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Occupational Pension Value in the Public and Private Sectors

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by

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Abstract

It is well known that in the UK defined benefit pensions are more prevalent in the public sector than in the private sector. Furthermore, we find that the average value of accrual to members of both defined benefit pensions and defined contribution pensions is lower in the private sector than in the public sector. As a result of both these factors, we find that the average value of pension accrual is much higher in the public sector than in the private sector. Due to the long-running shift away from defined benefit pensions to less generous workplace defined contribution pensions in the private sector continuing between 2001 and 2005 the difference in average pension accrual between the sectors increased over this period. While on average over this period earnings in the public sector grew 3.5% faster than in the private sector, including pension accrual increases this difference by one-third to 4.7%. We simulate a plausible reform to the public sector defined benefit pensions – an increase in the normal pension age from 60 to 65 for future pension accrual of all current members. We find that, had this reform been implemented between 2001 and 2005, average growth in total remuneration over this period in the public sector would actually have been almost the same as that in the private sector.

Key words: Public pensions Age-earnings profiles

JEL classification: J32 J38

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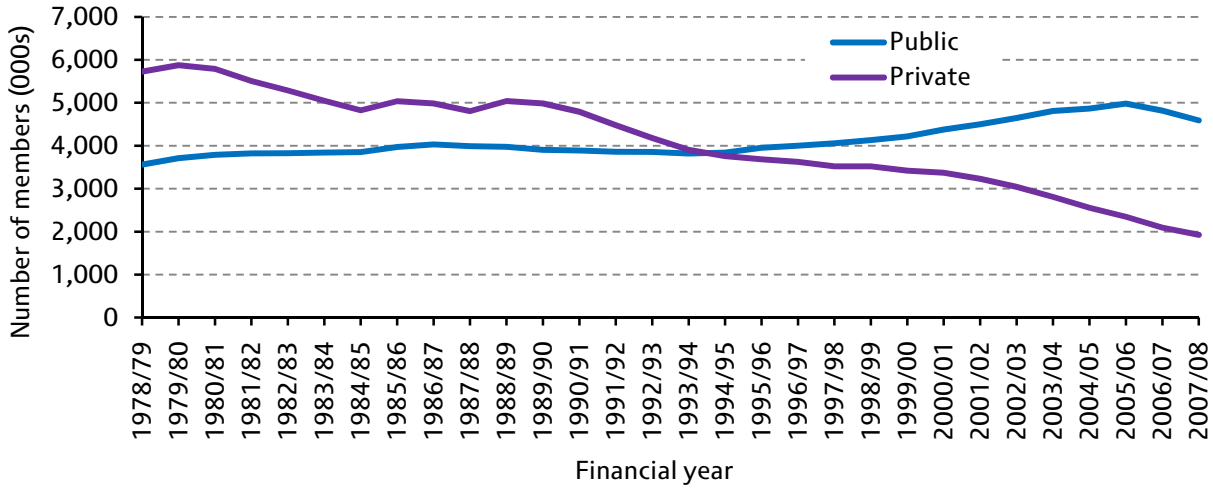
1. Introduction

The divergence between the prevalence and value of occupational pension schemes in the public and private sectors in the UK has become a topic of considerable importance. Differences in the value of pension provision could amplify or offset any divergence in current pay between the sectors. This has been of particular interest in recent years because of the well-documented decline in the number of defined benefit (DB) pension schemes available in the private sector, especially those still open to new members.

There are three ways in which the average value of annual remuneration received in the form of pensions may differ between the public and private sectors. First, the proportion of employees in each sector who are members of an occupational DB or a defined contribution (DC) pension may vary. Second, amongst members of DB schemes, there may be differences in the average value of a year's pension rights arising from differences in scheme rules between the sectors. Third, for members of DC schemes, there may be a difference in the average value of a year's pension rights arising from differences in the level of contributions made to DC schemes in the public and private sectors. Over time the difference between the value of pension remuneration in each sector may have widened or narrowed if these factors – pension participation and the value of schemes to their members – changed differently in the public and private sectors. The focus of this paper is to quantify these differences and, specifically, to examine how they have changed over time.

The proportion of employees who are members of an occupational DB pension does differ between the sectors. Figure 1.1 uses data from the Department for Work and Pensions Second Tier Pension Provision statistics to illustrate how membership of contracted out DB schemes has changed over time. There has been a steady decline in DB scheme membership in the private sector since the 1970s. The difference in the number of members of DB schemes between the sectors is even more significant when they are considered as a proportion of each sector's workforce because the public sector is much smaller than the private sector. For example in 2005–06 data from the Annual Survey of Hours and Earnings (ASHE) suggest that less than one-third of the workforce was affiliated with the public sector, whereas Figure 1.1 shows that public sector workers comprised two-thirds of members of contracted out DB pensions in that year.

Figure 1.1 Principal membership of contracted-out DB plans, by sector



Note: Figure shows "principal" membership; for those with more than one pension membership, this is defined as the one with highest earnings in that tax year.

Source: Department for Work and Pensions, Second Tier Pension Provision statistics, (http://research.dwp.gov.uk/asd/asd1/tabtools/stpp_summary.xls).

Disney, Emmerson and Tetlow (2009) investigated the difference in the level of DB pension rights between the two sectors in 2001 using data from the British Household Panel Survey (BHPS). They showed that not only was participation in DB pension plans greater in the public sector, but the median pension accrual as a percentage of current salary amongst members was also significantly higher. This arose both due to more generous scheme rules operating, on average, in the public sector than in the private sector, and differences in the shape of pay profiles of graduates which boosted the generosity of final salary pension arrangements for older graduates in the public sector relative to older graduates in the private sector.

The evolution of the value of current pay over time – including how this has differed between the sectors – is well documented (for a recent discussion see Bozio and Johnson, 2010). However, even though pensions form an important part of total remuneration for many people, little work has been done to examine how the value of remuneration in the form of pension rights has evolved over time. This paper extends the existing research by quantifying the extent to which remuneration in the form of pensions grew between 2001 and 2005, in particular focussing on how this trend has been different in the public and private sectors. We also combine this with evidence on how current pay and bonuses evolved over the same period to get a picture of how total remuneration changed in the public and private sectors over this four-year period. We do not here attempt to address the question of how the *level* of total remuneration differs between the public and private sectors.[1] Rather our focus is on how total remuneration has grown in each sector over time. To the extent that we find there has been faster growth in total remuneration in the public sector, this could either reflect public sector remuneration catching up with, or pulling further ahead of, that in the private sector.

This paper examines how participation, and the average value of remuneration, provided by each broad type of pension scheme – occupational DB, workplace DC and other DC – has changed in the public and private sectors over time. We use data from the BHPS in 2001 and 2005 which asked respondents detailed questions about their pension provisions and sector affiliation (unfortunately other waves of the BHPS do not contain these questions). Section 2 describes the data and the method used to calculate the value of pension accrual and the assumptions made. Section 3 presents the main results, including participation in, and the value of, occupational DB and workplace DC pensions to individuals in both the public and private sectors and how this has changed between 2001 and 2005. Section 4 combines pension accrual with earnings for each individual to investigate how the total remuneration packages offered by the public and private sectors have changed over time. Section 5 considers what effect a potential reform to the public sector DB pension schemes would have had. Section 6 concludes.

[1] Analyses of workers' remuneration using cross-sectional data in the UK and elsewhere have uncovered significant differences in pay levels between the public and private sectors after controlling for observed characteristics (see Bell *et al* (2007); Blackaby, Murphy and O'Leary (1999); Disney and Gosling (1998); and Henley and Thomas (2001)). Whether such differentials persist in the long run after adjusting for self-selection of job movers and measuring worker quality more precisely is, however, open to question (see Disney and Gosling (2003); Nickell and Quintini (2002); Postel-Vinay and Turon (2005)).

2. Methodology and Data

This paper estimates the value of occupational and non-occupational private pensions to a sample of individuals from the BHPS in 2001 and 2005. The measure of pension value that we focus on is how much additional pension a person earns entitlement to by working for one more year. This measure can most easily be compared to other types of remuneration such as current annual pay and is equivalent to the "current unit method" used by actuaries. We also ignore accrual of state pensions in our calculations and therefore we are explicitly not measuring total retirement saving (which would also require an estimate of non-pension saving for retirement).[2] Section 2.1 describes how the value of accruing an extra year of pension rights under different pension schemes can be assessed. Section 2.2 describes the data and assumptions used in the calculations.

2.1 Valuing pension accrual

In general terms, pension schemes provide individuals with an annual income from the date at which they retire until the date they die. In this paper we define the value of accrued pension rights as the present discounted value of this stream of pension income. The marginal value of an additional year's worth of pension rights is the difference between the value of accrued pension rights that the individual would be entitled to if he stayed in the scheme for an additional year, and the value of accrued pension rights that the individual would be entitled to if he left the scheme this year. This section sets out the approach used to value an additional year of pension accrual. Section 2.1.1 considers final salary DB pension schemes, whilst section 2.1.2 considers DC pension schemes.

2.1.1 The value of additional accrual in a defined benefit pension scheme

The annual pension income received from a DB pension depends on a measure of 'final' salary[3] (y_t), an accrual fraction (α) and the number of years' tenure in the scheme (n_t). The present discounted value of this stream of pension income is calculated according to the following formula.

$$V_t = \sum_{s=r}^{T} \partial^s \alpha n_t y_t \qquad [1]$$

Where δ = discount rate
r = number of years from t until retirement
T = number of years from t until death

In some schemes an individual may be entitled to a lump sum upon retirement in addition to the annual pension income. Some schemes also make provision for a dependent's pension; for example half of the annual pension income may be paid to a surviving partner until their death in the event of the death of the scheme member. The present discounted value of a DB pension including these benefits is calculated according to equation 2.

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[2] By not including accrual in the State Earnings-Related Pension Scheme (SERPS) in 2001, or its successor the State Second Pension (S2P) in 2005, means that we are underestimating accrual in contracted-out pensions (which will include the majority of DC pensions) relative to pensions that are not contracted out (which will include the majority of DB pensions). However to the extent to which lower accrual is reflected in reduced employee National Insurance (NI) payments this will be included in our measure of total remuneration in Section 4 (since earnings are taken gross of income tax and employee NI). Moreover the focus of this paper is in the *change* in pension accrual and total remuneration between 2001 and 2005 and therefore to the extent to which employer NI funded second-tier pensions are unchanged over this period are results will be unaffected.

[3] The measure of salary used to calculate a DB pension entitlement is not necessarily the final salary. However the National Association of Pension Funds Survey, *The State of Britain's Pensions,* 2005 (selected statistics in Hewitt, 2007) found that 51% of schemes used either the final salary at retirement or the average over the last 12 months. A further 29% used the best 3 years' salary from a prescribed period which, so long as individuals do not experience rapidly changing annual earnings, will be very similar to a final salary scheme. We therefore assume DB pension entitlements are calculated based on an individual's final salary.

$$V_t = \partial^r \beta n_t y_t + \sum_{s=r}^{T} \partial^s \alpha n_t y_t + \sum_{q=T+1}^{T_p} \frac{1}{2} \partial^q \alpha n_t y_t \quad [2]$$

Where β = lump sum fraction

T_p = number of years from t until partner's death

The marginal value of an additional year's accrual in the scheme is given by the difference between the present discounted value of the pension the member is entitled to in year t and the present discounted value of the pension the member would be entitled to in year t+1. The value of an additional year of pension accrual is therefore described by equation 3.

$$\begin{aligned} V_{t+1} - V_t &= \partial^r \left(\beta n_t \{ y_{t+1} - y_t \} + \beta y_{t+1} \right) \\ &+ \sum_{s=r}^{T} \partial^s \left(\alpha n_t \{ y_{t+1} - y_t \} + \alpha y_{t+1} \right) \\ &+ \sum_{q=T+1}^{T_p} \frac{1}{2} \partial^q \left(\alpha n_t \{ y_{t+1} - y_t \} + \alpha y_{t+1} \right) \qquad [3] \end{aligned}$$

The value of an additional year of pension accrual therefore depends on the scheme rules (α and β), accrued tenure (n_t), current earnings (y_t) and earnings growth ($y_{t+1} - y_t$) over the next year.

