions, is sufficient to offset the impact of worsening annuity rates (known as mortality drag). As shown by Smith (2005) those adopting a lifestyling approach – namely moving their investments away from higher risk, higher expected return, assets into lower risk, lower expected return, assets might still expect to see their pension wealth decline if they choose not to leave work and draw their private pension. However it would still be the

[9] An earnings test applied prior to April 1989. Disney and Smith (2002) find that the removal of this led to a small increase in hours worked.

case that the retirement incentives evolve in a smooth way, with no spike at any particular age.

Figure 2.2 highlights the fact that otherwise identical individuals could face different pension wealth accrual depending on their choice of pension arrangement. It is also the case that individuals within the same scheme will face different accrual dependent on other characteristics. Under the assumption that these other characteristics do not have an independent impact on an individual's retirement decision, they can be used to generate additional variation in both pension wealth and pension wealth accrual that can be used to estimate the impact of these financial considerations on retirement behaviour.

Table 2.1 shows the determinants of variation in pension wealth accrual within the population that could potentially be exploited when modelling retirement. The accumulated fund, earnings and marital status impact on pension wealth accrual in all scheme types. In addition those in defined benefit schemes will see their pension wealth accrual affected by the NRA, their tenure in the pension scheme and the accrual fraction (often $1/60^{th}$ or $1/80^{th}$ of final salary for each year of membership).

Those in defined contribution schemes will see their pension wealth accrual affected by their future contribution rate and perhaps whether or not they smoke (since smokers are, in some annuity arrangements, able to qualify for more generous annuity rates due to their lower life expectancy). Those who are in S2P (and who were in its predecessor SERPS) could see their pension wealth accrual affected by their date of birth since aspects of the pension reforms of 1975, 1986, 1995 and 2000 varied by date of birth.[10]

[10] Simulations of the impact of these reforms on the income at State Pension Age of different cohorts are presented in Disney and Emmerson (2005). The impact on expected lifetime income is described in Figure 4.7a of Banks, Blundell, Emmerson and Oldfield (2006)

Table 2.1. Variation in pension accrual over and above scheme type.

Pension type	Variation exploited in retirement modelling
All pension types	Accumulated fund Earnings Marital status
Defined benefit pensions	Normal Retirement Age Accrual fraction Pension tenure
Defined contribution pensions	Contribution rate Whether or not a smoker
SERPS / S2P	Date of birth

In our retirement modelling we do allow for earnings and marital status to have an independent impact on retirement decisions. However in the main analysis – in addition to choice of second tier pension arrangement – we also only allow the other characteristics set out in Table 2.1 to impact on retirement decisions through their effect on the accrual of pension wealth.

3. Data

The analysis in this paper uses panel data from the first two waves (2002–03 and 2004–05) of the English Longitudinal Study of Ageing (ELSA).[11] This is a representative sample of the household population aged 50 and over in England, though here we make use only of data on those aged between 50 and the State Pension Age in 2002–03 – that is men aged 50 to 64 and women aged 50 to 59 (inclusive). Table 3.1 gives details of the sample sizes. In total the first wave of ELSA contains 4,974 individuals meeting this criterion, of which 4,870 did not die by the second wave. Those who died are excluded from our analysis; while this will make our sample non-representative of those in 2002–03 the estimated responsiveness of retirement behaviour to financial incentives, and other background characteristics, conditional on survival are arguably of greater interest than the unconditional responsiveness.

Table 3.1 Sample sizes used in the analysis

	All wave 1	Of which do not die by wave 2	Of which in paid work in wave 1	Of which remain in sample	% retention in sample
	(1)	(2)	(3)	(4)	(5) = (4)/(3)
Men					
50–54	896	885	733	618	84.3
55–59	1,020	987	719	570	79.3
60–64	808	783	374	296	79.1
All men	2,724	2,655	1,826	1,484	81.3
Women					
50–54	1,086	1,077	807	668	82.8
55–59	1,164	1,138	691	567	82.1
All women	2,250	2,215	1,498	1,235	82.4
All	*4,974*	*4,870*	*3,324*	*2,719*	*81.8*

[11] Details of the ELSA data can be found in Marmot, *et al*, (2003). The reference for the data is Marmot, *et al*, (2005).

The analysis in Section 4 also uses only the sample of 3,324 individuals in paid work in the first wave. In other words, we look at the responsiveness of retirement behaviour to financial incentives conditional on initially being in paid work. This is the same approach as most of the literature in this area (for example Blundell, Meghir and Smith, 2002). Ideally we would account for the fact that a non-random sample of those aged between 50 and the State Pension Age will have already left paid work before they were picked up in the study.

Details of the work status in 2002–03 by background characteristics are shown in Table 3.2. This shows the percentage of each type of individual who is in paid work (i.e. included in the main analysis in this paper), out of paid work and self-reporting that they are retired/semi-retired or out of paid work but not self-reporting that they are retired or semi-retired. Hence (aside from rounding) the rows sum to 100%.

Just over two-thirds of men and women aged between 50 and the State Pension Age were in work in 2002–03. Of those not in paid work just under half of men, but only one-fifth of women, report that they are retired (or semi-retired). Single men are less likely to be in paid work, and more likely to be not in paid work but not retired, than men in couples, whereas the percentage of women in each work status varies very little by whether she is single or in a couple. Unsurprisingly older individuals, and those reporting having been diagnosed by a doctor with specific health problems, are less likely to be in paid work in 2002–03 than those who are younger or those who do not report any health problems.

Table 3.2. Work status in 2002–03 by background characteristics

	In work	Not in work		*Sample size*
		Retired	Inactive	
Men	68.8	14.6	16.6	*2,655*
Single	54.6	16.2	29.2	*445*
Couple	71.6	14.3	14.1	*2,210*
Age 50–54	82.8	4.3	12.9	*885*
Age 55–59	72.8	10.6	16.5	*987*
Age 60–64	47.8	31.2	21.1	*783*
No health prob.	80.3	12.3	7.4	*1,014*
Some health pr.	61.7	16.0	22.4	1,641
Wealth quintile:				
Poorest	48.2	5.3	46.6	*380*
2nd	72.6	7.3	20.1	*478*
3rd	76.5	9.6	13.9	*519*
4th	74.6	16.6	8.7	*607*
Richest	65.9	27.5	6.6	*651*
Women	67.6	6.8	25.6	*2,215*
Single	64.9	7.7	27.4	*518*
Couple	68.5	6.5	25.0	*1,697*
Age 50–54	74.9	2.7	22.4	*1,077*
Age 55–59	60.7	10.7	28.6	*1,138*
Age 60–64				
No health prob.	78.3	4.9	16.8	*755*
Some health pr.	62.1	7.8	30.1	*1,460*
Wealth quintile:				
Poorest	50.8	3.8	45.4	*476*
2nd	74.4	3.4	22.2	*414*
3rd	73.8	7.4	18.8	*432*
4th	72.3	7.8	19.9	*412*
Richest	68.5	12.4	19.1	*435*

Note: Rows might not sum to one hundred due to rounding.

As highlighted by Banks and Casanova (2003) there is a u-shaped pattern of being in paid work by quintile of the wealth distribution. Those at the bottom and the top of the wealth distribution are less likely to be in paid work than those in the middle of the wealth distribution but for different stated reasons. The wealthy are more likely to consider themselves retired while those with relatively low levels of wealth are more

likely to report being out of work for other reasons (with ill-health being the most commonly cited).

The estimated marginal effects from a probit regression looking at the relationship between a set of observed characteristics and whether or not an individual is in paid work in the first wave are presented in Table 3.3. In order to aid comparability between the three groups the marginal effects are calculated for someone who is 59 years old[12] with a partner of the same age, in the poorest wealth quintile, in a couple, with a low level education and no health problems.

The estimated marginal effects show that the univariate descriptives presented in Table 3.2 are robust to holding other observed characteristics constant. Among all three groups we find that those in the middle of the wealth distribution are the most likely to be in paid work. Amongst women aged 50 to 59 and men aged 60 to 64, it is those with the highest levels of education who are also the most likely to be in paid work. Those with health problems are significantly less likely to be in paid work in the first place.

