

# Occupational Pensions and Inter...rm Job Mobility in The European Union. Evidence from The ECHP Survey.

Vincenzo Andrietti<sup>a</sup>

Universidad Carlos III de Madrid, Department of Economics  
and Center for Research on Pensions and welfare policies, University of Turin.

May 14, 2001

## Abstract

Although the issue of portability of occupational pension rights has been high on the European Union (EU) policy agenda in the last two decades, no comparative studies have been produced to support the policy debate with empirical evidence. Using data from the European Community Household Panel survey we estimate the role of occupational pensions on individual job mobility choices for a sample of EU Member States - Denmark, Ireland, the Netherlands and the United Kingdom - where occupational pensions play a major role in the provision of retirement income. We model individual job mobility choices as driven by ex-ante evaluation of the expected benefits and costs from mobility. The latter include potential pension portability losses arising to workers covered by defined benefit plans. Within a switching regression econometric framework we control for potential selection bias due to unobservables simultaneously affecting prospective wages and job mobility choices. This allows us to predict counterfactual (unobserved) wages for both movers and stayers and to identify the expected wage differential as well as the mobility cost parameters in a structural probit equation. We find that, among the countries under study, pension covered workers are significantly less likely to move only in the United Kingdom, while pension portability losses do not generally act as a significant impediment to labour mobility. Although

---

<sup>a</sup>Correspondence address: Universidad Carlos III de Madrid, Departamento de Economía. c/Madrid 126, 28903 Getafe (Madrid). Tel. +34 916245744. Fax +34 91 6249875. E-mail: vandriet@eco.uc3m.es. Financial support from the European Commission within the TMR Programme, Access to Large Scale Facilities and from the Center for Research on Pensions and Welfare Policies (CeRP) is gratefully acknowledged. Part of this research has also been supported by a Marie Curie Fellowship of the European Community program Improving Human Potential under contract number HPMF-CT-2000-00504. I am indebted to Franco Peracchi and Vincent Hildebrand for their helpful comments on previous drafts of this paper. The usual disclaimer applies.

these results are consistent with the pension portability options guaranteed by defined contribution plans in Denmark and by industry wide and company defined benefit plans in the Netherlands, they provide somewhat surprising evidence for the United Kingdom and particularly for Ireland, where defined benefit pensions typically have limited portability. Rather, the finding of positive wage premiums accruing to pension covered workers in the latter two countries, particularly in Ireland, is consistent with the view that individuals are less likely to leave "good" jobs.

**Keywords:** Labour mobility, Occupational Pension Plans, Pension Portability, Endogenous Switching Regression Models.

**JEL classification:** C35, J31, J32, J41, J63, J68.

Pension portability reforms undertaken in recent years in industrialized countries have often been inspired by the need for a more mobile labour force to adjust rapidly to shifts in demand (an efficiency argument). Motivating portability reforms on efficiency grounds requires interpreting the lack of pension portability as a causal determinant of the lower turnover of workers covered by defined benefit plans. However, such an interpretation does not receive unanimous support in the pension literature. First, within the implicit contract paradigm dominating labour economics literature in the last two decades, nonportable pensions can raise productivity by preserving productive job matches, stimulating investments in workers, or creating incentives for workers not to shirk. Second, there is a lack of consensus in the empirical pension literature regarding the role played by financial (pension loss) disincentives, compensation premiums and self-selection in explaining the lower mobility rates of pension covered workers. Finally, most of the empirical literature analyzes US data. Although the issue of pension portability has been high on the European Union (EU) policy agenda in the last two decades, no comparative studies have been produced to support the ongoing policy discussion with empirical evidence. The main aim of this paper is to fill this gap using data from the European Community Household Panel (ECHP) survey. The analysis is limited to four EU Member States - Denmark, Ireland, the Netherlands and the United Kingdom - where occupational pension plans play an important role in the provision of retirement income, covering a large portion of the private sector workforce. We model individual job mobility choices as driven by comparison of the expected benefits and costs from mobility, including among the latter potential pension portability losses arising to workers covered by defined benefit plans. Within a switching regression econometric framework we control for potential selection bias due to unobservables simultaneously affecting prospective wages and job mobility choices. This allows us to predict counterfactual (unobserved) wages for both movers and stayers and to identify the expected wage differential as well as the mobility cost parameters in a structural probit equation. We find that, among the countries under study, pension covered workers are significantly less likely to move only in the United Kingdom, while pension portability losses do not generally act as a significant impediment to labour mobility. Although these results are consistent with the pension portability options guaranteed by defined contribution plans in Denmark and by industry wide and company defined benefit plans in the Netherlands, they provide some surprising evidence for the United Kingdom and particularly for Ireland, where defined benefit pensions typically have limited portability. The finding of positive wage premiums accruing to pension covered workers in the latter two countries is rather consistent with the view that individuals are simply less likely to leave "good" jobs (jobs offering a pension plan as well as a better wage profile).

The paper is organized as follows. The next section outlines the issue of pension portability and reviews the related empirical literature. Section 2 summarizes legislation regulating occupational pensions portability at EU as well as at national level. Section 3 introduces the empirical model of inter...rm job mobility. Section 4 discusses the data. Section 5 presents the results. Section 6 concludes.

## 1 Pension Portability

Pension portability can be de...ned as the capacity of workers covered by an occupational pension plan<sup>1</sup> to carry the actuarially fair value of their accrued rights from one job to the next. When a mover is not entitled to full preservation of his/her accrued rights, either in the old or in the new scheme, pension portability is not guaranteed and a portability loss is expected to arise. The latter can be de...ned as the shortfall of actual retirement bene...ts from those that would have been paid if there had been no change in scheme membership as a consequence of job separations during the career. Occupational pension plans, independently of their nature and subject to country speci...c pension regulations, usually de...ne a vesting period representing the minimum length of service to be completed in order to obtain pension rights' entitlement. Workers leaving the plan before completion of the vesting period forfeit their pension rights. Portability losses related to vesting are usually small in magnitude, given the short length of the vesting period, while portability losses arising to vested early leavers could be sizeable. In this respect, the distinction between de...ned bene...t and de...ned contribution plans becomes relevant. In de...ned contribution plans employer contributions are accumulated into individual accounts and invested on behalf of the employee. The annual pension accrual rate<sup>2</sup> is constant over the worker career, and vested workers are entitled to an actuarially fair lump-sum distribution of their accrued rights upon leaving. Alternatively, de...ned bene...t plans are characterized by a "backloaded" structure of pension rights' accrual<sup>3</sup>. In a traditional de...ned bene...t plan the sponsoring employer promises to the worker the payment of a pension annuity of the

---

<sup>1</sup>Occupational pension plans are employer sponsored plans aiming to supplement retirement income provided by public statutory schemes.

<sup>2</sup>De...ned as the increment of accrued pension rights from continuing employment, net of returns on accumulated pension rights.