2.1.2 The value of additional accrual in a defined contribution pension scheme

The value of a DC pension scheme is calculated using the same principles as used to value the DB pension schemes. Each year the scheme member and/or their employer contribute some fraction of their salary to the pension scheme. These contributions then earn some investment returns until the individual reaches retirement. At retirement, DC pension funds are generally annuitised and the purchased annuity provides the individual with a stream of pension income from the date they annuitise until the date they die. We therefore define the value of a DC pension as the present discounted value of the stream of pension income that the annuity will provide. Note that this will not necessarily be the same as simply taking the DC fund value but will incorporate the fact that an annuity will have to be purchased to convert the fund into a retirement income, and is an analogous methodology to that employed for valuing DB rights. The marginal value of an additional year's accrual in the scheme is given by equation 4. An additional year's contribution to the pension scheme ($\bar{c} y_t$) receives a real investment return (x) until the point at which the fund is used to purchase an annuity. An annuity is then purchased which provides a stream of income until death at a given rate (ρ).

$$V_{t+1} - V_t = \sum_{s=r}^{T} \partial^s \rho \bar{c} y_t (1+x)^r \qquad [4]$$

Where ρ = sex-specific indexed annuity rate

$\bar{C}$ = combined employer and employee contribution rate

x = real annual rate of return on investments

In section 3 these values of additional years' accrual are expressed as a percentage of current usual gross salary for both DB and DC pension schemes. The values are expressed gross of any employee contribution.

2.2 Data and assumptions

The value of the pensions held by individuals is calculated for a sample of individuals in the BHPS in 2001 and 2005 – the only years in the BHPS in which respondents have been asked detailed questions about their pensions. Individuals were asked if their employer offered a pension scheme, and if so whether they were a member of the scheme. If they said they had joined the scheme, individuals were then asked how

long they had been in the scheme, whether it was a DB or DC scheme, whether it was contributory, and if so what proportion of their salary they contributed. Individuals were also asked if they contributed to a personal private pension, and if so how much they contributed. The sample used for each year is all non-proxy respondents who were employed and aged between 20 and 59. This resulted in a sample of 4,821 individuals in 2001 and 3,857 in 2005.

2.2.1 Defined benefit schemes

The value of sector-specific stylised DB schemes is estimated for individuals in the BHPS sample who were members of an occupational DB scheme. The survey respondents report their scheme tenure and current earnings. To calculate the value of a year's accrual, as shown in equation 3, we have had to make assumptions about scheme rules and earnings growth. The main assumptions that were made are listed below and are in line with Disney, Emmerson and Tetlow (2009):

- DB pension scheme members are assumed to draw their pension at the normal pension age (NPA) for their scheme. The NPA is assumed to be 60 for public sector DB schemes and 65 for private sector DB schemes.
- The accrual fraction is assumed to be 1/60th in private sector schemes and 1/80th in public sector schemes. Public sector DB schemes are assumed to provide a 3/80th lump sum (per year of tenure) on retirement, whilst private sector DB schemes are assumed, by default, not to provide any lump sum.[4]
- The stylised DB schemes are assumed to provide a dependent's pension if the individual is part of a couple, which is equal to half of the annual pension income of the member.
- To project earnings growth over the next year, we use sex-, sector- and education- specific age-earnings profiles estimated using the Labour Force Survey (LFS). These are described in more detail in section 2.2.5 below.

The largest public sector DB pension schemes have recently undergone reform, with scheme rules being changed to reduce costs and generosity. For instance the NPA for most new members of public sector DB schemes is now 65. Our stylised public sector DB scheme does not reflect these 'new' public sector schemes as almost all of these reforms were introduced after 2005 and existing members did not have their NPA increased. In Section 5 we simulate accrual under the scenario where an increased NPA was implemented for future accrual for all members between 2001 and 2005.

2.2.2 Defined contribution schemes

Individuals were counted as being a member of a DC scheme if they said they were a member of their employer's DC pension scheme, or if they said they contributed to an individually arranged private pension. We refer to the former as a 'workplace DC' scheme and the latter as an 'other DC' scheme. There might be some doubt as to whether the public sector individuals who claimed to be members of a workplace DC scheme in 2001 actually were members of such a scheme, and so the sensitivity of the main results to this is tested in appendix B.

As shown in section 2.1.2, the value of annual accrual in DC schemes depends primarily on the fraction of salary contributed and the investment return that these funds can attract between now and retirement.

- Respondents to the BHPS report their own employee contribution rates in the survey. Where this was missing or not known, a 'hot decking' procedure was used to impute a contribution rate. This

[4] Private sector schemes often allow members to receive a lump-sum in return for a reduced annual pension (sometimes known as commutation). As long as this is done on a fair basis, this will not affect the present discounted value of the stream of payments (including the lump sum).

process finds an individual with similar characteristics and uses the employee contribution rate they report as a proxy response. For members of employer DC schemes the characteristics matched on were sex, marital status and broad age group. For holders of other DC pensions an additional characteristic was used, which was whether the holder only contributed to an other DC pension or whether they contributed to both an other DC pension and an occupational pension.

- Employers were assumed only to contribute to workplace DC schemes and not to other DC pensions. Private sector employer contributions were assumed to be the sex- and occupation-specific mean contribution suggested by data from ASHE in 2005, adjusted by a year-specific constant so that the mean across the BHPS sample was equal to the mean employer contribution found by the Occupational Pensions Scheme Survey (OPSS).[5] Public sector employers were assumed to contribute according to the rules of the Civil Service Partnership Scheme, which has contributions increasing with age and employer matching of employee contributions up to 3%.
- Individuals with DC pensions are assumed to annuitise when they reach 65. The annuity rates used are the second best sex-specific RPI-linked annuity rates reported by the Financial Services Authority in March 2009. Sensitivity of the main results to this assumption is discussed in appendix B.[6]
- The real annual rate of return on investments is assumed to be 2%, a reasonable estimate of the long run risk free rate of return. Sensitivity of the main results to this assumption is tested in appendix B.

2.2.3 Life expectancy

The estimates of life expectancy used are the Government Actuary Department's sex- and age-specific cohort life expectancies based on 2006 population projections. We assume that all individuals survive with certainty to 'retirement' age (where this is the NPA for DB scheme members and age 65 for DC members).

For DB pension scheme members, life expectancy at the relevant NPA is used. This will differ depending on the year the individual reaches the NPA or equivalently on the individual's attained age in 2001 (for the 2001 BHPS sample) or 2005 (for the 2005 BHPS sample). For DC pension scheme members we use the life expectancy of an individual who reaches age 65 in 2009, since the 2009 annuity rates we use will reflect these expectations of life. Whilst life expectancy may differ for DC pension holders who reach age 65 in years before or after 2009, we can expect the annuity rates offered by insurance companies to differ in order to reflect this, and so the value of the annuity stream should be relatively unaffected. Life expectancies are all adjusted for the mortality gradient observed by social class.[7]

2.2.4 Discount rate

Individuals are assumed to discount the future at a rate of 2% per year – in other words, receiving £1 of pension income next year would only be worth £0.98 today. Since the main focus of this paper is comparing the value of pension accrual between sectors and looking at how any disparity has changed

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[5] For 2001, average contribution rates are matched to those observed in the 2000 OPSS (Government Actuary's Department, 2003); for 2005, the 2005 OPSS is used (Government Actuary's Department, 2006).

[6] Women might be more likely to annuitise at age 60 rather than at age 65, however this would make little difference to the present discounted value of the income stream. The majority of individuals actually purchase nominal rather than RPI linked annuities. However using nominal annuity rate would add the complexity of inflation risk when calculating the present discounted value of the stream of pension income.

[7] This is outlined in Office of National Statistics figures on trends in life expectancy by Registrar General's Social Class for 2002 to 2005 (http://www.statistics.gov.uk/downloads/theme_population/Life_Expect_Social_class_1972-05/life_expect_social_class.pdf).

over time, the actual choice of discount rate is not particularly important so long as the same discount rate is used for all individuals throughout.

2.2.5 Earnings profiles

It is clear from equation 3 that an important component of the value of an additional year's accrual in a final salary DB scheme is how quickly earnings grow from one year to the next. If earnings growth differs between the public and private sector or between different age groups, for example, then calculations of the value of pension accrual which fail to take this into account will miss an important source of variation in the value of additional pension rights.

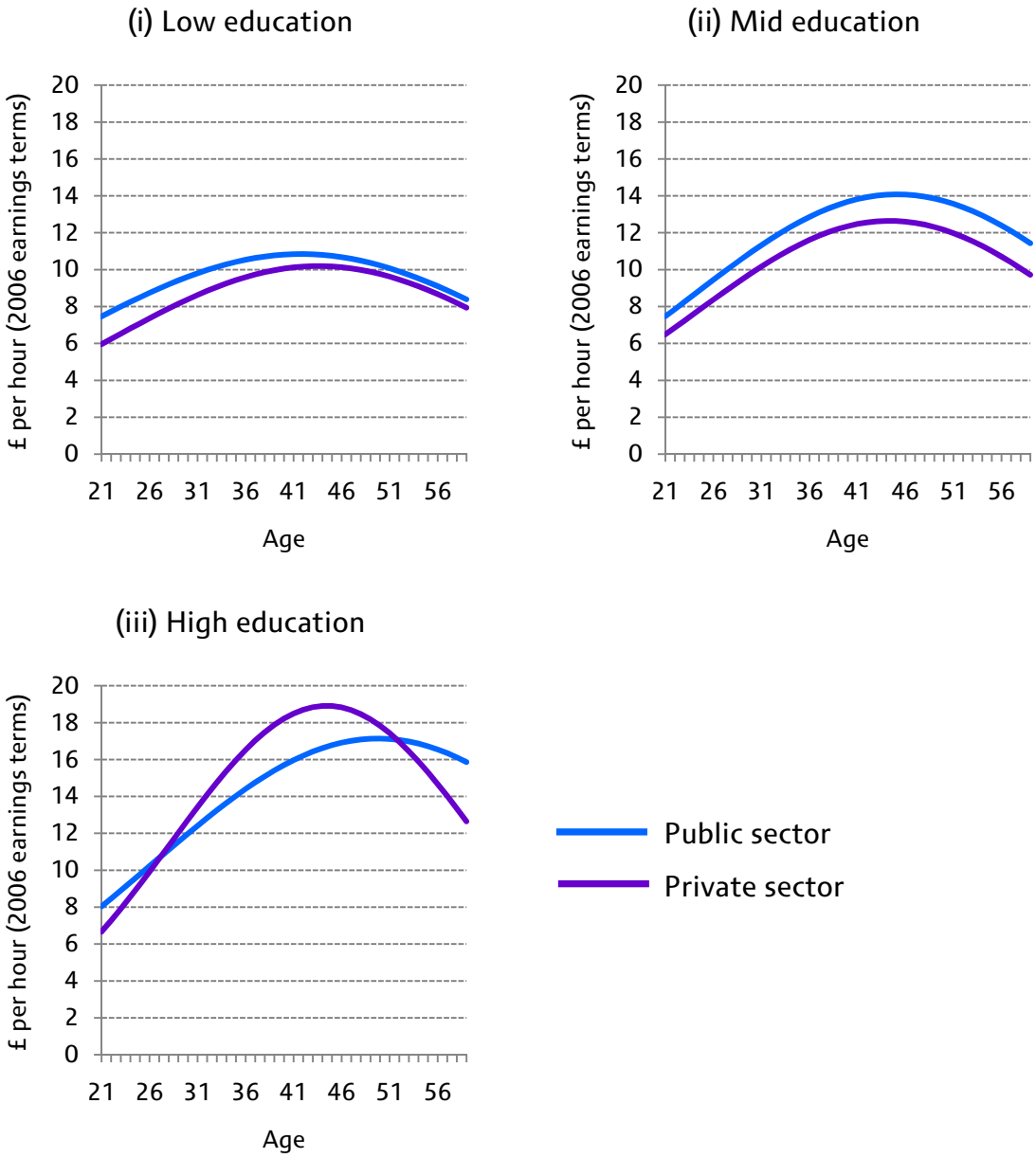
Using the same method as Disney, Emmerson and Tetlow (2009) we estimated age-earnings profiles for men and women of three different education levels in the public and private sectors using thirteen years of data from the LFS. Earnings in each year are inflated to 2006 earnings terms using the average earnings index for the relevant sector (public or private), which means that these profiles will understate 'true' growth in earnings at younger ages and overstate the 'true' decline in earnings at older ages. The education levels distinguished were: leaving full-time education at compulsory school leaving age (low), remaining in education until age 18 (mid), continuing in education beyond age 18 (high).[8] The measure of earnings used was usual hourly pay (defined as usual weekly earnings divided by usual hours of work) as this is likely to be closest to pensionable earnings as it excludes bonuses and overtime. These age-earnings profiles (approximated by quadratics in age) are shown in Figures 2.1A and 2.1B. In the case of women, we have also allowed for different curvatures for those aged under and over 30. These quadratic age-earnings profiles are used in the calculation of projected pension rights described below.

