CHOICE OF PENSION SCHEME AND JOB MOBILITY IN BRITAIN

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by

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Abstract

This paper examines the choice of pension scheme and job mobility in Britain. Workers in Britain can choose to belong wholly to the social security (public pension) programme, or to a company-provided plan (occupational pension), or to purchase their own individual pension. We use household panel data for the 1990s to show that individuals that subsequently move job select pension arrangements that *a priori* impose lower costs on job mobility. A feature of the British policy 'experiment', and of the data, is that we can differentiate between choice of actual pension arrangement by the individual and what pension arrangements were *offered* to that individual. This permits us to test indirectly whether the observed relationship arises from employer selection or from pension scheme design.

Key words Pensions Job tenure labour mobility

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CHOICE OF PENSION SCHEME AND JOB MOBILITY IN BRITAIN

1. Introduction

This paper examines the relationship between choice of pension scheme and job mobility in Britain. Workers in Britain are now free to choose whether or not to belong wholly to the social security (public pension) programme, or to a company-provided pension plan, or to purchase their own individual pension. They must however choose one or other option. This choice framework is probably unique, at least among OECD countries. In fact successive UK governments, especially in the 1980s and early 1990s, saw greater choice of pensions as an essential ingredient in the desire to 'free up' the labour market by encouraging greater flexibility and portability of pension arrangements. For example, in 1985 the then Conservative Government argued that "A major factor in the demand for personal pensions has always been that they should be fully portable. People must be able to take their own pensions with them without any loss when they change jobs. The Government are committed to ensuring that barriers in pensions do not affect job mobility" (Department of Social Security, 1985). The reform process built on the existing framework of 'contracting out' (see below) in order to accomplish this task.

What theoretical rationale can be put forward for greater choice of pensions as a means of encouraging labour market flexibility? Consider the individual's incentive to move jobs in the context of an 'option value' model, in which he or she evaluates the current return to quitting against the maximum return from staying in the job for the current period (with whatever subsequent staying or quitting strategy). The option value of staying will essentially depend on the current and projected wage relative to the outside wage offer, and on the pension loss, if any, resulting from moving job. A consequence of the British pension reforms has been that a worker can choose the pension arrangement *within the current job* that minimises the potential pension loss from job mobility. This increases labour market flexibility, if mobility is a regarded as a basic indicator of labour market flexibility, by reducing a potential barrier to job mobility arising from membership of a particular pension scheme.

This paper uses household panel data for the 1990s. It shows that individuals that subsequently move job do indeed select pension arrangements that *a priori* impose lower costs on job mobility. A nice feature of the British 'experiment', and of the data available to us, is that we can differentiate between choice of actual pension arrangement by the individual and what pension arrangements were *offered* to that individual. Specifically, whilst we confirm the general research finding that individuals who are covered by company pension plans have lower rates of job mobility than uncovered individuals, we are also able to show that individuals who were offered a company pension plan but declined it are more likely subsequently to move than individuals who took up the offer. Implicitly, therefore, we can examine the relationship between job mobility and pension arrangement conditioned on employer-employee matches.[1] In addition, since many job exits may not be into other jobs, we have to condition our modelling on the (continued) employment of the individual.

What are the policy options of our findings on pension choice and job mobility? Not surprisingly, given the complexity of British pension arrangements, a large amount of financial advice and a significant portion of the regulatory structure has been devoted to the question of which pension arrangement 'suits' particular individuals so that, it is hoped, individuals will be able to make 'informed' choices. Typically, such analyses assume either lifetime jobs or exogenous probabilities of severance from a particular job.

If, however, individuals select their pension arrangement on the basis of their subjective expectation of future quitting or staying, they may make choices that appear to be at odds with the 'average' individual of their age or income group. To take a specific example, I may not choose to join my employer's pension plan, however generous the benefits on a lifetime basis relative to the alternative that I have chosen, if I expect to quit that employer tomorrow and where the employer's plan is not fully transferable.[2] Since

[1] That is, employers with high turnover costs may choose individuals for their expected rates of job mobility and we cannot separate this selective matching from the impact of scheme design on job turnover *per se.* Of course, *not* joining an employer's pension plan may itself be a signal, and we also have to ask why, if there is compensating offset between current and deferred pay, an individual would choose to join an employer with a pension plan and not take up the pension offer. We discuss these issues further below.

[2] And this in turn has implications for official attitudes towards 'inappropriate' pension choices. In the mid to late-1990s, large sums of compensation were paid to many individuals who were held to have been 'mis-sold' a Personal Pension when they had available the alternative of belonging to a company pension

our analysis shows that there is a strong and significant link between choice of pension arrangement and subsequent job mobility then, our results provide firm evidence that individuals take subsequent job mobility into account in choosing their pension arrangements.

The framework of the rest of the paper is as follows. The next section provides a very brief account of the British pension system. Section 3 summarises the past literature on job mobility and pension scheme coverage, focussing on the British literature in particular. Section 4 describes a basic option value model, the incentives attached to various kinds of pension schemes, and the implications of individual choice of pension scheme. Section 5 gives our basic empirical findings on job mobility and pension choice. Section 6 has some description of how pension choices evolve over time, and in particular their relationship to job changes. Section 7 is a short conclusion and summing-up of our main findings.

2. Pension arrangements in the United Kingdom: a brief description[3]

There has been a radical sequence of pension reforms in recent years in the UK.[4] An important feature of this reform process has been to extend the provision by which individuals may opt out of part of the public pension (social security) programme, known as 'contracting out'. Individuals can now remain in the public programme, known as the State Earnings-Related Pension, SERPS, choose to contract out into a company pension (known as an 'occupational pension' in British parlance), or buy an retirement account from an insurance company individually (an 'Approved Personal Pension', or, since 2001 a 'stakeholder pension'). Moreover, individuals can switch between pension provision 'routes' (not always costlessly).

A schema of the pension programme is depicted in Figure 1. The key element of the programme for our purposes is the second, mandatory, tier. Until 1988, workers had

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scheme. Needless to say, compensation payments were based on 'representative' calculations of likely future rates of job separation, career trajectories etc.

[3] We normally refer to 'Britain' throughout given that the data utilised here only cover Britain for most of the period. The relevant legislation and policy changes cover the whole of the United Kingdom, in the field of pensions at least, and so this sub-section refers to 'the UK' (i.e. including Northern Ireland).

little choice. If they were covered by an approved occupational pension scheme for contracting-out purposes, which had to be of the defined benefit form, they were required to join that scheme.[5] Such an approved contracted-out scheme took over responsibility for paying part of the social security benefit from the state. In return, the employer and employee paid a lower rate of payroll tax (the National Insurance contribution) into the scheme. Employees *not* covered by an approved occupational pension scheme had, since 1978, been members of the state earnings-related pension scheme (SERPS), for which they paid the full (contracted in) National Insurance contribution. The latter is the default option – individuals that makes no private arrangements and who earn above a certain level (the lower earnings limit, LEL) will automatically become members of SERPS.

After 1988, the government, in order to encourage private provision in the face of stagnant provision by private defined benefit schemes, relaxed the contracting-out provisions. Occupational pension schemes could now be of the defined contribution type (known as 'money purchase' in British terminology). Moreover, individuals could also purchase an individual retirement saving account, known as an Approved Personal Pension (APP), instead of either joining an employer's occupational pension scheme or SERPS. If they chose an APP, the contracted out rebate (the difference between the full and reduced rates of National Insurance contribution) would be paid direct by the Department of Social Security into the individual's account with their chosen provider. From 2001, there is yet another 'route', in that individuals can buy a 'stakeholder pension', which is a kite-marked 'no frills' defined contribution provided by an insurer through the employee's workplace.

There are some key points in all this. First individuals can switch between different types of pension regime – social security or occupational pension, defined benefit or defined contribution – at any time in their working life. Rights are generally

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[4] For further discussion, see Dilnot *et al* (1994), Disney, Emmerson and Tanner, (1999), and Banks and Emmerson (2000).

[5] Initially, it was at the discretion of the scheme as to whether all or some workers were covered by their pension scheme. However a 1994 ruling by the European Court of Justice requires that occupational pension schemes be offered in a non-discriminatory fashion – for example, part time workers, who are mostly women, cannot be excluded from the scheme if they wish to join. Note also that defined contribution schemes could exist at this time but they were unapproved and therefore did not 'count' as part of the mandatory tier of the provision.

retained in the scheme from which the worker exits (although there is some limited portability between different occupational pension plans). So, for example, a worker who starts out with an APP but who subsequently reverts to SERPS, will retain accumulated rights in the APP that will compound at the fund's rate of return, as well as accumulating additional rights in the social security programme. The same is also true of an individual who makes the opposite transition.[6]

In similar vein, an individual can choose to purchase an APP instead of joining the employer's occupational pension scheme, with the opportunity, if they so wish, to join later or, if they switch employer, to join another occupational pension scheme at a later date. This differentiation between individuals who join SERPS or buy an APP having been offered an occupational pension, and those who are in SERPS or purchase an APP who were *not* offered an occupational pension, is central to what follows. A consequence of this framework is that many workers are likely reach their age of retirement with a multiplicity of rights drawn from a number of pension sources.[7] Our object here is not to discuss the merits of such a policy framework, but to study the implications of this regime for job changing behaviour.

