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PENSION PORTABILITY AND LABOUR MOBILITY IN THE UNITED STATES. NEW EVIDENCE FROM SIPP DATA

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Abstract

We explore the role of employer provided pensions on job mobility choices using data from the Survey of Income and Program Participation. Defined benefit plans are found to have a significant negative effect on mobility. However, we find no significant evidence that the potential pension portability losses deter job mobility among workers covered by these plans. We also find that the portability policy change implemented by the Tax Reform Act of 1986 had only minor effects on mobility. Puzzlingly, defined contribution plans, although fully portable, are found to have an impact similar to defined benefit plans. Evidence of compensation premiums accruing to workers in pension, union and health insurance covered jobs supports the view that workers are less likely to leave "good jobs".

Keywords: Labour mobility; Pension portability; Switching regression models.

JEL classification: C35; J31; J32; J41; J63; J68.

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1 Introduction

The question of employer provided pensions' portability in the US has been widely debated within the "new pension economics" literature. Using different empirical approaches, Allen, Clark and McDermed (1988, 1993), Ippolito (1985, 1987), and Gustman and Steinmeier (1987, 1993, 1995) all investigate whether a lack of pension portability is primarily responsible for the lower job mobility rate observed among pension covered workers. However, no consensus emerged from those studies. Futhermore, the evidence they provide is based on data collected during the late 1970s and early 1980s, that cannot reflect the rapid changes experienced by the US pension and labour markets in the last two decades.

First, there is substantial evidence[1] that employer provided pension coverage has significantly declined among young males. Structural changes in the labour and pension markets have been advanced as possible explanations. A second development is the shift from defined benefit toward defined contribution plans. The rapid growth of defined contribution plans is expected to affect both job mobility and future retirement income as well as the structure of wages. Under defined benefits plans, workers accumulate lower retirement benefits when they change employers frequently. In contrast, job changes have relatively little impact on future retirement benefits for those enrolled

[1] See, among others, Even and Macperson (1994).

in defined contribution plans. This implies that in the future mobile workers may enter retirement with larger total pension benefits than in the past, although the adequacy of retirement income provided by defined contribution plans is widely debated. Furthermore, defined contribution plans place greater responsibility and investment risks on the individual worker. In a competitive setting, such a risk shift is likely to induce higher compensation levels as compensating differentials to employees, which also potentially affect mobility.

In order to account for these developments and to contribute to a better understanding of the pension-mobility relationship in the US, we use data drawn from different survey years of the Survey of Income and Program Participation (SIPP) spanning 1984 to 1994. In contrast with the limited interpretability of reduced form estimates provided by most of the previous studies, we estimate a structural model similar to that of Gustman and Steinmeier (1993). The advantage of the structural approach is that it allows one to separately identify the impact of employer provided pensions (either defined benefit or defined contribution plans), and of prospective wage differentials on the probability of individual job mobility.

However, our modeling differs from Gustman and Steinmeier (1993) in two main respects. First, we correct for the potential endogeneity of mobility choices by estimating a more general sample selection model. Second, we adopt a specification which allows us to disentangle the effects of the various fringe benefits including defined benefit and defined contribution pensions as well as health insurance coverage. In addition, the period covered by our data allows us to examine the effect on individual mobility of the reduction in vesting period introduced by the Tax Reform Act of 1986.

We find that workers covered by defined benefit pensions are significantly less likely to move. However, the potential portability loss arising to workers leaving a defined benefit plan does not seem to play a significant role in explaining job mobility choices. Our results also reveal that defined contribution plans, despite of their complete portability, are as important as defined benefit plans in reducing job mobility. In addition, employer provided health insurance and union coverage are also found to play a major role in deterring job mobility. These results seem to undermine the argument that the lack of pension portability is a key factor in explaining the lower mobility rate observed among workers in pension covered jobs. Evidence of compensation premiums in pension and health insurance covered jobs further supports the alternative view that workers in "good jobs" are simply less likely to move.

From a policy perspective, these results cast doubts on the effectiveness of reforms aimed at improving labour market efficiency through portability measures. On the other hand, the data do suggest that pension portability reforms have improved the retirement income prospects of mobile workers by some 46 percent. So while our estimates of behavioural responses suggest that the 1986 *Tax Reform Act* had almost no impact on job mobility, it may have succeeded with respect to the complementary goal of ensuring adequate retirement incomes.