<sup>3</sup>The term "backloading" is sometimes used to refer to a weighting scheme whereby the pension formula explicitly gives greater weight to later than to earlier years of employment. In the context of this paper, backloading refers to the positive slope of the pension accrual pro...le that results even when all years of work receive equal weight in the pension bene...t formula.

following form:

$$P(R) = b(R - t_{k-1})W(R); \quad (1)$$

where  $P(R)$  is the pension annuity accrued at retirement age  $R$ ;  $(R - t_{k-1})$  represents the years of pensionable service accumulated at retirement,  $b$  is the annual (percentage) accrual rate and  $W(R)$  is the wage earned immediately before retirement. Pension contributions paid in the early years of membership will generally be set at a higher level than is required to fund pension benefits on the basis of the individual's current salary, because the actuary will anticipate salary increases which can be expected in the future. Where an individual leaves prior to pensionable age, he/she will accordingly have paid too much for the benefit to which he/she is entitled, given that upon leaving the pension rights accrued under the scheme freeze and do not grow in line with any other salary increases which he/she may receive from subsequent employment. This actuarial practice is consistent with the implicit pension contract view (Ippolito, 1985), which predicts a portability loss proportional to the difference between retirement and separation wages arising to early leavers. Alternatively, the spot pension contract view, proposed by Bulow (1982), argues that the worker pension contributions are determined on the basis of current wage earnings, and therefore no portability losses arise to early leavers. Ippolito (1985) and Kotlikoff and Wise (1985) provide empirical evidence supporting the implicit contract view of pensions. Following this approach, the value of pension rights that the worker would be entitled to if he/she stays with the firm until retirement - the Stay Pension Wealth - calculated at time  $t_k$  is based on current service,  $(t_k - t_{k-1})$ ; and retirement wage earnings,  $W(R) = W(t_k)e^{g^e(R - t_k)}$ :

$$P^{Stay} = b(t_k - t_{k-1})A(t_k)W(t_k)e^{g^e(R - t_k)}e^{-i^e(R - t_k)}; \quad (2)$$

where  $A(t_k)$  is the annuity factor transforming the pension annuity into pension wealth,  $i^e$  is the long term expected discount rate at which the pension annuity is discounted from retirement to current age and  $g^e$  is the expected rate of nominal wage growth. The value of pension rights that the worker would be entitled to upon leaving a defined benefit plan before retirement - the Leave Pension Wealth - calculated at time  $t_k$  is based on current service,  $(t_k - t_{k-1})$ ; and current wage,  $W(t_k)$ :

$$P^{Leave} = b(t_k - t_{k-1})A(t_k)W(t_k)e^{-i^e(R - t_k)}; \quad (3)$$

Assuming that pension covered movers immediately find another job with the same pension plan and with the same wage profile, and that  $g^e = i^e$ , the portability loss arising to vested workers is defined as:

$$P^{Loss} = P^{Stay} - P^{Leave} = b(t_k - t_{k-1})A(t_k)W(t_k)(1 - e^{-i^e(R - t_k)}); \quad (4)$$

while for unvested workers the portability loss is defined as:

$$P^{Loss} = P^{Stay} = b(t_k | t_{k-1})A(t_k)W(t_k): \quad (5)$$

The pension portability loss has a concave shape relative to age. Its basic pattern does not depend upon the worker joining the firm at any specific age or upon actuarial assumptions, although the latter affect its magnitude. The "new pension economics" literature of the early 1990s includes pension portability loss<sup>4</sup> as well as compensation premiums accruing to pension covered workers<sup>5</sup> or self-selection of workers into pension covered jobs<sup>6</sup> as potential explanations to the well documented low mobility rate for pension covered workers<sup>7</sup>. In Allen, Clark and McDermid (1993) pension portability losses are assumed to act both as a mobility deterrent for pension covered workers and as a self-selection device, inducing "stable" workers to join pension covered jobs while screening out workers who are likely to quit or to be laid off. Estimating a switching bivariate probit model of pension coverage and turnover on 1975-1982 PSID data, Allen, Clark and McDermid (1993) conclude that the main reason why a lower turnover rate is observed among workers covered by defined benefit pensions seems to be the prospect of a pension wealth loss. In contrast, they find little evidence of sorting on unobservables. A different research approach, similar to the one adopted in this paper, is followed by Gustman and Steinmeier (1993). They question the causal interpretation usually attributed to the strong negative correlation between portability losses and job mobility suggesting, as an alternative explanation, that implicit contracts may provide the payment of compensation premiums to pension covered workers. Using the 1984 release of the SIPP data, Gustman and Steinmeier (1993) model the individual job mobility decision as depending on current as well as on alternative job lifetime wage earnings, on a constructed pension backloading variable and on a set of other regressors proxying mobility costs. Imposing joint normality on the wage and the mobility equation error terms, they estimate the model through a maximum likelihood procedure. However, their self-selection mechanism differs from standard switching regression models with endogenous switching, including the one presented in this paper. In particular, Gustman and Steinmeier (1993) assume a different definition of actual and counterfactual wages: stayers' wages are observed for all individuals in period one job, while the alternative (mover) wages are observed only for those who have changed job between period one and period two. These assumptions allow them to compute an actual wage differential for movers (as opposed to the usual one derived from counterfactuals imputation) while

---

<sup>4</sup>Allen, Clark and McDermid (1988).

<sup>5</sup>Gustman and Steinmeier (1993).

<sup>6</sup>Allen, Clark and McDermid (1993).

<sup>7</sup>Mitchell (1982, 1983).

providing enough information to estimate an additional parameter - the correlation among unobservables in the current and alternative wage equations - which is not identifiable in the standard setting of a switching regression model with endogenous switching. Their empirical findings suggest that efficiency wage premiums rather than backloaded pension accrual patterns are the primary cause for the lower turnover rates of workers covered by defined benefit pension plans. Similar results are provided by Andrietti and Hildebrand (2001) estimating the model presented here on SIPP pooled panel data covering the period 1985 - 1994.

Empirical models have mainly been tested on US data, while there is almost no evidence on pension-mobility patterns for EU countries<sup>8</sup>. The main aim of the paper is to fill this gap, using recent available releases of data from the European Community Household Panel (ECHP) survey, while providing an alternative modelling approach to the empirical analysis of pension portability.

## 2 Pension Portability in The EU

Promoting labour mobility within the EU is a fundamental aim of the Community. Application of the principle of workers' freedom of movement stated in the Rome Treaty should guarantee portability of pension rights, either statutory or supplementary, within the EU area. However, while coordination of mandatory public pension schemes through a number of regulations allows private sector migrant workers to fully preserve their accrued statutory pension rights, legislation on portability of supplementary pension rights is just taking its first steps. After a long discussion and various EC proposals, a directive on "safeguarding the supplementary pension rights of workers moving within the European Union" was adopted by the Council of Europe in June 1998<sup>9</sup>. The directive establishes the right of workers temporarily posted from their employers to another EU State to continue membership in their domestic pension plans, recommending the extension of this right to workers that temporarily migrate while changing employer. Moreover, the hosting State cannot oblige migrant workers to participate in a pension scheme in case they choose to continue membership in the domestic scheme. The Commission has preferred to confine its strategy to matters of principle; the principle is that each worker should be able to move to a job in another Member State without suffering portability losses from occupational pension arrangements. According to this approach, the aim of the directive is to preserve migrant

---

<sup>8</sup>Although some evidence is provided by Mealli and Pudney (1996) and McCormick and Hughes (1984) for the United Kingdom.

<sup>9</sup>Directive 98/49/EC.

workers' pension rights at least at the level guaranteed in the case of within-borders mobility. It is then worthwhile to provide an overview of the portability regulation implemented within the countries under study<sup>10</sup>.

**Denmark** In Denmark the typical plan is defined contribution. Vesting rules usually depend upon the contractual scheme's nature. Private pension funds, regulated by the Pensions and Savings Fund Act, provide immediate vesting rights for employees contributions, while employer contributions are vested only after five years. Group insurance arrangements, regulated by the Tax on Pension Schemes Act, require a minimum age of 30 for early leavers as a further condition for full vesting. Employees are entitled to a tax free transfer value once they move job. However, in group insurance arrangements employees cannot surrender their pension policy once they move jobs without permission from their former employer.

**Ireland** In Ireland the 1990 Pension Act introduced several provisions aiming to improve pension portability. Employees' pension rights have now to be vested within a five years period. Vested employees leaving a scheme after January 1, 1993 are entitled to a preserved benefit. The amount to be preserved is related to the benefit rules of the scheme and represents accrued rights after January 1, 1991. In particular, workers leaving a defined benefit scheme from January 1, 1996, are entitled to preserved benefits which are revalued annually until retirement in line with the Consume Price Index up to a 4 percent maximum. Early leavers entitled to a preserved benefit cannot obtain a refund of contributions paid since January 1, 1991, while this is possible for contributions paid prior to that date. As an alternative to preserved benefits, early leavers have the right, within two years, to request the transfer of their accrued pension rights to a new employer's pension scheme or, even beyond two years, to a Life Assurance Company retirement bond.