Finally, it should be noted that all this mobility comes at a price. We discuss below (section 4) the issue of costs associated with leaving jobs covered by occupational pension schemes. There are also significant start-up and recurrent costs associated with defined contribution schemes, notably Approved Personal Pensions, although the size of these costs relative to various measures of scheme magnitude (size of fund, contribution levels, as a percentage of the return) is an issue of some controversy and exit costs *per se* are probably rather low.[8] The perceived magnitude of these costs were one factor behind the government's decision to introduce 'stakeholder pensions' as another alternative form of contracting-out in 2001 (Department of Social Security, 1998; Disney, Emmerson and Tanner, 1999). Only SERPS can truly be said to have low entry *and* exit costs although

[6] Although this would not normally be a sensible strategy: see Dilnot *et al* (1994).
[7] For evidence on multiple occupational pension rights, see Disney and Whitehouse, 1996. For some preliminary evidence on *all* types of pension rights accumulated, see Disney, Emmerson and Smith (2001).
[8] See, for example, Murthi, Orszag and Orszag (1999), Whitehouse (2000).

the balance of opinion is that, in terms of average pay-off, it provides the lowest average return of all the alternatives.[9]

In our data set, described in more detail in Section 5, just over half of respondents were offered the opportunity to join an occupational pension scheme. Of those offered the opportunity to join an occupational pension, ¾ choose to join that scheme, while ¼ decide not to join. As shown in Table 1 just under a third of those who opted out of their employer's scheme decided instead to join a personal pension with the remainder remaining in SERPS.

3. Evidence on job mobility and pension scheme coverage

Job tenure and defined benefit pension plans

There is no research at present on the implications of this complex system of pension arrangements in Britain for job mobility. However, there is a literature that suggests that company pension schemes have an impact on the job tenure of individuals.[10] In particular, both theory and empirical evidence suggests that 'defined benefit' schemes, in which pension benefits are related to some measure of earnings (often final, or an average of final years' salary), prolong individual tenures, at least until late in the working lifetime when company pension schemes are often used as a vehicle for early retirement. Such incentives are enhanced where there are vesting procedures, which impose a minimum service length before an individual is entitled to pension benefits, or where non-transferable pension rights ('preserved' or 'deferred' benefits) are incompletely indexed to average earnings.

Such incentive effects should not be surprising. Company pension schemes may be seen by employers as a way of reducing individual quit rates or as an incentive device to recruit long-staying and reliable workers in the presence of significant costs of

[9] At the risk of tiring the reader, doubtless puzzled by the apparent inveterate tinkering with the UK social security programme, it will come as no surprise to learn that SERPS, too, is to be replaced by another pension, known as the State Second Pension (SSP).

[10] For the US, see *inter alia*, Schiller and Weiss (1979), Mitchell (1982), Ippolito (1987), Allen, Clark and McDermed (1993), Gustman, Mitchell and Steinmeier (1994), Dorsey (1995); for Britain, McCormick and Hughes (1984), Henley, Disney and Carruth (1994), Mealli and Pudney (1996) and, for Europe, Andretti (2001).

recruitment and severance (Lazear, 1979, 1981; Ippolito, 1997). Indeed Ippolito (1994, 1997) argues that pensions are a better vehicle for recruiting and retaining more productive workers than simply deferring basic pay to later in the working lifetime. In fact, employers may both backload pay, so that year-on-year lifetime pay grows faster than productivity, and introduce pension schemes. Lifetime remuneration profiles will bear little relation to year-on-year productivity levels. This has important implications for, *inter alia*, the interpretation of individual-level wage equations with tenure variables.

Nevertheless, in the presence of strong selection mechanisms, it is difficult to show that company defined benefit pension plans *cause* lower quit rates and longer tenures *per se*, once conditioned on individual characteristics. Indeed, if workers with certain characteristics (such as low discount rates) choose pension-covered jobs or are selected by employers, *any* kind of company pension scheme may be associated with lower quit rates.

Job mobility, wage gains and pension coverage

In looking at the impact of (private) pension arrangements on job mobility, therefore, it is important to differentiate between mobility in and out of pensioned jobs, in contrast to mobility between pensioned jobs that involve a change of pension plan. There are several reasons why mobility out of jobs covered by pension plans may be a good deal lower than mobility of uncovered workers. In the United States context, Gustman and Steinmeier (1993) use the Survey of Income and Program participation (SIPP) to show that pension mobility is much lower for people in jobs with *any* private pension scheme – whether of the DB or DC type. In a three-year period (1984–86) they found that 6% of those initially in pensioned jobs moved jobs compared to 20% in non-pensioned jobs. Of those who moved out of a pensioned job, 64% moved to a job without a pension and, moreover, incurred an average loss of wages of 6% by moving. In contrast, 14% of movers out of uncovered jobs gained pension coverage by moving and all movers previously in uncovered jobs gained on average 7% wages by moving. These statistics highlight the strong deterrents to moving out of a pensioned job *per se*, which should be separated from the 'costs' arising from moving *between* pensionable jobs

associated with non-portability of pensions. Moreover these facts show why individuals may choose pensionable jobs even if they do not choose to join the pension scheme.[11]

Table 2 confirms the Gustman and Steinmeier result for Britain using our data set, which is described in more detail below. The average year-on-year real earnings growth in this sample (which includes both underlying productivity growth and age-related earnings increments) was just under 7%. Individuals who moved jobs in general had higher earnings growth, as did those in uncovered jobs relative to pensioned jobs. But the most striking feature is the differentiation of pay gains by moves between sectors. Those who were covered by pension schemes and moved to other pensioned jobs gained, on average, 15% whereas those who moved to uncovered jobs gained only 4%. And those who were uncovered gained 28% in real earnings by moving to a pensioned job, higher than the gain of those moving to other uncovered jobs. Clearly workers are not compensated with higher pay for loss of 'pension capital' arising from moving job.[12]

Evidence from Britain on pensions and job tenure

There is some literature on pension portability and pension coverage in the British context. McCormick and Hughes (1984) focus on portability costs, analysing firm specific pension capital as a fraction of pension capital and, in particular, the loss of pension capital from moving between (DB plan) pensionable jobs. At the time that they wrote, there were three options concerning moves between covered jobs in the UK: benefits could be deferred (preserved), a cash refund of contributions could be obtained, or there could be a transfer value into the new scheme. McCormick and Hughes show that these alternative options are optimal at different points in the working life and that the 'envelope' loss-minimising function is non-linear with pension scheme tenure.

To implement their model empirically, they use a General Household Study (GHS)-based subjective measure of likely job turnover. The question used asks 'are you

[11] This contrasts with the literature which purports to show a trade-off (compensating variation) between current wages and current pension accruals. Wage equations with additional variables proxying pension accruals rarely show negative and significant coefficients on the latter. Our wage equation (below) finds significant positive correlations between private pensions and wage levels.

[12] These real wage gains may look rather high relative to, say, the US but, apart from the fact that Britain has seen higher real wage growth than the US, it is important to note that the sample is selected to exclude certain workers – for example those who move between employment and unemployment or non-participation, who may have had lower wage gains when in work.

(the worker) seriously considering changing employer'? The explanatory variables of the cross section analysis are personal characteristics, job satisfaction and interactions of pension status, job tenure and age which are supposed to capture the non-linearity of the loss function (a simple dummy for pension scheme membership is insignificant). Their results hinge on the coefficient on (years of job tenure*pension status), with job tenure *not* included as an independent regressor. Since we know from other studies that search is (negatively) affected by tenure, this can be interpreted as suggesting that tenure matters only in pensionable jobs and the coefficient is indeed significant. However, while the loss function (the envelope) estimated by the authors is quadratic in tenure, the curvature seems to be the 'wrong way' in their results relative to their theoretical arguments.