The age-earnings profiles for low and mid-educated men and women have a similar shape in the public and private sectors. However, the earnings profiles for the high educated group demonstrate markedly more curvature in the private sector than in the public sector. In other words, earnings growth is more rapid at younger ages in the private sector but declines rapidly at older ages, whereas in the public sector earnings growth is more similar across the age groups. See Disney, Emmerson and Tetlow (2009) for more comprehensive analysis of the statistically significant differences between these sector-specific earnings profiles.

Actual real earnings growth is taken to be that implied by these profiles (i.e. to vary by age, education, sex and sector), plus 2% for an estimate of real economy-wide earnings growth. A floor of –2.5% is then applied as it is assumed that individuals are, in practice, unlikely to receive a reduction in their nominal hourly pay.

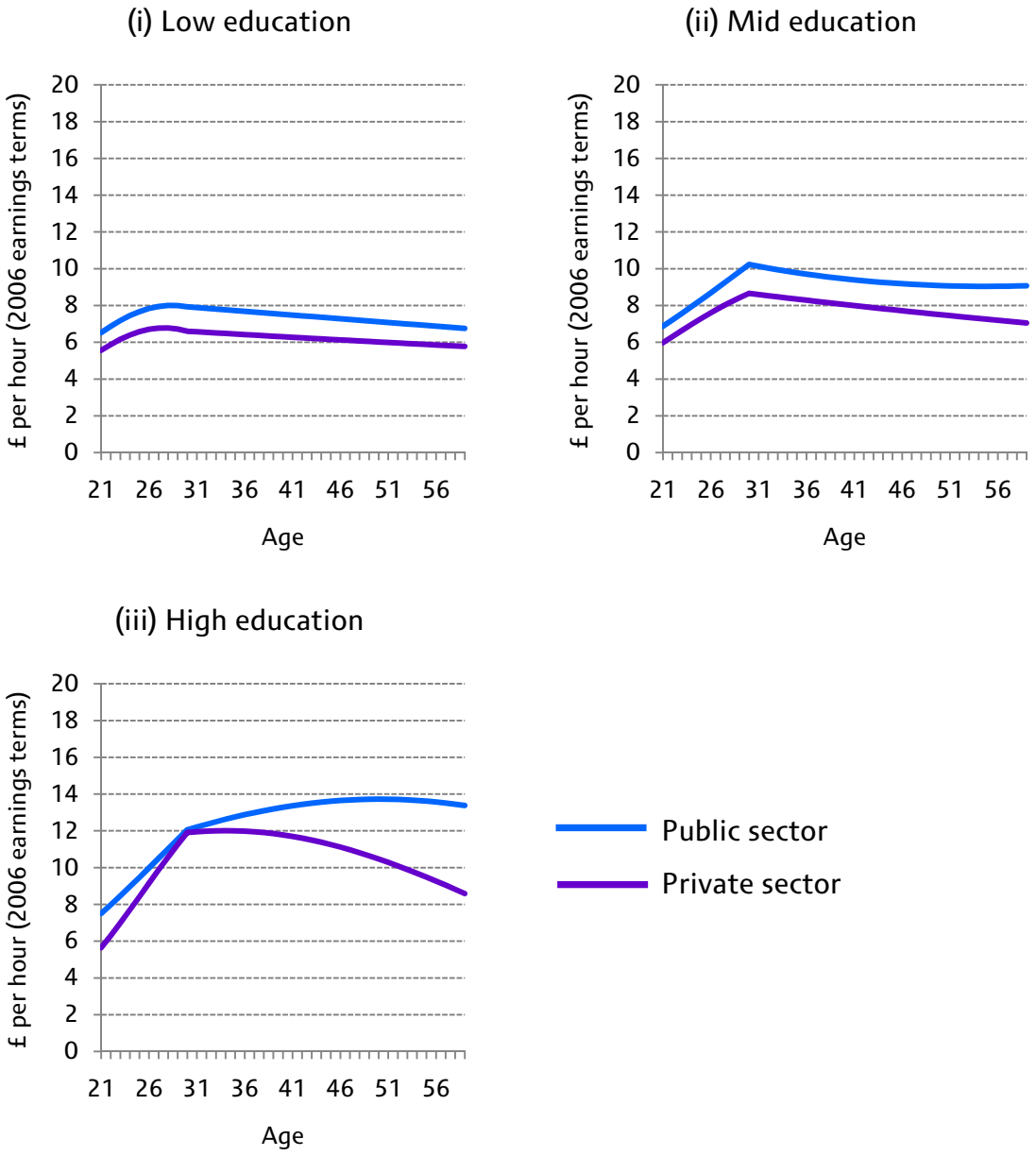
[8] The "high" educated group includes anyone who continued in education beyond the age of 18; this includes, but is not limited to those gaining degree-level qualifications.

Figure 2.1A Median age-earnings profiles, public and private sector men by educational group



Note: Profiles exclude sector specific earnings growth. Education is defined as low: leaving full-time education at or before the compulsory school leaving age; mid: remaining in education until age 18; and high: continuing in education beyond age 18.
Source: Authors' calculations using data from the LFS (1994 to 2006).

Figure 2.1B Median age-earnings profiles, public and private sector women by educational group



Note: Profiles exclude sector specific earnings growth. Education is defined as low: leaving full-time education at or before the compulsory school leaving age; mid: remaining in education until age 18; and high: continuing in education beyond age 18.
Source: Authors' calculations using data from the LFS (1994 to 2006).

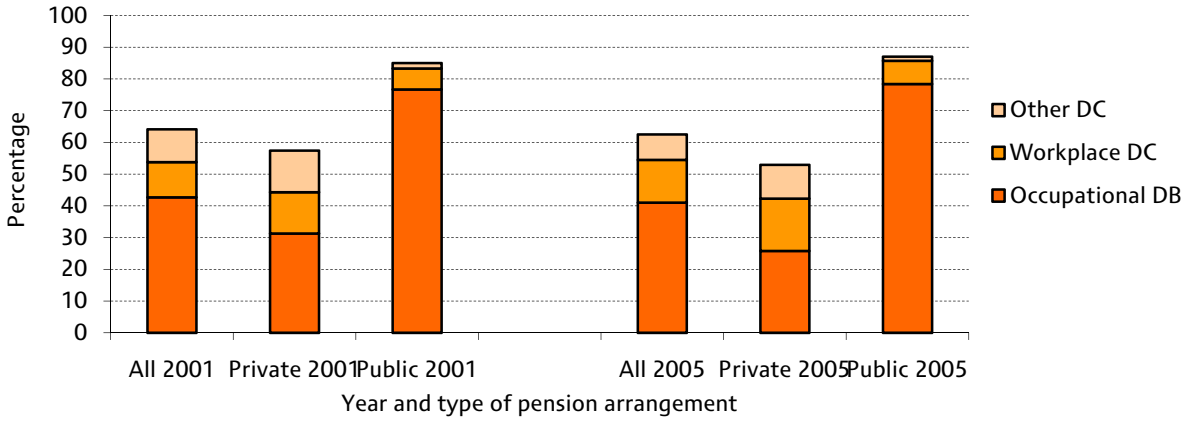
3. Pension participation and accrual: 2001 to 2005

This section presents figures for pension participation in the BHPS sample, and the value to individuals in the BHPS of an additional year's accrual in their pension schemes. Section 3.1 explores the participation in each type of pension scheme in 2005 and indicates how this has changed since 2001. Section 3.2 presents the value of annual pension accrual as a percentage of current earnings in 2001 and 2005 for each type of pension scheme, while Section 3.3 considers the value of annual total pension accrual. Section 3.4 provides a brief discussion of differences in the risks borne by members of each scheme.

3.1 Pension participation in 2001 and 2005

Figure 3.1 shows how pension participation changed between 2001 and 2005, both overall and for each sector. Total pension participation was largely unchanged between 2001 and 2005, though there was some shift to workplace DC schemes from other DC schemes. In the private sector total pension participation was lower in 2005 than it had been in 2001, caused by falls in occupational DB and other DC participation which in total were greater than the increase in workplace DC participation. If the average value of pension remuneration to those who belonged to a pension was the same in 2001 and 2005, then this decline in participation in the private sector would be expected to have led to a decline in the average value of pension accrual when we look across the whole private sector workforce. By contrast total participation has not changed significantly in the public sector.

Figure 3.1 Pension participation among employees, by sector and year



Source: Authors' calculations using data from the BHPS 2001 and 2005

Pension participation differs not just by sector, but also by other observed factors such as age, sex and education.[9] It is therefore important to ensure that the differences in participation identified between the sectors are due to an association between participation rates and sector, and not due to some association with another characteristic. To this end we use a linear probability model to estimate the probability of being covered by the various types of pension scheme, and control for a number of characteristics in addition to sector.[10] The results are presented in Table 3.1. After controlling for these characteristics, we find that individuals are significantly more likely to be a member of an occupational DB scheme and significantly less likely to be a member of a workplace or other DC scheme if they are in the public sector. Furthermore, individuals (particularly men) in the private sector are significantly less likely to be a member of an occupational DB pension in 2005 than 2001, while there is no significant difference for

[9] Results of participation by these subgroups are not reported here but are available on request

[10] We use a linear probability model in preference to models for binary choice such as probit and logit because of the difficulty of interpreting the marginal effects of interaction terms in these types of models.

public sector workers. Private sector workers are significantly more likely to be a member of a workplace DC scheme in 2005 than 2001, while again there is no significant difference for public sector workers. Both public and private sector workers are significantly less likely to be a member of an other DC scheme in 2005 than in 2001. These results show that the associations between participation and sector in Figure 3.1 are not simply explained by differences in the composition of the workforce in terms of age, sex or education.

Table 3.1 Probability of participating in each type of pension scheme

	Any pension	Occupational DB	Workplace DC	Other DC
Year 2005	−0.065***	−0.081***	0.038***	−0.052***
	(0.015)	*(0.012)*	*(0.011)*	*(0.010)*
Age 30-39	0.204***	0.113***	0.042***	0.074***
	(0.014)	*(0.013)*	*(0.010)*	*(0.010)*
Age 40-49	0.249***	0.149***	0.035***	0.106***
	(0.014)	*(0.014)*	*(0.010)*	*(0.011)*
Age 50-59	0.217***	0.115***	0.039***	0.117***
	(0.015)	*(0.016)*	*(0.011)*	*(0.013)*
Female	−0.135***	−0.076***	−0.026***	−0.060***
	(0.013)	*(0.013)*	*(0.009)*	*(0.011)*
Public sector	0.258***	0.441***	−0.066***	−0.105***
	(0.014)	*(0.015)*	*(0.010)*	*(0.011)*
Mid education	0.082***	0.076***	0.016	0.003
	(0.016)	*(0.017)*	*(0.012)*	*(0.013)*
High education	0.143***	0.102***	0.028***	0.047***
	(0.011)	*(0.012)*	*(0.009)*	*(0.010)*
Public sector * 2005	0.067***	0.066***	−0.024*	0.023*
	(0.019)	*(0.018)*	*(0.013)*	*(0.013)*
Female * 2005	0.014	0.036**	−0.012	0.005
	(0.020)	*(0.016)*	*(0.013)*	*(0.012)*
Sample size	8,541	8,541	8,541	8,541

Note: Baseline is probability of a low educated private sector male employee aged 20-29 in 2001 being covered. Education is defined as low: highest qualification is less than GCSE level; mid: highest qualification is GCSE or A-level or equivalent; high: highest qualification is above A-level. Statistical significance at the 1%, 5% and 10% levels denoted by ***, ** and * respectively.
Source: Authors' calculations using data from the BHPS (2001 and 2005).