**The Netherlands** In the Netherlands the vesting period, originally set to five years in the Pension and Savings Funds Act of 1953, was reduced to one year in 1972. In the case a worker leaves before the required vesting period, he/she is entitled to a refund of his/her own contributions. Employers are not required to index deferred pension benefits or pensions in payment. Early leavers' deferred benefits are usually voluntarily indexed by sponsoring employers. However, indexation of preserved benefits is required whenever the scheme provides indexation for pensions in payment. Substantial changes in employer provided pension regulation aiming to improve pension portability were introduced in 1987

---

<sup>10</sup>For an institutional analysis of cross borders pension portability in the EU see Andrietti (2001).

and in 1994. The 1987 Pensions and Savings Fund Act introduced the obligation for pension schemes to entitle early leavers with a deferred benefit proportional to the length of plan membership. Moreover, occupational pension members changing job after July 1994 have been given the statutory right of transferring their accrued rights to another pension scheme. In the Netherlands, portability of pension rights differs between industry-wide plans and company pension plans. Industry-wide plans guarantee portability of pensionable service within a particular industry, enabling workers to change jobs without losing service credit when they resume work with another employer in the plan. Company pension plans transfer deferred benefits through active portability clearing-houses called transfer circuits, in which a plan can participate upon satisfying a number of requisites. A job leaver has the option of keeping the vested rights in the former employer's plan or to use a clearing-house for transferring them to the new employer's plan. Again, these transfer circuits operate for company plans within a particular industry, so that only people moving jobs within a particular industry are not penalized.

**The United Kingdom** A number of legislative changes have contributed to improve the situation of early leavers over the last 25 years. Before 1975, early leavers in the United Kingdom had no legal right to transfer their accrued pension entitlements to a new scheme or even to have a deferred pension from their old scheme. Under the current rules, the vesting period is set at two years of pension plan membership. In particular, vested early leavers from defined benefit plans can have their accrued rights preserved in the pension scheme as deferred benefits, to be revalued until retirement guaranteeing a minimum Limited Price Indexation in line with the Retail Price Index (RPI), up to a maximum of 5 percent. Alternatively they can take a tax free transfer value to a different occupational pension scheme (either defined benefit or defined contribution) or to an approved personal pension or purchase a retirement annuity.

### 3 The Model

The literature on pensions and mobility, reviewed in section one, does not share a common view on the role played by financial disincentives, compensation premiums and self-selection arguments in explaining the lower mobility rates of pension covered workers. Empirical evidence is far from conclusive and further research is needed, together with more adequate data. However, it seems to be evident that mobility is affected not only by the worker's current wage and potential pension portability loss, but also by how his/her current compensation compares to that perceived on alternative jobs. The model presented in this

section<sup>11</sup> focuses on the role played by structural wage differentials and expected portability losses in the job mobility decision, while testing for the existence of compensation premiums accruing to pension covered workers. We don't consider the self-selection of workers into pension/no pension jobs but we account for potential selectivity bias arising when the individual mobility choice is endogenous due to potential correlation between the unobservables determining the choice and alternative prospective wages. The model is based on a binary representation of the job mobility decision. Individuals in the sample are assumed to observe the lifetime wage earnings profile in their current job as well as in their next best alternative. They also perceive a variety of pecuniary and non-pecuniary mobility costs either due to the loss of accumulated firm specific human capital or to family and relocation costs. In addition, workers covered by defined benefit plans expect to suffer a pension wealth loss while moving to a new job, due to the limited portability of their accrued pension rights. The mobility choice of individual  $i$  is represented by the binary random variable  $I_i = 1$  if  $I_i^* > 0$ ; where  $1$  is the usual indicator function and  $I_i^*$  is the lifetime net gain from mobility. We specify the latter as follows:

$$I_i^* = Y_{mi} - Y_{si} - C_i \quad \mathbf{R} \ 0; \quad i = 1, \dots, n; \quad (6)$$

where  $Y_{mi}$  is the expected present value of lifetime earnings on the assumption that the individual moves into his/her best alternative job,  $Y_{si}$  is the expected present value of lifetime earnings on the assumption that the individual remains in his/her current job,  $C_i$  is the expected present value of costs associated with mobility. The individual mobility choice in (6) is based on an ex-ante comparison. The individual moves to a different job if his/her expected lifetime earnings gains exceed mobility costs. Otherwise he/she stays in his/her current job. In representing the individual decision empirically we have two main problems. First, we don't observe lifetime wage earnings for actual movers and stayers. We assume current earnings to be the best predictor of lifetime earnings<sup>12</sup>. The second, and

<sup>11</sup>This model was pioneered by Roy (1951) and since then has been applied to the analysis of a wide variety of individual choices, ranging from education levels (Willis and Rosen 1979), migration (Robinson and Tomes 1982), sector of employment (Rees and Shah 1986) and job mobility (Borjas and Rosen 1980). These studies focus on the economic consequences - in terms of returns - of the choice taken, while we are rather investigating the factors affecting job mobility choices. A model similar to ours was proposed by Gustman and Steinmeier (1993), although their estimation methodology is based on a different set of assumptions.

<sup>12</sup>Another approach would have been to assume a constant, but unobserved, rate of future wage growth, discounting back at a constant interest rate the streams of future wages and assuming that the individual stays in his/her job until retirement, on the basis of the following formula:

$$\text{Lifetime Wage} = \sum_{t=0}^{\infty} Y_t e^{(g_i - r)t}$$

even more important, problem is that we cannot observe the counterfactual wage for each individual, that is what the individual would have earned had he/she taken the alternative mobility choice. What we observe is the wage conditional on the choice actually taken. In order to obtain predictions of the counterfactual wage for each individual we use the estimated coefficients of the actual movers and stayers. Given that the event  $fl_i^m > 0$  is equivalent to the event  $fl_i^m = I_i^m = Y_{si} > 0$  and that mobility costs are not directly observable, we can specify the selection index as follows:

$$I_i^m = \alpha (\ln Y_{mi} - \ln Y_{si}) - \beta' X_{ci} + v_{ci}; \quad i = 1; \dots; n; \quad (7)$$

where  $X_{ci}$  is a vector of personal and job specific mobility costs predictors,  $\beta$  is a vector of unknown parameters, and  $v_{ci}$  is a continuous random variable distributed independently of  $X_{ci}$  with zero mean and variance  $\sigma_c^2$ . Wage equations for movers and stayers are modelled using a semilog form:

$$\ln Y_{mi} = \alpha_m' X_i + v_{mi} \quad i = 1; \dots; m; \quad (8)$$

$$\ln Y_{si} = \alpha_s' X_i + v_{si} \quad i = m + 1; \dots; n; \quad (9)$$

where  $\ln Y_{mi}$  is the natural logarithm of hourly net wage for movers,  $\ln Y_{si}$  is the natural logarithm of hourly net wage for stayers,  $X_i$  is a vector of personal and job specific variables including education level, gender, experience and its square, occupational pension coverage, type of contract, industry, occupation and employer size dummies,  $\alpha_m$ ;  $\alpha_s$  are vectors of unknown parameters, and  $v_{mi}$ ;  $v_{si}$  are continuous random errors containing unobservable variables, such as individual abilities and specific capital that are useful in the chosen job, distributed independently of  $X_i$  with zero mean and unknown variances  $\sigma_m^2$ ;  $\sigma_s^2$ . Equations (7); (8); and (9) represent our structural model of inter-firm job mobility. Substituting from (8) and (9) into (7) yields a reduced form selection index:

$$I_i^m = \alpha' W_i + v_i \quad i = 1; \dots; n; \quad (10)$$

where  $W_i = [X_i; X_{ci}]$ ;  $\alpha = [(\alpha_m' \quad \alpha_s')] \beta$ ; and  $v_i = (\alpha_m v_{mi} - \alpha_s v_{si}) - \beta v_{ci}$ : The decision rule (10) selects individuals into movers and stayers according to their largest expected present value. Therefore, wages actually observed in each group are not random samples of the population, but truncated samples. Selectivity bias in wage equations estimation arises from any correlation between the unobserved determinants of mobility choices and wages. Only if such a correlation were not present, the usual ordinary least square method could

