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PENSION CHOICES AND JOB MOBILITY IN THE UK*

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Abstract

Using data from the British Household Panel Survey we analyze the impact of second tier pension schemes on voluntary job mobility within a discrete time hazard rate modelling framework. We find that workers covered by occupational pension plans have significantly lower quit rates, independently of their participation decision. Contrary to common policy suggestions, pension portability losses are not important in explaining quits. However, when we account for occupational pensions' endogeneity through instrumental variables, we find that their negative impact on quit hazards is due to "selection on unobservables".

JEL classification: C41, J31, J32, J41, J63, J68
Key words: Labour Mobility, Occupational Pension Plans, Duration Analysis, Instrumental Variables

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1 Introduction

Notwithstanding the pension reforms implemented in the last three decades, portability of occupational pension rights is still a matter of public policy concern in the UK. While provisions such as the reduction of the vesting period, inflation indexation of deferred rights and the introduction of transfer options, have improved the position of early leavers from occupational pension plans, there is still concern among policy analysts that a lack of pension portability could be detrimental to labour market efficiency.[1] This view links in a causal way the evidence on lower job mobility of workers participating to occupational pension plans and the financial penalties imposed to early leavers by plans of the defined benefit type. While receiving some support in the early literature,[2] this view has also been challenged by alternative arguments, like "pension wage premia"[3] and "selection" into pension schemes.[4] However, conclusive evidence has not yet been produced. Moreover, most studies focus on the US, while the few studies available for the UK usually do not account for workers' selection into pension arrangements.

The "selection" issue is particularly relevant in the UK context. The neat feature of the UK system of pension provision is that individuals who are offered the chance to join their employer's scheme can choose to make alternative pension arrangements. This means that it is possible to compare job turnovers of those in pension covered jobs who choose not to join that scheme with the job turnovers of those in pension covered jobs who did choose to join. We exploit this feature of the UK pension system,

estimating the impact of available pension choices on quit hazards. Moreover, we address the endogeneity of occupational pensions through an instrumental variables identification strategy. In particular, we exploit the exogenous variation provided by regional occupational pension offer rates to identify the impact of occupational pension schemes on quits. The results show that the effect of occupational pension schemes on quit hazards changes significantly while moving from a "simple" hazard model to an "IV" hazard model. In the former, workers covered by an occupational pension scheme have significantly lower quit rates. In particular, once covered, workers who decide to join the scheme are found equally less likely to quit than those who decide not to join. Contrary to common policy suggestions, pension portability losses are not found to be important in explaining quit hazards. Once we account for the endogeneity of occupational pension coverage, we find that the observed negative relationship between occupational pensions and quits is due to "selection on unobservables".

The remaining of the paper is organized as follows. The next section describes the current structure of the UK system of pension provision. Section 3 focuses on the portability of occupational pension rights and its regulation in the UK. Section 4 reviews the UK literature. Section 5 describes the data. Section 6 introduces the empirical model. Section 7 illustrates the results and the IV identification strategy. Section 8 concludes.

2 The Current System of Pension Provision in the UK

The current UK pension system has a three tiered structure. A flat-rate first-tier pension is provided by the state and is known as the Basic State Pension (BSP). Second-tier pensions are provided by the state, employers and private sector financial institutions. Finally, there is a third tier of voluntary private retirement saving.

The wide variety of retirement pension plans currently offered in the UK is the result of a number of reforms undertaken over the last 25 years.[5] An important feature of this reform process is represented by the "contracting-out" mechanism, introduced originally in 1978 as a means of integrating existing occupational defined benefit (DB)[6] pension schemes into the new State Earnings Related Pension Scheme (SERPS). While employees with earnings between a Lower Earnings Limit (LEL) and an Upper Earnings Limit (UEL) were automatically enrolled into SERPS, initially they were also given the option of contracting-out into an approved DB scheme. The 1986 Social Security Act extended the contracting-out option to approved defined contribution (DC)[7] schemes and to approved personal pensions.[8] The 1999 Welfare Reform and Pensions Act further extended the contracting-out option to Stakeholder Pension Schemes (SPS),[9] introduced in April 2001. The Child Support, Pensions and Social Security Act 2000 abolished SERPS replacing it, since April 2002, with the State Second Pension (S2P). The S2P was initially earnings-related but from April 2007 becomes a flat-rate benefit, even though contributions are earnings-related.

There is no obligation on employers to operate their own pension scheme,[10] nor, since 1988, is there any contractual requirement for an employee to join the employer's scheme if it has one. Moreover, employees can always decide to remain into the state scheme or to later reenter it. Finally, individuals can eventually top up their occupational or personal pension with additional voluntary contributions or free-standing additional voluntary contributions (up to the limits permitted by the Island Revenue).[11]

Tables 1 and 2 report figures elaborated from the *Occupational Pensions Schemes Survey* collected over the 90s by the Government Actuary.[12] Table 1 indicates that there has been a downward trend in private sector occupational pension schemes' membership over the decade. Alternatively, the distribution of active members by type of plan has remained relatively stable over time, with more than 80 percent of plan participants belonging to DB plans. Table 2 indicates that the level of contracting-out also has been fairly stable over time, with more than 80 percent of private sector workers participating to contracted-out plans. Most workers participate to contracted-out DB plans - Contracted-Out Salary Related (COSR) schemes - while a minority of workers participate to contracted-out DC plans - Contracted-Out Money Purchase (COMP) schemes. A minority of workers participate to Contracted In Salary Related (CISR) or Money Purchase (CIMP) schemes.