[12] This means we are projecting slightly out of sample for the group of men aged 60 to 64.

Table 3.3. Regression results of who is in paid work in 2002–03

	Men (50–59)	Men (60–64)	Women (50–59)
Quintile of total wealth			
2	0.242***	0.146	0.247***
	(0.040)	*(0.089)*	*(0.036)*
3	0.286***	0.278***	0.251***
	(0.041)	*(0.082)*	*(0.037)*
4	0.247***	0.330***	0.223***
	(0.041)	*(0.082)*	*(0.038)*
Richest	0.140***	0.164*	0.152***
	(0.045)	*(0.085)*	*(0.041)*
Age-50	–0.005	0.410	0.009
	(0.021)	*(0.266)*	*(0.017)*
(Age-50)^2	–0.003	–0.019*	–0.004**
	(0.002)	*(0.011)*	*(0.002)*
Couple	0.002	0.013	0.060**
	(0.033)	*(0.046)*	*(0.026)*
Education			
A level	0.087**	0.086	0.118***
	(0.039)	*(0.055)*	*(0.038)*
Degree	0.226	0.294**	0.332***
	(0.152)	*(0.129)*	*(0.061)*
Partner's age	–0.001	–0.006	–0.010***
	(0.003)	*(0.004)*	*(0.002)*
Mild cardiovascular disease	–0.068**	–0.057	–0.083***
	(0.030)	*(0.039)*	*(0.023)*
Severe cardiovascular disease	–0.313***	–0.229***	–0.253***
	(0.048)	*(0.061)*	*(0.057)*
Emotional/psychiatric problems	–0.291***	–0.224***	–0.204***
	(0.040)	*(0.069)*	*(0.027)*
Arthritis/osteoporosis	–0.153***	–0.195***	–0.107***
	(0.033)	*(0.046)*	*(0.023)*
Lung disease/asthma	–0.121***	–0.096**	–0.051*
	(0.040)	*(0.048)*	*(0.030)*
Other health problems	–0.127	–0.163**	–0.048
	(0.081)	*(0.077)*	*(0.046)*
Sample size	1,870	795	2,204
Mean prediction	0.570	0.410	0.406
Pseudo R2	0.174	0.118	0.111

Note: Marginal effects and *(standard errors)* are reported. Marginal effects are evaluated for individuals in the poorest wealth quintile, in couples, aged 59 with a partner of the same age. All other variables set to zero.

As was discussed in section 2, incentives vary between different pension scheme types. Table 3.4 shows the distribution of current pension arrangements among those in paid work in 2002–03, again split by different background characteristics of interest. Individuals are classified according to what type of private pension they currently belong

to (either a defined benefit scheme, a defined contribution scheme, both or if they do not know the nature of the scheme). Those not currently in a private pension are split by whether or not they have ever been in a private pension. Men in couples are more likely to currently be a member of a defined benefit or a defined contribution scheme and are less likely to only have past pension rights than single men. In contrast the pension coverage of single women is very similar to that of women in couples. Across both men and women, younger individuals are more likely to be a member of a current pension scheme than older individuals, while there is very little variation by whether or not they report having a health problem.

Among both men and women, the wealthy are more likely to be members of a defined benefit scheme; those in the 2nd and 3rd wealth quintiles are most likely to be members of a defined contribution pension arrangement. However membership of defined contribution schemes is widespread across the distribution of wealth for both men and women. The prevalence of DC scheme membership appears higher in Table 3.4 than is implied by Figure 1.1 because Figure 1.1 only shows each individual's principal second tier pension type. Anyone who is a member of SERPS/S2P and also has a defined contribution pension will be categorised in Figure 1.1 as belonging to the State Second Tier Pension but will be shown in Table 3.4 to have a DC pension. Men and women at the bottom of the wealth distribution are more likely to have only been a member of a past private pension.

Men who leave work over the next two years are more likely to currently be a member of defined benefit schemes, or to have never been a member of a private pension scheme, than those who remain in paid work over the subsequent two-year period. Among women a different pattern is seen – those who leave work over the next two years are less likely to have a current private pension, with those who remain in paid work being

more likely to be currently a member of either a defined benefit or a defined contribution pension scheme.

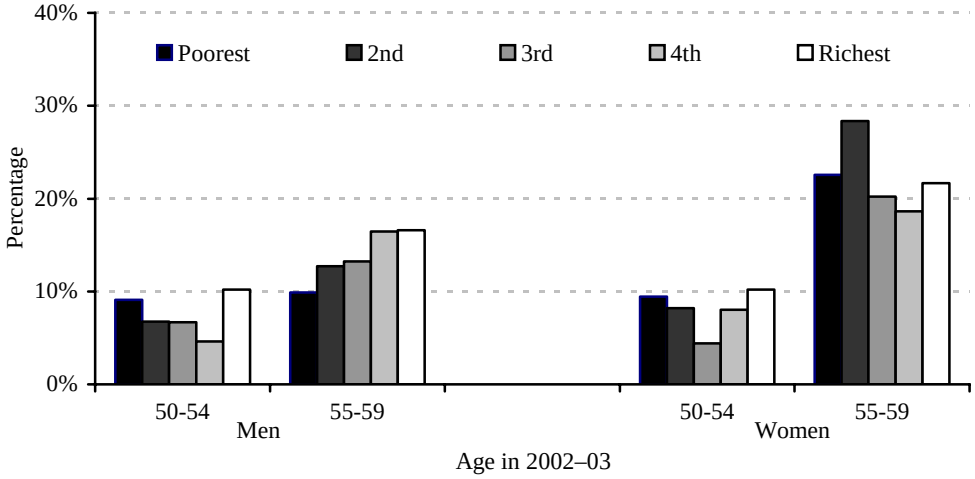
Table 3.4. All those in paid work in 2002–03 data

	In current private pension				Not in current private pension		*Sample size*
	DB	DC	Both	D/K	Never	Past only	
Men	27.2	41.8	2.5	2.4	16.9	9.2	*1,846*
Single	20.5	36.9	2.8	4.0	17.7	18.1	*249*
Couple	28.2	42.5	2.5	2.2	16.8	7.8	*1,597*
Age 50–54	33.6	42.5	3.3	1.5	11.8	7.3	*736*
Age 55–59	26.0	43.0	1.9	2.5	16.7	9.9	*730*
Age 60–64	17.1	37.9	2.4	4.2	27.1	11.3	*380*
No health prob.	28.8	42.2	2.7	2.4	15.5	8.4	*820*
Some health pr.	25.9	41.4	2.4	2.4	18.0	9.7	*1,026*
Wealth quintile:							
Poorest	3.1	39.1	1.0	6.3	18.8	31.8	*192*
2nd	10.9	56.2	0.6	4.0	14.9	13.5	*349*
3rd	24.3	50.5	1.3	2.0	15.5	6.5	*400*
4th	37.1	35.2	4.1	2.4	17.5	3.7	*458*
Richest	42.8	30.5	4.4	0.0	18.4	4.0	*430*
Remain in work	27.2	43.8	2.9	2.0	16.0	8.0	*1,268*
Leave paid work	36.2	23.1	0.9	4.1	27.1	8.6	*221*
Women	30.1	24.6	2.8	5.9	10.0	26.7	*1,513*
Single	29.4	26.2	2.6	6.8	10.6	24.4	*340*
Couple	30.3	24.1	2.8	5.6	9.8	27.4	*1,173*
Age 50–54	31.6	26.7	2.8	5.4	8.3	25.2	*810*
Age 55–59	28.3	22.2	2.7	6.4	11.9	28.4	*703*
Age 60–64							
No health prob.	31.5	23.6	2.7	5.2	9.8	27.3	*594*
Some health pr.	29.2	25.2	2.8	6.3	10.1	26.3	*919*
Wealth quintile:							
Poorest	5.3	25.9	0.4	8.5	10.5	49.4	*247*
2nd	20.8	29.8	1.0	9.0	7.4	32.1	*312*
3rd	34.4	26.9	2.2	5.3	9.3	22.0	*323*
4th	41.8	21.4	3.7	5.0	11.0	17.1	*299*
Richest	44.1	19.4	5.7	2.0	12.7	16.1	*299*
Remain in work	32.7	25.4	3.2	5.8	8.7	24.2	*1,053*
Leave paid work	23.0	19.7	1.6	6.6	16.9	32.2	*183*

Note: Rows might not sum to one hundred due to rounding.