---

where  $g^e$  is the expected nominal rate of wage growth and  $i^e$  is the expected nominal discount rate. However, these approaches are similar in that both implicitly assume that available information about current wages is indicative of lifetime wages.

be used to consistently estimate the wage equation parameters on the selected subsample. In general, however, this does not occur. Consistent estimates of the above model are obtained using Heckman's (1979) two-step correction. It is assumed that the error terms ( $v_{mi}; v_{si}; v_i$ ) are independent of  $(X_i; W_i)$  and have a trivariate normal distribution, with a zero mean vector and unknown variance covariance matrix:

$$\Sigma = \begin{pmatrix} \sigma_m^2 & \sigma_{sm} & \sigma_{vm} \\ \sigma_{ms} & \sigma_s^2 & \sigma_{vs} \\ \sigma_{mv} & \sigma_{sv} & 1 \end{pmatrix};$$

where  $v_i$  is assumed to have a unit variance, since the parameters of the reduced form probit equation (10) are estimable only up to a scale factor. Estimation of selection corrected wage equations allows us to predict wages for actual movers and stayers as well as to impute counterfactual wages for each individual's unobserved mobility status, conditional on his/her own observed characteristics:

$$\ln Y_{mi} = \alpha_m^0 X_i + \sigma_{mv} \hat{\lambda}_{mi}; \quad i = 1; \dots; n; \quad (11)$$

$$\ln Y_{si} = \alpha_s^0 X_i + \sigma_{sv} \hat{\lambda}_{si}; \quad i = 1; \dots; n; \quad (12)$$

where  $\hat{\lambda}_{si}$  and  $\hat{\lambda}_{mi}$  are the inverse Mills' ratios - estimated from the first-step reduced form probit - accounting for non randomness of job mobility choices. The following step is to compute the individual ex-ante structural wage differential:

$$\ln Y_{mi} - \ln Y_{si} = (\alpha_m^0 - \alpha_s^0) X_i + (\sigma_{mv} \hat{\lambda}_{mi} - \sigma_{sv} \hat{\lambda}_{si}); \quad i = 1; \dots; n; \quad (13)$$

The first term on the right hand side of (13) represents differences between systematic components of wages in the alternative and in the current job, while the second term accounts for random differences not captured by wage equations but important in determining the mobility choice. The imputed wage differential is then substituted in (7) to obtain a structural probit equation:

$$I_i^m = \alpha_c^0 (\ln Y_{mi} - \ln Y_{si}) + \beta_c X_{ci} + \epsilon_i; \quad i = 1; \dots; n; \quad (14)$$

where:  $\epsilon_i = (v_{mi} - v_{si}) + v_{ci}$

Maximum likelihood estimation of equation (14) allows us to obtain estimates of the structural parameters related to the main determinants of the individual mobility choice. The model requires identifying exclusion restrictions. First, identification of wage equations parameters requires that at least one exogenous variable belonging to the vector  $X_{ci}$

be not contained in  $X_i$ <sup>13</sup>. Second, identification of the parameter  $\rho$  in the structural probit equation requires that at least one exogenous variable belonging to the vector  $X_i$  be excluded from  $X_{ci}$ : Both these conditions are satisfied by our underlying economic model. The reduced form selection index contains variables included in  $X_{ci}$  but excluded from  $X_i$ <sup>14</sup>, while the vector of regressors  $X_i$  explaining wages contains job specific variables not included in  $X_{ci}$ <sup>15</sup>: A further identifying covariance restriction,  $\sigma_{ms} = 0$ , accounts for the fact that sample observations cannot reflect the correlation between  $\ln Y_{mi}$  and  $\ln Y_{si}$ . Parametric estimation of sample selection models exploits the relationships between selection and outcome equations' errors operating through distributional assumptions. In particular the joint normality assumption implies linear relationships between selection and outcomes equations' errors. Sample selection models based on normality have been criticized on grounds of a seemingly lack of robustness of the parameters estimates to misspecification of the maintained distributional assumptions. In particular, the most recent literature proposes a semiparametric approach, where the outcome equation error conditional on the selected regime is not implicitly - through distributional assumptions - or explicitly assumed to be a linear function of the selection's equation error. Rather, this relationship is represented by an unknown function<sup>16</sup>. However, Newey, Powell and Walker (1990) and Lanot and Walker (1998) provide evidence that semiparametric methods give similar results to Heckman's two-step parametric procedure.

## 4 Data: The ECHP Survey

The European Community Household Panel (ECHP) survey is a standardized, multi-purpose, annual longitudinal survey<sup>17</sup> collected since 1994 in most of the EU Member States under Eurostat coordination. It is structured in the form of annual interviews to a selected representative sample of household members in each country. Our empirical

---

<sup>13</sup>This avoids multicollinearity between regressors in the wage equation in case of linearity of the inverse Mills' ratio. However, in principle identification could be attained even only relying on non linearity of the latter.

<sup>14</sup>The variables excluded from the wage equations are: Not Married, Children, Household Size, House Tenant, Age, Temporary Employment Contract, Employer Provided Training, Employer Size dummies, Occupational Pension Plan, Private Pension Plan, Pension Portability Loss. All these variables refer to the beginning of the observation period.

<sup>15</sup>The following variables were excluded from the mobility costs equation: Occupational Pension Plan, Temporary Employment Contract, Occupation, Industry and Firm Size dummies. All these variables refer to the end of the observation period.

<sup>16</sup>See Vella (1998) for a survey of this literature.

<sup>17</sup>For an extensive and critical analysis of the ECHP survey structure, see Peracchi (forthcoming).

analysis is limited to a sample of four countries - Denmark, Ireland, the Netherlands and the United Kingdom - where occupational pensions play a major role in the provision of retirement income. For each country a longitudinal dataset linking wave 2 (1995) to wave 3 (1996) has been used. We have selected a sample of individuals aged between 20 and 59 employed for at least 30 hours per week (full time) in the private - non agricultural sector at the beginning of the observation period. Job mobility is defined as a change of employer between interview dates without an intervening spell of unemployment. Only transitions to full time jobs are considered. Under this definition job mobility can be interpreted as the outcome of individuals' maximizing behavior<sup>18</sup>. After dropping from the sample individuals with missing information in the relevant variables as well as those experiencing a job move with an intervening spell of unemployment (interpreted here as an involuntary move) we were left with: 1.040 observations for Denmark, 943 observations for Ireland, 1.542 observations for the Netherlands and 1.017 observations for the United Kingdom.

For the purposes of our analysis we need to know if the worker was covered by an occupational pension plan at the time when the job mobility decision was taken, and, if it is the case, to obtain a description of the plan design and characteristics. Occupational pension coverage data derived from the first (1994) ECHP wave suffer of measurement error for most of the countries analyzed here. However, from the second wave onward pension coverage questions were changed and respondents were asked: "Are you a member of a job-related or occupational pension scheme?". Respondents were also asked: "Do you contribute at present to a private pension scheme?", where private pension scheme refers here to individual voluntary retirement plans offered by private sector financial institutions<sup>19</sup>.

---

<sup>18</sup>Although an individual initiated separation (quit) could be followed by an unemployment spell while a firm initiated separation (layoff) could produce a job to job transition, still there are good reasons to use the above definition. First, even if the ECHP data allow to distinguish between quits and layoffs, a comparative empirical analysis focused on quits could not include the United Kingdom, due to missing data. Where the quit/layoff distinction is available, we have found a very high correlation between quits and job to job transitions without intervening unemployment. Moreover, self-reported causes of job mobility could suffer of measurement error, while the event of no unemployment experience between a job to job transition seems to offer a more objective measure of voluntary job mobility.