The proportion of private sector workers who were members of a pension scheme declined significantly between 2001 and 2005. In the absence of any change in the value of pension accrual to scheme members over this period, we would expect the value of average remuneration in the form of pensions to have declined in the private sector relative to the public sector. The next sub-section considers whether, in addition to this phenomenon, the value of accrual to members of pension schemes in each sector has also changed.

3.2 Annual pension accrual in 2001 and 2005

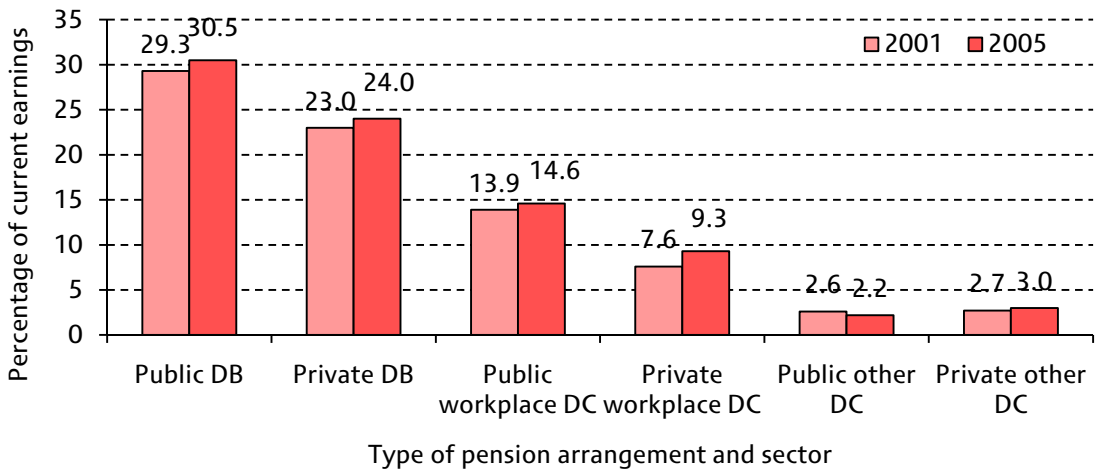
Figure 3.2 shows the mean value of annual pension accrual to members of each type of pension scheme, by sector and year.[11] The value of pension accrual is expressed as a percentage of current earnings – for example, the figure 29.3 above the left-hand bar in Figure 3.2 indicates that pension accrual was worth on average 29.3% of current salary to members of public sector DB schemes in 2001. It is clear that DB pensions are on average more valuable than DC pensions. Increasing the assumed rate of return on assets held in DC pensions does, of course, increase the value of these pensions in each year. We demonstrate the sensitivity of our estimates to an increase in the assumed rate of return from 2% (an assumed risk-free

[11] The full distributions of DB pension accrual and DC pension accrual to members of these schemes, split by sector and year, are provided in Figures A.1 and A.2, respectively, in appendix A.

rate) to 4% a year in Appendix B. However, even after doubling the assumed rate of return, DB pensions are still found to be more generous on average (see Appendix B).

The values also differ between the sectors, with the mean value of accrual in both DB and workplace DC schemes being slightly higher in the public sector than in the private sector. (Note, however, that – as shown in Figure 3.1 – DC schemes are relatively rare in the public sector). Between 2001 and 2005 the mean value of pension accrual to both DB and workplace DC members in each sector increased slightly, and by a similar amount. The mean value of accrual in other DC schemes was much lower than occupational DB schemes or workplace DC schemes, but did not differ much between the sectors or change much between 2001 and 2005.

Figure 3.2 Mean value of annual pension accrual to members



Source: Authors' calculations using data from the BHPS and LFS.

The value of annual pension accrual is affected not just by which sector an employee works in, but also by other observed characteristics such as age, sex and education. This means that apparent differences in pension accrual between the sectors may actually be caused by other characteristics if the composition of employees differs. Similarly, apparent changes in the value of pension accrual over time could be caused by a change in the composition of the workforce over time, rather than because the pensions provided by the public or private sectors have become inherently more valuable over time. In order to identify the marginal effects of individual characteristics on the value of pension accrual, and avoid the problems associated with changes in the composition of the sample over time, the 2001 and 2005 BHPS samples were pooled and multivariate analysis conducted on the pooled cross-section sample.

Table 3.2 indicates how the value of accrual to members of each type of pension scheme is associated with a number of characteristics. Once other characteristics have been controlled for, the value of DB accrual to scheme members is higher in the public sector by 5.9 percentage points. A key cause of this is the lower NPA in public sector schemes. More recently the Government has reduced the generosity of public-service pensions for new entrants through (in most cases) an increase in the NPA to 65. In Section 5 we show the estimated distribution of pension accrual under a reform where the NPA was 65 in both public and private sector DB arrangements for both new and existing members alike.[12] The value of annual accrual in DC pensions is also significantly higher in the public sector, caused by public sector employers typically making larger contributions than employers in the private sector. The association between sector and the

[12] As discussed in section 2, public sector DB pension schemes are also assumed to offer a lower accrual fraction but a larger lump sum payment than private sector DB schemes. These alternative sets rules are, however, broadly the same in terms of overall scheme value.

value of pension accrual to members changed only very slightly, and often not by a statistically significant amount, between 2001 and 2005 for each of the types of pension scheme.

The value of pension accrual is also significantly associated with characteristics other than sector. The value of DB pension accrual is positively associated with age, most likely due to older members having higher pension tenure. DB accrual was also positively associated with education and lower for women than men, as a result of the differences in earnings growth estimated for these individuals. The value of DB accrual was not significantly higher for men in 2005 than in 2001 but for women DB accrual was on average 0.9% (i.e. 0.342+0.593) of current earnings higher in 2005 than in 2001.

Table 3.2 Regressions of the value of annual pension accrual to members, by pension type

	Total	Occupational DB	Any DC
Year 2005	−0.814**	0.342	0.401*
	(0.351)	*(0.285)*	*(0.217)*
Age 30-39	3.189***	4.633***	0.646***
	(0.402)	*(0.290)*	*(0.200)*
Age 40-49	4.253***	5.453***	1.175***
	(0.423)	*(0.325)*	*(0.225)*
Age 50-59	2.333***	2.382***	1.821***
	(0.431)	*(0.376)*	*(0.281)*
Female	−1.112***	−2.096***	0.691***
	(0.352)	*(0.278)*	*(0.231)*
Public sector	12.188***	5.904***	2.828***
	(0.357)	*(0.292)*	*(0.345)*
Mid education	4.641***	5.699***	0.540*
	(0.515)	*(0.419)*	*(0.297)*
High education	5.599***	7.450***	0.772***
	(0.357)	*(0.319)*	*(0.221)*
Public sector * 2005	0.524	0.056	−0.646
	(0.435)	*(0.355)*	*(0.446)*
Female * 2005	1.502***	0.593*	0.921**
	(0.442)	*(0.347)*	*(0.374)*
Private and Workplace DC			1.935***
			(0.364)
Private DC and DB			−8.233***
			(0.344)
Private DC only			−5.888***
			0.201
Sample size	5,474	3,640	2,160

Notes: The sample included is individuals who were a member of (any pension/an occupational DB pension/any DC pension) for the ('Total'/'Occupational DB'/'Any DC') regressions respectively. The baseline is accrual in 2001 to a low educated private sector male employee aged 20-29. In the case of the 'Any DC' regression for DC pension accrual, the baseline is an individual with these characteristics who has only a workplace DC pension. Education is defined as low: highest qualification is less than GCSE level; mid: highest qualification is GCSE or A-level or equivalent; high: highest qualification is above A-level. Statistical significance at the 1%, 5% and 10% levels denoted by ***, ** and * respectively.
Source: Authors' calculations using data from the BHPS and LFS.

Being a member of both a workplace DC scheme and an other DC scheme is (unsurprisingly) associated with a higher value of DC accrual , while not having a workplace DC scheme is associated with lower accrual as these individuals will (by assumption) not enjoy any employer contributions to their DC pension. Older individuals, who on average make larger employee contributions, have higher accrual . Accrual is also positively associated with education, since higher educated individuals on average have higher employee contributions, and are also more likely to be in occupations where their employer makes

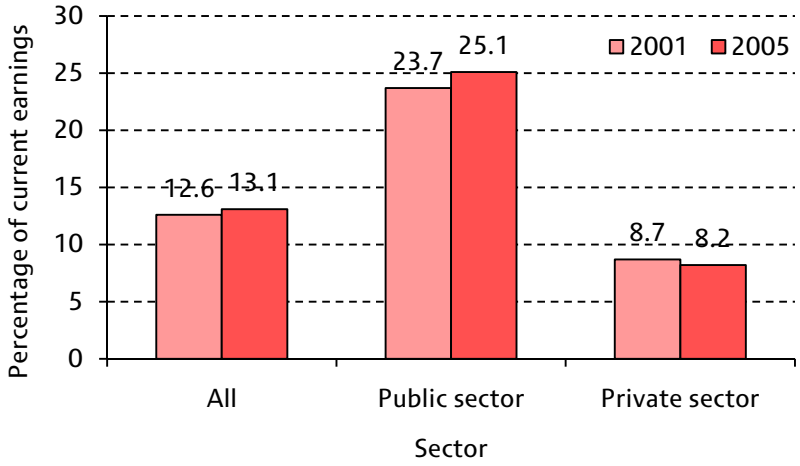
a larger contribution. The value of DC accrual to members was higher in 2005 than in 2001 – by an average 0.4% of current earnings for men, and 1.3% of current earnings for women.

3.3 Annual total pension accrual in 2001 and 2005

This subsection presents figures for total annual pension accrual among all employees. Those who are members of more than one pension scheme (either a member of both an occupational DB scheme and an other DC scheme, or a member of both a workplace DC scheme and an other DC scheme) have total pension accrual equal to the sum of their pension accrual under each scheme. Employees who are not members of any pension are counted as receiving an annual pension accrual of zero. This measure of total pension accrual aims to get a better overview of the differences between the sectors by considering the entire workforce, and incorporating both differences in participation and differences in the value of accrual for each type of pension scheme.

Figure 3.3 shows the mean value of total annual pension accrual across all employees in the sample, split by sector. In the sample as a whole the mean value of total pension accrual increased between 2001 and 2005, from 12.6% to 13.1% of current earnings. The level of mean pension accrual and the change between 2001 and 2005 is quite different between the sectors. The mean value of accrual in the public sector was around three times that in the private sector, and rose between 2001 and 2005 from 23.7% to 25.1% of current earnings. The private sector by contrast saw a fall in the mean value of pension accrual over this period of 0.5 percentage points. Even assuming a significantly higher rate of return on assets held in DC pensions has very little impact on the *change* in pension accrual between 2001 and 2005 for the public and private sectors. Appendix B demonstrates the impact on the estimated level of accrual (in each sector, in each year) of increasing the assumed rate of return on DC funds from 2% to 4% and shows that the impact on the *change* in the value of pension accrual over time is small.

Figure 3.3 Mean value of total pension accrual across all employees

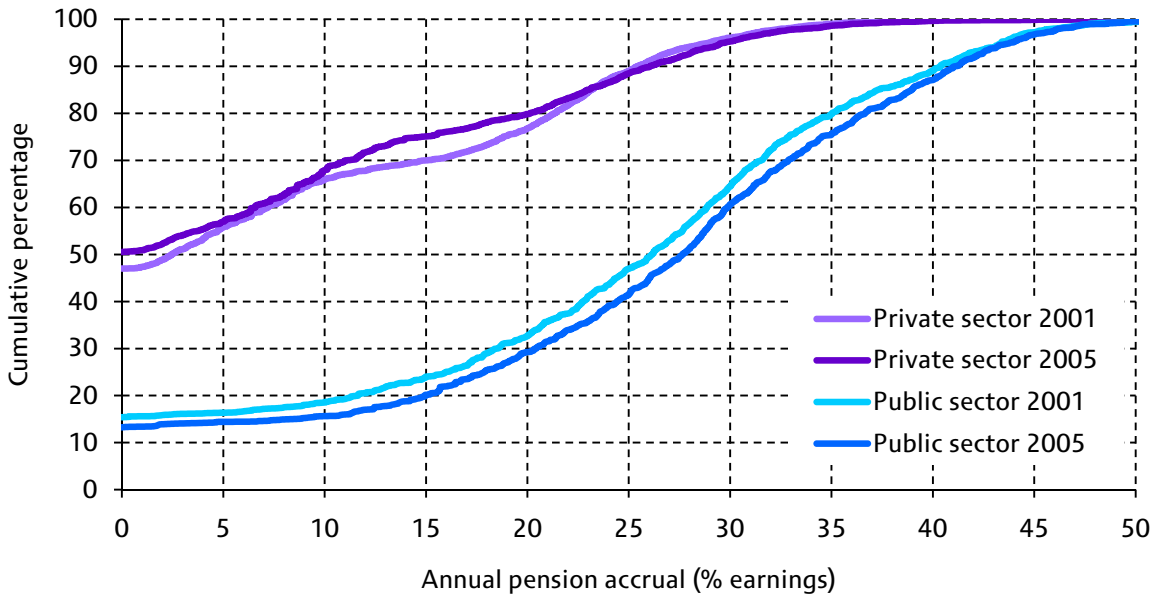


Source: Authors' calculations using data from the BHPS and LFS.