Tables 3.2 and 3.3 show that in 2002–03 individuals who were at the bottom and the top of the wealth distribution were more likely to not be in paid work; Figure 3.1 shows further that, at least for younger men and women, among those who were in paid work in 2003–03 it is also those who are at the bottom and the top of the wealth distribution who were more likely to have moved out of paid work by 2004–05. The analysis in section 4 shows the extent to which this relationship remains once other observable characteristics are taken into account.

Figure 3.1. Percentage of individuals in paid work in 2002–03 who are not in paid work in 2004–05, by age band, sex and total wealth in 2002–03.



Source: Figure 3.8 of Emmerson and Tetlow (2006).

As described in section 2 the peak value model that we utilise in this paper assumes that an individual's retirement decision will depend, at least in part, on their current wealth, and the additional wealth and earnings that they would accrue if they chose to remain in paid work. In particular the size of the 'peak value accrual', that is the difference between the maximum level of pension wealth that could be attained if they stayed in paid work and the level of pension wealth already accrued, should be an important determinant of retirement decisions. Summary statistics of this 'peak value accrual', current wealth (both

pension and non-pension), and current earnings for those in paid-work in 2002–03 are shown in Table 3.5.[13] The sample used for the statistics shown in this table includes all of those who are in paid work in the first wave and who are observed in the 2nd wave (and for whom we observe information on pension and non-pension wealth for both them and, where relevant, their partner in the 1st wave). Men, on average, have higher levels of peak value accrual, pension wealth and earnings than women. The table also shows that the distribution of non-pension wealth is more skewed than the distribution of pension wealth. This is documented comprehensively in chapters 3 and 4 of Banks, Emmerson, Oldfield and Tetlow (2005).

Table 3.5. Distribution of pension accrual, wealth and earnings (£000s), those in paid-work in 2002–03

	p25	Median	p75	Mean	*Standard deviation*
Men					
Peak value accrual	0	6.3	20.8	13.5	*22.6*
Pension wealth	80.2	150.5	290.4	214.6	*221.7*
Non-pension wealth	52.7	109.5	200.5	198.2	*511.8*
Earnings	13.0	19.2	29.0	23.8	*40.9*
Women					
Peak value accrual	0	2.6	8.8	6.0	*8.3*
Pension wealth	57.0	90.8	196.3	142.3	*136.6*
Non-pension wealth	45.6	100.9	192.5	182.6	*410.0*
Earnings	5.6	10.1	16.8	12.8	*10.5*

Note: Sample size = 1,430 men and 1,132 women. Includes only those who do not die or attrit from the sample for other reasons between 2002–03 and 2004–05.

Of those who were in paid work in 2002–03, just over four-fifths, 81.8%, remained in the sample to the second wave and this could represent non-random retention within the survey. For example even conditional on not dying, retention in the survey was higher for men aged between 50 and 54 than it was for older men (this is shown in Table 3.1). Therefore, we use a two-stage estimation procedure (with an appropriately chosen

[13] Detailed information on how current pension wealth and future accrual of pension wealth were estimated can be found in Banks, Emmerson and Tetlow (2005).

instrumental variable) to adjust for this (the methodology for which is set out in section 4).

4. Results

In this section we present the results from applying the peak value retirement model outlined in section 2.1 to the ELSA data described in section 3. The multivariate model that we estimate is

$$Q^*_i = X_i'\beta + \varepsilon_i \tag{1}$$

Where Q^*_i is the latent probability of individual *i* moving out of paid work over the next two years, X_i is a vector of explanatory variables including measures of the financial incentives suggested by the peak value retirement model and ε_i is an error term. The actual latent probability is not observed — instead, we only observe whether or not an individual moves out of paid work (Q_i):

$$Q_i = \begin{cases} 1 & \text{if } Q_i^* = X_i'\beta + \varepsilon_i > 0 \\ 0 & \text{otherwise} \end{cases} \tag{2}$$

Since whether or not an individual in paid work moves out of paid work by the next wave is only observed if the individual is retained in the ELSA data, we also allow for the possibility of non-random selection of individuals into the second wave of ELSA data using a bivariate probit model with selection. Whether or not an individual *i* is observed in the second wave of ELSA (R_i) can be written as:

$$R_i = \begin{cases} 1 & \text{if } X_i'\lambda + Z_i'\eta + \mu_i > 0 \\ 0 & \text{otherwise} \end{cases} \tag{3}$$

Where λ and η are vectors of coefficients, Z_i is a vector of instruments that are assumed to influence whether or not an individual remains in the sample but to have zero (conditional) correlation with whether or not the individual moves out of paid work, and

μ_i is an error term. The bivariate probit model makes the following three assumptions, the third of which – that the correlation between the impact of unobserved characteristics on whether or not an individual leaves work and the impact of unobserved characteristics on whether or not an individual remains in the sample is constant across individuals – being particularly restrictive:

$$E(\varepsilon_i) = E(\mu_i) = 0$$

$$\text{var}(\varepsilon_i) = \text{var}(\mu_i) = 1$$

$$\text{cov}(\varepsilon_i, \mu_i) = \rho$$

We use as an instrument in the first stage equation the retention rate in the sample amongst the other individuals that shared the same interviewer.[14] This can be thought of as a proxy for interviewer quality (at least in the dimension of ability to retain respondents). Section 4.1 presents the results from this modelling. Section 4.2 presents the findings from some other extensions to the model and section 4.3 looks at factors correlated with movements out of work when we distinguish between movements into self-defined "retirement" and movements into other inactivity.

4.1 Retirement modelling, allowing for non-random sample retention

Separate analysis is run for men aged 50 to 59, men aged 60 to 64 and women aged 50 to 59 using those individuals who are in paid-work in 2002–03 who are known not to die in the next two years. Table 4.1 presents the coefficients on interviewer retention rates from the model explaining whether or not individuals are still in the sample in 2004–05. Importantly we find that our instrument – a proxy for the quality of the individual's

[14] A similar instrument is used in Attanasio and Emmerson (2003).

interviewer in the first wave – is positively and statistically significantly associated with an individual being more likely to be in the sample two years later. Most of the other regressors included are not significantly associated with retention in the sample – full results are reported in Table A.3 in the Appendix.

Table 4.1. 1st stage regression results for selection into retention.

	Men (50–59)	Men (60–64)	Women (50–59)
Interviewer's retention rate	1.821***	1.887**	1.836***
	(0.469)	*(0.816)*	*(0.470)*
Interviewer's ret. rate missing	–0.534	0.888	–0.732
	(0.571)	*(0.883)*	*(0.631)*
Sample size	*1,400*	*371*	*1,375*

Note: Coefficients and *(standard errors)* are reported. Statistical significance denoted by: 1% level = ***, 5% = ** and 10% = *. See Table A3 for details of other variables included.

Table 4.2 presents the full results from the analysis of whether or not individuals remain in paid work, taking into account the possibility of non-random retention into the second wave. In terms of the financial incentives, retirement amongst men aged 50 to 59 seems to be more strongly associated with pension accrual incentives than retirement amongst older men or women. For men aged 50 to 59, we find that having lower accrual, higher own pension wealth, higher family non-pension wealth, and lower earnings are all associated with a higher probability of retirement and all of the co-efficients are statistically different from zero, at least at the 10% level. We find that higher partner's pension wealth is also associated with greater retirement, although this co-efficient is not statistically different from zero.

Table 4.2. 2nd stage regression results for retirement.