<sup>19</sup>This question is particularly relevant for the United Kingdom, where private pension schemes, defined as personal pensions, can also be employment related. In particular, the employer could offer a group personal pension rather than an occupational pension scheme. Individuals reporting to be covered by an occupational pension scheme as well as to contribute to a private pension scheme are therefore likely to belong to a group personal pension scheme. However, it may be also the case that some people who are in their employers' defined benefit occupational pension scheme answer affirmatively to the private pension pension question because they are making additional contributions to their occupational scheme in the form of Free Standing Additional Voluntary Contributions. The ECHP data allows us to identify these individuals through further questions. We therefore assume that individuals reporting to be covered both by an occupational and by a

The fact that the latter plans are generally not employment related and have a defined contribution nature guarantees their portability. Occupational and private pensions coverage rates - defined on a base of full time private sector employees - are reported in Table 1. Relying on occupational pension coverage figures we can divide the countries under study in two groups. In Denmark and in the Netherlands occupational pension plans have been established mainly at industry-wide level through employers' federations and trade unions. The high degree of union coverage and the mandatory nature of participation in industry-wide funds have guaranteed pension coverage of large sections (around 80 percent) of the private sector workforce. Ireland and the United Kingdom belong to a second group of countries that seem to have followed a different pattern of development, with coverage rates ranging between 40 and 50 percent. These lower coverage rates can be explained by the fact that occupational pension plan provision/participation has been preserved as an employer/employee choice. The figures are consistent with those provided by national and EU sources reported in Table 2. Table 2 also reports pension coverage rates by plan type for the countries under study. Defined benefit plans are dominant in all countries except Denmark, where almost only defined contribution plans are found. Given that our data do not provide any information on the nature of the plan, for the purposes of our empirical analysis we assume that all pension covered workers participate to defined contribution plans in Denmark, while participating to defined benefit plans in the remaining countries. The calculation of pension portability losses is based on the typical defined benefit plan found in each country, whose characteristics are reported in Table 3<sup>20</sup>. These assumptions seem to be a reasonable approximation, given the low proportion of workers covered by defined contribution plans in Ireland, in the Netherlands and in the United Kingdom, and given the fact that the tight legal and administrative regulation of occupational pension plans as well as competition between pension funds has led to a considerable degree of similarity between the features of most defined benefit schemes in these countries.

Tables 4 to 7 provide some preliminary empirical evidence on the relationship among mobility rates, occupational pension coverage and wages in the countries under study.

---

personal pension are not covered by an occupational pension in the case they are not making any additional voluntary contribution.

<sup>20</sup>We assume, following Ippolito (1985), that  $g^e = i^e$ . Notice that the variable measuring job tenure is left truncated for those who started to work with the current - 1995 - employer before 1981. This leads to an underestimation of pension portability losses for workers with longer - truncated - tenures. We also account for the fact that in the Netherlands portability losses only arise to pension covered inter-industry movers. Thus, in computing the potential pension losses arising to pension covered stayers we include as a weight the predicted probability of inter-industry mobility. The latter is derived estimating a probit model of inter-industry mobility among actual movers.

First, in all the countries under study but in Denmark there is significant evidence of a negative relationship between pension coverage and job mobility. A second piece of evidence is that pension covered workers, either stayers or movers, are better paid than workers with no pension. This could reflect either worker or job specific attributes. If the entire wage differential between workers with and without pension coverage was due to individual characteristics, such as unmeasured ability, the wage on any alternative job would be identical to the current one, and no wage losses would result from a move. If wage on the current job was instead just a reflection of job specific rather than personal characteristics, identical workers would be paid more on pension jobs than on no pension jobs, either as a result of rent-sharing or because of some productivity enhancing-scheme requiring efficiency wage payments. Figures reported in Tables 5 to 7 seem to be consistent with the latter interpretation, indicating that in Ireland and in the United Kingdom a large portion of pension covered movers lose their pension coverage, while in the Netherlands and in the United Kingdom pension covered movers suffer wage losses while moving job. In the empirical model we test for the existence of compensating wage premiums accruing to pension covered workers by means of pension coverage dummy variables in movers' and stayers' wage equations.

## 5 Empirical Results

The empirical model is estimated under two different specifications. The first includes among the mobility costs just a dummy variable indicating occupational pension coverage. For Ireland, the Netherlands and the United Kingdom, we estimate a second specification of the model including also the individual expected pension portability loss among the mobility costs. The latter specification aims to capture the role of the opportunity cost of leaving a defined benefit plan (in terms of lost pension rights' accruals) on job mobility decisions. Given that pension coverage choices are not explicitly modelled, the validity of our results rests on the assumption that selection of workers into pension covered job is based on observable variables included in our specification.

### 5.1 Reduced Form Probit Estimates

Reduced form probit estimates provide very limited information about the validity of the theoretical framework captured by equations (7) i (9), giving only the total effect of each regressor on the probability of job mobility. Moreover, the sign of most variables included in the reduced form probit equation is a priori uncertain, thus raising interpretation problems on estimated coefficients' values. The reduced form estimates, not reported here,

are however the first step to derive Heckman's two-steps consistent estimates of the wage equations.

## 5.2 Selectivity in Wage Equations

Tables 8 and 9 present sample-selection corrected wage equations for movers and stayers. Given that the estimated parameters are not sensitive to the different specifications adopted, we only report wages estimated under the first specification (model 1). The reported t-values are computed correcting the variance-covariance matrix of the estimated coefficients with the Heckman procedure<sup>21</sup>. Earnings equations, and consequently mobility choices, can be thought as being affected by two kinds of variables: the observed ones and the unobserved ones. The latter are captured by the inverse Mills' ratios. In particular, the coefficients obtained on  $\hat{\lambda}_m$  and  $\hat{\lambda}_s$  signal if there is positive or negative selection bias in the movers'/stayers' categories. The reported t-values for  $\hat{\lambda}$  coefficients simply test for the null hypothesis that  $\hat{\lambda}_{m;s} = 0$  (no sample selection). Unobservables play a significant role in Denmark and in Ireland, indicating negative selection of stayers. Turning to the role of pensions as wage determinants, if pensions were merely a vehicle for tax-preferred retirement saving, with no implications for employee productivity, a trade-off between cash wages and pension coverage should be observed<sup>22</sup>. On the other hand, if covered workers receive more training, are more stable, or are less likely to shirk, some of this firm specific productivity gain will likely result in higher wages<sup>23</sup>. Our empirical findings are consistent with the above predictions. We find evidence that where defined benefit pensions are dominant - Ireland, the Netherlands, the United Kingdom - pensions covered stayers earn a significant wage premium, while we find some insignificant evidence of a wage-pension trade off in Denmark, where defined contribution plans are widespread. The effect of occupational pension coverage on movers' wages is not significant at standard levels in all the countries under study. In the context of our modelling approach it is interesting to notice that occupational pension coverage is associated with an individual compensation premium. The latter, determined for each individual as the difference between the coefficients on the pension coverage dummies in the stayers' and movers' wage equations, turns out to range from 22 percent in Ireland to 3.5 percent in the United Kingdom. These findings are consistent with Gustman and Steinmeier (1993) view that individuals are less

---

<sup>21</sup>See Heckman (1979). The routine for computation of the correct standard errors, programmed in Stata - version 6, is available upon request from the author. Reported t-values followed by one (two) asterisks are significant at 90 (95) percent level.

<sup>22</sup>However, Andrietti and Hildebrand (2001) provide evidence that in the US workers covered by defined contribution plans also earn a significant wage premium.

<sup>23</sup>Some of this rent would represent a compensating wage premium to offset the cost of reduced mobility.

likely to leave jobs offering pension coverage as well as higher wages.