The paper is divided into six sections. Section 2 discusses the main issues surrounding pension portability as well as the related empirical literature. Section 3 introduces our structural model of interfirm job mobility. Section 4 describes the data set used for the empirical analysis and presents preliminary evidence on the relationship between pension coverage, mobility and wages. Section 5 reports the empirical results obtained from the estimation of our model. Section 6 provides a summary and a policy oriented discussion of the results.

2 Pension Portability: Issues and Previous Literature

In general, *pension portability* can be defined as the capacity of workers covered by an employer provided pension plan 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, a portability loss is expected to arise. The latter can be defined as the shortfall of actual retirement benefits 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.

It is important to emphasize that the pension portability issue is strictly tied to the nature of the pension contract. Employer provided pension plans can be divided into two broad categories: defined benefit and defined contribution plans. In a traditional defined benefit plan, each employee's future benefit is determined by a specific formula, and the plan provides a nominal level of benefits upon retirement. The typical *"final pay"* formula relates pension benefits to the length of service and to the final salary received, with the pension promise being usually funded through employers' contributions. Defined contribution plans provide for periodic contributions into an individual pension account for each worker. The contributions may be made by the firm and/or the worker. The level of benefit at retirement is determined by the total amount of contributions made and the rate of return of each individual's retirement assets. Although different types of defined contribution plans[2] are offered in the US, most of them have the so called *401(k) option* which allows participant employees to make pre-tax contributions. Employers could establish 401(k) plans that rely entirely on voluntary employee contributions. However, they usually offer matching contributions up to a limit.

In the United States, individuals enrolled in pension plans, either of the defined benefit or defined contribution type, usually gain nonforfeitable and inalienable (vested) rights to pension benefits after meeting specific service and/or age requirements[3]. Prior to the Employee Retirement Income Security Act (ERISA) of 1974, there were no

[2] Money purchase plans, saving and thrift plans, profit sharing plans, stock bonus plans and employee stock ownership plans.

[3] These can include a minimum (or maximum) eligibility age for plan participation and/or a minimum waiting service period in addition to the vesting period usually required in order to be entitled to any pension benefit.

required standards for the vesting of pension benefits. ERISA first established a 10 year vesting standard. The Tax Reform Act of 1986 further reduced the vesting period, allowing private single employer plans to provide either full (cliff) vesting after 5 years of service (with no partial vesting before that time) or graded vesting of 20 percent after 3 years of service and 20 percent for each subsequent year of service, with full vesting reached after 7 years of service[4].

Currently, most defined contribution plans allow for the immediate vesting of employee contributions, while virtually all defined benefit plans impose five years vesting. However, vesting is neither the only nor the most important element to consider in evaluating the portability of employer provided pensions. While mobility restrictions implied by vesting rules have been found to be insignificant in most empirical studies[5], a more relevant portability issue arises to workers covered by defined benefit plans[6]. The typical structure of such plans implies that upon leaving a job before retirement, vested workers are entitled to a deferred retirement pension annuity determined on the basis of earnings received upon leaving the firm. In the US deferred annuities are not indexed to inflation or to productivity growth. Thus, vested workers who move across

[4]The new vesting provisions applied to pension rights accrued after January 1, 1989.

[5]See, for example, Allen, Clark and McDermeed (1988, 1993).

[6]A necessary condition for the rise of portability losses is that defined benefit pensions are interpreted as implicit contracts under which workers accept to forego wages proportional to retirement pension benefits conditional upon remaining with the firm until retirement against the firm's promise to preserve the employment relationship and to pay the agreed pension benefits upon worker's retirement (Ippolito, 1985).

firms with identical defined benefit pension plans and offering similar wage profiles, will accumulate lower total pension benefits than workers who remain with the same firm throughout their career[7].

In contrast, workers covered by defined contribution plans typically do not incur such capital losses when they change employers. In general, these workers have a legal claim on a pension account in which all pension contributions have been invested. If the funds remain in an account after the worker leaves the firm, the account will continue to grow by the accumulated returns on invested assets. Alternatively, the funds can be withdrawn from the pension account of a former employer and either rolled over into an individual retirement account (IRA) or in a new pension account. In either case, the worker who has changed jobs retains the full value of the pension funds. Thus, in general, defined contribution plans are portable and workers can change jobs without suffering any loss in future pension benefits.