	Men (50–59)	Men (60–64)	Women (50–59)
Peak value accrual (£00,000s)	–0.623*	–0.457	–0.138
	(0.373)	*(2.184)*	*(0.909)*
Ln(pension wealth)	0.216*	–0.008	–0.050
	(0.118)	*(0.138)*	*(0.059)*
Zero pension wealth	n/a	n/a	–0.049
	n/a	*n/a*	*(0.410)*
Ln(partner's pension wealth)	0.118*	0.046	0.209***
	(0.068)	*(0.121)*	*(0.072)*
Ln(non-pension wealth)	0.023	–0.096	0.024
	(0.045)	*(0.060)*	*(0.036)*
Non-positive non-pen. wealth	0.487**	–0.812*	0.455**
	(0.247)	*(0.446)*	*(0.198)*
Ln(earnings)	–0.117*	–0.042	–0.101**
	(0.066)	*(0.089)*	*(0.048)*
Self-employed	–0.042	–0.457**	0.143
	(0.145)	*(0.219)*	*(0.155)*
Physically demanding job	0.105	0.004	–0.112
	(0.114)	*(0.164)*	*(0.117)*
Job tenure (years)	–0.019	–0.032	0.023
	(0.014)	*(0.020)*	*(0.016)*
(Job tenure)^2	0.001	0.001**	–0.001
	(0.000)	*(0.000)*	*(0.001)*
Partner in work 2002–03	–0.249*	–0.302*	–0.212*
	(0.135)	*(0.176)*	*(0.128)*
Age-50	0.068***	0.019	0.068**
	(0.024)	*(0.121)*	*(0.033)*
Reach state pension age	n/a	0.784**	0.472***
	n/a	*(0.323)*	*(0.161)*
Individual or partner hits age 60	0.057	n/a	–0.013
	(0.156)	*n/a*	*(0.135)*
Couple	–0.063	0.303	–0.001
	(0.198)	*(0.244)*	*(0.156)*
Degree	–0.202	0.188	–0.235
	(0.128)	*(0.203)*	*(0.144)*
Mild cardiovascular disease	0.230*	0.220	0.121
	(0.125)	*(0.162)*	*(0.100)*
Severe cardiovascular disease	0.290	–0.371	1.002***
	(0.263)	*(0.363)*	*(0.356)*
Emotional/psychiatric problems	0.423*	0.463	0.115
	(0.236)	*(0.401)*	*(0.155)*
Arthritis/osteoporosis	0.028	0.097	0.140
	(0.135)	*(0.187)*	*(0.104)*
Lung disease/asthma	0.117	0.122	–0.044
	(0.163)	*(0.219)*	*(0.136)*
Other health problems	0.166	0.687	0.212
	(0.303)	*(0.496)*	*(0.185)*
Sample size (uncensored)	*1,139*	*291*	*1,132*

Note: Coefficients and *(standard errors)* are reported. Statistical significance denoted by: 1% level = ***, 5% = ** and 10% = *. A control for missing partner's pension wealth included.

For women aged 50 to 59 we find that it is only partner's pension wealth (and not own pension wealth or accrual) which is statistically significantly associated with retirement. This is in contrast to Coile (2004) who looks at the retirement of couples in the US and finds that men are very responsive to their wives' pension incentives, but that women are not responsive to their husbands' pension incentives. For men aged 60 to 64, although statistically insignificant, the co-efficients on peak value accrual, partner's pension wealth and earnings all have the 'right' sign. Conversely the co-efficient on own pension wealth actually has the 'wrong' sign.

Non-financial factors are also significantly associated with exits from work. Men and women of all ages are found to be less likely to leave work if they had a partner who was in work in 2002–03. Age also seems to be important – men and women aged 50 to 59 are more likely to leave work the older they are, while for both men and women reaching the State Pension Age seems to be strongly associated with an increased likelihood of leaving work.

Most of the health factors controlled for do not seem to be individually significantly correlated with exits from work (though they are jointly significant for men and women of all ages). It is perhaps not surprising that pre-existing health conditions should be only weakly correlated with exits from work, given that these individuals were in work despite having these health problems already.[15] We might instead expect that exits from work would be more strongly correlated with the onset of a health problem rather than a pre-existing condition. However, we have not included onset of health problems as an explanatory variable for two reasons. First, it is difficult to identify which happened first,

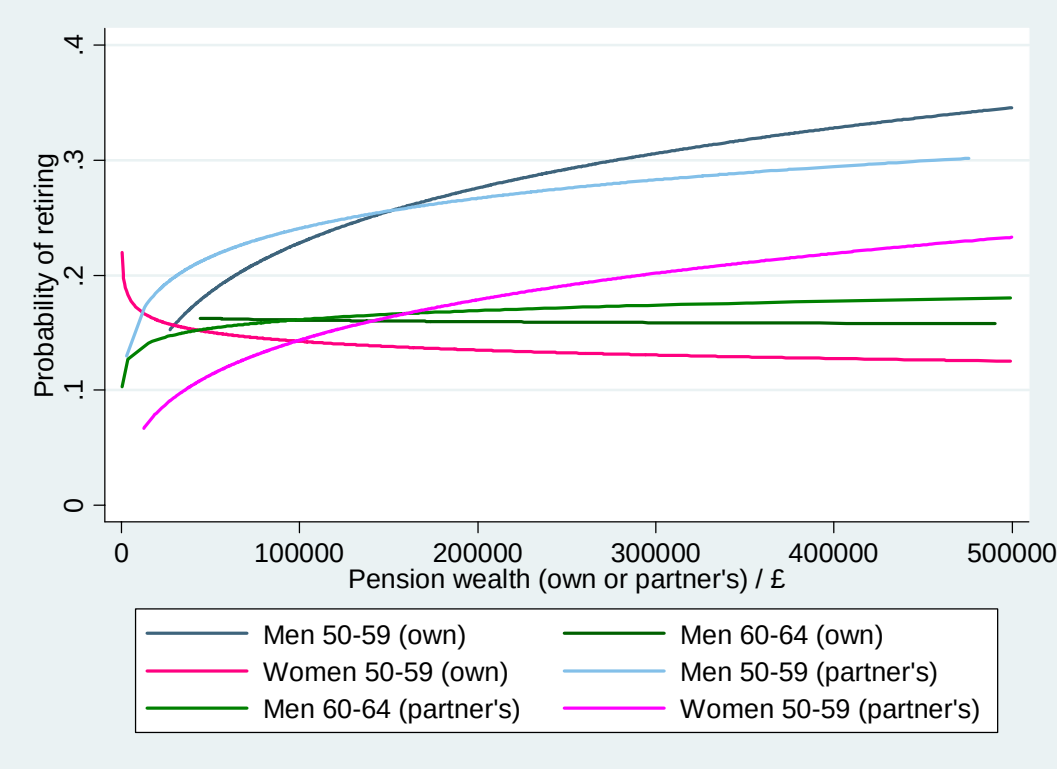
[15] Table 3.2 (univariate) and Table 3.3 (multivariate) show that having a pre-existing health problem is associated with an individual being significantly less likely to be in paid work in 2002–03.

the change in health or the exit from work. Second, as we observe only a two year period, the number of people experiencing the onset of a new health condition is small.

The covariance between the error terms in the retention and the retirement equation (ρ) varies between the three specifications. For men aged 50 to 59 it is estimated to be –0.7 implying that, conditional on the observed characteristics that we control for, those who are more likely to remain in the sample are less likely to move out of paid work. For the other two specifications the correlation is estimated to be +1.0 implying that, conditional on observed characteristics, it is those who are more likely to retire who are also more likely to remain in the sample.

To look more closely at how changes in the financial variables are associated with retirement, Figures 4.1-4.3 show (for individuals with a certain, fixed, set of characteristics) how predicted retirement probabilities change with increasing (own and partner's) pension wealth, peak value accrual and earnings respectively. Figure 4.1 shows that men aged 50 to 59 respond similarly strongly to increases in their own pension wealth as women aged 50 to 59 do to changes in their partner's pension wealth. An increase in own pension wealth from £100,000 to £200,000 is associated with an increase in the retirement probability of about 5 percentage points for men aged 50 to 59, whilst an increase in partner's pension wealth from £100,000 to £200,000 is also associated with an increase in retirement probability of just over 5 percentage points for women of the same age.