3 Pension Portability

Portability of occupational pension rights is usually limited and depends to a great extent on the DB/DC nature of the plan. First, a vesting period is typically required in all plans.[13] Second, the backloaded structure of pension rights' accrual in DB plans impose further separation penalties to vested early leavers. In traditional DB plans the sponsoring employer promises the payment of a retirement pension annuity P_R :

$$P_R = b(R - t_{k-1})W(R), \tag{1}$$

where $(R - t_{k-1})$ are service years accumulated from t_{k-1} (age of hire) to R (retirement age), b is the annual (percentage) accrual rate, $W(R)$ is the retirement wage. Conditional upon remaining with the employer until retirement, at each age t_k, the worker will be accumulating a pension wealth $P_{t_k}^{stay}$:

$$P_{t_k}^{stay} = b(R - t_{k-1})A(t_k)W(t_k)e^{g(R-t_k)}e^{-i(R-t_k)}, \tag{2}$$

where $A(t_k)$ is the annuity factor transforming pension annuities in pension wealth, $W(t_k)$ is the wage earned at t_k, $e^{g(R-t_k)}$ is a wage growth factor,[14] and $e^{-i(R-t_k)}$ is a discount factor.[15] Leaving the employer before completion of the vesting period, the worker forfeits her pension rights. Leaving the employer at age t_k -after vesting and before retirement- the worker is entitled to receive a pension annuity based on the salary at t_k (rather than at R):

$$P_{t_k}^{leave} = b(R - t_{k-1})A(t_k)W(t_k)e^{-i(R-t_k)}. \tag{3}$$

Pension separation penalties arise if a worker will receive a pension that has a value less than her implicit pre-separation contributions, including both explicit payments to the plan and any reduction in wages below the opportunity wage. This is usually the case in DB plans.[16] Assuming that early leavers find another job with the same characteristics, and that $g = i$, their portability loss is defined as the difference between (2) and (3) :

$$P_{t_k}^{Loss} = b(t_k - t_{k-1})A(t_k)W(t_k)(1 - e^{-i(R-t_k)}). \tag{4}$$

Pension portability rules are set by pension plans within the standards defined by law. In the UK the situation of early leavers has improved over the last 30 years. Before 1975, early leavers had no legal right to transfer their accrued pension entitlements to a new scheme or even to receive deferred benefits from their old scheme. Under the current rules, the vesting period is set at 2 years, while vested early leavers from a DB plan can take a tax free transfer value to a different occupational pension scheme or to an approved personal pension or to purchase a retirement annuity. Alternatively, they can have their accrued rights preserved in the pension scheme as deferred benefits, to be revalued until retirement in line with the Retail Price Index, up to a maximum of 5 percent. If the latter option is chosen, the pension loss formula should to be modified to account for the limited price indexation (π):

$$P_{t_k}^{Loss} = b(t_k - t_{k-1})A(t_k)W(t_k)(1 - e^{(\pi-i)(R-t_k)}). \tag{5}$$

4 Literature

The impact of employer provided pension plans on individual job mobility choices has been widely investigated in the US pension literature. Early empirical studies document a significant negative correlation between plan participation and job mobility.[17] More recently, arguments such as pension portability losses,[18] pension wage premia[19] and selection into pension jobs[20] have been proposed to explain this stylized fact. While no conclusive evidence emerge in the literature, the available evidence on the UK is limited to five previous studies.

McCormick and Hughes (1984) estimate turnover logit equations on 1974 General Household Survey (GHS) data. They find that pension workers are significantly less likely to move and that pension capital losses - proxied by an interaction term between tenure and a pension dummy - have a negative and significant impact. Henley, Disney and Carruth (1994) estimate job separation hazard rates on 1985 GHS data. They find that occupational pension scheme membership and a quadratic pension-tenure interaction term significantly decrease the hazard, while transferability of pension rights increases it.

Mealli and Pudney (1996) is the only study that takes into account the potential endogeneity of pension choices. They estimate a random-effects competing risks model on retrospective data drawn from the 1988-1989 Retirement Survey. They find a strong positive association between the length of job tenure and pension participation status,

and no role for unobservables. Disney and Emerson (2002) estimate probit models of job mobility using BHPS data. They find that not only those who join an occupational pension plan offered by their employer but also those who decline to join it have significantly lower mobility rates. Although Disney and Emerson (2002) suggest that their results could be explained by different selection processes inducing alternative pension choices, their empirical strategy does not account for the endogeneity of pension choices.