Henley, Disney and Carruth (1994) adopt a different approach. They wish to investigate whether assets holdings affect job tenure, such as owning a house, belonging to a pension scheme, and so on. The authors argue that a better identifier of the impact of pensions on job mobility, given self-selection, is whether the particular *characteristics* of a pension scheme have an impact on the propensity to move. Of course, it is still possible that individuals self-select into the type of pension scheme according to their implicit moving probabilities, but this may require a more sophisticated calculus than a simple membership decision.[13]

The empirical strategy involves using incomplete reported job tenure intervals to construct the hazard rather than a binary variable approach, using the 1985 General Household Survey. The truncation of the durations and the measures of housing equity (observed only for house movers) involve some standard econometric procedures for handling censored data. A key finding is that occupational pension scheme membership significantly decreases the exit hazard from jobs, but reported transferability of pension rights increases it (on the basis of observed completed spells) relative to simple pension scheme membership. Moreover the effect on the hazard rate of membership interacted with time (duration) and time squared is superior to a simple dummy, confirming the McCormick-Hughes proposition that the loss function is time dependent and possibly

[13] But since the characteristics are self-reported, a natural criticism is that these characteristics are known, even if not understood.

non-linear. In fact (for men) Henley *et al* get a result that approximates the curvature of the McCormick-Hughes theoretical loss function.

Mealli and Pudney (1996) is the only British paper that attempts to look at the endogeneity of pension status, but it does so indirectly. It uses the job histories and pension scheme tenures in the UK Retirement Survey to model transitions. Obviously the permutations of possible multiple state transitions are large over the lifetime, so their paper essentially uses a competing risks model to examine transitions between various states (e.g. a pensioned job, non-pensioned job, unemployment etc.) conditional on treating the initial state as exogenous (but see below). Note that transitions *between* pensioned jobs but with different pension schemes (which is the basis of the McCormick-Hughes model of job-specific pension capital) are ignored. So this is not a test of job-specific pension capital impact but of the impact of pension coverage on tenure, like Gustman and Steinmeier (1993). Their finding is that job durations are systematically longer for pensioned jobs. We reproduce this finding below.

The question, however, is whether this is unobserved heterogeneity of participants or a consequence of pension status. Essentially the authors do not utilise explicit instruments to control for this endogeneity (even if any could be found that were plausible) but add state specific random effects into the competing risks model. By specifying various forms of heterogeneity (individual effects, random effects, random effects*sectoral status, etc.) the object is to see whether the differences in duration between pensioned and non-pensioned jobs are eliminated, and their overall answer appears to be that the differences are never wholly eliminated (Table VIII, *ibid*). So there may be a 'pension coverage effect' overall.

Overall, the findings of the British studies are:

i) that the theoretical relationship between job-specific pension capital and tenure is non-linear;

ii) that (DB) pensionable jobs have longer durations;

iii) this is not wholly due to heterogeneity (self-selection);

iv) transferable pension rights are associated with more job mobility;

v) that there appears to be a non-linear relationship between duration and the 'pension effect' in DB plans.

4. Basic theory

A model of job quitting with pensions

As suggested in the introduction, a useful conceptual device for understanding the job mobility of individuals is the *option value* of remaining in a job. In a competitive labour market with spot market equilibrium wage rates, and zero transaction costs to employer and worker when moving between jobs, workers are perfectly mobile. In such circumstances, the worker is indifferent between remaining in the job and choosing the best outside option. However, in general, this stylised model is unrealistic, in particular where part of remuneration takes the form of deferred pay (pensions). More generally, the value of remaining in a particular job depends on:

i. The impact of changing job on prospective pension rights. This is particularly apposite where job mobility involves termination of a particular pension plan.[14]

ii. The expected future wage in the current job relative to the option implied by the best prospective job offer, times the probability of exogenous severance from the current job.

In considering the impact of pension rights on job mobility, it is necessary to understand the evolution of pension rights with job tenure. Denote as P_t the expected discounted value at t of the pension annuity available at retirement if the workers leaves the firm at the end of period t. The exact evolution of P_t will depend on the type of pension scheme, and is discussed further below. Characteristically, however, company pension plans of the defined benefit form exhibit important non-linearities in the time path of P_t, related to vesting periods, early retirement options, benefit calculations, ceilings on years of service etc. P_t will therefore exhibit 'spikes' and distinct discontinuities, as in the illustrations of Kotlikoff and Wise (1985). If job mobility is closely related to the evolution of P_t, as is implicit in much of the literature, then we might also expect to observe 'spikes' in exit rates at particular tenures, unless current

[14] To simplify the issue, we treat the ultimate retirement date as *exogenous.* For an option value treatment of the retirement decision, see Stock and Wise (1990).

remuneration fully offset these variations. As Kotlikoff and Wise point out, such offsets are unlikely in practice.

For this reason, as Lazear and Moore (1988) argue, P_t is probably not the appropriate measure in order to examine the impact of pension accruals on job turnover. For example, in the year prior to vesting, P_t is zero, but a worker would be foolish to quit if there was a low chance of severance prior to vesting. A forward-looking worker will take account of the *future* evolution of P_t in his or her quit decision. In the option value approach, the worker compares the current value of quitting with the *maximum* future (discounted) value of remaining with the current employer. If no future value from remaining in the job exceeds the current value of quitting, the worker will quit. Appendix A demonstrates how the option value of quitting can be calculated recursively.

In general, it can be shown that the option value approach to job mobility predicts that the probability of job exit will be higher:

- The higher the expected outside wage to the current wage,
- The lower the pension loss associated with job quitting,
- The less risk averse the individual (proxied by, say, being younger or childless),
- The greater the risk of exogenous severance (proxied by firm characteristics).

In the next section, we focus on pension losses from quitting behaviour, and how these losses vary according to pension plan type.

A defined benefit occupational pension

We now show how P_t varies according to choice of pension plan. Consider first a standard defined benefit occupational pension. Assume for simplicity that retirement date T is exogenous and that the annuity rate A_T that converts the pension fund into an annuity is fixed by this retirement date. Denote also x as the accrual factor and y as the year in which the individual entered the scheme (so that $(t\text{-}y)$ is the number of years of

eligible service so far accrued). The *accrued* value of the pension at time t, aP_t, is therefore:

$$aP_t = A_T(t-y)xW_t e^{-d(T-t)} \quad (1)$$

where W_t is the current wage and d is the rate of discount. If the individual leaves immediately, the *projected* value, P_t – which is needed for the option value calculation – is (2). In contrast, if the individual stays on in the current job until the retirement date, the projected value, P_T, is (3):

$$P_t = A_T(t-y)xW_t e^{-(d-p)(T-t)} \quad (2)$$

$$P_T = A_T(R-y)xW_T e^{-d(T-t)} \quad (3)$$

Here, it is assumed that, as in UK practice since 1995, preserved (deferred) benefits are indexed to price inflation, p. Thus the choice between leaving now or staying in the job/scheme to retirement depends in practice on the individual's rate of nominal earnings growth relative to the rate of price inflation, and the value of accruing extra years of service. Normally, we would expect the former to exceed the latter, but since lifetime earnings growth is typically non-linear, and possibly even zero or negative later in life, the attraction of taking deferred benefits may increase later in life.

Moreover, in the option value approach, the individual compares quitting now with *all* future possible job tenures, not just the 'lifetime' contract. For example, leaving in the year just before retirement will generate the projected pension P_{T-1} in (4), which could in principle exceed both (2) and (3).

$$P_{T-1} = A_T(T-y-1)(1+p)xW_{T-1}e^{-d(T-t)} \quad (4)$$

The option value approach described in the previous section therefore involves comparing all these values, taking account also of the pension derived from any future spells in *alternative* pension schemes, such a different occupational pension scheme, SERPS or a defined contribution scheme such as an Approved Personal Pension, if the individual quits the scheme before reaching retirement age.

The state earnings-related pension scheme

The state earnings-related pension scheme, SERPS, is of course fully portable between jobs and is the default option if a worker does not belong to a private pension scheme. The benefit calculation is quite complex, with the accrual factor depending on year of reaching pensionable age, different earnings averaging procedures according to year of reaching pensionable age, and a revaluation procedure. Here, we present the post-1995 scheme, in which eligible earnings (the wage in each year minus the value of the basic state retirement pension) are revalued using an index of *average* earnings growth, and benefits are calculated on lifetime average earnings.

Consider the projected rights in SERPS at t if the individual leaves the scheme in that year (analogous to (2) for an occupational pension). These can be written as:

$$P_{t\,\mathrm{SERPS}} = A_T(t-y)x_T\bar{w}_t e^{-d(T-t)} \tag{5}$$

where: $\bar{w}_t = \sum_{i=1}^{T-y} \frac{(w_i - BSP_i)(1+g)^{T-i}}{(t-y)}$ if $w_i < w_{i\,\max}$ and $w_i = w_{i\,\max}$ otherwise.