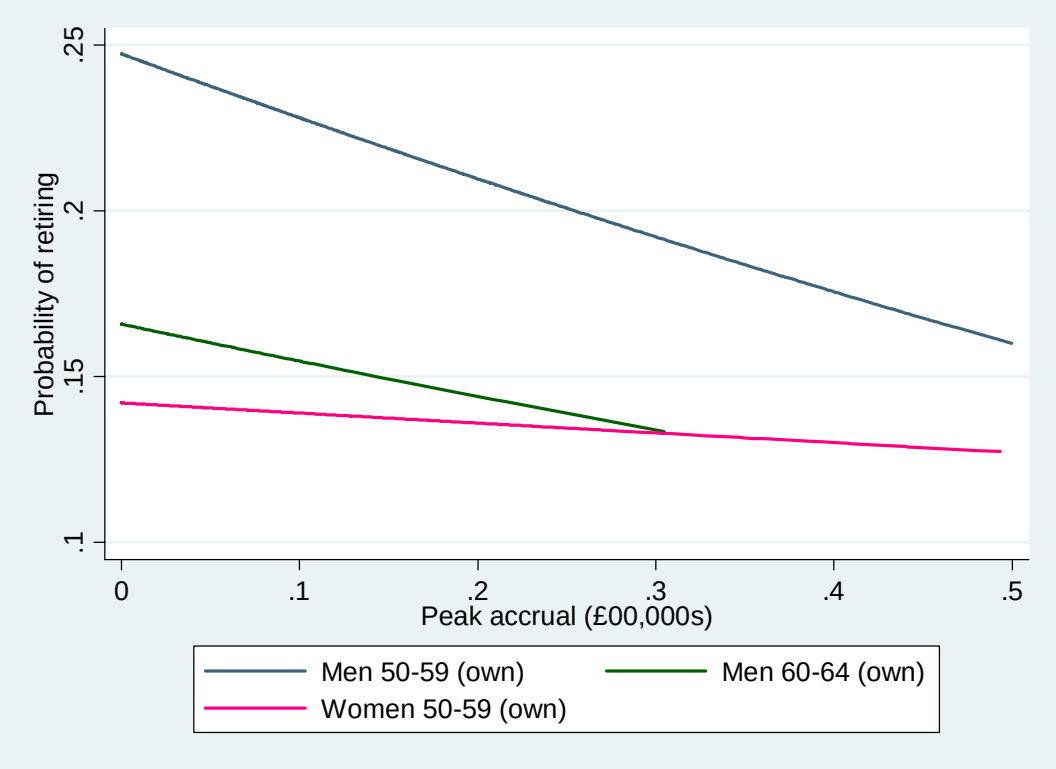
Figure 4.1. Marginal effect of own or partner's pension wealth on probability of retirement



Note: These graphs are drawn for a representative individual – aged 59, in a couple, with no health problems, not in a physically demanding job, not self-employed, partner not in work, does not hit the SPA, no degree, median earnings, median non-pension wealth, median job tenure and median pension wealth accrual. This means we are projecting slightly out of sample for the group of men aged 60 to 64. The 5% of individuals with the highest pension wealth have been excluded from this graph.

Figure 4.2 confirms what we observed in Table 4.2, that retirement probabilities amongst men aged 60 to 64 and (even more noticeably) amongst women aged 50 to 59 are less strongly associated with future accrual of pension wealth than retirement probabilities of the younger group of men. Figure 4.2 shows that, for an individual with this specific set of characteristics, an increase in peak accrual from £0 to £10,000 is associated with a decrease in the retirement probability for men aged 50 to 59 of about 2 percentage points, compared to only around 1 percentage point for older men and less than half a percentage point for women.

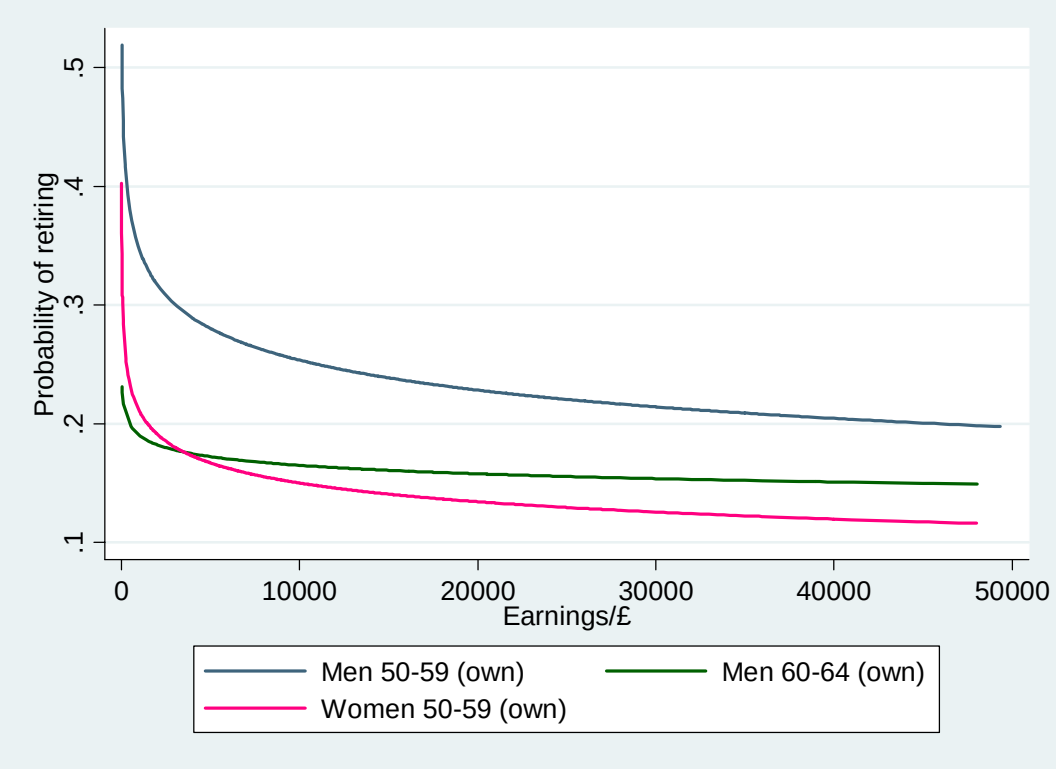
Figure 4.2. Marginal effect of peak accrual on probability of retirement



Note: These graphs are drawn for a representative individual – aged 59, in a couple, with no health problems, not in a physically demanding job, not self-employed, partner not in work, does not hit the SPA, no degree, median pension wealth, median earnings, median non-pension wealth and median job tenure. This means we are projecting slightly out of sample for the group of men aged 60 to 64. The 5% of individuals with the highest peak value accrual have been excluded from this graph.

Figure 4.3 shows how retirement probabilities are related to earnings levels for each of the three groups. Retirement probabilities of the older group of men are least strongly correlated with earnings. An increase in earnings from £20,000 to £30,000 amongst men aged 60 to 64 is associated with less than half a percentage point decrease in retirement probability, compared to just over 1 percentage point amongst men and women aged 50 to 59.

Figure 4.3. Marginal effect of earnings on probability of retirement



Note: These graphs are drawn for a representative individual – aged 59, in a couple, with no health problems, not in a physically demanding job, not self-employed, partner not in work, does not hit the SPA, no degree, median pension wealth, median non-pension wealth, median job tenure and median pension wealth accrual. This means we are projecting slightly out of sample for the group of men aged 60 to 64. The highest earning 5% of individuals have been excluded from this graph.

4.2 Further extensions of the model

This section presents three refinements to the model of retirement (with selection for non-random retention within the survey) that was presented in section 4.1. The first looks at how the association between reaching the state pension age and retirement varies across the wealth distribution; the second looks at the differences between the retirement behaviour of people doing physically demanding jobs who are in poor health compared to those in good health and the last looks at whether financial incentives are more important in determining retirement for people in good health than those in poor health.

Table 4.3 presents the coefficients from a model of retirement including interactions between quintile of total family wealth and reaching the state pension age. We can see

that, for both men and women, it is only individuals in the middle of the wealth distribution for whom reaching the state pension age has a significant effect on their probability of leaving work. The effect is smaller and statistically insignificant for both those at the top and those at the bottom of the wealth distribution.