Since the value of accrual in occupational DB and DC schemes is so different, the differences in participation between the sectors that were identified in section 3.1 will be of considerable importance. This can be seen in the large difference in the mean value of total accrual between the two sectors (Figure 3.3), despite the differences in the value of accrual in each type of scheme not being that different (Figure 3.2). It must also be true that the decline in mean pension accrual in the private sector overall is caused by the decline in occupational DB scheme participation, since the mean value of accrual to members of both occupational DB schemes and DC schemes in the private sector increased between 2001 and 2005 (seen in Figure 3.2).

The full distribution of the value of total pension accrual is presented in Figure 3.4 subdivided by year and sector. The value of pension accrual was higher in the public sector than in the private sector across the whole distribution This difference is caused largely by the much higher pension participation in the public sector, which results in a much lower proportion of employees in the public sector having zero pension accrual than in the private sector: in 2001 just 15% compared with 47%. There are also fewer individuals with low values of pension accrual, caused by the greater prevalence of more valuable DB pensions in the public sector. Comparing 2001 and 2005, the value of pension accrual in the public sector increased across the distribution. This was caused primarily by a decline in the proportion of individuals with zero pension accrual, due to the increase in pension participation, and also by the increase in average DB accrual to female members and the increase in average DC accrual to members. By contrast, between 2001 and 2005 participation in the private sector fell, and so the proportion of individuals with zero pension accrual increased. The proportion of individuals with lower values of pension accrual also increased, caused by a shift in participation from DB pensions to DC pensions which typically have lower values of accrual. However the very top of the private sector distribution shifted very slightly to the right between 2001 and 2005, indicating that the value of accrual for the top 10% of the distribution in 2005 was slightly greater than the value of accrual for the top 10% in 2001.

Figure 3.4 Distribution of total pension accrual across all employees, by sector and year



Source: Authors' calculations using data from the BHPS and LFS.

Table 3.3 provides the results of multivariate analysis of the mean value of total pension accrual, which controls for differences in the composition of the workforce between the sectors, and changes in the composition of the workforces over time, in order to obtain a better idea of the difference in total pension accrual between the sectors.[13] Regressing the value of total accrual on an indicator of being observed in 2005 or not (model 1) indicates that the +0.5 percentage point increase in annual total pension accrual for the whole sample between 2001 and 2005 (seen in Figure 3.3) is statistically significant. However once other characteristics are controlled for (model 4), we find a statistically significant fall in the mean value of pension accrual over this period.

[13] Table A.1 in appendix A provides the mean value of annual pension accrual in 2001 and 2005 for the BHPS sample as a whole and for various subgroups, without controlling for other characteristics.

According to model 6, the value of total pension accrual was 1.5 percentage points lower in 2005 than in 2001 for men in the private sector, but did not change significantly for private sector women. The value of total accrual was 1.5 percentage points higher for women in the public sector in 2005 than in 2001, but did not change significantly for men.[14]

Once other characteristics are controlled for, being in the public sector is associated with having a much larger annual pension accrual in 2001 than being in the private sector – 14.1 percentage points according to model 6. Model 6 also indicates that this difference is greater in 2005, when being in the public sector is associated with having mean annual total pension accrual that is 16.1 percentage points higher than for private sector employees.

Table 3.3 Regressions of annual total pension accrual

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Year 2005	0.536**	0.419**	−0.002	−0.437**	−1.050***	−1.524***	−1.495***
	(0.216)	*(0.213)*	*(0.194)*	*(0.192)*	*(0.219)*	*(0.285)*	*(0.285)*
Age 30-39		5.919***	4.892***	4.871***	4.888***	4.905***	3.987***
		(0.389)	*(0.342)*	*(0.334)*	*(0.334)*	*(0.334)*	*(0.368)*
Age 40-49		8.102***	6.072***	6.374***	6.386***	6.390***	5.350***
		(0.436)	*(0.369)*	*(0.364)*	*(0.364)*	*(0.364)*	*(0.409)*
Age 50-59		5.884***	3.630***	4.353***	4.364***	4.381***	3.859***
		(0.450)	*(0.382)*	*(0.376)*	*(0.376)*	*(0.376)*	*(0.413)*
Female		0.215	−2.848***	−2.445***	−2.443***	−2.912***	−2.911***
		(0.348)	*(0.283)*	*(0.278)*	*(0.278)*	*(0.317)*	*(0.316)*
Public sector			16.066***	15.012***	14.016***	14.130***	10.848***
			(0.345)	*(0.333)*	*(0.389)*	*(0.390)*	*(0.642)*
Mid education				4.060***	4.065***	4.059***	4.022***
				(0.430)	*(0.431)*	*(0.431)*	*(0.430)*
High education				5.869***	5.874***	5.860***	5.871***
				(0.300)	*(0.300)*	*(0.300)*	*(0.301)*
Public sector * 2005					2.147***	1.898***	1.949***
					(0.453)	*(0.458)*	*(0.458)*
Female * 2005						1.056***	1.011***
						(0.382)	*(0.382)*
Age 30-39 * 2005							4.333***
							(0.838)
Age 40-49 * 2005							4.484***
							(0.866)
Age 50-59 * 2005							2.937***
							(0.895)
Sample size	8,678	8,678	8,541	8,541	8,541	8,541	8,541

Note: Baseline is accrual to a low education private sector male employee aged 20-29 in 2001. Education is defined as low: highest qualification is less than GCSE level; mid: highest qualification is GCSE or A-level or equivalent; high: highest qualification is above A-level. Statistical significance at the 1%, 5% and 10% levels denoted by ***, ** and * respectively.
Source: Authors' calculations using data from the BHPS and LFS.

3.4 Value of protection against risk

An important issue to take into account, when comparing the value of different types of pension schemes, is that the risk inherent in each type of scheme is different. This will affect the expected value of any pension.

[14] The combined coefficients for private sector men in 2005 and public sector women in 2005 produced by model 6 are both statistically significant at the 1% level.

Individuals with DC pensions face two main types of risk. The first is rate of return risk, which refers to the fact that the rate of return individuals can expect on their invested pension fund is very uncertain. Whilst an individual may contribute a certain amount to their pension fund, how much this fund is worth by the time they come to annuitise it will depend on the rate of return received. Clearly, if the value of the pension fund is uncertain, then the pension income that can be purchased with that fund is also uncertain. For this reason we assume a real fund return of 2% a year, which is assumed to be in line with a risk-free rate of return. The second type of risk faced by DC pension holders is annuity risk. DC pension funds are converted into an income stream in retirement by purchasing an annuity from an insurance company. The rate at which a pension fund can be converted into a stream of retirement income is the annuity rate, and there is uncertainty over what future annuity rates will be at the time an individual is planning to annuitise. This means that even if an individual knew with certainty what their pension fund would be (in other words if there was no rate of return uncertainty), they would still not know for certain what stream of retirement income it would be able to buy. An alternative way of decomposing these two risks is rate of return risk and longevity risk – while a DC pension is being accrued it will be exposed to rate of return risk, while annuity rates will depend on both expected longevity and expected rates of return. Sensitivity analysis to both our assumed rate of return and the assumed annuity rate are provided in Appendix B.

Individuals with DB pensions do not face the rate of return or annuity risk that individuals with DC pensions face because the pension benefits from DB schemes are defined based on years of scheme tenure and some measure of final salary. However, this is not to say that DB pensions are riskless, they just face different types of risk. Individuals with a final salary pension will face the risk that their final salary could differ from what they expect, or that they leave their employer sooner than planned and therefore their final pension tenure is lower than expected. They also face the risk that their employer becomes insolvent, leaving a pension scheme deficit and unable to pay the pension to which the individual is entitled. While some protection may be afforded by the Pensions Protection Fund (PPF) the value of protection afforded is limited. Of course, members of DB pension schemes may bear some investment and longevity risk insofar as shocks to these lead to lower pay increases, greater redundancies or greater employer insolvency with pension scheme deficits.

Not only is the risk different between different types of pension scheme, the risk may also differ between sectors for a given type of pension scheme. Public sector DB schemes are financed by the government, which is far less likely to become insolvent than any private sector employer. This could imply that public sector DB pensions carry less risk than private sector DB pensions. In addition, public sector schemes (currently) offer complete insurance against inflation as measured by the RPI while most private sector schemes offer only the legally-required minimum of limited price indexation (LPI). This was set as the lesser of the RPI and 5%, but was changed in 2005 to the lesser of RPI and 2½% in order to help private sector DB schemes with the burden of having to contribute to the new PPF. This will affect, potentially, both the period from when pension rights stop being accrued and the period from which pension rights are drawn (which won't be the same if individuals leave their employer before drawing their pension). So private sector scheme members are exposed to the risk that inflation exceeds 2½% a year. Both public and private sector scheme members are exposed to some political risk in this dimension. To the extent that private sector DB schemes offer only the minimum inflation insurance legally required of them, private DB scheme members are exposed to the risk that future policymakers reduce the level of LPI to be applied to any future accrual as was done in 2005. Meanwhile public sector DB scheme members are exposed to the risk that a future government may decide to apply only limited, rather than complete, price indexation to future accrual.

While we recognise that the risk to pensions has an important effect on the expected value of any pension, and that this risk differs between different types of pension schemes and between sectors, we do not attempt to quantify the impact here or adjust out estimated values of pension accrual. To the extent that DB pensions are less risky than DC pensions, and public sector DB pensions are less risky than private

sector DB pensions, we probably underestimate the difference in the average value of pension accrual between the two sectors. To the extent that the riskiness has changed over time then this could also change our results. The PPF is likely to have reduced the risk faced by members of private sector DB schemes; since this was introduced in 2005, we probably overestimate the average value of private sector DB accrual by more in 2001 than in 2005.

4. Growth in total remuneration: 2001 to 2005

The divergence between the value of pension accrual in the public and private sectors will have affected how total remuneration has evolved in the two sectors. The decline in average pension accrual in the private sector may have offset higher growth in current pay in the private sector, or accentuated slower growth. This section examines how growth in the value of pension accrual has combined with growth in current earnings in each sector to get a picture of how total remuneration grew in each sector over the four-year period from 2001 to 2005.

We construct a measure of total remuneration by adding our estimates of occupational DB and workplace DC pension accrual to reported current earnings. In order to be able to do this our estimates of the value of pension accrual need to be net of employee contributions – otherwise the earnings contributed to pensions will be double counted in our measure of total remuneration (i.e. included in both pension accrual and in earnings). Our value of net pension accrual is calculated as the gross value of pension accrual (described in sections 3.1 and 3.2) less the actual contribution that the employee made (taken directly from the BHPS data). Calculating net pension accrual in this way means that the value of DC pension accrual is not exactly equal to the employer contribution rate. This is because the annuity rate at which an individual must convert his pension fund into a stream of retirement income is priced to include some insurance against the risk that the individual lives longer than expected (and so requires a stream of income for longer in retirement).

The measure of current earnings used also differs slightly from previously. When calculating pension accrual, an individual's usual current earnings (as reported in the BHPS) were used when a measure of earnings was required. However, when looking at total remuneration, earnings are taken to be the sum of usual current earnings and any financial bonuses received over the last year (again, as reported in the BHPS). This is to account for the fact that bonus income can also be an important part of the remuneration package. Of course there are likely to be other financial and non-financial benefits – such as holiday leave, provision of company cars, life insurance, private healthcare and maternity and paternity arrangements – that differ between the two sectors (and indeed different costs of working in each sector). But the advance here is to examine a broader measure of remuneration growth than earnings growth which is usually examined.