Equation (5) states that pension rights are based on a measure of average earnings at time t. The supplementary equation shows how this average is calculated. First, the value of the basic state pension (BSP) in any year is deducted to obtain that year's eligible earnings. The earnings must be not greater than a ceiling set at (approximately) seven times the rate of the basic state pension. Each year's earnings, here year *i* within the interval $(0...y...i...t...T)$, are revalued to the retirement age by an economy-wide earnings growth rate *g*. These revalued earnings are averaged, and then multiplied by the accrual rate and the number of years' service to obtain the final pension.

An equivalent formula can be derived for continuing in SERPS to retirement age, or to any other date. However, SERPS is of course fully portable so that job quitting does not require that an individual leaves SERPS. Note, too, that an individual choosing to leave their *occupational* pension at t may calculate the option value in terms of subsequent membership of SERPS, since SERPS is the default pension – thus they will

compare (2) plus subsequent accumulated SERPS entitlements from t to T (calculated in a similar manner to (3)).

At first sight, SERPS looks a rather generous scheme, since the worker's earnings are revalued by an average earnings index. In an occupational pension scheme, this 'revaluation' is typically incorporated into the way in which the pension is calculated on the basis of final year's, or an average of the last few year's salary. Thus, the relative attractiveness of the schemes appears to depend on the worker's projected path of real earnings relative to that of the economy as a whole. However, this would be a misleading deduction for two reasons. First, the accrual factor attached to an occupational pension is intrisically more generous than that attached to SERPS. A typical occupational pension would provide 1/2 or 2/3rds of relevant earnings for a forty year working life whereas SERPS would only pay a maximum of 1/5th if an individual worked for a full 49 years. Whilst the size of the contracted-out rebate is supposed to adjust for this difference in prospective returns, governments have typically erred on the size of excessive generosity to contracted-out schemes.

Second, the ceiling on eligible earnings, which has in recent time been *price indexed*, imposes a real constraint on the value of the pension in SERPS.[15] This means that high earners (currently any male worker above average earnings, for example, with the ceiling falling in value steadily relative to earnings growth) will find their pension constrained by this rule. Indeed the proposed reform of SERPS, replacing it by the Second State Pension, will exacerbate this by effectively introducing differential accrual rates according to earnings level (analogous to the 'bend points' in the US social security scheme). These factors make contracting out into a private pension, whether of the DB or DC form, much more attractive for better-off workers (Dilnot *et al*, 1994; Disney, Emmerson and Tanner, 1999). On the other hand, SERPS may be relatively more attractive to people whose earnings peak relatively early in their working life and, of course, to people who change jobs frequently.

An Approved Personal Pension (APP)

The projected pension arising from an APP is more straightforward. Denote as F_t the size of the accumulated fund in the APP at time t and s_t as new saving in the APP during t. Assume that a fraction *c* of the fund is taken in charges and that the fund earns a return *r*. The size of the fund at any t can of course be found recursively given past values of *s, c* and *r*. Then the projected pension if the individual leaves their APP at time t is depicted in (6) and at retirement in (7). Other analogous option values for other years of plan termination are easy to depict. It is assumed that the main form of charging for running an APP is as a levy on the capital value of the fund; there are likely however also to be start-up charges and fees which one can think of as reflected in a reduction in, or even negative, contributions (saving) in early years.

$$P_t = A_T[F_t(1-c)+s_t]e^{-(d-r)(T-t)} \tag{6}$$

$$P_T = A_T F_T(1-c)e^{-(d-r)(T-t)} \tag{7}$$

The fund earns *r* and this value to retirement is discounted at rate *d*. It is natural to think of *r* exceeding *d*. The occupational pension also earns *r* but the value to the participant in a DB plan is reflected in the accrual factor *x*. Thus defined benefit and defined contribution plans, even if they have identical portfolios, will have different pay-offs to different workers, depending on their job tenures. Disney and Whitehouse (1996) show, using empirical evidence on job tenures for Britain, that the skewed nature of job tenures and the 'backloading' inherent in DB plans, means that a slight majority of workers would be better off in DC than DB plans, for identical net returns and contribution rates. Typically, very short tenures in funded plans are penalised: in DB plans because cumulated wages of short tenured individuals are low, and in DC plans (APPs) because individuals may not fully recoup plan start-up fees such as broker commission and other plan charges. However these penalties tend to deeline with tenure in an APP plan, whereas they may increase in DB plans, at least for a time (since, as suggested previously, pension losses in DB plans tend to evolve non-linearly).

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[15] Although the March 1999 Budget announced above inflation increases in April 2000 and April 2001 raising £¾bn (HM Treasury, 1999).

Worker choices with endogenous pension plan choice

In the option value model sketched out in the earlier sub-section, individuals chose the timing of their quits based on exogenous pension plan membership. The last sub-section described the pension choices available to individuals in the British labour market, and signalled how different types of pension scheme might be associated with different incentives to quit. The logical extension, therefore, is to posit a model in which both choice of pension plan *and* quitting behaviour are endogenous, since such a model implicitly underpins worker behaviour in Britain.

Such a model is only sketched out here as it is hard to apply the standard option value approach to this augmented approach. As we saw in the option value model, the worker compares the total remuneration stream associated with quitting at each future time period and compares the maximum from that calculus with quitting now. If no future quitting strategy provides a greater remuneration than the current outside offer, he or she quits now. In an extended model with endogenous pension choice, however, this is too simplistic. First, the option values must be extended to all alternative wage-pension combinations. This in itself is not difficult, since some pension choices are likely to dominate all others in the future. More problematic, however, is to model the proposition that the worker may have chosen their *current* pension status such as to maximise the value of the present and future opportunities available. This implies that the worker has to form an expectation, in joining (or not joining) a particular pension scheme, of what future opportunities will become available and how of the option values will be affected by current decisions. As such, a modelling strategy that considers the expected value of the maximum is more appropriate, as individuals may choose to switch between, and even revert to, previous pension schemes.

Suppose the worker expects a future flow of job offers, with some probability attached to receiving an offer that is more attractive than remaining in the existing job in each period. This probability can depend on age and time (for example, demand shocks). Given this sequence, the individual's choice of pension plan will depend on the likelihood of such an offer arising. Past pension choices cannot be unravelled, so the option of quitting now remains, but the choice of pension plan in the current period may

influence the expected value of a future outside job offer versus remaining in the existing job, if there are significant losses attached to certain pension choices in the event of job mobility. A formal model is sketched out in equation (13) in Appendix A.

To take a practical example, suppose my expected future probability of an outside job offer that is more attractive than my current job is rather low, given my age and career path. I might then select a pension scheme (for example, an employer's offer of a final salary-based defined benefit pension) which would penalise me were I to move. This choice of pension scheme of course makes it less likely that any given job offer would indeed be attractive in the future. Conversely even if I had the offer of an employer's pension plan then, if I had a strong expectation of a better job offer (perhaps with an alternative employer's plan attached), it might make sense for me to decline the current pension offer and instead opt for SERPS or an APP in the meantime.[16] If these expectations are fulfilled on average, then we can expect to see greater job mobility *ex post* associated with choice of more portable plans (broadly SERPS, followed by an APP). In addition, we would expect to see a correlation between characteristics than reduce (enhance) mobility (such as age, marital status etc.) and choice of pension plan. These propositions form the basis of the empirical analysis in the next section.

5. Empirical analysis

The data and a first look at the evidence

To examine this issue, we utilise observations from eight waves of the British Household Panel Study 1992-99.[17] We include in our core sample anyone who is aged between 20 and 59, who is employed and who answered the subsequent year's question of whether he or she had moved employer during the past 12 months. This gives us a total sample of 9,360 individuals and a total of 37,844 observations.

[16] We abstract from the important point that declining an employer's pension offer might be a strong signal to the employer as to the future expectations and plans of the worker.

[17] In fact we use nine waves, since the data for 2000 are used to identify moves *ex post* for those observed in 1999. Moreover, from 1997 onwards, the data set contains a small number of observations for Northern Ireland.

There are clear advantages in using the BHPS data to look at the relationship between an individual's choice of pension scheme and job mobility. The BHPS questionnaire asks individuals separate questions about whether they are eligible to join an employer's pension scheme, whether they actually joined such a scheme, and whether they have decided to take out a personal pension scheme. Crucially this allows us to distinguish the group of people who were offered an occupational pension scheme but choose to not join. Furthermore the panel element of the BHPS data allows us to identify those people who did decide to move employer in the following year.