Table 4.3. 2nd stage regression results including interactions between position in the wealth distribution and reaching the State Pension Age (SPA)

	Men (60-64)	Women (50–59)
Poorest quintile * reach SPA	n/a	0.431
	(n/a)	*(0.302)*
Quintile 2 * reach SPA	0.864	0.895***
	(0.532)	*(0.242)*
Quintile 3 * reach SPA	0.575	0.639***
	(0.404)	*(0.241)*
Quintile 4 * reach SPA	0.924***	0.223
	(0.351)	*(0.233)*
Richest quintile * reach SPA	0.593	0.120
	(0.411)	*(0.284)*

Note: Coefficients and *(standard errors)* are reported. Statistical significance denoted by: 1% level = ***, 5% = ** and 10% = *. Full results are available from the authors on request. Sample size: men = 289, women = 1,132. Interaction between poorest quintile and reaching SPA omitted for men 60-64 as it perfectly predict non-retirement for the 2 men aged 60 to 64 who do reach the SPA; these two observations are therefore omitted from the estimation.

We also find that health is an important determinant of how retirement probabilities are affected by certain other factors We found in the model presented in Table 4.2 that doing a physically demanding job was not significantly associated with being any more or less likely to stop working. However, as shown in the top panel of Table 4.4, when we instead include interactions between doing a physical job and having some form of health problem and doing a physical job and not having any health problems, we find that for men aged 50 to 59 those in poor health doing physical jobs are significantly more likely to leave work than those not doing a physical job. Those doing physical jobs and in good health are no more or less likely to leave work than those doing non-physically demanding jobs.

Similarly, we find evidence that the relationship between pension accrual incentives and retirement is different for those in good and bad health. The bottom panel of Table 4.4

shows that greater future pension accrual is only statistically significantly associated with a reduced likelihood of retirement for men aged 50 to 59 who are in good health. The co-efficient on this measure of financial incentive is smaller and statistically insignificant for men in poor health.

Table 4.4. 2nd stage regression results including interactions with health status

	Men (50–59)	Men (60–64)	Women (50–59)
(a) Health status and doing a physically active job			
Has health problems * does a physically active job	0.283* *(0.145)*	0.079 *(0.189)*	–0.320** *(0.154)*
Does not have health problems * does a physically active job	–0.234 *(0.180)*	–0.138 *(0.264)*	0.165 *(0.171)*
(b) Health status and pension accrual incentive			
Has health problems * Peak value accrual (£00,000s)	–0.427 *(0.391)*	–0.453 *(2.534)*	–0.234 *(1.013)*
Does not have health problems * Peak value accrual (£00,000s)	–1.660* *(0.893)*	0.015 *(3.515)*	0.066 *(1.186)*

Note: Coefficients and (*standard errors*) are reported. Statistical significance denoted by: 1% level = ***, 5% = ** and 10% = *. Full results are available from the authors on request. Sample size: men 50–59 = 1,139; men 60–64 = 291; women 50–59 = 1,132.

4.3 Alternative definitions of exit from work

So far we have simply defined retirement as exit from paid work. However, there are likely to be many routes out of work at older ages and not all may be influenced by the same factors. In particular, whilst financial incentives may be important in determining the timing of "retirement", it may be less important in explaining exits from work which might be considered less voluntary (such as exits due to ill-health or lack of employment opportunities). Therefore, this section presents a slightly different model to those presented so far in this paper. Here we examine a multinomial model of exit from paid

work into two alternative states: exits to self-defined retirement and exits to other inactive states.[16] The most prevalent self-defined states for men who leave work and do not define themselves as retired are "unemployed" and "permanently sick or disabled", whilst for women the most common state is to be "looking after home or family".[17]

Table 4.5 shows that, for both men and women aged 50 to 59, different factors are important in explaining exits to the two different states. Whilst accrual and wealth incentives from pensions are significantly associated with exits to "retirement" for men aged 50 to 59 and health problems are not, the reverse is true for explaining exits to inactivity. Amongst women aged 50 to 59, those with higher levels of pension wealth are less likely to leave work and define themselves as inactive than those with low levels of pension wealth, whilst those whose partner was working are less likely to "retire" than those whose partner was not.

[16] This specification does not control for retention in the survey data.

[17] See Figure 3.3, Emmerson and Tetlow (2006)

Table 4.5. Multinomial (logit) regression of activity in 2004–05 (without correction for non-random retention within the survey) – men and women aged 50–59

	Men (50–59)		Women (50–59)	
	Retired	Inactive	Retired	Inactive
Peak value accrual (£00,000s)	–3.038**	–0.383	–7.376	1.202
	(1.536)	*(0.990)*	*(5.520)*	*(2.249)*
Ln(pension wealth)	1.166***	–0.11	0.221	–0.373***
	(0.254)	*(0.266)*	*(0.173)*	*(0.142)*
Zero pension wealth	n/a	n/a	0.069	–0.097
	(n/a)	*(n/a)*	*(1.083)*	*(1.090)*
Ln(partner's pension wealth)	0.228	0.305	–33.872	0.292
	(0.185)	*(0.228)*	*(1.97e+07)*	*(0.189)*
Ln(non-pension wealth)	–29.587	–31.332	0.010	–30.324
	(3.10e+07)	*(3.79e+07)*	*(0.091)*	*(2.21e+07)*
Non-positive non-pen. wealth	0.039	0.073	0.401	0.042
	(0.128)	*(0.129)*	*(0.691)*	*(0.100)*
Ln(earnings)	–0.262	1.437***	0.014	1.240***
	(1.065)	*(0.459)*	*(0.159)*	*(0.423)*
Self-employed	–0.423***	–0.143	–0.391	–0.342***
	(0.139)	*(0.184)*	*(0.493)*	*(0.106)*
Physically demanding job	–0.149	–0.148	–0.191	0.493
	(0.443)	*(0.454)*	*(0.320)*	*(0.352)*
Job tenure (years)	–0.106	0.719**	–0.004	–0.004
	(0.326)	*(0.329)*	*(0.041)*	*(0.306)*
(Job tenure)^2	0.030	–0.098**	0.000	0.064
	(0.040)	*(0.045)*	*(0.001)*	*(0.045)*
Partner in work 2002–03	0.000	0.003**	–0.923***	–0.002
	(0.001)	*(0.001)*	*(0.303)*	*(0.002)*
Age-50	–0.164	–0.400	0.369***	0.284
	(0.359)	*(0.422)*	*(0.115)*	*(0.435)*
Reach state pension age	n/a	n/a	0.650	0.115
	(n/a)	*(n/a)*	*(0.409)*	*(0.506)*
Individual or partner hits age 60	0.143	0.302	–0.096	–0.050
	(0.403)	*(0.504)*	*(0.319)*	*(0.396)*
Couple	–0.680	–0.268	0.511	–0.617
	(0.460)	*(0.520)*	*(0.387)*	*(0.497)*
Degree	–0.470	–0.623	–0.845**	–0.392
	(0.333)	*(0.499)*	*(0.401)*	*(0.397)*
Mild cardiovascular disease	0.151	1.251***	0.282	0.225
	(0.288)	*(0.334)*	*(0.259)*	*(0.272)*
Severe cardiovascular disease	0.237	0.756	2.595**	1.810*
	(0.806)	*(0.744)*	*(1.009)*	*(0.972)*
Emotional/psychiatric problems	0.554	1.720***	–0.046	0.257
	(0.509)	*(0.433)*	*(0.432)*	*(0.379)*
Arthritis/osteoporosis	–0.460	0.726**	0.170	0.456*
	(0.413)	*(0.344)*	*(0.268)*	*(0.273)*
Lung disease/asthma	0.046	0.139	0.359	–0.293
	(0.450)	*(0.495)*	*(0.334)*	*(0.390)*
Other health problems	–33.539	1.540**	0.299	0.519
	(1.44e+07)	*(0.626)*	*(0.455)*	*(0.513)*

Note: Coefficients and (*standard errors*) are reported. Statistical significance denoted by: 1% level = ***, 5% = ** and 10% = *. Sample size: men 50–59 = 1,139; women 50–59 = 1,132.