Both Mealli and Pudney (1996) and Disney and Emerson (2002) do not estimate the role of pension quit disincentives. A last study by Andrietti (2003) provide evidence on the impact of occupational pensions and pension portability losses on quits. Estimating a switching regression model of job mobility on data from the European Community Household Panel (ECHP) survey, Andrietti (2003) finds that workers participating to occupational pension plans in the UK are significantly less likely to move, while pension portability losses do not play a mobility impeding role.

The contribution of the present paper to the existing pension literature is threefold. First, we exploit the richness of a data set that provides detailed information on occupational and personal pension participation status and that follows individuals over a relatively long time period to estimate the impact of available pension choices on quits. Second, we account for the endogeneity of occupational pension choice through an instrumental variable identification strategy. Finally, we explicitly test for the impact of pension portability losses on quits.

5 Empirical Model

We are interested in modelling the length of the employment spell for individuals with their current employer. Individuals in the sample are indexed by $i = 1, ..., n$, while the passage of calendar time is set in integer years. Year $d_i = 1$ is the year in which the respondent started working with the current employer (and is before the sample selection year). Let $d_i = j_i$ index the sample selection year, which can be different for different individuals. Each of the respondent is then interviewed approximately one year later. If the individual subsequently moves we denote the length of the spell running after the first interview date by k_i. So, the calendar time of a spell end is denoted by $d_i = j_i + k_i$. Otherwise, k_i denotes the censoring point at the end of the observation window. Our panel is unbalanced in that we follow individuals until they are no more observed in their "current employment" spell, either because they experience a job to job transition or because they drop out from the survey, or because they experience a transition to another labour market state. Respondents experiencing a job to job transition before the end of the observation window contribute complete duration data. All the others contribute censored duration data, with censoring immediately before the end of the interval between two consecutive waves. However, observations censored because they remained with the current employer are still at risk of experiencing a transition during the observation period.

Suppose that job to job transitions are determined as discrete time counterparts to

an underlying continuous time proportional hazards model:

$$\theta_i(t) = \lambda(t) \exp(\mathbf{x}'_{it}\boldsymbol{\beta}), \tag{6}$$

where $\lambda(t)$ denotes the baseline hazard, $\mathbf{x}_{it}$ is a vector of time variant/invariant explanatory variables, and $\boldsymbol{\beta}$ is a vector of unknown coefficients. The discrete time hazard denotes the probability of the current employment spell being completed by time $t+1$, given that it was still continuing at time t, and is given by:

$$h_i(t) = 1 - \exp\left\{-\int_t^{t+1} \theta_i(u)du\right\} = 1 - \exp\left\{-\exp(\mathbf{x}'_{it}\boldsymbol{\beta})\gamma(t)\right\}, \tag{7}$$

where:

$$\gamma(t) = \int_t^{t+1} \lambda(u)du \tag{8}$$

denotes the integrated baseline hazard. We do not specify any functional form for $\gamma(t)$ and estimate the model semiparametrically. In order to avoid the bias deriving from the fact that we are using a "stock sampling" rather than a "flow sampling" design, we need to condition transition rates on the length of the spell at the first interview date.[21] The individual likelihood contribution can be written as:

$$\begin{aligned} L_i &= c_i \ln h_i(j_i + k_i) + \sum_{t=j_i+1}^{j_i+k_i-1} \ln\left\{\ln(1 - h_i(t)\right\} \\ &= c_i \ln\left(1 - \exp - \left[-\left\{\exp \mathbf{x}'_{it}\boldsymbol{\beta} + \gamma(j_i + k_i)\right\}\right]\right) \\ &\quad - \sum_{t=j_i+1}^{j_i+k_i-1} \exp\left\{\mathbf{x}'_{it}\boldsymbol{\beta} + \gamma(t)\right\} \end{aligned} \tag{9}$$

where c_i is a censoring indicator that takes the value 1 if d_i is uncensored and zero otherwise. The model can be estimated through binary outcome models where duration

dependence is built into the specification through period specific constants.[22] Moreover, the model can be estimated separately for quits (voluntary separations) and layoffs (involuntary separations), while viewed as competing risks.[23] In this paper we focus on quits, using a logit specification of the hazard.[24] Under the competing risks framework the quit hazard is estimated by treating durations terminated in a layoff as censored. Our basic model specification includes among the regressors four dummy variables indicating pension schemes participation status: joining an occupational pension plan once offered by the employer, not joining an occupational pension plan and contract out a personal pension plan, not joining an occupational plan and remaining in the state scheme, and, finally, contracting out a personal pension while not being offered an occupational pension plan. These dummies correspond to the available pension choices in the UK system, keeping as reference category those workers who were not offered an occupational pension plan and remained into the state scheme. However, it may be true that individual pension status is endogenous with respect to the duration of employment. Endogeneity would lead to a spurious correlation between pension status and job tenure. In order to account for it we use an instrumental variable identification strategy, described in subsection 7.2.