The basic relationship between job mobility and type of pension scheme in our data set is presented in Table 3. These are 'raw' averages - a multivariate approach in taken in the next sub-section. In total 7.6% of our sample move jobs over the next twelve months. Mobility is lower among those who were offered an occupational pension (7.0%) than those who were not (8.3%). This difference is significant. Of course this could be a feature of the types of jobs that offer occupational pensions – for example larger employers are more likely to offer an occupational pension than smaller employers and they may also have lower rates of staff turnover. A first pass at mitigating this problem is provided by looking simply at those who were offered the chance to join an occupational pension scheme. We find that subsequent job mobility was indeed higher amongst those who choose not to join the scheme. This difference is highly significant. However, this again might be associated with certain characteristics (such as age), as discussed next.

A multivariate analysis

We utilise the data for a multivariate analysis of the relationship between pension choice and subsequent job mobility. The basic equation is of the following form:

$$\Pr(m_{t+1}) = f(\tilde{w}_t, P_t, Z_t) + \varepsilon_t$$

where $\Pr(m_{t+1})$ is the probability of having moved job within the previous 12 months at t+1. This is conditioned on a vector of state variables comprising both industry and firm characteristics (Z) and the pension status of the individual (P) at time t. Note the sequencing of these variables, which utilises the panel aspect of the data.

The additional variable, $\tilde{w}_t$, is the predicted wage from an auxiliary wage equation less the actual wage observed. Our prediction is that there will be a positive relationship between this 'wage gap' and the probability of moving *ex post*. A higher predicted wage relative to the actual would suggest that the individual is more likely to receive an outside wage offer higher than the 'inside' wage in the next period, and therefore is more likely to have moved job by the time he or she is observed at t+1, *ceteris paribus*. Since wages are only observed for those employed, the outside wage is selectively corrected for the probability that the individual is employed in at least two sequential periods. Identification is obtained by using details on the education of individuals' partners in the auxiliary employment equation. These restrictions are found to be strongly significant.

It is possible that individuals that enter or exit jobs from and to non-employment states may have different job moving probabilities. Thus the moving probit should also be corrected for selectivity with an auxiliary probit of employment status. Thus the overall model structure is a bivariate probit with selection – the structure and likelihood are derived in Appendix B. This selectivity correction is less precisely determined than in the wage equation, suggesting that job movers are not significantly different from those that move between labour market states (or, of course, that our instruments are less useful here than in the wage equation). Appendix B also contains descriptive statistics for the main explanatory variables, and coefficient estimates for the auxiliary employment and wage equations.

Finally, since the data ask a subjective question 'reasons for moving' to those who moved, we re-estimate the model structure using as the dependent moving variable those who reported 'moving to a better job'. Since the option value and other choice-based exit models are essentially models of voluntary moving, this seems a reasonable proxy for such quits. Note however that overall we are only considering the sub-set of job exits that involve moving to another job: exits into retirement or unemployment, for example, are excluded from our moving equation (which is why the wage and moving equations are corrected for selectivity). Our prior is that the majority of moves that we are identify are largely voluntary in any event.

Table 4 provides the basic equations for the moving outcome. Column (1) is a probit on all job moves between employers, with no selectivity correction for employment status. It merely includes the actual wage rather than our 'wage gap' variable, which is predicted to have a negative effect on job mobility, *ceteris paribus*. Column (2) is a probit on all job moves with the 'wage gap' variable derived from an auxiliary wage equation, and with both the mobility and wage equations corrected for the selectivity of the employment probability. Column (3) uses the same equation structure as Column (2) but replaces the dependent variable by the 'probability of having moved in the last 12 months' *and* reporting that 'the move is to a better job'.

All specifications contain vectors of dummies for educational qualifications, region of residence, year, industry and firm size. Marginal effects are cited in column (1) for the basic probit estimates. In the case of firm size, job mobility rates are significantly highest amongst the smallest size category and the largest size category – the latter perhaps proxying an internal labour market. Table 4 shows that the probability of moving job increases with travel time to work, although the relationship is non-linear. Being an owner occupier reduces the probability of moving job by the next period, cumulated if the owner occupier also has a mortgage. Disability, and having children, also (plausibly) reduce the job moving probability, the former not significantly.

There is a quadratic in age, although its impact on job mobility is most significant for men. The previous discussion suggested that this non-linearity might be particularly pertinent for individuals in occupational pension schemes, where we might expect the pension accrual structure to induce a declining exit probability until late in life, after which the probability might increase. We confirm this in an auxiliary probit of job mobility only for men and women in occupational pension schemes. The turning point in the age quadratic for men is at age 51 – that is, the exit probability declines until this age, after which it rises (note again that we are only considering mobility between jobs, not exits into inactivity). For women, the turning point is not at any sensible positive number, suggesting that the job moving probability declines monotonically with age in a pensionable job. This is not surprising, as women are very much less likely to have accumulated a long tenure in a pension scheme, and extra years of service will generally

increase their pension wealth significantly, whereas for men, greater tenure will ultimately lead to a declining rate of pension accrual with extra years' service.

The current wage in column (1) is negative and the predicted wage gap is positive in both columns (2) and (3), as theory would suggest. Its coefficient is higher among those who reported that they 'moved to a better job' (column 3), suggesting that wage gains are central to what constitutes such a move.

Of most interest, however, are the pension status variables. For these variables, the marginal effects in column (1) give some guide to interpretation. Being *offered* membership of an occupational pension scheme, for example, reduces the probability of leaving the job in the next 12 months by 3.5 percentage points; actually joining the scheme reduces it by 10.6 percentage points. The calculated average probabilities for each pension scheme choice, conditioned on means of other variables, are depicted in Table 5. This table is the 'core' of the empirical results, and readers are reminded again that these are the probabilities of subsequent job moving attached to *prior* pension status.

A basic finding of other studies, in both Britain and the US, is confirmed in all three columns of Table 5, which replicate columns (1) to (3) of Table 4, namely that individuals who are not offered, and therefore do not belong, to an occupational (company) pension scheme are about three times more likely to move job than individuals who belong to a company pension scheme (for example, comparing 16.7% to 5.8% in column (2)). This finding is the equivalent of similar findings in other studies, such as that of Gustman and Steinmeier (1993) for the US. However, given the choice-based structure in the British pension programme, we can probe this result in more detail.

The most striking finding concerns the disparity in the *ex post* probability of job moving between those who accept and those who decline their employer's offer of membership of a company pension. In column (2), again, for example, mobility rates of 13.0% (SERPS) and 11.6% (APP) are observed for non-joiners versus 5.8% for those who join the scheme. Individuals who expect to move job do indeed make pension

arrangements that minimise the costs of job mobility in terms of potential pension losses.[18] This is the finding that the models outlined in Section 4 would predict.

Table 5 also casts light on the employee-employer selection issue. First, it is apparent that those who are offered occupational pension plan membership have a lower rate of job turnover than those not offered, even if the former do not in fact join the employer's scheme. Thus, in column (2), the mobility rate for those not offered is 16.7%, but for those offered, it is lower at 11.6% (for a Personal Pension purchaser) and 13.0% for a SERPS member. Having chosen a fully portable pension scheme, covered workers still have significantly lower rates of mobility than uncovered workers. The obvious interpretation is that employers with pension schemes appear to be successful in selecting workers with lower job exit probabilities, even if those workers do not take up the offer of pension scheme membership. This result cannot therefore be 'explained' by the backloading incentives inherent in the company's pension plan and suggests that the pension scheme offer correlates with other elements of the offer of a covered job (for example, higher wages).

Second, individuals who choose to buy *any* private pension have lower mobility rates *ex post* than those who do not. This can be seen in the lower mobility rates of those in 'portable' pensions (PPs) as against those in SERPS – 14.0% to 19.2% in column (2) for those *not* covered by occupational pensions (significant at less than 0.05%) and 11.6% as against 13.0% for those covered by occupational pensions (but only significant at 19.0%). This suggests that purchase of a (fully portable) private pension is associated with other characteristics – such as perhaps lower discount rates or more general 'forward looking' behaviour that is also reflected in longer job tenures.

[18] It would of course be useful to be able to quantify these losses and therefore estimate the exact impact of pension loss on the probability of job moving. Unfortunately, we do not have any details of the structure of the occupational (company) pension plan but, even if we did, we would have to evaluate the moving decision against the option value of all possible future pension values from remaining in the job for a certain tenure. See Disney and Whitehouse (1996) for an attempt to calculate the latter without examining the impact on job mobility (at a time when the present panel data set did not yet exist).

6. Job mobility and pension mobility

In this final empirical section, we provide some brief descriptive analysis of the relationship between job mobility and *pension scheme* mobility (among scheme types). Note that we cannot identify from the data whether individuals, on moving job, move between pension schemes of the same type, although of course this type of mobility is not relevant for members of SERPS and is very unlike to arise either among those opting for a Personal Pension. However it is an important issue for members of occupational pension schemes. Moreover, a fully specified empirical model of the joint determination of pension status and job tenure, as described in the latter part of Appendix A, lies outside the scope of the present paper.