Table 4.1 shows the real growth (that is, after price inflation) in public and private sector remuneration between 2001 and 2005. These figures are estimated using data from the BHPS. Table C.3 in Appendix C compares the earnings growth estimated from BHPS data with another estimate available from the Office for National Statistics (2005). The BHPS numbers for growth seem to be slightly higher than ONS estimates of earnings growth over this period, though the difference between the two sectors is similar.

Mean real earnings grew faster in the public sector than the private sector, by an average 0.8 percentage points each year between 2001 and 2005.[15] When pension accrual is included in the measure of total remuneration, this difference in growth rates between the sectors is increased. Mean remuneration grew faster in the public sector than in the private sector by 1.1 percentage points. This indicates that the divergence in pension accrual between the sectors has not acted to compensate for lower wage growth in the public sector over this period; it has in fact been combined with faster earnings growth to lead to an even greater increase in public sector remuneration relative to private sector remuneration than simply looking at current earnings would suggest.

[15] The mean of the middle 98% of employees in each sector (by earnings) is taken to avoid outlying individuals in either year with very high or very low earnings having an undue influence on the results.

Table 4.1 Average growth in earnings and total remuneration

	Average annual % real growth 2001 - 2005			% real growth 2001 - 2005		
Mean:	*Public*	*Private*	*ppt difference*	*Public*	*Private*	*ppt difference*
Earnings	2.3	1.5	*0.8*	9.5	6.0	3.5
Pension	3.0	–0.8	*3.8*	12.7	–3.2	15.9
Remuneration	2.4	1.3	*1.1*	10.0	5.3	4.7

Note: Earnings include bonuses. Sample is restricted to the middle 98% of employees (by earnings) in each sector.
Source: Authors' calculations using BHPS and LFS.

Considering total remuneration rather than just current earnings is therefore clearly important when comparing the compensation of employees between the sectors. The divergence between the sectors found when looking at mean remuneration is over a third greater than just looking at the divergence in mean current earnings. Of course this faster growth in total remuneration in the public sector could reflect the level catching up with, rather than necessarily pulling further ahead of, the appropriate level (for example, public sector pay grew less quickly, on average, than private sector pay over the period from May 1997 to September 2001).[16] A lower remuneration package for public sector workers would, in addition to reducing the taxpayer cost, have made the Government's ambitions for "world-class public services" (Labour Party, 2001) harder to achieve.

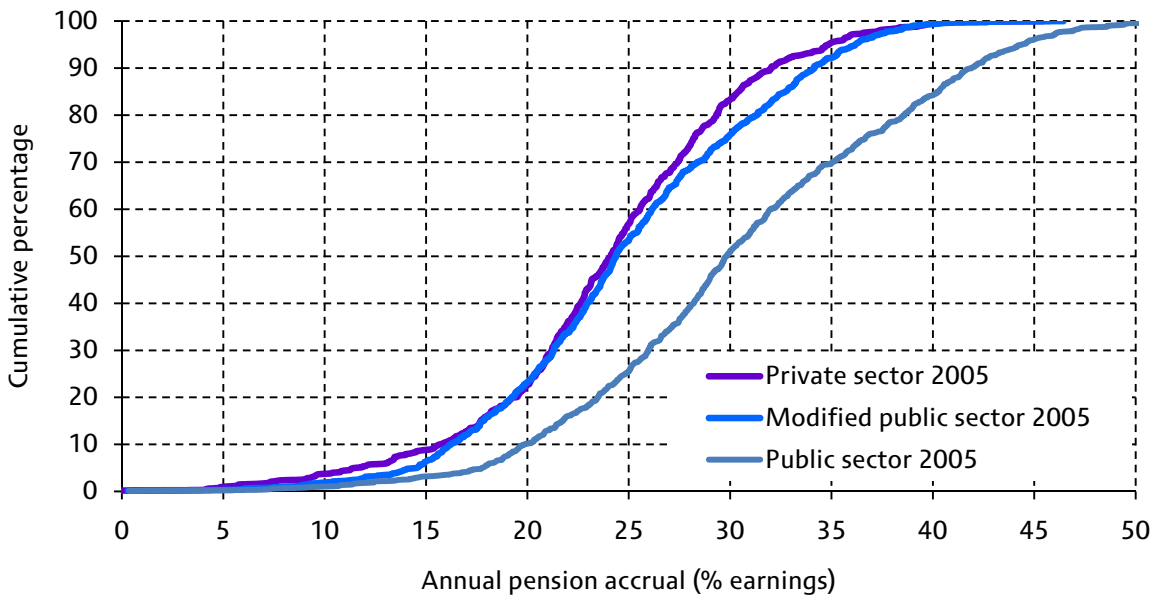
[16] See Bozio and Johnson (2010) for a discussion of recent trends in public and private sector pay.

5. Simulated public sector reform

This section considers how our findings would have differed had the public sector reformed the occupational pensions system available to its workers between 2001 and 2005. We suppose that after 2001 but prior to 2005 the NPA for all future accrual in occupational DB pensions in the public sector was increased to 65 (from 60). In 2002 the Government proposed carrying out this reform "initially for new members" (Department for Work and Pensions, 2002). To date this reform has been implemented for most new entrants but has not been extended to existing scheme members.[17]

Figure 5.1 shows the distribution of DB pension accrual to individuals in the public and private sectors who were members of such schemes in 2005 using the assumptions described in section 2.2; they are, therefore, the same as the results from which the mean DB pension accrual was reported in section 3.2. Accrual in the public sector is higher across the whole distribution than accrual in the private sector, with 49% of DB members in the public sector having pension accrual worth more than 30% of their current earnings, compared to just 16% of private sector DB members. Figure 5.1 also shows what the distribution of DB accrual in the public sector would have looked like in 2005 had an NPA of 65 applied to all future accrual. The entire distribution is shifted to the left, and is much more similar to that of the private sector. Under the simulated reform only 24% of public sector DB members would have had a pension accrual worth more than 30% of their current earnings.

Figure 5.1 Distribution of DB pension accrual in 2005



Source: Authors' calculations using the BHPS and LFS.

The mean value of pension accrual among DB members in the reformed public sector is 24.9% of current earnings, compared to 30.5% in the public sector without the simulated reform and 24.0% in the private sector. Once other factors are controlled for using regression analysis[18], the value of DB accrual in 2005 is

[17] For example new entrants from 1st April 2008 in the NHS pension plan, from 1st January 2007 in the Teachers' Pension Scheme and from 30th July 2007 in the Principal Civil Service Pension Scheme. See, for example, Pensions Policy Institute (2008), for an overall assessment of the impact of these reforms. For a detailed study of the reforms to the Teachers' Pension Scheme in England and Wales see Disney, Emmerson and Tetlow (2010). In 2004, the government did propose extending the provision to all existing members of the Civil Service pension scheme from 1 April 2013 (Cabinet Office, 2004). However, this proposal was abandoned, at least for the time being, in the face of strike action.

[18] Equivalent regressions to those reported in Table 3.4 in section 3.2 (which control for year, age, sex, sector and education and allow interactions between year and sector and year and sex). Results are available on request.

not significantly different at the mean in the private sector and the reformed public sector. This indicates just how important the different NPA between the sectors is for the difference in the value of DB accrual to members in each sector. However, since DB participation is considerably higher in the public than the private sector, even if this reform had taken place the value of total pension accrual across the whole sample would still be higher in the public sector than the private sector in 2005.

The simulated reform clearly lowers the value of DB pension accrual in the public sector, and the new mean value in 2005 of 24.9% of current earnings would be significantly lower than the 2001 public sector mean of 29.3%. It terms of overall pension accrual – i.e. taking account those accruing rights in DC pensions and those not accruing any additional rights – under the simulated reform this would have averaged 20.7% of current earnings in 2005 among public sector workers. In other words instead of mean total pension accrual among public sector workers rising from 23.7% in 2001 to 25.1% of current earnings in 2005 (as shown in Figure 3.3) had this reform been implemented between 2001 and 2005 it would have fallen from 23.7% to 20.7%. This compares to a fall in mean pension accrual among private sector workers from 8.7% to 8.2% of current earnings (again as was shown in Figure 3.3). Table 5.1 shows how the simulated reform would have affected the growth in mean total remuneration over the period 2001 to 2005. We estimated that mean pension accrual in the public sector actually grew at an average annual real rate of 3.0% between 2001 and 2005, but under the simulated reform our estimate of the average annual real growth is –3.2%. Combining this with growth in current earnings suggests that mean remuneration would have grown at 1.4% a year instead of growing at 2.4%, as we estimated in Section 4. Thus the difference in the growth of mean remuneration between the sectors would have been just 0.1ppt.

Table 5.1 Effect of simulated pension reform on remuneration growth

	Average annual % real growth 2001 - 2005					
Mean:	*Public*	*Private*	*ppt diff*	*Reformed public*	*Private*	*ppt diff*
Earnings	2.3	1.5	*0.8*	2.3	1.5	*0.8*
Pension	3.0	–0.8	*3.8*	–3.2	–0.8	*–2.4*
Remuneration	2.4	1.3	*1.1*	1.4	1.3	*0.1*

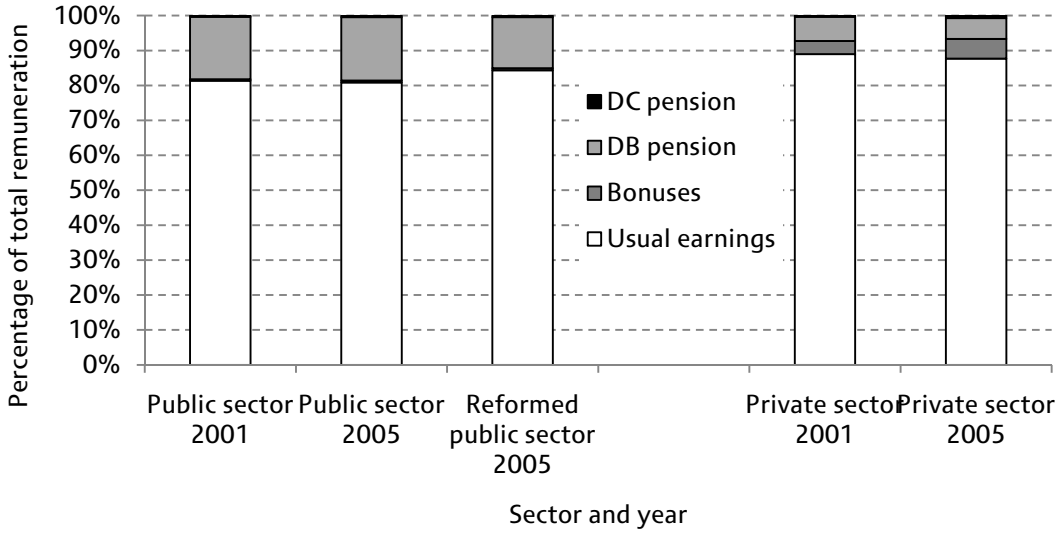
Note: Earnings include bonuses. Sample is restricted to the middle 98% of employees in each sector (by earnings).
Source: Authors' calculations using BHPS and LFS.

Therefore, in terms of mean remuneration, the gap between the public and private sectors would have remained largely unchanged between 2001 and 2005 had this reform to public sector pensions been introduced between these two years. The decline in the value of public sector DB pension accrual would represent a shift in emphasis in the composition of the public sector remuneration package, with current earnings becoming more important and pension remuneration less important. Of course, reducing the value of the remuneration package paid to public sector workers would have reduced the taxpayer cost but might also have made improvements to public services harder to achieve.

The composition of the total remuneration bill for each sector in 2001 and 2005 is shown in Figure 5.2. Figure 5.2 also shows what the composition of the total remuneration bill in the public sector in 2005 would have looked like had the NPA for public sector DB schemes been increased from 60 to 65 for all members. In 2005, 81% of the total remuneration earned in the public sector was in the form of current earnings, with 18% coming from DB pension accrual. Bonuses and DC pension accrual together accounted for less than 1% of total remuneration. If the public sector DB pension schemes had been reformed for existing members in the way outlined above, the proportion of total remuneration coming from current earnings in the public sector in 2005 would have increased to 84%, and the share from DB pension accrual reduced to 15%. This would have made the composition of remuneration in the public sector more similar to that in the private sector, where in 2005 88% of remuneration was in the form of current earnings and

6% is in the form of DB pension accrual. Bonuses are a much more important aspect of remuneration in the private sector than in the public sector – the share of private sector remuneration attributable to bonuses increased between 2001 and 2005, reaching 6% of total remuneration in 2005. The extent to which the public sector is better able to attract and retain a high quality workforce (and therefore provide better value for money to the taxpayer) by offering a remuneration package that on average is relatively skewed towards pensions rather than pay or bonuses is a very interesting but still open question that we leave for further research.