### 5.3 Structural Probit Estimates

Maximum likelihood estimation of the individual probability of inter-firm job mobility, as expressed by the structural probit equation (14) allows to disentangle the structural coefficients of the mobility costs equation<sup>24</sup>. For each country a likelihood ratio test of the overall fit of model specification leads to rejection of the null hypothesis that all slope coefficients are equal to zero. The results relative to model 1 are reported in Table 10. We find that female workers are significantly less likely to change employer than their male colleagues in Denmark and in Ireland. A prediction of the migration literature is that renting a house generally makes individuals more likely to move, as job change often implies a change of residence. However, this may not be true where the housing rental market is characterized by queues, like in the Netherlands and in the United Kingdom. Our results generally support these predictions, although the estimates are statistically significant at standard levels only in Denmark and in the Netherlands. Education endows a worker with skills, increasing his/her ability to adjust to change and to gather information on alternative job opportunities, contributing to reduce mobility costs and thus increasing job mobility. However, we find that higher education significantly increase mobility only in the Netherlands. In general, it is also expected that younger and less experienced workers are more willing to bear the fixed costs of moving in order to accept a better job, while it is likely that an older worker, having accumulated more firm specific capital, is endowed with a greater firm attachment. However experience, being linearly dependent from age, also reflects different stages in the life cycle and the probability of changing jobs could decline non-linearly with experience because of changing preferences. We find that age has a negative and significant effect on the probability of job mobility in Ireland and in the United Kingdom. Experience variables present mixed signs, while being generally insignificant. Larger firms are expected to be related to lower job mobility rates, but we find this effect at significant levels only for the United Kingdom. Alternatively, temporary workers are found to be significantly more likely to move in all the countries under study but in the United Kingdom. Employer provided training has a negative effect on the probability of job mobility in all the countries

---

<sup>24</sup>The parameter estimates represent the effect of a one unit change in the independent variable on the probability of job mobility, evaluated at the sample means. Those marked with one (two) asterisk are significant at 10 (5) percent level. Standard errors are corrected for heteroskedasticity. The base case individual is male, married, without children, house owner, with education lower than third level, not covered by an occupational or private pension, not receiving employer provided training, employed under a permanent contract as a blue collar worker in a small firm in the manufacturing industry.

under study, being significant at standard levels in Denmark and in the Netherlands.

Our model assumes that an individual's decision to change jobs responds positively to a wage differential defined as the lifetime earnings gain from moving. The finding of positive and significant effects of the wage differential on the probability of job mobility in Ireland and in the Netherlands constitutes evidence supporting the model<sup>25</sup>.

Consistently with their full portability, private pension plans offered by financial institutions are generally found to have a positive impact on the probability of job mobility, although this is true at standard significance levels only in the Netherlands under the first model specification. Turning to the role of occupational pensions on job mobility decisions, we find that pension coverage significantly reduce the probability of job mobility by 3.2 percent in the United Kingdom. This results explains more than half of the mobility differential between pension and non-pension workers reported in Table 7. In the other countries under study pension coverage does not significantly affect the probability of job mobility. The results for the Netherlands and the United Kingdom seem to be robust to the inclusion in the structural probit equation of a pension portability loss variable, aimed to capture the effect of the individual's perceived opportunity cost of leaving a defined benefit plan. In the United Kingdom pension covered workers preserve a significantly lower probability of job mobility, but among them workers suffering higher pension losses are not significantly less likely to move. In the Netherlands occupational pensions continue not to affect significantly job mobility, neither directly nor through pension portability losses. A peculiar result is found for Ireland, where pension portability loss turns out to have a negative and significant effect on the probability of job mobility of pension covered workers. However, while predicting job mobility at the individual level such an effect is compensated, even for the workers suffering the highest portability loss, by the magnitude of the positive coefficients on the pension coverage dummy, which is also statistically significant<sup>26</sup>.

On the basis of the above findings, it seems that pension portability losses do not have an important effect on the mobility decisions of pension covered workers. However, while interpreting the role of occupational pensions on job mobility choices using the results presented in this section one should keep in mind the assumptions underlying them. First, incorrectly including people who actually belong to defined contribution occupational pension schemes with people who belong to defined benefit occupational schemes - as we did for the lack of information in the data - could lead to underestimate the effect of the latter

---

<sup>25</sup>However, we also find a negative and significant impact of the wage differential on job mobility choices for the United Kingdom. The latter result is likely due to the poor fit of the movers' wage equation.

<sup>26</sup>Note that the latter results could be affected by the high degree of collinearity among the pension coverage dummy and the pension loss variable.

type of coverage on job mobility choices<sup>27</sup>. A further caveat is due to the truncated nature of the available job tenure data needed to calculate the pension loss, which leads to underestimate the actual expected loss. Second, it can be the case that pension covered individuals in the United Kingdom give more importance to the fact of being covered by a pension per se or that they do not have or are not able to handle the information needed to calculate pension losses<sup>28</sup>. Finally, it could be that pension covered workers are intrinsically less likely to move. This would be the case if pension coverage choices were not randomly made and were rather based on unobservables simultaneously affecting future job mobility choices.

## 6 Conclusions

This paper provides a comparative empirical analysis of pension portability in a sample of EU Member States grounded on a structural econometric model of inter-firm job mobility. Defined benefit pension plans play an important labour market role in Ireland, the Netherlands and the United Kingdom, covering large sections of private sector workforce. Pension portability in these countries has been much improved over the last two decades, particularly in the Netherlands where pension portability losses have been virtually eliminated for within-industry job moves. These reforms have often been inspired by the need for a more mobile labour force to adjust rapidly to shifts in demand. At the EU level, the application of workers' freedom of movement principle would require full portability of pension rights within and between countries. Such an institutional argument is also inspired by the assumption that portability losses are likely to prevent an efficient rate of job mobility. However, motivating portability reforms on efficiency grounds requires interpreting the lack of pension portability as a causal determinant of the lower turnover of workers covered by defined benefit plans. Using recent releases of the ECHP data to analyze within-country job mobility choices, we do not find significant evidence supporting this argument. In particular we find that, among the countries under study, pension covered workers are significantly less likely to move only in the United Kingdom, while pension portability losses do not generally act as a significant impediment to labour mobility. We also find that occupational pension plans in Denmark do not significantly deter job mobility choices. Although these results are consistent with the pension portability options guaranteed by defined contribution plans in Denmark and by industry wide and company

---

<sup>27</sup>However, note that Gustman and Steinmeier (1993) and Andrietti and Hildebrand (2001) find no evidence that mobility is differently affected by whether the employer's plan is of the defined benefit or defined contribution form in the US.

<sup>28</sup>Mitchell (1988) provides evidence consistent with this argument for the US.

defined benefit plans in the Netherlands, they provide somewhat surprising evidence for the United Kingdom and particularly for Ireland, where defined benefit pensions typically have limited portability. However, the finding of substantial compensation premiums accruing to stayers in pension covered jobs in the latter countries, particularly in Ireland, is more in line with the view that workers are less likely to leave good jobs.

From a policy perspective, our results cast doubt on the effectiveness of reforms aimed at improving labour market efficiency through portability measures. Still, there is reason to suspect that in the EU case the role of pension portability could be more relevant for between countries job mobility decisions. However, an empirical analysis at this level is currently prevented by the lack of adequate data.

Despite efficiency considerations, pension portability reform appear to be quite effective in reducing retirement income losses of early leavers. For instance, if the indexation of early leavers' pension rights introduced in Ireland in 1990 were made retroactive pension portability losses would be reduced by more than 30 percent on average. In the context of national pension policies focused on the reduction of social security benefits and in the light of the upward trend of women labour force participation, a more convincing argument in favor of increased pension portability would be ensuring retirement income adequacy to multiple job changers, and particularly to women, whose careers are usually characterized by frequent interruptions.