6 Data

The data used in the empirical analysis are from waves 1 to 12 of the British Household Panel Survey (BHPS). Started in 1991, the survey has a longitudinal design, covering a

nationally representative random sample of the UK population. We select a sample of private - non agricultural, no construction - sector full time male employees aged 25 to 50 and interviewed at least in two consecutive waves during the observation period.[25] We follow individuals until they separate from their current employer. Every year, working age individuals are asked to complete their employment history over the previous year, indicating the end of any employment spell and the motivations behind it. This allows us to define quits, or voluntary separations, as job separations motivated either by the take up of a better job with a different employer or by other personal related reasons. The BHPS also contains a number of questions about employees' pension arrangements. Employees are asked if their current employer runs an occupational pension scheme for which they are eligible, if they participate into it and if they have contracted a personal pension. These questions allow us to recover the pension status of each employee. Unfortunately, participants to an occupational pension plan are not asked to provide a description of their plan. This prevents us to estimate separately the role of DB and DC plans. However, in the empirical analyisis potential portability losses are computed for all employees participating to an occupational pension scheme as if the latter was the "typical" UK private sector DB plan.[26] While this assumption implies a possible upward bias of the portability loss effects, we also believe that it is a reasonable approximation, given the low proportion of workers in DC plans and the high degree of similarity among DB schemes in the UK.[27] We report in Table 4

pension schemes' participation rates of individuals when first observed in our sample. More than three quarters are offered an occupational pension scheme, and 80 percent of them join the scheme.[28] About 60 percent of those who decline to join contract out a personal pension, while the others remain in the state scheme. Among workers not offered an occupational pension, 56 percent contract out a personal pension.

Table 5 summarizes quits over the observation period by pension participation status. In our sample, the quit rate of workers participating to an occupational pension plan is about four times lower of that of workers not offered an occupational pension arrangement and staying into SERPS. It is interesting to note that also workers who decline to join an occupational pension plan offered by their employer have lower quit rates. Overall, workers offered an occupational pension scheme, independently of their take-up decision, have a quit rate of 4,6 percent against the 11,3 percent quit rate of workers not offered any occupational scheme. These results are suggestive of a negative correlation among occupational pension coverage/participation and job mobility. However, the observed differences in quit rates could be due to observable and/or unobservable characteristics correlated with pension status. Indeed, Table 6 indicates that workers in different second tier pension arrangements are different along many other observable dimensions. In particular, workers covered by occupational pension plans earn higher hourly wages, are more likely to be union members, to have a degree and to be in large firms. To account for these observable differences a multivariate approach

is taken. We also investigate the role of unobservables simultaneously affecting pension choices and employment duration through an instrumental variables identification strategy.

7 Results

7.1 Simple Quit Hazards

The estimated coefficients for the proportional quit hazard model are reported in Tables 7 and 8.[29] We assume a flexible semiparametric piece-wise form for the baseline hazard. Duration dependence is captured through 12 job duration dummies, one for each of the first eleven years and a further dummy that groups durations over 12 years. The estimates in column (1) of Table 7 indicate that not only workers participating to occupational pension plans but also workers that although being offered a scheme decide not to join, either opting out for a personal pension or staying into the state scheme, are significantly less likely to quit. Alternatively, workers not offered an occupational pension scheme but contracting out a personal pension are not less likely to quit at significant levels. The estimated coefficients on occupational pension dummies are very close to each other. A test of their equality is not rejected at 99 percent significance level. The estimates on the other variables indicate that children negatively affect quits, while family size and experience increase the likelihood of voluntary separations. The baseline quit hazard estimates, reported in Column (1) of Table 8 show a significant negative although non-monotonic shape. Until the 3rd year, the hazard is

monotonically decreasing. Upward spikes are found at the 3rd, 6th, 8th and 12th year of the spell. Column (2) of Table 7 reports results from a second specification of the quit hazard, which aims to capture the effect of financial quit losses on the likelihood to quit. Contrary to common policy predictions, pension portability losses are not found to be significant at standard levels. These results are consistent with those provided by Disney and Emerson (2002) and Andrietti (2003). They suggest that the most relevant pension status affecting the quit decision is whether the individual holds an occupational pension covered job. This may reflect "endogenous choice", and thus selection into occupational pension jobs, as well as the fact that workers in occupational pension jobs may be less likely to leave because they are in "good jobs", that is jobs paying wages above competitive levels.

These results also suggest that we may use a more parsimonious specification. Given that we cannot reject equality of the occupational pension dummies coefficients', we group them in a single dummy indicating if the worker is covered by an occupational pension. Moreover, given the non significance of the personal pension dummy for non covered workers we extend the reference category to all workers not offered an occupational pension scheme. Results from estimates of this alternative specification are reported in Columns (1) and (2) of Tables 9 and 10. The results are similar to those reported in Tables 7 and 8. However, the advantage of using this specification is that it allows us to address the endogeneity of the occupational pension coverage dummy

exploiting the exogenous variation provided by the only available instrumental variable.