Table 6A investigates pension scheme transitions for all individuals, whether they move job or not. Reading across the first row, for example, 93.7% of individuals who were in SERPS at *t* were also observed to be in SERPS at *t+1* (90.3+3.4).[19] However 3.7% had joined a Personal Pension by *t+1* and 6.2% had moved to a job that offered an occupational pension, although only 2.4% took up that offer. These small transition proportions will of course be subject to panel measurement error. Similar inertia is observed among occupational pension scheme members with 91.2% (84.1+7.1) remaining in their scheme, while 4.6% reported leaving the scheme within a covered job (which might however be another job). A much larger observed transition occurs among those who had a Personal Pension at *t* and who were not offered an occupational pension – 18.5% reported not belonging to a Personal Pension at *t+1*. Some of these may have allowed the pension to lapse or perhaps chose simply not to contribute to their private plan at *t+1*.

It seems sensible to differentiate pension movers between those who remained in the same job and those that moved job. These are considered in Tables 6B and ^C respectively. Among job stayers, not surprisingly. 'persistence' is much stronger and some responses are probably attributable to measurement error (for example the 2-3%

[19] Note again that were are treating each successive transition as a separate observation – thus status at *t+2* relative to *t+1* is a new observation to that from *t* to *t+1*.

who report switch from 'covered' to 'uncovered' status without changing job - although there is a possibility that their employer closed down their pension plan over that period.

Table 6C reports on job movers. Again this is subject to the *caveat* of cell size (although note that we are observing round 3000 job moves in total over the nine year period). Here there are some interesting preliminary findings. For example, of those who were offered an occupational pension at *t* and declined to join it, only 29% remained in the same pension status after 12 months if they moved job. Of the remainder, 42% had moved to a job with pension coverage, but 22% had joined a pension plan in the new job. In contrast, among movers who had not been offered an occupational pension at *t*, 31.5% had been offered a pension plan by *t+1* and, of these, over 40% had joined it. With this extent of mobility between pension scheme types associated with job mobility, it is not surprising that the cumulative diversity of pension holdings lengthens as we extend the comparison over longer intervals (Disney, Emmerson and Smith, 2001). Further analysis of the cumulative exit probabilities, and of multiple transitions, however requires further, more detailed analysis.

7. Conclusion

This paper has examined the choice of pension scheme and job mobility in the Britain. Workers in Britain can choose to belong wholly to the social security (public pension) programme, or to a company-provided pension plan, or to purchase their own individual pension. We used household panel data for the 1990s to show that individuals that subsequently move job select pension arrangements that *a priori* impose lower costs on job mobility. A feature of the British policy 'experiment', and of the data, is that we were able to differentiate between choice of actual pension arrangement by the individual and what pension arrangements were *offered* to that individual. This permitted us indirectly to test whether the observed relationship arises from employer selection or from pension scheme design.

Conditioning on industry and firm-specific characteristics, and controlling for the selection into employment, we found that individuals who were in company pension plan had mobility rates one third those of individuals who were not offered such plans,

comparable with US studies. However, even individuals who rejected their company's pension plan offer had lower rates of mobility than those who had no offer, hinting at some employer selection of workers into covered jobs according to expected job mobility. Moreover, employees who had purchased *any* private pension in preference to remaining in the public pension programme have lower mobility rates than the latter, again suggesting some selection processes, in the sense that individuals who make active pension arrangements for the future (and, therefore, have lower discount rates) may also have more stable job tenures. However further progress on identifying these particular selection mechanisms requires construction of satisfactory instruments, which has proven to be problematic in this context in past studies. An additional topic of ongoing research, given the theoretical structure sketched out here, is as to whether *changes* in pension arrangements are associated with moves between jobs, since both job tenures and pension choices should be simultaneously determined, and the previous section provided some preliminary descriptive evidence on this issue.

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Table 1

Pension coverage in our BHPS sample, by whether given the opportunity to join an employers occupational pension scheme

	Whether offered an occupational pension?		*All*
	Not offered (46.9% of sample)	Offered (53.1% of sample)	
No private pension arrangement	84.3	17.6	48.9
Occupational pension	–	63.5	33.7
Personal pension	15.7	7.9	11.5
Personal pension and an occupational pension	–	11.1	5.9
Total observations	*19,594*	*22,155*	*41,749*

Notes: Includes only individuals aged 20 to 59 who are not self-employed. The probabilities are averaged over all nine years of the data.

Source:: British Household Panel Survey, 1992–99; Authors' calculations.

Table 2

Average pay increase among those staying or changing job, by whether or not offers pension coverage (full time employees only).

	Average pay increase (%)	% of sub-sample	*Observations*
All individuals	6.9	100.0	19,428
	(0.3)		
Individuals who do not change jobs	5.8	90.2	17,531
	(0.3)		
Individuals who change jobs	17.5	9.8	1,897
	(1.6)		
Those in pension covered jobs only:	5.7	100.0	14,655
	(0.3)		
Who do not change jobs	5.2	93.1	13,646
	(0.3)		
Who change jobs and lose coverage	4.4	2.0	289
	(2.2)		
Who change jobs and retain coverage	15.4	4.9	720
	(1.9)		
Those in non-pension covered jobs only:	10.9	100.0	4,773
	(0.7)		
Who do not change jobs	8.0	81.4	3,885
	(0.6)		
Who change jobs and don't gain coverage	20.6	11.9	569
	(3.0)		
Who change jobs and gain coverage	28.8	6.7	319
	(6.4)		

Notes: Includes only individuals aged 20 to 59 who were interviewed in the following wave who are not self-employed and who are employed full-time in both the current wave and the subsequent wave. Standard errors contained in parenthesis. Pay deflated to September 2000 prices using the Retail Price Index.

Source:: British Household Panel Survey, 1992–99; Authors' calculations.

Table 3

Proportion of people moving job in the next year, by pension choice

	Whether offered an occupational pension?		*All*
	Not offered	Offered	
No private pension arrangement	7.4	11.8	8.2
	(0.2)	(0.6)	(0.2)
Occupational pension	–	5.3	5.3
		(0.2)	(0.2)
Personal pension	13.3	11.9	12.8
	(0.6)	(0.8)	(0.5)
Personal pension and an occupational pension	–	6.0	6.0
		(0.5)	(0.5)
All	8.3	7.0	7.6
	(0.2)	(0.2)	(0.1)
Total observations	*17,981*	*19,863*	*37,844*

Notes: Includes only individuals aged 20 to 59 who were interviewed in the following wave who are not self-employed. Standard errors contained in parenthesis.

Source:: British Household Panel Survey, 1992–99; Authors' calculations.

Table 4. Probits of probabilities of moving job

	(1) dependent variable = Prob of moving (mean = 11.2)			(2) dependent variable = Prob of moving (mean = 11.2) (selectivity corrected)		(3) dependent variable = Prob of moving for 'better job' (mean = 5.1) (selectivity corrected)	
	dy / dx	Co–eff	s.e.	Co-eff	s.e.	Co-eff	s.e.
Log wage	–0.014*	–0.087*	(0.027)				
Wage gap				0.087*	(0.027)	0.105*	(0.033)
Travel time	0.053*	0.321*	(0.064)	0.304*	(0.064)	0.309*	(0.077)
Travel time^2	–0.009	–0.053	(0.027)	–0.051	(0.027)	–0.085	(0.034)
Full time	0.008	0.050	(0.044)	–0.014	(0.039)	–0.023*	(0.048)
Manager	–0.003	–0.021	(0.027)	–0.042	(0.026)	–0.086	(0.033)
Age/100	0.393	2.406	(1.460)	2.071	(1.455)	3.791†	(1.796)
(Age/100)^2	–1.005*	–6.150*	(1.948)	–5.785*	(1.938)	–8.542*	(2.413)
(Age/100) * male	–0.664†	–4.061†	(1.878)	–4.913†	(2.144)	–6.119†	(2.654)
((Age/100) * male)^2	1.006†	6.154†	(2.505)	7.240†	(2.867)	7.996†	(3.605)
Male	0.114†	0.683†	(0.330)	0.784†	(0.354)	1.045†	(0.430)
Owner occupier	–0.027*	–0.182*	(0.050)	–0.204*	(0.056)	–0.094	(0.067)
Mortgage	–0.015*	–0.090*	(0.031)	–0.128†	(0.051)	–0.095	(0.063)
Married	0.007	0.043	(0.047)	0.055	(0.054)	0.107	(0.066)
Cohabiting	0.015	0.090	(0.053)	0.088	(0.053)	0.089	(0.065)
Partner in work	0.002	0.010	(0.041)	–0.010	(0.053)	–0.020	(0.069)
White	–0.006	–0.035	(0.032)	–0.046	(0.035)	–0.046	(0.042)
Disabled	–0.028	–0.197	(0.148)	–0.107	(0.183)	–0.197	(0.258)
Dependent child	–0.018*	–0.114*	(0.044)	–0.146	(0.076)	–0.234†	(0.093)
Not off OP, with PP	–0.028*	–0.188*	(0.042)	–0.208*	(0.042)	–0.099†	(0.050)
Off OP, no PP	–0.035*	–0.241*	(0.040)	–0.253*	(0.040)	–0.125*	(0.047)
Off OP, joined PP	–0.041*	–0.302*	(0.052)	–0.325*	(0.052)	–0.277*	(0.066)
Off & joined OP	–0.106*	–0.668*	(0.036)	–0.697*	(0.036)	–0.562*	(0.046)
Off & join OP & PP	–0.071*	–0.619*	(0.053)	–0.653*	(0.052)	–0.573*	(0.070)
Selection correlation		*N/a*		–0.080	(0.130)	–0.209	(0.149)
Controls for:	F-test	p–value		F-test	p–value	F-test	p–value
Firm size (11)	30.93	0.001		34.06	0.000	16.94	0.110
Industry (24)	61.16	0.000		61.51	0.000	51.12	0.000
Education (13)	43.04	0.000		32.14	0.001	46.32	0.000
Year (8)	25.68	0.000		22.59	0.000	27.10	0.000
Region (19)	25.62	0.082		22.35	0.172	19.14	0.320
Log likelihood	–8177.4417			–26593.54		–23041.78	
				Total	*Uncensored*	*Total*	*Uncensored*
Observations	*25,742*			*37,844*	*25,742*	*37,815*	*25,713*
Unique individuals	*6,379*			*9,360*	*6,379*	*9,359*	*6,377*