## References

- Allen, S., R. Clark and A. McDermid (1988). "Why do pensions reduce mobility?" NBER Working Paper, # 2.509.
- Allen, S., R. Clark and A. McDermid (1993). "Pensions, bonding and lifetime jobs." *Journal of Human Resources* 28 (3), 502-517.
- Andrietti, V. (2001). "Portability of supplementary pension rights in the European Union." *International Social Security Review* 54 (1).
- Andrietti, V., and V. Hildebrand (2001). "Pension portability and labour mobility in the United States. New evidence from SIPP data." CeRP, Working Paper # 10.
- Borjas, G. J., and S. Rosen (1980). "Income prospects and job mobility of younger men." In R. Ehrenberg (Ed.) *Research in Labor Economics* 3, 159-181. Greenwich, Ct. JAI Press.
- Bulow, J. (1982). "What are corporate pension liabilities?" *Quarterly Journal of Economics* 97 (3), 435-452.
- Commission of the European Communities (1997). *Green Paper on Supplementary Pensions in The Single Market*. COM (97) 283, Bruxelles.
- Government Actuary's Department (2000) *Occupational Pensions Schemes 1995: Tenth Survey by the Government Actuary*. London, HMSO.
- Gustman, A. L. and T. L. Steinmeier (1993). "Pension portability and labor mobility. Evidence from the Survey of Income and Program Participation." *Journal of Public Economics* 50, 299-323.
- Heckman, J. (1979). "Sample selection as a specification error." *Econometrica* 41, 153-161.
- Hughes, G. and B. J. Whelan (1996). *Occupational and Personal Pension Coverage 1995*. Dublin, Economic and Social Research Institute.
- Ippolito, R. (1985). "The labor contract and true economic pension liabilities." *American Economic Review* 75 (5), 1031-1043.
- Kotlikoff, L. and D. Wise (1985). "Labor compensation and the structure of private pension plans: evidence for contractual versus spot labor markets." In Wise, D. (Ed.) *Pensions, Labor, and Individual Choice*. Chicago, IL: University of Chicago Press.

- Lanot G. and I. Walker (1998). "The union/non-union wage differential. An application of semi-parametric methods." *Journal of Econometrics* 88, 327-349.
- McCormick, B. and G. Hughes (1984). "The influence of pensions on job mobility." *Journal of Public Economics* 23 (1-2), 183-206.
- Mealli, F. and S. Pudney (1996). "Occupational pensions and job mobility in Britain: estimation of a random-effects competing risks model." *Journal of Applied Econometrics* 11, 293-320.
- Mitchell, O. S. (1982). "Fringe benefits and labor mobility." *Journal of Human Resources* 17 (2), 287-298.
- Mitchell, O. S. (1983). "Fringe benefits and the cost of changing jobs." *Industrial and Labor Relations Review* 37, 70-78.
- Mitchell, O. S. (1988). "Worker knowledge of pension provisions." *Journal of Labor Economics* 26 (1), 21-39.
- Newey, W. K., J. Powell and J. Walker (1990). "Semiparametric estimation of selection models: Some empirical results." *American Economic Review. Papers and Proceedings*. 80 (2), 324-328.
- OECD (1999). *Economic Outlook*. Paris: OECD Press.
- Peracchi, F. (forthcoming). "The European Community Household Panel: A review." *Empirical Economics*.
- Rees, H. and A. Shah (1986). "An empirical analysis of self-employment in the UK." *Journal of Applied Econometrics* 1, 95-108.
- Robinson, C. and N. Tomes (1982). "Self selection and interprovincial migration in Canada." *Canadian Journal of Economics* 14 (3), 517-535.
- Roy, A. D. (1951) "Some thoughts on the distribution of earnings." *Oxford Economic Papers - New Series* 3, 135-146.
- Vella, F. (1998) "Estimating models with sample selection bias: a survey", *Journal of Human Resources* 33 (1), 127-169.
- Willis, R. J. and S. Rosen (1979) "Education and self selection." *Journal of Political Economy* 87, s7-s35.

Table 1: Occupational and Private Pension Coverage Rates in EU Countries

	Denmark	Ireland	Netherlands	UK
Occupational Pension Plan	77.4	40.2	80.4	50.1
Private Pension Plan	46.7	8.5	12.8	25.7
Sample Size	1.040	943	1.542	1.017

Base: Full Time Private Sector Employees.  
 Source: Our Elaboration on ECHP 1995 data.

Table 2: Occupational Pension Coverage Distribution in EU Countries

	Denmark <sup>□</sup>	Ireland <sup>□□</sup>	Netherlands <sup>□</sup>	UK <sup>□□□</sup>
Defined Benefit Plan	1	32	84	40
Defined Contribution Plan	79	10	1	10
Occupational Pension Plan	80	42	85	50

Sources: \*Commission of the European Communities (1997),  
 \*\*Hughes and Nolan (1996), \*\*\*Government Actuary's Department (2000).

Table 3: Portability Rules and Assumptions for Calculation of Pension Losses

	Ireland	Netherlands	UK
Annual Accrual Rate	1/60	1.75%	1/60
Pensionable Wage	Final Wage	Final Wage	Final Wage
Retirement Age	60	60	60
Inflation Rate <sup>a</sup>	2.5%	1.9%	3.4%
Post-Retirement Benefits Indexation	0.5 (CPI)	0.5 (CPI)	RPI up to 3.5 %
Vesting Period	5 years	1 year	2 years
Early Leavers' Indexation	no	Yes - Optional	Inflation up to 5%
Transfer to another Employer Provided Plan	Legal Right	Legal Right Transfer Circuits Industry Wide Plans	Legal Right
Long Term Nominal Interest Rate <sup>a</sup>	8.2%	6.9%	8.2%

\* Source: OECD (1999).

Table 4: Denmark. Job Mobility, Wages and Pension Coverage

	No Pension		Pension	
	Stayer	Mover	Stayer	Mover
Observations	209	26	730	75
Mobility (%)	11.06		9.32	
Mobility (%) to Pension Job	81		89	
Pearson Chi Squared Test	0.633, pr: .426			
Hourly wage 1995 wave	7.24	6.87	7.27	7.14
ϕWage (%)	6.2	9.2	5.5	4.9

Source: Our elaboration on ECHP data.

Table 5: Ireland. Job Mobility, Wages and Pension Coverage

	No Pension		Pension	
	Stayer	Mover	Stayer	Mover
Observations	498	66	357	22
Mobility (%)	11.70		5.80	
Mobility (%) to Pension Job	14		41	
Pearson Chi Squared Test	9.317, pr: .002			
Hourly wage 1995 (Euro)	5.85	5.75	9.09	6.65
ΔWage (%)	2.9	10	-8.2	1.9

Table 6: The Netherlands. Job Mobility, Wages and Pension Coverage

	No Pension		Pension	
	Stayer	Mover	Stayer	Mover
Observations	269	34	1.178	61
Mobility (%)	11.22		4.92	
Mobility (%) to Pension Job	38		79	
Pearson Chi Squared Test:	16.7, pr: .000			
Hourly wage 1995 (Euro)	6.11	5.28	7.66	8.1
ΔWage (%)	12.7	31.6	1.5	-7.7

Source: Our elaboration on ECHP data.

Table 7: The United Kingdom. Job Mobility, Wages and Pension Coverage

	No Pension		Pension	
	Stayer	Mover	Stayer	Mover
Observations	470	37	502	8
Mobility (%)	7.30		1.57	
Mobility (%) to Pension Job			22	37.5
Pearson Chi Squared Test:			19.73, pr: .000	
Hourly wage 1995 (Euro)	6.38	5.51	8.49	8.54
$\Phi$ Wage (%)	8.6	12.3	0.9	-24.9

Source: Our elaboration on ECHP data.