The possible consequences of the lack of portability of defined benefit plans on individual job mobility choices have been widely investigated in the US pension literature. Using simple statistical models (such as probit models explaining job change[8], or hazard models[9] explaining job tenure), early empirical studies documented a significant negative correlation between pensions and job mobility. The "new pension economics"

[7]See Andrietti (2001) for a detailed exposition of the pension loss computation methodology.

[8]Mitchell (1983).

[9]Wolf and Levy (1984).

literature of the early 1990s developed different modelling approaches to further investigate this stylized fact. The major explanations advanced for the negative relationship between pension coverage and turnover include, in addition to the expected portability losses, the compensation premiums accruing to pension covered workers[10] or the "self-selection" of immobile workers into pension covered jobs[11].

In Allen, Clark and McDermed (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. Both the decision to join a pension covered job and the job mobility decision conditional on pension status are treated as endogenous, in order to establish if the lower turnover rates of pension covered workers can fully be explained by unobservable heterogeneity. Estimating a switching bivariate probit model of pension coverage and turnover on 1975-1982 PSID data the authors 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[12].

[10] Gustman and Steinmeier (1993).

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

[12] A theoretical extension to the self-selection argument has been proposed by Ippolito (1997). Assuming that workers can be classified as "low" or "high" discounters and that low discounters have some characteristics that is ex-ante unobservable but valuable to the firm (such as higher productivity or lower turnover rates), he argues that defined contribution plans, as well as defined benefit plans, are natural candidates for sorting workers on the basis of their unobserved discount rate. In particular the

Using the 1984 release of SIPP, Gustman and Steinmeier (1993) develop a research approach similar to the one adopted in this paper. The authors question the causal interpretation usually attributed to the strong negative correlation between pension coverage and job mobility. Rather, they look for other causal factors whose omission could have generated this correlation. In particular, they suggest that the causality may run from the implicit contract, interpreted as the omitted factor, to mobility and pension design. As implicit contracts may provide the payment of compensation premiums to pension covered workers, the authors model the relative role of lifetime efficiency wage premiums and pension portability losses on individual job mobility. They assume that there is no separate role for pension coverage beyond its monetary influence. Thus, in their specification, pension coverage is not included in the mobility equation but its monetary effect is incorporated in their measure of lifetime wage differential (referred to by Gustman and Steinmeier (1993) as the compensation premium). This assumption does not allow them to distinguish between the mobility effects of defined benefit and defined contribution pensions[13]. Furthermore, our specification also includes important potential mobility predictors such as employer provided health insurance coverage.

Imposing joint normality on the wage and the mobility equation error terms, they

backloaded structure of defined benefit plans attract low discounters, while the actuarially fair lump sums provided to early leavers by defined contribution plans encourage the departure of mistakenly hired high discounters early in tenure.

[13]However, they provide some evidence of the unexpected role of defined contribution plans in preventing mobility in the estimation of their reduced form mobility equation.

estimate a self-selection model through a maximum likelihood procedure. However, their self-selection mechanism differs from standard models with endogenous switching, including the one estimated in this paper. In particular, the estimation of their wage differential parameter does not explicitly account for potential sample selection into mover/stayer status. In their approach, the wage differential is just given by the difference between the current and alternative wages actually observed for movers. The usual approach is to derive the wage differential from counterfactual imputations. Gustman and Steinmeier (1993) procedure provides them with enough information to estimate an additional (incidental) parameter - the correlation among unobservables in the current and alternative wage equations - which is not identified in the standard setting of a regression model with endogenous switching.

Their findings suggest that efficiency wage premiums rather than backloaded pension accrual patterns are the primary cause of lower turnover rates among workers covered by defined benefit plans.

This brief overview reveals the absence of a common view in the 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. The main objective of this paper is to shed some more light on the role of pension portability losses and compensation premiums on the individual job mobility choices in the US using more recent data sources. Moreover, the period covered by our data allows us to examine the effect of a policy change - the reduction of the vesting period introduced by the Tax Reform Act of 1986 - on individual job mobility.