7.2 IV Quits Hazards

To address pension endogeneity we focus on the specification used in Column (1) of Tables 9 and 10, which excludes pension portability losses. The use of this specification is motivated by the lack of significance of the pension loss variable. We use an instrumental variables (IV) identification strategy. In general, IV estimation requires at least one explanatory variable satisfying an exclusion restriction which is directly related to the identification issue: the variable used as an instrument must not have any direct influence on the outcome variable, while any influence on it should be only indirect through the instrumented explanatory variable. Our instrument for the occupational pension coverage dummy variable is the occupational pension offer rate by region of residence. The latter variable, whose variation is reported in Table 12, should be correlated with the choice to take up an occupational pension job. However, the validity of our instrument relies on the mantained assumption that individuals do not choose their region of residence. Given their region of residence, individuals face an occupational pension offer rate in that region which affect their probability of entering in an occupational pension job. Occupational pension coverage choice is modelled as a reduced form and should be seen as the result of employer/employee decisions. When discussing IV estimation methods the focus is usually on linear outcome equations. In our case we deal with a nonlinear outcome (logit) equation. Consistent two step estimation in the

resulting class of simultaneous probability models has been discussed by Mallar (1977) and Angrist, Imbens and Rubin (1996). Recent applications include Dearden, Machin, Reed and Wilkinson (1997), Veum (1997) and Hujer, Maurer and Wellner (1999). They all estimate probit models to obtain individual training participation propensities which are then used to instrument potentially endogenous training variables in job mobility equations. We follow a similar approach. We estimate a probit occupational pension coverage equation which includes the regressors in the quit hazards and the occupational pension offer rate.[30] It is also possible to ignore the dicotomous nature of the dependent variable and estimate the occupational pension coverage equation as a linear probability model (LPM). This allows to relax the normality assumption imposed by the probit model on the error terms and to estimate the equation by least square. The estimated results for these models are reported in Columns (1) and (2) of Table 11 respectively, and confirm the validity of our instrument in explaining significantly the occupational pension coverage decision[31]. The second step in the IV procedure requires computing predicted probabilities of occupational pension coverage and substituting them for the occupational pension coverage dummy in the quit hazard. The results of the IV quit hazard are reported in Columns (3) and (4) of Tables 9 and 10.[32] Comparing these results with those in Column (1) we notice that the impact of occupational pension coverage on quit hazards is now not significant at standard levels, even switching to positive when we use the LPM in the first step. Alternatively the other

coefficients remain virtually unchanged. Exogeneity of occupational pension coverage status in the quit hazard is also rejected using an Hausman (1978) test.[33] These results seem to indicate that the negative relationship between occupational pension coverage and quits is due to "selection on unobservables" and confirm the importance of taking into account of the endogeneity of pension choices, an issue that is disregarded by most of the empirical literature.

8 Conclusions

This paper analyzes voluntary separations of private sector male employees in the UK using an hazard rate modelling framework. The aim is to evaluate the impact of second tier pension schemes choice and portability rules on voluntary job mobility. Our main finding is that the impact of occupational pension status on quit hazards changes significantly moving from a simple model to an instrumental variable hazard model. In the former, workers either offered and participating or offered but not participating to an occupational pension plan are found to have significantly lower quit rates. However, once endogeneity is accounted for through instrumental variables these effects are no more significant. Alternatively, the effect of pension portability losses on quit hazards is never significant. These results seem to indicate that the negative relationship between occupational pension coverage and quits is due to spurious correlation and confirm the importance of taking into account of the endogeneity of pension choices, an issue that is disregarded by most of the empirical literature. From a policy perspective, our re-

sults cast doubts on the effectiveness of pension portability reforms on fostering labour mobility, suggesting that the lower job mobility rate of pension covered workers may be attributed to unobservable individual traits (eg. lower discount rates) or to a better quality of these jobs (e. g. in terms of wage rates) rather than to the costs associated with pension portability losses.

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Notes

[1]See Dorsey (1995).

[2]See Ippolito (1985, 1987, 1991) and Allen, Clark and McDermed (1988, 1993). McCormick and Hughes (1984) and Henley, Disney and Carruth (1994) provide evidence for the UK.

[3]Gustman and Steinmeier (1993), Ippolito (1994).

[4]Allen, Clark and McDermed (1993), Ippolito (1997).

[5]These reforms are known as *Thatcher reforms* (Social Security Act 1980, Social Security Act 1986), *Major reforms* (Pension Act 1995), and *Blair reforms* (Welfare Reform and Pension Act 1999, Child Support, Pensions and Social Security Act 2000).

[6]In a DB plan workers' pension benefits are determined on the basis of an accrual rate, years of plan participation and final salary.

[7]In a DC plan an individual account is opened for each worker. Contributions are invested in financial assets.

[8]Personal Pension Schemes are individual DC pension accounts offered by financial institutions and usually not linked to a particular employer.

[9]SPS are defined contribution schemes set up by employers, representative, membership or affinity organizations, or financial services companies. Although they are similar to personal pensions, they have to meet minimum standards for charges-access-terms. Employers without an occupational scheme and with at least five staff must offer access to SPS.

[10]Employers can also sponsor a "contracted-in" occupational pension scheme supplementing, rather then substituting, SERPS/S2P pension benefits.

[11]Individuals can participate to occupational and personal pension schemes at the same time only if the occupational scheme is "contracted-in" or if the personal pension scheme is used to receive a transfer payments from a previous scheme.