Notes: Standard errors in brackets, significant at 1% = *, at 5% = †; Defaults: woman, renting, part time, non-manager, single, in SERPS; 'Wage gap' is 'predicted wage (from separate wage equation selectivity corrected for employment status) minus actual wage at t'; Whether a partner is in work and partners education are used as instruments in the wage equation; Partners education and log regional unemployment are used as instruments in the job mobility equation; OP= Occupational pension, PP= Personal pension; Columns (1) and (2) dependent variable is job change between t and t+1 (all other variables dated t); Column (1) Estimates from simple probit model, among those in employment only. Column (2) Estimates from probit model, wage and mobility equations corrected for probability of observing in employment. Column (3) as (2) but dependent variable is conditioned on reason for move being to a 'better job'. A full set of results is available from the authors on request.

Table 5

Probabilities of moving job and pension status

	Pension status	(1) dependent variable = Prob of moving (mean = 11.2)	(2) dependent variable = Prob of moving (mean = 11.2) (selectivity corrected)	(3) dependent variable = Prob of moving for 'better job' (mean = 5.1) (selectivity corrected)
	All individuals	9.1	9.6	4.5
1.	Not offered OP	15.3	16.7	7.7
2.	Offered OP	7.3	7.7	3.6
	(p–value of difference, 1 v 2)	(0.000)	(0.000)	(0.000)
3.	Not offered OP, SERPS	17.7	19.2	8.7
4.	Not offered OP, PP	13.3	14.0	7.3
	(p–value of difference, 3 v 4)	(0.000)	(0.000)	(0.048)
5.	Offered OP, OP (& not PP)	5.5	5.8	2.7
6.	Offered OP, SERPS	12.2	13.0	6.9
7.	Offered OP, PP (& not OP)	11.0	11.6	5.1
	(p–value of difference, 5 v 6)	(0.000)	(0.000)	(0.000)
	(p–value of difference, 5 v 7)	(0.000)	(0.000)	(0.000)
	(p–value of difference, 6 v 7)	(0.268)	(0.190)	(0.025)

Notes: These are *conditional* probabilities, derived from Table 4. P-values show the result of Chi-Squared tests for significant differences between the relevant co-efficients shown in table 3; OP= Occupational pension, SERPS= State Earnings-Related Pension, PP= Personal pension; first status denotes reported offer, second denotes reported choice. Columns (1) and (2) dependent variable is job change observed between t and t+1 (all other variables dated t); Column (1) Estimates from simple probit model, among those in employment only; Column (2) Estimates from probit model, wage and mobility equations corrected for probability of observing in employment.; Column (3) as (2) but dependent variable is conditioned on reason for move being to a 'better job'. Note 'SERPS' also includes people who do not have a private plan but whose earnings are too low for them to be eligible for SERPS.

Table 6A. Changes in pension coverage between years, all individuals

Pension in year	Pension in coverage subsequent year					
	Not offered OP		Offered OP			
	No pension	Joined PP	No pension	Joined PP	Joined OP	OP & PP
Not offered OP:						
No pension	90.3	3.5	3.4	0.2	2.4	0.2
Joined PP	18.6	70.5	1.3	4.8	2.7	2.2
Offered OP:						
No pension	21.5	1.1	63.9	5.8	7.2	0.6
Joined PP	3.0	10.9	13.2	68.5	2.4	1.9
Joined OP	3.7	0.6	3.7	0.9	84.1	7.1
OP & PP	3.0	4.1	2.5	4.8	35.5	50.1

Notes: Includes only individuals aged 20 to 59 who were interviewed in the following wave who are not self-employed. Standard errors contained in parenthesis.

Source:: British Household Panel Survey, 1992–99; Authors' calculations.

Table 6B. Changes in pension coverage between years, job stayers only

Pension in year	Pension in coverage subsequent year					
	Not offered OP		Offered OP			
	No pension	Joined PP	No pension	Joined PP	Joined OP	OP & PP
Not offered OP:						
No pension	92.2	3.4	2.5	0.1	1.5	0.1
Joined PP	19.1	72.6	1.1	3.4	2.0	1.9
Offered OP:						
No pension	19.6	1.0	67.9	5.8	5.3	0.5
Joined PP	2.4	8.3	13.6	72.5	1.8	1.4
Joined OP	2.9	0.5	3.4	0.9	85.2	7.1
OP & PP	2.4	3.1	2.3	4.0	36.2	52.0

Notes: Includes only individuals aged 20 to 59 who were interviewed in the following wave who are not self-employed. Standard errors contained in parenthesis.

Source:: British Household Panel Survey, 1992–99; Authors' calculations.

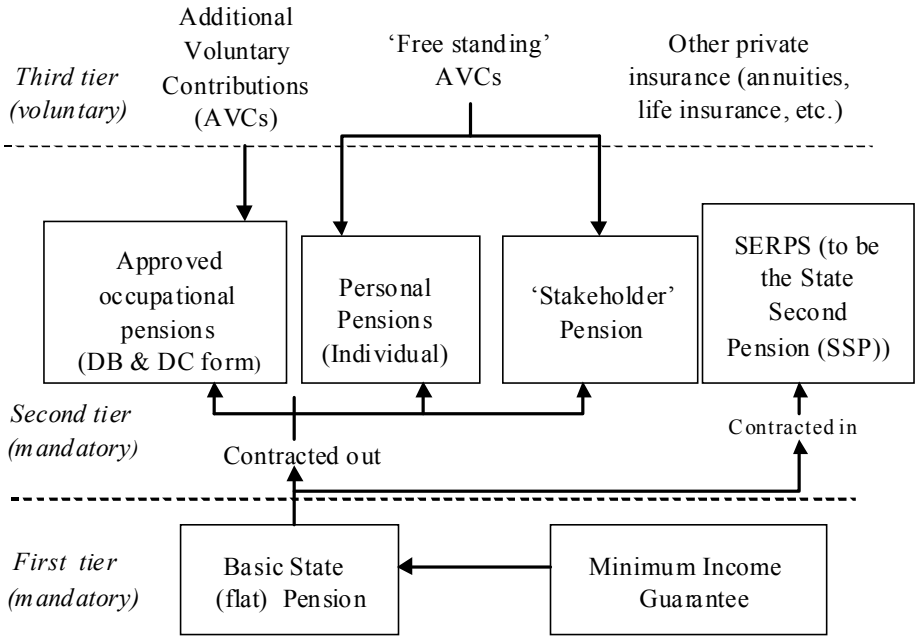
Table 6C. Changes in pension coverage between years, job movers only

Pension in year	Pension in coverage subsequent year					
	Not offered OP		Offered OP			
	No pension	Joined PP	No pension	Joined PP	Joined OP	OP & PP
Not offered OP:						
No pension	65.6	3.9	14.4	1.2	13.7	1.2
Joined PP	16.3	53.8	2.8	14.7	7.8	4.7
Offered OP:						
No pension	41.8	2.4	29.1	3.8	21.7	1.2
Joined PP	8.0	33.7	7.4	36.8	7.4	6.7
Joined OP	21.6	2.9	13.2	1.9	55.7	4.7
OP & PP	13.7	19.4	6.5	16.5	18.7	25.2

Notes: Includes only individuals aged 20 to 59 who were interviewed in the following wave who are not self-employed. Standard errors contained in parenthesis.