5. Conclusions

This paper has set out a preliminary analysis of how pension incentives impact upon retirement decisions in the UK under the current institutional arrangements. The findings are important since (unlike in periods previously studied) a large proportion of the UK workforce, including those approaching retirement, are already covered by defined contribution as opposed to defined benefit pensions. Taking account of potential non-random retention within the ELSA survey we find that both pension accrual and pension wealth are important determinants of the retirement behaviour of men aged 50 to 59, while financial incentives – with the notable exception of the impact of partner's pension wealth – have a weaker role in determining the retirement decisions of women of the same age. Financial incentives appear to play a weaker role for men aged 60 to 64.

A direct contrast between these results with those of Blundell, Meghir and Smith (2002) is not straightforward since they examine the retirement behaviour of men aged 55 to the State Pension Age over a five year horizon (1988–89 to 1994), whereas the analysis in this paper looks at movements out of paid work of men (and women) aged between 50 and the State Pension Age over a two year window. Furthermore the richer information collected from ELSA respondents allows us to include a broader set of observed characteristics – in particular in terms of individuals' health. At least qualitatively, there seem to be two differences in the findings. First, there is evidence consistent with pension wealth accrual appears to have a stronger impact on retirement behaviour of men in this analysis than in the previous study. Second, the prediction from economic theory that higher pension wealth should lead to increased retirement appears to be more apparent in our study, at least for men aged between 50 and 59, than the earlier work. The extent to which this represents a genuine increase in the responsiveness to financial incentives over time, or over successive cohorts, as opposed to being caused by other

methodological differences between the two studies would be an interesting topic for future research.

Extensions to our basic model suggest that the impact of pension accrual on retirement is only important for those in good health and that among those in physically demanding jobs we find that it is only men in poor health – as opposed to women or men in good health – who are more likely to retire early. We also find some evidence that reaching the State Pension Age is a more important determinant of labour market exits for those in the middle of the wealth distribution. In terms of the analysis of individuals' self-reported economic activity, both pension wealth and its accrual (at least for men aged between 50 and 59) are important determinants of movements out of paid work into 'retirement', while poor health plays a more important role in determining movements out of paid work into other (in)activities.

There are three key implications of these findings for the impact of current trends in the UK. First, going forwards, improvements in health and a reduction in the number of physically demanding jobs, could lead to a significant increase in retirement ages. Second, the shift from defined benefit to defined contribution pensions that is occurring in the private sector could lead to some individuals increasing their retirement ages. Third coupled with the proposed future increase in Normal Retirement Ages in public sector defined benefit schemes (at least for new entrants) is also likely to lead to increased retirement ages. In addition our findings for men aged 50 to 59 suggest that any improvement in the health of those approaching retirement should also increase the extent to which individuals respond to their pension accrual.

In terms of the latest set of proposed pension reforms, it is less clear how individuals' retirement behaviour will respond. Under the proposals, state pensions (per pensioner) would, on average, remain roughly constant (relative to national income), which is likely

to have little impact on (average) retirement ages. The proposed (and, for women, already implemented) increases in State Pension Age could lead to an increase in retirement ages – particularly for those who are in the middle of the wealth distribution. However, an important impact of reforms (as opposed to trends that were occurring anyway) could come from the recent change which means individuals can draw their private pension while working for the same employer. This was implemented in April 2006 and will decouple the link between retirement and the decision to begin drawing a private pension. This may smooth financial incentives to retire at particular ages even faster than the shift from defined benefit to defined contribution pensions would otherwise have implied.

References

Asch E., S. Haider and J. Zissimopoulos (2005) 'Financial Incentives and Retirement: New Evidence from Federal Civil Service Workers', *Journal of Public Economics*, vol. 89, pp. 427-440.

Attanasio, O., Banks, J., Blundell, R., Chote, R. and Emmerson, C. (2004), *Pensions, Pensioners and Pensions Policy: Financial Security in UK Retirement Savings?*, IFS Briefing Note no. 48, (http://www.ifs.org.uk/publications.php?publication_id=1796).

Attanasio, O. and Emmerson, C. (2003), 'Mortality, health status and wealth', *Journal of the European Economics Association*, vol. 1, pp. 821–50.

Banks, J., Blundell, R. and Emmerson, C. (2005), 'The balance between defined benefit, defined contribution and state provision', *Journal of the European Economic Association*, vol. 3, pp. 466–76.

Banks, J. and Blundell, R. (2005), 'Private pension arrangements and retirement in Britain', *Fiscal Studies*, vol. 26, pp. 35–53.

Banks, J., Blundell, R., Emmerson, C. and Oldfield, Z. (2006), *State Pensions and the Well-Being of the Elderly in the UK*, IFS Working Paper No. 06/14 (http://www.ifs.org.uk/publications.php?publication_id=3687).

Banks, J. and Casanova, M. (2003), 'Work and retirement', in Marmot, M., Banks, J., Blundell, R., Lessof, C. and Nazroo, J. (eds), *Health, Wealth and Lifestyles of the Older Population in England: The 2002 English Longitudinal Study of Ageing*, London: IFS (http://www.ifs.org.uk/elsa/report_wave1.php).

Banks, J., Emmerson, C., Oldfield, Z. and Tetlow, G. (2005), *Prepared for retirement? The adequacy and distribution of retirement resources in England*, October 2005, 106 pp., Report R67, London: IFS (http://www.ifs.org.uk/publications.php?publication_id=3443).

Banks, J., Emmerson, C. and Tetlow, G. (2005), *Estimating pension wealth of ELSA respondents*, IFS Working Paper no. 05/09, http://www.ifs.org.uk/publications.php?publication_id=3369.

Banks, J. and Smith, S. (2006), 'Retirement in the *UK' Oxford Review of Economic Policy*, Spring 2006, vol. 22, no. 1, pp. 40-56.

Blundell, R., Meghir, C. and Smith, S. (2002), 'Pension incentives and the pattern of early retirement', Economic Journal, vol. 112, pp. C153–70.

Blundell, R. and Johnson, P. (1998) 'Pensions and Labor Force Participation in the UK', *American Economic Review*, vol. 88 no. 2, pp. 173-178.

Coile, C. C. (2004) "Retirement Incentives and Couples' Retirement Decisions" Topics in Economic Analysis & Policy 4(1): article 17.

Coile, C. C. and Gruber, J. (2004) "The Effect of Social Security on Retirement in the United States" in *Social Security Programs and Retirement around the World: Micro Estimation*, Gruber, J. and Wise, D. A. eds. Chicago: University of Chicago Press.

Disney, R., Emmerson, C. and Tanner, S. (1999), *Partnership in pensions: an assessment*, Commentary No. 79, London: IFS (http://www.ifs.org.uk/publications.php?publication_id=1939).

Disney, R., Emmerson, C. and Wakefield, M. (2006), 'Ill health and retirement in Britain: a panel data-based analysis', *Journal of Health Economics*, Vol. 25, No. 4 , pp. 621-649.

Disney, R. and Whitehouse, E. (1992) *The Personal Pension stampede*, London: Institute for Fiscal Studies.

Disney, R. and Emmerson, C. (2005), 'Public pension reform in the United Kingdom: what effect on the financial well-being of current and future pensioners?' *Fiscal Studies*, Vol. 26, No. 1, pp. 55-81.

Disney, R. and Hawkes, D. (2003), 'Declining employment of older workers: has Britain turned the corner?' in Dickens, R., Gregg, P. and Wadsworth, J. (eds), *The Labour Market Under New Labour*, The State of Working Britain, Hampshire: Palgrave.

Disney, R. and Smith, S. (2002), 'The Labour Supply Effect of the Abolition of the Earnings Rule for Older Workers in the United Kingdom', *Economic Journal*, vol. 112, no. 478, pp. 136-152.

Department for Work and Pensions (2006), *Security in retirement: towards a new pensions system*, Cm6841 (http://www.dwp.gov.uk/pensionsreform/whitepaper.asp).

Disney, R., Grundy, E. and Johnson, P. (eds) (1997), *The Dynamics of Retirement: Analyses of the Retirement Surveys*, Department of Social Security Research Report no. 72, London: Stationery Office.

Disney, R., Meghir, C. and Whitehouse, E. (1994) 'Retirement behaviour in Britain', *Fiscal Studies*, vol. 15, no. 1, pp. 24-43.