Figure 5.2 Composition of remuneration, by sector and year



Source: Authors' calculations using BHPS and LFS.

6. Conclusions

Recent years have seen the long running trend away from DB pensions in the private sector continue. As a result, there has been an increasing debate of the continuing existence of DB pensions in the public sector and the benefits that they provide to their members. To the extent that the new DC pension arrangements in the private sector are less generous than the schemes they have replaced, these trends will have resulted in an increase in relative remuneration in the public sector that is not captured by headline figures for sector-specific current pay growth. Indeed it has been suggested by some public sector employers that current pay should be restrained to offset the growing relative generosity of remuneration in the form of pensions (see, for example, para 7.17 of NOHPRB, 2007).

Simply because the prevalence of DB schemes has been declining does not mean that total remuneration (or even simply pension remuneration) has also been declining in the private sector relative to the public sector. This is not least because equally generous DC pensions may have replaced the former DB schemes. To date there has been no systematic assessment of how average remuneration in the form of pensions has actually changed in the public and private sectors over time in the UK. This paper has sought to go some way towards filling this void.

Using data from the 2001 and 2005 waves of the BHPS, we have examined the average value of annual pension accrual amongst employees in the public and private sectors in each of these two years. These figures take into account not only the fact that scheme rules and employer contributions to pension schemes differ between the two sectors, but also the fact that the proportion of employees who are members of such schemes also differs.

The results show that average pension accrual in the private sector was worth 0.5% of current salary less in 2005 than it was in 2001, compared to a 1.4% of current salary increase for public sector workers. The overall decline in average accrual value in the private sector reflects, after accounting for other changes in the composition of the private sector workforce, a combination of a 1.5 percentage point decline amongst men and no significant change amongst women. The overall increase in average accrual for public sector workers reflected a significant increase in the average value of accrual for female employees and no significant change for male employees.

These overall results reflect a number of different factors. First, the average value of occupational DB schemes to men who were members of such schemes did not change significantly between 2001 and 2005, whilst the value to female members increased (by 0.9% of current salary). Second, the average value of DC schemes to their members in the private sector also increased significantly between 2001 and 2005 – by 0.4% of current salary for men and 1.3% of current salary for women. However, over the same period, the proportion of private sector workers who were members of a DB pension declined significantly, while the proportion covered by a workplace DC scheme increased by a smaller amount. Therefore, overall the proportion of private sector workers covered by any pension scheme has decreased (by 6.5 percentage points for men and 7.9 percentage points for women). This decline in participation has driven the fall in the average value of remuneration received by private sector workers in the form of pensions.

Over the same period, there has been no significant decline in participation in the public sector. The average value of annual pension accrual was higher in the public sector than in the private sector in 2001 and over the following four years diverged further. This could have either offset faster growth in other forms of remuneration in the private sector relative to the public sector, or accentuated slower growth. To assess this question we looked at how growth in pension accrual has combined with growth in current earnings (including bonuses) in each sector to get a picture of how total remuneration grew in each sector over this four-year period. The results suggested that not only did the value of pension accrual grow on

average more quickly in the public sector than in the private sector between 2001 and 2005 but so too did current earnings. Consequently total remuneration in the public sector grew on average by 2.4% a year in real terms between 2001 and 2005, while that in the private sector grew by 1.3% a year on average. The gap of 1.1 percentage points faster growth in remuneration a year in the public sector compared to the private sector is one-third larger than the 0.8 percentage points a year difference observed when focusing solely on earnings. Of course this faster growth in total remuneration in the public sector could reflect the level catching up with, rather than necessarily pulling further ahead of, the appropriate level. Reducing the value of the remuneration package paid to public sector workers would, in addition to reducing the taxpayer cost, also have made improvements to public services harder to achieve.

The decline in participation in employer-sponsored pension schemes in the private sector – with no accompanying decline having taken place in the public sector – contributed to faster growth in average remuneration for public sector workers than private sector workers between 2001 and 2005. However, looking forwards, these trends may not continue in quite the same way beyond 2005. Most obviously most public-service pension schemes have been reformed in a way which, on average, reduces their generosity. A major part of these reforms is typically an increase in the NPA for new members from 60 to 65. Our analysis shows that had this increase been implemented between 2001 and 2005 for both new members and for future accrual of pension rights for existing members then this would have significantly reduced the generosity of these schemes and almost entirely offset the faster growth in public sector earnings relative to private sector earnings seen over this period. As the reforms have in fact only been implemented in full for new members the impact of this change will, in practice, take some time to come in. Further reforms are also possible. Were private sector pensions to continue to become less generous over time relative to public sector pensions then this might lead to further reductions in the generosity of public sector schemes or, alternatively, to less generous public sector pay awards. Which of these options would deliver relatively better value to the taxpayer in terms of their impact on recruitment and retention of public sector workers of suitable quality is left for further research.

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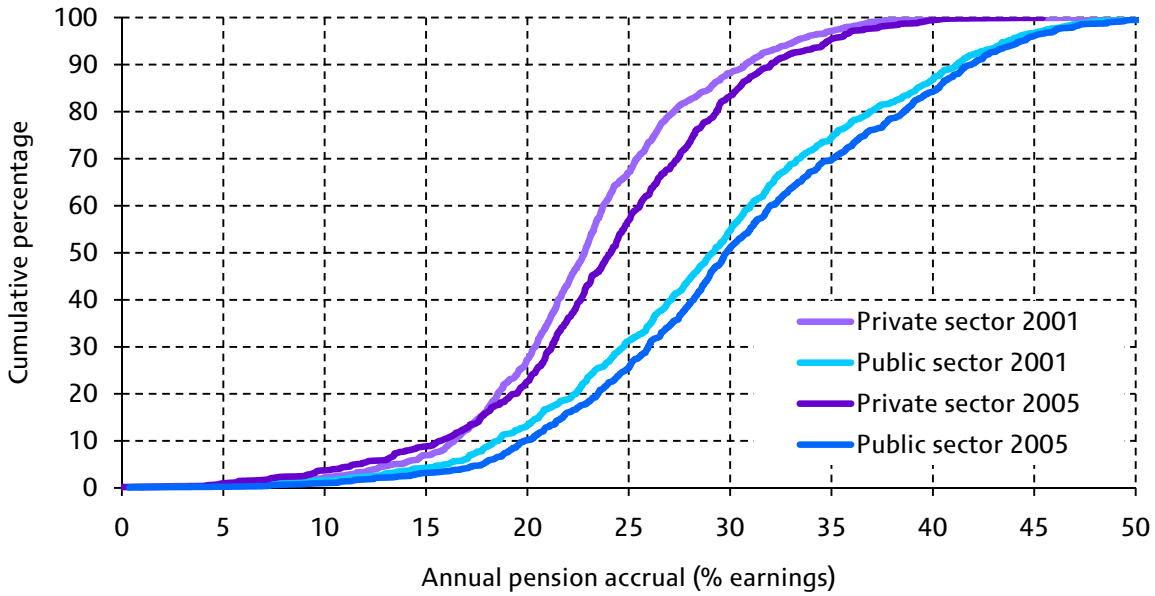
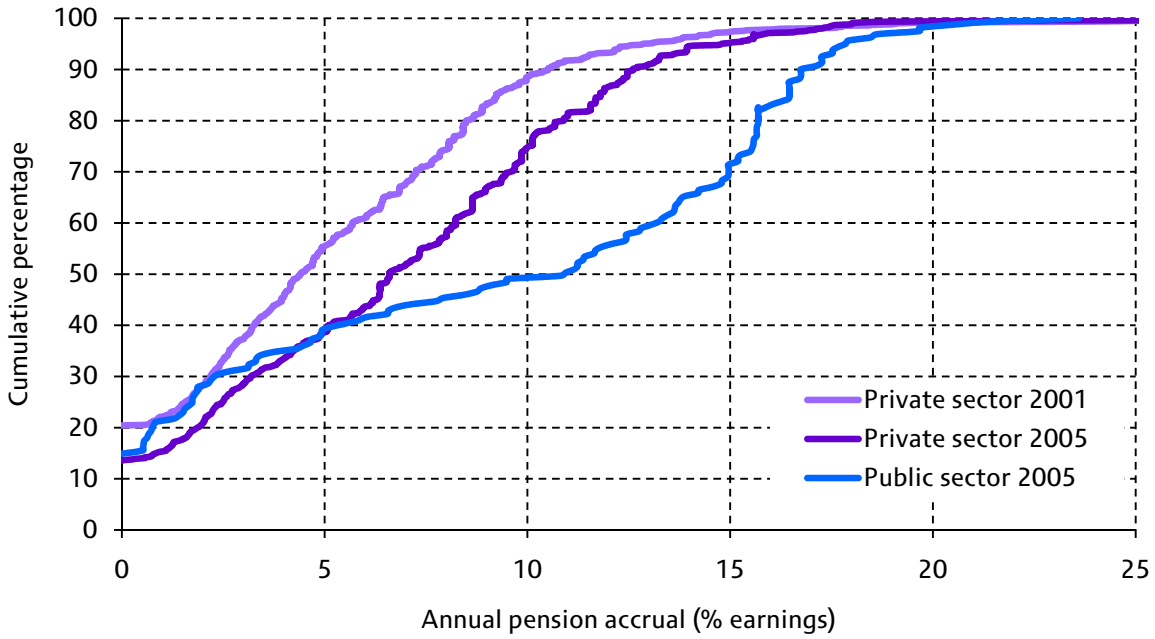
Appendix A: Pension accrual

Figure A.1 Distribution of DB pension accrual to DB pension scheme members



Source: Authors' calculations using the BHPS and LFS.

Figure A.2 Distribution of DC pension accrual to DC pension members



Notes: Employees with a DC pension but annual pension accrual of 0% are those with an 'other DC' pension who did not make any employee contributions in the past year.
Source: Authors' calculations using the BHPS and LFS.

Table A.1 Mean value of annual total pension accrual

	Mean annual accrual as % of earnings 2001	2005	*ppt difference*
All	12.6	13.1	+0.5
Public sector	23.7	25.1	+1.5
Private sector	8.7	8.2	-0.5
High education	16.1	16.1	+0.0
Mid education	11.9	11.0	–0.9
Low education	7.9	8.0	+0.1
Men	12.8	12.5	–0.4
Women	12.3	13.7	+1.4
Age 20-39	10.9	11.0	+0.0
Age 40-59	14.5	15.6	+0.8
Earning <£15k	8.1	8.2	–0.1
Earning £15k to <£30k	15.5	14.4	–1.1
Earning >£30k	20.2	20.3	–0.2
Public Sector			
Men	26.2	26.6	+0.4
Women	22.5	24.4	+2.0
Age 20-39	22.3	23.1	+0.7
Age 40-59	24.8	26.6	+1.9
Earning <£15k	17.1	17.8	+0.7
Earning £15k to <£30k	27.2	26.9	–0.3
Earning >£30k	35.4	33.5	–1.8
Private Sector			
Men	10.2	9.2	–1.0
Women	6.8	6.9	+0.1
Age 20-39	7.9	7.0	–0.9
Age 40-59	9.8	9.5	–0.3
Earning <£15k	5.2	4.4	–0.7
Earning £15k to <£30k	10.8	8.8	–2.0
Earning >£30k	15.6	14.2	–1.4

Notes: Education is defined as low: highest qualification is less than GCSE level; mid: highest qualification is GCSE or A-level or equivalent; high: highest qualification is above A-level.
Source: Authors' calculations using data from the BHPS and LFS.

Appendix B: Sensitivity of Results

The sensitivity of the main results to some of the assumptions made is tested in this section. Section B.1 considers sensitivity to the choice of investment return, while section B.2 considers sensitivity to annuity rates. Section B.3 tests how sensitive the results are to the assumption that individuals, specifically those in the public sector, correctly report their pension scheme membership.