[12]Government Actuary's Department (1995, 2001, 2003).

[13]The vesting period represents the minimum length of service to be completed in order to obtain pension rights' entitlement.

[14]g accounts for worker's expected wage increases reflecting firm's wage-tenure profile, overall productivity growth and inflation.

[15]i is the worker's expected nominal interest rate.

[16]See Ippolito (1985) and Kotlikoff and Wise (1985).

[17]See Mitchell (1983) among others.

[18]Ippolito (1985, 1987, 1991), Allen, Clark and McDermed (1988, 1993).

[19]Gustman and Steinmeier (1993), Ippolito (1994).

[20]Allen, Clark and McDermed (1993), Ippolito (1997).

[21]See Jenkins (1995).

[22]See Sueyoshi (1995).

[23]See Narendranathan and Stewart (1993).

[24]The complete set of results including job separation and layoff hazard models are available upon request from the author.

[25]These age limits are set in order to avoid sample selection issues related to labour force attachment of younger workers and retirement of older workers.

[26]Table 3 reports the assumptions used in the computation.

[27]See Tables 1 and 2

[28]Differences with the figures provided by the Government Actuary's Department (1995, 2001, 2003) may be due to the fact that our sample is defined on a more restricted age range, excluding females, construction and part time employees.

[29]Logit coefficients are reported. Standard errores are reported in parenthesis. Statistical significance is denoted with one (90 percent) or two (95 percent) asterisks.

[30]In this case, an instrument is not strictly required given that identification is guaranteed by the nonlinearity of the probit model.

[31]Included in the model but not reported here are 11 dummies for job tenure. The estimated coefficients have been transformed into marginal effects. Bootstrapped standard errors (1.000 draws) are reported in parenthesis, while the coefficients' statistical significance is indicated with one (90 percent) or two (95 percent) asterisks. The complete set of results is available upon request.

[32]Bootstrapped standard errors (1.000 draws) are reported in parenthesis, while the coefficients' statistical significance is indicated with one (90 percent) or two (95 percent) asterisks.

[33]This method involves estimating a specification of the hazards which includes both the actual and the predicted values of occupational pension coverage as regressors and testing the null hypothesis that the coefficients on the predicted values are equal to zero. The test statistic obtained allows to reject exogeneity at standard significance levels.

Table 1: Private Sector Pension Schemes Members by Plan Type

	1991		1995		2000	
	Millions	%	Millions	%	Millions	%
DB Plans	5.3	81.5	4.87	80	4.6	80.7
DC Plans	1	14.3	1.1	18	0.9	15.7
Hybrid Plans	0.2	4.7	0.3	4.9	0.2	3.5
Total Active Members	6.5	100	6.2	100	5.7	100
Private Sector Workers	15.8		16		17	
OP Members in % of Private Sector Workers		40		39		36

Source: Government Actuary's Department (1995, 2001, 2003)

Table 2: Private Sector Pension Schemes Members by Plan Type and Contracting Out Status

	1991		1995		2000	
	Millions	%	Millions	%	Millions	%
DB Plans						
COSR	4.6	90.2	4.13	87.3	4.1	89.1
CISR	0.5	9.8	0.57	12.7	0.5	10.9
DC Plans						
COMP	0.4	44.4	0.46	42	0.3	33.3
CIMP	0.5	55.6	0.64	58	0.6	66.7
Total contracting-out	5	84	4.6	80	4.4	83

Source: Government Actuary's Department (1995, 2001, 2003)

Table 3: Assumptions for Portability Loss Computation

Annual Accrual Rate	1/60
Pensionable Wage	Final Wage
Normal Retirement Age	60
Expected Inflation Rate	3%
Expected Nominal Wage Growth Rate	5%
Post-Retirement Indexation	3%
Early Leavers' Indexation	3%
Nominal Discount Rate	5%
Inflation Adjusted Discount Rate	2%

Table 4: Pension Schemes Coverage and Participation

Offered OP	77.33
Offered OP - joined	60.77
Offered OP - not joined - PP	9.81
Offered OP - not joined - SERPS	6.75
Not Offered OP	22.67
Not Offered OP - PP	12.77
Not Offered OP - SERPS	9.90
Sample Size	1.081

Source: Our Elaboration on BHPS Data

Table 5: Quits by Pension Status

Offered OP	**4.63**
OP Member	4.28
Offered OP, No Joined-PP	6.90
Offered OP, No Joined-SERPS	6.44
Not Offered OP	**11.26**
Not Offered OP-PP	8.54
Not Offered OP-SERPS	15.98
Sample Size	4.427