Emmerson, C., Tetlow, G. and Wakefield, M. (2006), *The Pensions White Paper: who wins and who loses?*, PMI News, August, (http://www.ifs.org.uk/publications.php?publication_id=3717).

Emmerson, C. and Tetlow, G. (2006), 'Labour market transitions', in Banks, J., Breeze, E., Lessof, C. and Nazroo, J. (eds), *Retirement, health and relationships of the older population in*

England: The 2004 English Longitudinal Study Of Ageing (Wave 2), London: IFS (http://www.ifs.org.uk/publications.php?publication_id=3711).

Gruber, J. and Wise, D. (eds), 2004, *Social Security Programs and Retirement around the World: Micro-Estimation*, The University of Chicago Press.

Gustman, A. L. and Steinmeier, T. (2002), *The Social Security Early Entitlement Age In A Structural Model of Retirement and Wealth*, NBER Working Paper 9183.

Lazear, E. (1986) 'Retirement from the labor force', 305-355 in O. Ashenfelter and R. Layard (eds) *Handbook of Labour Economics*, Volume 1, Elsevier Science Publishers, BV, Amsterdam.

Marmot, M., Banks, J., Blundell, R., Lessof, C. and Nazroo, J. (2003, eds), *Health, Wealth and Lifestyles of the Older Population in England: The 2002 English Longitudinal Study of Ageing*, London: IFS (http://www.ifs.org.uk/elsa/report_wave1.php).

Marmot, M. *et al.* (2005), *English Longitudinal Study of Ageing (ELSA): Wave 1, 2002–2003 [computer file]*, 2nd edition, Colchester, Essex: UK Data Archive [distributor], June 2005. SN: 5050.

Meghir, C. and Whitehouse, E. (1997) 'Labour market transitions and retirement of men in the UK', *Journal of Econometrics*, vol. 79, pp. 327-354.

Smith, S. (2005), 'What do defined contribution pensions mean for retirement?' Paper presented at the RTN final conference on financing retirement in Europe (http://www.cepr.org/meets/wkcn/5/5529/papers/Smith.pdf).

Stock, J. and Wise, D. (1990a) 'Pensions, the option value of work and retirement', *Econometrica*, vol. 58, no. 5, pp. 1151-1180

Stock, J. and Wise, D. (1990b) 'The Pension Inducement to Retire: An Option Value Analysis' In Wise, D. (ed.), *Issues in the Economics of Aging*. Chicago: University of Chicago Press.

Tanner, S. (1998), 'The dynamics of male retirement behaviour', *Fiscal Studies*, vol. 19 no. 2, pp. 175-196.

Zabalaza, A., Pissarides, C. and Barton, M. (1980) 'Social security and the choice between full-time work, part-time work, and retirement', *Journal of Public Economics*, vol. 14, pp. 245-276.

Appendix

Table A.1. Sample characteristics, men in paid work in 2002–03

	Mean	Standard deviation
Age	55.9	3.84
Individual reaches SPA	0.069	0.254
Individual or partner reaches age 60	0.114	0.318
Has a partner	0.858	0.350
Self-employed	0.120	0.400
Physically demanding job	0.378	0.485
Job tenure	13.3	12.1
Education		
GCSE/O level or less	0.433	0.496
A level	0.330	0.470
Degree	0.236	0.425
Health problems		
Mild cardiovascular disease	0.343	0.475
Severe cardiovascular disease	0.036	0.186
Emotional/psychiatric problems	0.053	0.225
Arthritis/osteoporosis	0.168	0.374
Lung disease/asthma	0.104	0.305
Other health conditions	0.021	0.144
Amongst those in couples:		
Partner's age	53.2	5.73
Partner in work	0.768	0.422

Note: Sample size = 1,426. Those with both mild and severe forms of cardiovascular disease (CVD) are only classified as having severe CVD.

Table A.2. Sample characteristics, women in paid work in 2002–03

	Mean	Standard deviation
Age	54.3	2.57
Individual reaches SPA	0.145	0.352
Individual or partner reaches age 60	0.136	0.343
Has a partner	0.749	0.434
Self-employed	0.100	0.300
Physically demanding job	0.202	0.401
Job tenure	10.1	8.68
Education		
GCSE/O level or less	0.402	0.491
A level	0.405	0.491
Degree	0.193	0.395
Health problems		
Mild cardiovascular disease	0.308	0.462
Severe cardiovascular disease	0.008	0.089
Emotional/psychiatric problems	0.103	0.305
Arthritis/osteoporosis	0.261	0.439
Lung disease/asthma	0.137	0.344
Other health conditions	0.054	0.226
Amongst those in couples:		
Partner's age	56.3	5.47
Partner in work	0.822	0.383

Note: Sample size = 1,132. Those with both mild and severe forms of cardiovascular disease (CVD) are only classified as having severe CVD.

Table A.3. 1st stage regression results for selection into retention.

	Men (50–59)	Men (60–64)	Women (50–59)
Interviewer's retention rate	1.821***	1.887**	1.836***
	(0.469)	*(0.816)*	*(0.470)*
Interviewer's ret. rate missing	–0.534	0.888	–0.732
	(0.571)	*(0.883)*	*(0.631)*
Peak value accrual (£00,000s)	0.001	–3.388	–1.200*
	(0.198)	*(2.305)*	*(0.678)*
Ln(pension wealth)	0.161***	–0.062	–0.070
	(0.061)	*(0.138)*	*(0.058)*
Zero pension wealth	n/a	n/a	0.134
	n/a	*n/a*	*(0.356)*
Ln(partner's pension wealth)	–0.045	0.064	0.060
	(0.057)	*(0.114)*	*(0.060)*
Ln(non-pension wealth)	0.045	–0.002	–0.013
	(0.029)	*(0.061)*	*(0.032)*
Non-positive non-pen. wealth	0.073	–0.653**	–0.136
	(0.212)	*(0.315)*	*(0.189)*
Ln(earnings)	–0.035	0.058	0.032
	(0.053)	*(0.082)*	*(0.049)*
Self-employed	–0.063	–0.051	0.248
	(0.111)	*(0.221)*	*(0.158)*
Physically demanding job	0.038	–0.060	–0.164*
	(0.090)	*(0.164)*	*(0.099)*
Job tenure (years)	0.005	–0.034	0.021
	(0.012)	*(0.021)*	*(0.014)*
(Job tenure)^2	0.000	0.001	–0.001
	(0.000)	*(0.001)*	*(0.000)*
Partner in work 2002–03	0.298***	0.077	0.115
	(0.105)	*(0.179)*	*(0.122)*
Age-50	–0.028	–0.186	–0.036
	(0.020)	*(0.120)*	*(0.027)*
Reach state pension age	n/a	0.590*	0.029
	n/a	*(0.335)*	*(0.154)*
Individual or partner hits age 60	–0.048	n/a	0.132
	(0.133)	*n/a*	*(0.130)*
Couple	–0.383**	–0.226	–0.226
	(0.151)	*(0.260)*	*(0.143)*
Degree	0.078	0.25	0.347***
	(0.105)	*(0.214)*	*(0.128)*
Mild cardiovascular disease	0.132	0.22	–0.094
	(0.089)	*(0.166)*	*(0.088)*
Sev. cardiovascular disease	–0.224	0.083	–0.55
	(0.206)	*(0.345)*	*(0.355)*
Emotional/psychiatric problems	0.457**	–0.424	0.336**
	(0.224)	*(0.385)*	*(0.161)*
Arthritis/osteoporosis	0.147	0.273	0.084
	(0.116)	*(0.209)*	*(0.095)*
Lung disease/asthma	–0.228*	0.001	–0.062
	(0.125)	*(0.222)*	*(0.118)*
Other health problems	0.064	–0.327	0.046
	(0.300)	*(0.436)*	*(0.182)*

Note: Coefficients and *(standard errors)* are reported. Statistical significance denoted by: 1% level = ***, 5% = ** and 10% = *. Control for missing partner's pension wealth included. Sample size: men 50–59 = 1,400; men 60–64 = 371; women 50–59 = 1,375.