Source:: British Household Panel Survey, 1992–99; Authors' calculations.

Figure 1
Schema of UK pension scheme, 2001



Appendix A: Theory

The option value can in principle be calculated recursively, as in Lazear and Moore. Consider the simplifying case where there is no wage uncertainty and the possibility of involuntary severance from the current job is ruled out. Denote the wage in the current job received at the end of period t as W_t and the discounted pension annuity *at retirement* associated with quitting *at the end* of the current period as P_t. Denote the best offer outside remuneration at time t as R_t – this may include deferred as well as current pay i.e. membership of another pension scheme. In the final year, T (retirement), the option value of employment in the current job is:

$$V_T = [P_T + W_T] - [P_{T-1} + R_T] \tag{8}$$

This gives the difference in current and future total remuneration arising from quitting at the end of period *T-1* as opposed to *T*.

The value of quitting at the end of period *T-1* depends on:

$$\begin{aligned} V_{T-1} = \max[&(P_T + W_T)/(1+r) + W_{T-1}, (P_{T-1} + R_T)/(1+r) + W_{t-1}] \\ &- [(P_{T-2} + R_T)/(1+r) + R_{T-1}] \end{aligned} \tag{9}$$

where r is the interest (discount) rate. The individual evaluates the maximum total remuneration arising either from continuing to work in this job until T, obtaining a (discounted) wage W in T and pension rights of P at the end of T, or of quitting at the end of *T-1*, which earns future pension rights of P_{T-1} and outside remuneration of R_T in the last period. The 'option value' approach compares this maximum with the value of quitting immediately (the term in the right hand brackets). If both options in the left hand brackets yields a lower value than quitting now, the worker will quit immediately.

In similar vein, in year *T-2*, the worker solves a similar problem, evaluating the maximum over three possible future options against quitting immediately:

$$V_{T-2} = \max[(P_T + W_T)/(1+r)^2 + W_{T-1}/(1+r) + W_{T-2},$$
$$(P_{T-1} + R_T)/(1+r)^2 + W_{T-1}/(1+r) + W_{T-2},$$
$$(P_{T-2} + R_T)/(1+r)^2 + R_{T-1}/(1+r) + W_{t-2}]$$
$$-[(P_{T-3} + R_T)/(1+r)^2 + R_{T-1}/(1+r) + R_{T-2}]$$

(10)

but this can be simplified by incorporating the maximand at *T-1* in equation (2):

$$V_{T-2} = \max[V_{T-1}/(1+r), (P_{T-2} + R_T)/(1+r)^2 + R_{T-1}/(1+r) + W_{T-2}]$$
$$-[(P_{T-3} + R_T)/(1+r)^2 + R_{T-1}/(1+r) + R_{T-2}]$$

(11)

In general, we can write:

$$V_t = \max\left[V_{t+1}/(1+r), \frac{P_t}{(1+r)^{T-t}} + \sum_{i=1}^{T} \frac{R_i}{(1+r)^{i-t}} + W_t\right] - \left[\frac{P_{t-1}}{(1+r)^{T-t}} \sum_{i=1}^{T} \frac{R_i}{(1+r)^{i-t}} + R_t\right]$$

(12)

This approach assumes that the trajectory of wages in known with certainty, and that no future exogenous severance probability. A stochastic component to wages will affect the decision to quit. Suppose, for example, a risk averse individual has greater knowledge of the trajectory of 'internal' wages ($w_1 \ldots w_i \ldots w_T$) than of the distribution of, and evolution of, outside wage offers ($F(R_1) \ldots F(R_I) \ldots F(R_T)$). This may be of greater importance in later life, especially where the individual is in a defined benefit plan and plan benefits depend on the lifetime wage profile. On the other hand, where there is some probability of exogenous job severance, such as redundancy or job termination, this will affect the current quit probability. Where this exogenous rate of separation is perceived to be high by the individual, the loss of prospective pension rights from quitting is lower.

In the case where the individual can also choose the pension scheme to which he or she belongs, the modelling is more complex. Formally, we can write a version of (12) that accommodates this decision making environment, as:

From $(P_{OP}, P_{SERPS}, P_{APP})$, find P^*_t that maximises:

$$V_t = \left[\left(1 - \Pr(age,t)\right)\left(V^*_{t+1}/(1+r)\right), \Pr(age,t)\left(\frac{P^*_t}{(1+r)^{T-t}} + \sum_{i=1}^{T} \frac{R_i}{(1+r)^{i-t}} + W_t \right) \right] - \left[\frac{P_{t-1}}{(1+r)^{T-t}} \sum_{i=1}^{T} \frac{R_i}{(1+r)^{i-t}} + R_t \right] \quad (13)$$

Which could again, in principle, be solved recursively from *T*. However, with endogenous job tenure *and* pension choice, an alternative solution procedure such as dynamic programming seems more appropriate.

Appendix B: Estimation

The general structure of the model is a moving probability equation, where the probability of moving in the 12 months after *t* is related to a vector of state variables at *t.* Write:

$$M^*_{it} = X_{it}'\beta + \varepsilon_{it} \tag{14}$$

where M^* is the latent probability of an individual i at time t moving job in the next 12 months, X is a vector of explanatory variables, β is a vector of coefficients and ε is an error term. The move is observed as a discrete variable and also requires that the individual be in employment at time t (and also respond to the retrospective moving question at time $t+1$). Therefore, denoting being in employment as E:

$$\begin{aligned} &\Pr(M_{it}) = 1 \text{ if } M^*_{it} > 0 \text{ and } E_{it} = 1 \\ &\text{and} \\ &\Pr(M_{it}) = 0 \text{ if } M^*_{it} < 0 \text{ and } E_{it} = 1 \end{aligned} \tag{15}$$

Moving or not moving is only observed if the individual is employed, so this partial observability of the moving decision requires a second probit *viz*:

$$\begin{aligned} &\Pr(E_{it}) = 1 \text{ if } (Z_{it}'\gamma + \mu_{it}) > 0 \\ &\text{where} \\ &\varepsilon_{it} \sim N(0,1) \\ &\mu_{it} \sim N(0,1) \\ &corr(\varepsilon_{it}, \mu_{it}) = \rho \end{aligned} \tag{16}$$

This is the bivariate probit model with selection, and there must be elements in the Z vector that permit us to identify the model (these are educational attainment of the spouse). It is the equation structure that underpins columns (2) and (3) in Table 4 – whereas column (1) estimates the standard probit model without selection. The likelihood for the bivariate probit with selection can be written as:

$$L = \prod \left[\Phi\left(X_{it}' \beta \left| E_{it} \right. \right)^{M} \left(1 - \Phi\left(X_{it}' \beta \left| E_{it} \right. \right) \right)^{1-M} \Pr\left(E_{it} \right) \right]^{E} . \left(1 - \Pr\left(E_{it} \right) \right)^{1-E} \qquad (17)$$

where Φ is the cumulative normal distribution.

The common elements of the X and Z vectors are a vector of household characteristics, X_{ht}, a vector of dummy variables including qualifications, region, year etc., D_{it}, a vector of pension scheme status variables, P_{it}, and a 'wage gap' variable, $\tilde{w}_{it}$. Thus: $X_{it} = \left(X_{ht}, D_{it}, P_{it}, \tilde{w}_{it} \right)$.

The 'wage gap' variable requires further explanation. We run an auxiliary wage equation to estimate a predicted wage for the individual. The inference is that a higher predicted wage than the actual wage will make it more likely that the individual will receive a better job offer. The 'wage gap' is the difference between the predicted wage and the actual observed wage. The elements of the wage equation are the same as (14), with the addition of regional unemployment as a proxy for 'wage curve' effects:

$$\begin{aligned} w_{it} &= X_{it}' \theta + \sigma u_{rt} + \nu_{it} \\ \tilde{w}_{it} &= \hat{w}_{it} - w_{it} \end{aligned} \qquad (18)$$

where the hat denotes the prediction and u_r is the regional unemployment rate with θ and σ as a vector of coefficients.

Table A1 provides some descriptive statistics. Table A2 provides estimates of the auxiliary wage and employment equations – note the (in general) positive correlations between indicators of private pension scheme membership and wages.