Source: Our Elaboration on BHPS Data

Table 6: Summary Statistics (Mean) by Pension Status

	Offered OP				Not Offered OP		
	Joined	PP	SERPS	All	PP	SERPS	All
Quits	.043	.069	.064	.046	.16	.085	.113
Married (%)	.85	.73	.75	.83	.79	.72	.77
Age	38.7	34.7	35.3	38.1	37.7	34.7	36.7
Children	1	.89	.74	1	.83	.73	.79
Household Size	3.3	3.1	3	3.2	3.1	3	3.06
Spouse Employed (%)	.66	.59	.55	.65	.64	.56	.61
Union Member (%)	.49	.28	.27	.34	.12	.09	.115
Manager & Professional (%)	.35	.23	.18	.33	.25	.19	.23
White Collar Worker (%)	.19	.17	.2	.19	.16	.16	.16
Medium Firm (%)	.34	.36	.42	.35	.10	.11	.107
Large Firm (%)	.28	.16	.17	.26	.03	.02	.03
Experience	22.2	18.3	19.2	21.7	21.7	18.6	21
Job Tenure	11.3	6.9	6.6	10.6	8.5	6	7.6
Distribution (%)	.12	.22	.16	.13	.25	.23	.24
Services (%)	.35	.24	.26	.33	.38	.34	.367
Education: Degree (%)	.22	.12	.12	.21	.09	.07	.08
Education: A Level (%)	.35	.34	.36	.35	.33	.38	.35
Education: O Level (%)	.26	.32	.24	.27	.31	.29	.31
Net Wage	7.1	5.3	4.9	6.8	5.4	4.7	5.16
Sample Size	3.157	348	233	3.734	448	245	698

Source: Our Elaboration on BHPS Data

Table 7: Quit Hazard Rates

	Model 1	Model 2
Married	0.033	0.025
	(0.253)	(0.253)
Education: Degree	0.241	0.236
	(0.252)	(0.251)
Education: A Level	0.060	0.064
	(0.213)	(0.214)
Education: O level	-0.160	-0.155
	(0.223)	(0.223)
Children	-0.226	-0.227
	(0.105)**	(0.105)**
Household Size	0.169	0.168
	(0.08)**	(0.08)**
House Tenant	0.023	0.027
	(0.198)	(0.198)
Spouse Job	-0.008	-0.004
	(0.188)	(0.188)
Experience	0.124	0.123
	(0.06)**	(0.06)**
Experience Squared	-0.004	-0.004
	(0.001)**	(0.001)**
Manager & Professional	0.089	0.094
	(0.177)	(0.178)
White Collar Worker	0.091	0.094
	(0.197)	(0.197)
Distribution	0.155	0.153
	(0.193)	(0.193)
Services	0.154	0.142
	(0.158)	(0.142)
Medium Firm	-0.189	-0.192
	(0.172)	(0.172)
Large Firm	-0.151	-0.159
	(0.201)	(0.201)
Union Member	-0.208	-0.206
	(0.172)	(0.172)
OP-Joined	-0.813	-0.859
	(0.233)**	(0.239)**
OP-No Joined-PP	-0.717	-0.713
	(0.29)**	(0.29)**
OP-No Joined-SERPS	-0.757	-0.755
	(0.333)**	(0.333)**
NO OP-PP	-0.393	-0.383
	(0.254)	(0.254)
Pension Loss		0.059
		(0.066)
Log Likelihood	-883	-882
Spells Ended from Risk	251	251
Sample Size	4.427	4.427

Table 8: Semiparametric Baseline Quit Hazards

	Model 1	Model 2
dur1	-1.892	-1.854
	(0.676)**	(0.677)**
dur2	-2.848	-2.812
	(0.676)**	(0.676)**
dur3	-2.924	-2.890
	(0.686)**	(0.686)**
dur4	-2.801	-2.769
	(0.676)**	(0.676)**
dur5	-3.031	-3.004
	(0.688)**	(0.689)**
dur6	-3.226	-3.201
	(0.692)**	(0.692)**
dur7	-3.125	-3.108
	(0.699)**	(0.699)**
dur8	-3.790	-3.777
	(0.733)**	(0.733)**
dur9	-3.776	-3.770
	(0.734)**	(0.734)**
dur10	-3.796	-3.797
	(0.745)**	(0.745)**
dur11	-3.600	-3.609
	(0.743)**	(0.744)**
dur12+	-3.951	-4.006
	(0.694)**	(0.698)**