B.1 Sensitivity to choice of investment return

The choice of a real annual rate of return on investment is an important assumption in the calculation of DC pension value. As described in section 2.1.2, contributions to a DC pension accrue an investment return (x) from the point they are made up until the point the individual retires and annuitises his pension fund. Since the return on the contributions may be compounded over many years if the individual is a long way from retirement, a small change in the assumed real rate of return has the potential to result in a significant difference in the estimated value of the DC pension. So far we have assumed a real rate of return on investment of 2% a year. In this section we test the sensitivity of our results to this assumption by repeating all the analysis but with an assumed real annual rate of return on investment of 4%.

Table B.1 reproduces the results for the mean value of pension accrual presented in Figure 3.2 and Figure 3.3 using the alternative real annual rate of return on investment of 4%. As would be expected the higher rate of return results in a higher mean value of DC pension accrual, and a greater increase between 2001 and 2005. The mean value across all pensions is increased, and by more so for the private sector since DC participation is greater. However the overall effect of changing the assumed real rate of return on the change in total pension value between 2001 and 2005 is small. The mean value in the public sector changes by the same percentage points under either assumption, and under the higher rate of return assumption the fall in mean private sector pension value is only reduced by two-tenths of a percentage point.

Table B.1 Sensitivity of mean pension value to rate of return

	x = 2%			x = 4%		
	2001	2005	*diff*	2001	2005	*diff*
All	12.6	13.1	+0.5	13.6	14.4	+0.7
Public	23.7	25.1	+1.5	24.3	25.8	+1.5
Private	8.7	8.2	–0.5	9.7	9.4	–0.3
DC						
Public	7.4	8.8	+1.4	11.6	13.7	+2.1
Private	5.2	6.9	+1.7	8.6	11.1	+2.5
DB						
Public	29.3	30.5	+1.2	29.3	30.5	+1.2
Private	23.0	24.0	+1.0	23.0	24.0	+1.0

Source: Authors' calculations using data from the BHPS and LFS.

The average annual growth in total remuneration reported in Table 4.1 is also tested for sensitivity to our assumed real rate of return on investments (x), and the results assuming a 4% real rate of return are presented in Table B.2. The higher rate of return increases the growth in mean pension value, and by more so for the private sector where DC pension participation is greater. However the effect is not large enough to have a significant effect on the estimates of remuneration growth, which are unchanged for the public sector and only one percentage point higher for the private sector. Mean remuneration is still estimated to grow 1.1 percentage points faster in the public sector than the private sector

The main results of section 3 and section 4 are therefore robust to moderate changes in the choice of the real rate of return of investments.

Table B.2 Sensitivity of remuneration growth to rate of return

	Average annual % real growth 2001 - 2005					
	x = 2%			x = 4%		
Mean:	*Public*	*Private*	*ppt diff*	*Public*	*Private*	*ppt diff*
Earnings	2.3	1.5	*0.8*	2.3	1.5	*0.8*
Pension	3.0	–0.8	*3.8*	3.2	0.4	*2.8*
Remuneration	2.4	1.3	*1.1*	2.4	1.4	*1.1*

Note: Earnings include bonuses. Sample is restricted to the middle 98% of employees in each sector (by earnings).
Source: Authors' calculations using data from the BHPS and LFS.

B.2 Sensitivity to annuity rates

The annuity rates used in the valuation of DC pension accrual were market annuity rates that were available in March 2009. These were used in conjunction with the 2009 life expectancies for 65 year olds, as it is assumed that 2009 annuity rates will be reflecting these expectations of longevity. Whilst life expectancies may differ for individuals who reach 65 in years before or after 2009, we can expect the annuity rates offered by insurance companies to differ in order to reflect this.

A potential problem with this reasoning could be that, due to the turmoil in financial markets, annuity rates available in March 2009 did not reflect a stable relationship with life expectancies, and so might not be a good proxy for the annuity rates available in future. To test this we re-valued DC pension accrual in 2001 and 2005, first using an approximation of 2006 annuity rates and 2006 life expectancies, and then using an approximation of 2003 annuity rates and 2003 life expectancies.[19] In both cases the mean value of DC accrual, by sector and year, was virtually unchanged. The effect on the mean value of total pension accrual across all individuals in the sample was therefore negligible.

If future annuity rates did turn out to be lower or higher than expected (after future differences in life expectancies are also taken into account), then our results may overstate or understate the value of DC accrual. The sensitivity of our results to this would be similar to, but slightly smaller than, the real rate of return turning out to be different from expected.

B.3 Sensitivity to assumed pension membership

As described in section 2.2, individuals were counted as being a member of an occupational DB scheme, a workplace DC scheme, or an individual DC scheme based on the actual answers they gave to the pension questions in the BHPS. Our results therefore depend on individuals correctly reporting their type of pension membership. The resulting data on participation in pension schemes from the BHPS is compared to data on participation from ASHE in appendix C.

Given how rare workplace DC pensions actually were in the public sector, particularly in 2001, it could be thought that the number of public sector individuals in the BHPS sample claiming to be a member of a workplace DC scheme is suspiciously high, particularly in 2001. Table C.2 suggests that fewer public sector employees in ASHE reported having workplace DC pensions than in the BHPS, with this difference being particularly large in 2001. One possibility is that the ASHE data are incorrect: indeed these do show that the number of members of public sector DC schemes is particularly low from 1999 to 2004 (inclusive) and is higher in both later and, more suspiciously, earlier years. If the ASHE data are correct then this could be caused either by BHPS respondents being mistaken about which sector they work in, or being mistaken about how their pension will be calculated. We consider that the latter is more likely[20], and so

[19] Approximations of RPI-linked annuity rates for 65 year old men and women in 2003 and 2006 are taken from Cannon and Tonks (2008). Life expectancies are GAD sex- specific life expectancies for 65 year olds in 2003 and 2006, based on 2003 and 2006 projections.

[20] Appendix C indicates that the sector affiliation in our BHPS sample is similar to that indicated by ASHE data.

test the sensitivity of our results to individuals in the public sector being mistaken about their type of pension in 2001. If this reporting error were constant over time, then the results presented in sections 3 and 4 may not be materially affected. However, we test here the sensitivity of our results to one potentially extreme assumption – namely, that in 2001 all public sector workers were in fact members of (as shown in section 3, on average more valuable) DB pensions, while in 2005 their scheme affiliation is as reported in the survey. This is potentially an 'extreme' assumption because it will tend to lower the estimated growth in the average value of pension accrual for the public sector between 2001 and 2005.

Public sector individuals who report having a workplace DC pension in 2001 are assumed to be mistaken, and to actually have an occupational DB pension. This increases occupational DB participation in the public sector from 76.7% to 83.3% in 2001. Between 2001 and 2005 the public sector would see a decline in DB participation of 4.9 percentage points, which is more than compensated for by the increase in workplace DC participation.

The value of pension accrual for public sector individuals in 2001 who had self-reported being in a workplace DC pension is calculated as if it was a DB pension, according to the method described in section 2.1.1. The mean value of accrual in public sector DB schemes is reduced slightly, to 29.1% of current earnings. Overall across the public sector the mean value of total annual pension accrual in 2001 is increased by 0.8 percentage points, to 24.5% of current earnings, as a result of higher participation in the more valuable DB schemes.

The difference in the mean value of total pension accrual between 2001 and 2005 is therefore also changed by the alternative assumption on public sector pension membership in 2001. The public sector increase in mean pension accrual between 2001 and 2005 is reduced from 1.5 percentage points to 0.7 percentage points. Once other observed characteristics have been controlled for using regression analysis (following model 6, Table 3.3), being in the public sector as opposed to the private sector is associated with having a mean pension value 15.0 percentage points greater in 2001, and 16.1 percentage points greater in 2005. This compares to our previous results (where public sector individuals were taken at their word if they reported having a DC pension in 2001) of 14.1 percentage points in 2001 and 16.1 percentage points in 2005.

Table B.3 indicates how the differences in pension value for the public sector in 2001 affect the average annual real growth in total remuneration between 2001 and 2005. The average annual real growth in the mean pension accrual in the public sector is reduced from 3.0% to 2.2%, which reduces the average annual real growth of mean total remuneration to 2.3%. The difference in the growth of mean total remuneration between the public and private sectors is therefore also only reduced by one-tenth of a percentage point, from 1.1 percentage points to 1.0.

Table B.3 Sensitivity of remuneration growth to membership assumptions

	Average annual % real growth 2001 - 2005					
	Baseline			Modified public sector 2001		
Mean:	*Public*	*Private*	*ppt diff*	*Public*	*Private*	*ppt diff*
Earnings	2.3	1.5	*0.8*	2.3	1.5	*0.8*
Pension	3.0	–0.8	*3.8*	2.2	–0.8	*3.0*
Remuneration	2.4	1.3	*1.1*	2.3	1.3	*1.0*

Notes: Baseline case is as Table 4.1 where individuals are assumed to report their pension membership correctly. The modified public sector 2001 case assumes individuals reporting workplace DC membership in 2001 are actually members of DB schemes. Earnings include bonuses. Sample is restricted to the middle 98% of employees in each sector (by earnings).
Source: Authors' calculations using data from the BHPS and LFS.

Appendix C: Representativeness of the BHPS sample

In order to provide some indication of how representative our BHPS sample is of the UK population as a whole we compare a number of important simple statistics to those produced by other sources, primarily the Annual Survey of Hours and Earnings (AHSE).

C.1 How BHPS public/private employment compares to ASHE data

Table C.1 shows the proportion of individuals employed in each sector in 2001 and 2005 according to the BHPS sample of employees (not restricted by age) and the ASHE sample. The proportions are very similar for both samples. The BHPS sample has a slightly greater proportion employed in the private sector than the ASHE sample in 2001, but a slightly lower proportion in 2005.

Table C.1 Sector affiliation in the BHPS and ASHE

	Percentage of employees in each sector:			
	2001		2005	
	Public	*Private*	*Public*	*Private*
BHPS	25.8	74.2	29.3	70.7
LFS	27.1	72.9	28.7	71.3
ASHE	27.0	73.0	28.3	71.7

Source: Authors' calculations using data from the BHPS (2001 and 2005) , ASHE (2001 and 2005) and the LFS (2001 and 2005).

C.2 How BHPS pension membership in public/private sector compares to ASHE data

Table C.2 indicates the proportions of individuals in each sector with various types of occupational pension. These should be compared with some caution since the ASHE survey was altered between 2001 and 2005 and the ONS indicates that results from 2005 may not be comparable with earlier years. The distinction between 'DC' and 'other' is also not identical between the ASHE and BHPS.

Table C.2 Occupational pension scheme membership in the BHPS and ASHE

	Percentage of employees with each type of occupational pension:					
	2001			2005		
	DB	*'DC'*	*other*	*DB*	*'DC'*	*other*
ASHE						
Public	80.6	0.7	0.6	76.3	3.3	4.1
Private	27.4	10.5	7.7	18.6	8.3	14.1
BHPS						
Public	76.7	6.6	1.7	78.4	7.3	1.3
Private	31.3	13.0	13.1	25.8	16.5	10.6

Notes: For ASHE: 'DC' includes DC schemes, while 'other' includes GPP, Stakeholder & other employee provisions. For BHPS: 'DC' corresponds to our 'workplace DC' measure, while other corresponds to our 'other DC' measure.
Source: Authors' calculations using data from the BHPS (2001 and 2005) and ASHE: Pensions Analysis (2001 and 2005).

C.3 Analysis of how BHPS earnings growth compares to ONS data

Comparing estimates of earnings growth from different data sources is not straightforward as they are rarely measured on an identical basis. Table C.3 compares the earnings growth from the BHPS with that from the official Average Earnings Index. The results from the BHPS data for the public and private sector are slightly higher than the official data. The differences between the sectors estimated from BHPS mean earnings are slightly smaller than the differences indicated by looking at mean earnings using the official series.

Table C.3 Growth in earnings in the BHPS and from the ONS

	% real growth 2001 to 2005		
	Public	*Private*	*Diff.*

BHPS	9.5	6.0	*3.5*
ONS	8.1	4.3	*3.8*

Notes: BHPS: Mean of mid 98% annual earnings, including bonuses, all employees; ONS: Average Earnings Index, including bonuses.
Sources: BHPS; ONS series LNKX, LNNI.