Table 8: Stayers' Wage Equation. Model 1

	Denmark	Ireland	Netherlands	UK
Female	-0.144 (7.44)**	-0.166 (6.63)**	-0.145 (9.69)**	-0.159 (7.04)**
Third Level Education	0.092 (4.24)**	0.115 (3.44)**	0.177 (10.20)**	0.265 (9.89)**
Experience	0.016 (4.91)**	0.022 (4.80)**	0.021 (10.07)**	0.024 (5.84)**
Experience Squared/100	-0.036 (5.17)**	-0.037 (3.81)**	-0.037 (7.28)**	-0.051 (5.68)**
Managers & Professionals	0.252 (9.60)**	0.283 (7.85)**	0.233 (12.35)**	0.307 (9.67)**
White Collar Workers	0.097 (4.13)**	0.054 (1.94)*	0.057 (3.13)**	0.142 (4.89)**
Construction	0.094 (2.90)**	0.000 (0.00)	-0.085 (3.90)**	0.011 (0.22)
Services	0.012 (0.56)	-0.049 (1.91)**	-0.038 (2.70)**	-0.019 (0.86)
Employer Size: 100-499	0.025 (1.26)	0.145 (5.54)**	0.009 (0.63)	0.038 (1.29)
Employer Size: 500+	0.081 (3.40)**	0.180 (5.12)**	0.068 (4.35)**	0.156 (5.18)**
Temporary Employment Contract	-0.042 (1.31)	-0.006 (0.13)	0.002 (0.35)	-0.093 (1.69)*
Occupational Pension Plan	-0.027 (1.16)	0.154 (5.26)**	0.052 (3.10)**	0.135 (5.77)**
Lambda <sub>S</sub>	0.321 (3.15)**	0.282 (1.69)*	0.06 (0.70)	-0.056 (0.37)
F-Test	43.15	64.14	81.31	55.56
Adjusted R-squared	0.37	0.49	0.42	0.42
Number of Observations	939	855	1.447	972

Table 9: Movers' Wage Equation. Model 1

	Denmark	Ireland	Netherlands	UK
Female	-0.109 (1.99)**	-0.174 (2.60)**	-0.175 (2.94)**	0.012 (0.10)
Third Level Education	0.012 (0.20)	0.220 (2.70)**	0.231 (3.62)**	0.289 (2.01)**
Experience	0.003 (0.33)	0.011 (0.88)	0.009 (1.01)	0.013 (0.53)
Experience Squared	-0.023 (0.87)	-0.022 (0.60)	0.01 (0.41)	-0.046 (0.86)
Managers and Professionals	0.367 (5.04)**	0.255 (2.69)**	0.32 (3.77)**	0.372 (2.24)**
White Collar Workers	0.085 (1.30)	-0.026 (0.33)	0.148 (1.84)*	.164 (1.18)
Construction	-0.038 (0.45)	0.270 (2.41)**	-0.178 (2.09)**	0.026 (0.11)
Services	-0.039 (0.53)	0.079 (1.16)	-0.078 (1.22)	-0.081 (0.66)
Employer Size: 100-499	-0.026 (0.45)	0.188 (2.51)**	0.030 (0.51)	0.024 (0.20)
Employer Size: 500+	-0.009 (0.11)	-0.055 (0.39)	0.092 (1.46)	0.120 (0.35)
Temporary Employment Contract	0.054 (0.77)	-0.145 (1.55)	-0.07 (0.51)	-0.20 (1.39)
Occupational Pension Plan	-0.034 (0.52)	-0.066 (0.76)	0.067 (1.26)	0.098 (0.79)
Lambda <sub>m</sub>	0.095 (1.07)	0.174 (1.27)	-0.02 (0.22)	0.020 (0.22)
F-test	3.69	5.44	8.09	1.65
Adjusted R-squared	0.26	0.40	0.50	0.16
Number of Observations	101	88	95	45

Table 10: Structural Form Probit Equation. Model 1

	Denmark	Ireland	Netherlands	UK
Wage Differential	0.083 (0.66)	0.223 (2.45)**	0.57 (0.50)**	-0.381 (4.35)**
Not Married	0.002 (0.10)	-0.017 (0.63)	-0.016 (1.22)	-0.011 (1.16)
Female	-0.032 (1.87)*	-0.015 (0.87)	-0.007 (0.53)	0.101 (3.55)**
Children	0.010 (0.48)	-0.018 (0.82)	0.034 (1.78)*	-0.001 (0.05)
Household Size	0.001 (0.15)	0.007 (1.33)	-0.013 (1.78)*	-0.005 (1.21)
House Tenant	0.042 (1.77)*	0.002 (0.08)	-0.021 (1.88)*	-0.004 (0.41)
Age	-0.003 (0.69)	-0.014 (2.75)**	-0.001 (0.78)	-0.005 (1.72)*
Third Level Education	0.006 (0.33)	0.014 (0.47)	0.006 (0.33)	0.039 (2.35)**
Experience	0.004 (0.87)	0.008 (1.38)	-0.000 (0.18)	-0.001 (0.22)
Experience Squared/100	-0.014 (1.83)*	0.004 (0.43)	-0.005 (0.53)	0.003 (0.89)
Employer Size: 100-499	-0.022 (1.18)	0.008 (0.44)	-0.004 (0.38)	-0.019 (1.97)**
Employer Size: 500+	-0.008 (0.33)	0.070 (1.49)	-0.001 (0.06)	-0.032 (3.12)**
Temporary Employment Contract	0.120 (3.31)**	0.068 (2.05)**	0.123 (4.51)**	-0.010 (0.72)
Occupational Pension Plan	-0.002 (0.13)	0.010 (0.42)	-0.011 (0.87)	-0.032 (2.71)**
Private Pension Plan	0.009 (0.51)	0.002 (0.07)	0.027 (1.67)*	0.010 (0.88)
Employer Provided Training	-0.034 (1.73)*	-0.008 (0.44)	-0.023 (2.17)**	-0.007 (0.76)
Log-likelihood	-299.4	-264.8	-315.5	-151.8
Wald Chi2	69.79	67.37	68.19	56.38
Pseudo R2	.0968	.0947	.1156	.1764
Number of Observations	1.040	943	1.542	1.017
Observed P	.0971	.0933	.0616	.0442
Predicted P(X)	.0757	.0729	.0427	.0229

Table 11: Structural Form Probit Equation. Model 2

	Ireland	Netherlands	UK
Wage Differential	0.204 (2.72)**	.273 (2.06)**	-0.390 (4.62)**
Not Married	-0.014 (0.58)	-0.012 (0.90)	-0.011 (1.15)
Female	-0.015 (0.97)	-0.019 (0.14)	0.106 (3.73)**
Children	-0.012 (0.61)	0.035 (1.73)	0.000 (0.02)
Household Size	0.006 (1.09)	-0.012 (1.86)*	-0.005 (1.21)
House Tenant	0.003 (0.10)	-0.018 (1.65)	-0.004 (0.41)
Age	-0.009 (1.94)*	-0.001 (0.76)	-0.005 (1.71)*
Third Level Education	0.004 (0.15)	-0.008 (0.54)	0.039 (2.38)**
Experience	0.006 (1.12)	0.002 (0.81)	-0.001 (0.34)
Experience Squared/100	0.000 (0.05)	-0.015 (1.56)	0.003 (0.89)
Employer Size: 100-499	0.009 (0.52)	-0.007 (0.64)	-0.018 (1.94)*
Employer Size: 500+	0.069 (1.71)*	-0.005 (0.38)	-0.032 (3.14)**
Temporary Employment Contract	0.049 (1.74)*	0.128 (4.63)**	-0.010 (0.78)
Pension Portability Loss/1000	-0.004 (2.70)**	-0.0006 (0.49)	0.000 (0.08)
Occupational Pension Plan	0.055 (2.04)**	-0.01 (0.76)	-0.031 (2.26)**
Private Pension Plan	-0.001 (0.05)	0.019 (1.13)**	0.010 (0.87)
Employer Provided Training	-0.004 (0.22)	-0.020 (2.14)**	-0.007 (0.76)
Log-likelihood	-258.6	-313.4	-150.05
Wald Chi2	71.2	71.91	60.34
Pseudo R2	.1158	.1216	.1858
Number of Observations	943	1.542	1.017
Observed P	.0933	.0616	.0442
Predicted P(X)	.0648	.042	.0223