Table 9: Quit Hazards Rates. Simple and IV Models

	Simple Quit Hazards		IV Quit Hazards	
	Model 1	Model 2	Probit 1st step	LPM 1st step
Married	0.024	0.013	-0.003	-0.010
	(0.252)	(0.253)	(0.259)	(0.252)
Education: Degree	0.222	0.212	0.186	0.142
	(0.250)	(0.249)	(0.282)	(0.260)
Education: A Level	0.048	0.049	0.031	0.017
	(0.213)	(0.213)	(0.224)	(0.214)
Education: O Level	-0.169	-0.167	-0.167	-0.174
	(0.222)	(0.222)	(0.225)	(0.221)
Children	-0.227	-0.228	-0.229	-0.238
	(0.104)**	(0.105)**	(0.114)**	(0.105)**
Household Size	0.172	0.171	0.173	0.178
	(0.080)**	(0.080)**	(0.089)**	(0.080)**
House Tenant	0.040	0.043	0.061	0.061
	(0.197)	(0.197)	(0.201)	(0.195)
Spouse Job	-0.009	-0.006	-0.000	0.007
	(0.188)	(0.188)	(0.204)	(0.187)
Experience	0.121	0.119	0.121	0.123
	(0.059)**	(0.059)**	(0.063)**	(0.059)**
Experience Squared	-0.004	-0.004	-0.004	-0.004
	(0.001)**	(0.001)**	(0.002)**	(0.001)**
Manager & Professional	0.075	0.058	0.013	-0.023
	(0.175)	(0.176)	(0.181)	(0.186)
White Collar Worker	0.076	0.074	0.037	0.000
	(0.196)	(0.196)	(0.213)	(0.193)
Distribution	0.150	0.147	0.149	0.157
	(0.193)	(0.193)	(0.204)	(0.193)
Services	0.146	0.135	0.176	0.196
	(0.158)	(0.158)	(0.177)	(0.160)
Medium Firm	-0.182	-0.184	-0.278	-0.342
	(0.172)	(0.172)	(0.204)	(0.196)
Large Firm	-0.144	-0.154	-0.243	-0.322
	(0.200)	(0.201)	(0.24)	(0.246)
Union Member	-0.218	-0.221	-0.202	-0.353
	(0.170)	(0.170)	(0.192)	(0.201)
OP	-0.578	-0.578	-0.195	0.139
	(0.170)**	(0.175)**	(0.504)	(0.667)
Pension Loss		0.056		
		(0.065)		
Log Likelihood	-883.8	-883.5	-889.5	-889.5
Spells Ended From Risk	251	251	251	251
Sample Size	4.427	4.427	4.427	4.427

Table 10: Semiparametric Baseline Quit Hazards

	Simple Quit Hazards		IV Quit Hazards	
	Model 1	Model 2	Probit 1st step	LPM 1st step
dur1	-2.017	-1.959	-2.158	-2.320
	(0.664)**	(0.667)**	(0.708)**	(0.735)**
dur2	-2.987	-2.932	-3.148	-3.318
	(0.664)**	(0.666)**	(0.712)**	(0.742)**
dur3	-3.078	-3.025	-3.229	-3.404
	(0.673)**	(0.675)**	(0.724)**	(0.754)**
dur4	-2.955	-2.904	-3.120	-3.298
	(0.664)**	(0.666)**	(0.717)**	(0.749)**
dur5	-3.186	-3.140	-3.381	-3.575
	(0.676)**	(0.678)**	(0.740)**	(0.773)**
dur6	-3.395	-3.353	-3.588	-3.777
	(0.680)**	(0.681)**	(0.740)**	(0.773)**
dur7	-3.283	-3.249	-3.481	-3.678
	(0.688)**	(0.689)**	(0.752)**	(0.786)**
dur8	-3.955	-3.927	-4.157	-4.352
	(0.723)**	(0.723)**	(0.783)**	(0.817)**
dur9	-3.941	-3.918	-4.141	-4.336
	(0.722)**	(0.723)**	(0.783)**	(0.818)**
dur10	-3.953	-3.938	-4.153	-4.347
	(0.735)**	(0.735)**	(0.793)**	(0.827)**
dur11	-3.758	-3.752	-3.975	-4.173
	(0.734)**	(0.734)**	(0.793)**	(0.829)**
dur12+	-4.120	-4.158	-4.331	-4.540
	(0.683)**	(0.686)**	(0.754)**	(0.793)**

Table 11: Pension Offer Rates by Region of Residence

Inner London	84.21
Outer London	83.61
South East	75.36
South West	78.02
East Anglia	77.08
East Midlands	77.33
West Midlands Conurbation	68
West Midlands	84.93
Greater Manchester	81.08
Merseyside	69.23
North West	79.66
South Yorkshire	68.97
West Yorkshire	69.05
York & Humberside	69.23
Tyne & Wear	76.19
North	85.71
Wales	71.7
Scotland	76.6

Source: Our Elaboration on BHPS Data

Table 12: OP Coverage Model

	Probit	LPM
Married	0.045	0.055
	(.199)	(.045)
Education: Degree	0.094	0.093
	(.204)**	(.041)**
Education: A Level	0.039	0.035
	(.155)	(.036)
Education: O Level	0.003	-0.002
	(.152)	(.035)
Children	0.011	0.014
	(.083)	(.018)
Household Size	-0.010	-0.014
	(.061)	(.015)
House Tenant	-0.017	-0.020
	(.136)	(.036)
Spouse Job	-0.024	-0.028
	(.155)	(.031)
Experience	0.002	0.001
	(.042)	(.01)
Experience Squared	-0.000	0.000
	(.001)	(.0002)
Manager & Prof.	0.104	0.138
	(.139)**	(.03)**
White Collar Worker	0.109	0.151
	(.154)**	(.032)**
Distribution	-0.006	-0.011
	(.145)	(.039)
Services	-0.079	-0.062
	(.126)**	(.026)**
Medium Firm	0.161	0.230
	(.14)**	(.027)**
Large Firm	0.200	0.251
	(.256)**	(.026)**
Union Member	0.159	0.173
	(.146)**	(.024)**
OP Offer Rate	0.008	0.007
	(.011)**	(.002)**
Sample Size	1.081	1.081