3 The Model

Our model[14] 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. The model is based on a binary representation of the job mobility decision. Individuals are assumed to observe both their current and their best alternative lifetime wage earnings profile. They also perceive a variety of pecuniary and non-pecuniary mobility costs either due to the loss of accumulated firm specific human capital, firm specific benefits (including pension and health coverage) or related to their family background. In addition to losing pension coverage, workers covered by defined benefit plans also expect to suffer a pension wealth loss while moving to a new job, due to the limited portability of their accrued pension rights. Interfirm job mobility in this framework represents basically a response to perceived net gains: a worker is expected to move if the discounted returns to a new job exceed the sum of the discounted returns to the current job and the discounted costs of moving[15]. For this reason, one should interpret *quits* as the appropriate depen-

[14] See Andrietti (2001).

[15] In this model, we need to impose two assumptions in order to impute the expected pension portability loss. First, we assume that movers change jobs only once in their working life. Second, we assume that the alternative wage offer matches the current wage. These assumptions are likely to

dent variable. However, because of the poor quality of the information in the SIPP on separation type (quit versus layoff), we consider an individual to be a *mover* as long as a transition to a new job has occurred, independently of the cause of separation. This assumption is consistent with the theoretical argument[16] that in an efficient turnover framework a truly meaningful distinction cannot be made between quits and layoffs since workers wishing to quit could induce a layoff, while firms desiring a layoff could induce a quit. We therefore implicitly assume all turnover to be "efficient" irrespective of who initiates it. The mobility choice of individual i is represented by the binary random variable $I_i = 1\{I_i^* > 0\}$,where $1\{\cdot\}$ is the usual indicator function and I_i^* is the lifetime net gain from mobility. We specify the latter as follows:

$$I_i^* \equiv Y_{mi} - Y_{si} - C_i \gtreqless 0, \quad i = 1, ...n, \tag{1}$$

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 (1) 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

underestimate the pension portability loss.

[16] Borjas and Rosen (1980) and McLaughlin (1991) provide empirical support to this argument.

two main problems. First, we do not observe lifetime wage earnings for actual movers and stayers. We assume current earnings to be the best predictor of lifetime earnings[17]. The second, and 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 $\{I_i^* > 0\}$ is equivalent to the event $\{I_i^+ > 0\}$, where $I_i^+ = I_i^*/Y_{si}$ and that mobility costs are not directly observable, we can specify the selection index as follows:

$$I_i^* = \gamma(\ln Y_{mi} - \ln Y_{si}) - \boldsymbol{\beta}_c'\mathbf{X}_{ci} - v_{ci}, \quad i = 1, ...n, \tag{2}$$

where $\mathbf{X}_{ci}$ is a vector of personal and job specific mobility costs predictors, $\boldsymbol{\beta}_c$ is a vector of unknown parameters, and v_{ci} is a continuous random variable distributed independently of $\mathbf{X}_{ci}$ with zero mean and variance σ_c^2. Wage equations for movers and

[17] 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:

$$Lifetime\ Wage = \sum_{t=0}^{R} Y_t e^{(g^e - i^e)t},$$

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.

stayers are modelled using a semilog form:

$$\ln Y_{mi} = \boldsymbol{\beta}'_m \mathbf{X}_i + v_{mi}, \quad i = 1, ...m, \tag{3}$$

$$\ln Y_{si} = \boldsymbol{\beta}'_s \mathbf{X}_i + v_{si}, \quad i = m+1, ...n, \tag{4}$$

where $\ln Y_{mi}$ is the natural logarithm of hourly net wages for movers, $\ln Y_{si}$ is the natural logarithm of hourly net wages for stayers, $\mathbf{X}_i$ is a vector of personal and job specific variables including education, experience and its square, occupational pension, health insurance and union coverage, industry, occupation, residential and location dummies, $\boldsymbol{\beta}_m, \boldsymbol{\beta}_s$ 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 $\mathbf{X}_i$ with zero mean and unknown variances σ^2_m, σ^2_s. Equations $(2), (3)$, and (4) represent the structural model of interfirm job mobility. Substituting from (4) and (3) into (2) yields a reduced form selection index:

$$I^*_i \equiv \boldsymbol{\beta}' \mathbf{W}_i + v_i, \quad i = 1, ...n, \tag{5}$$

where $\mathbf{W}_i = [\mathbf{X}_i, \mathbf{X}_{ci}]$, $\boldsymbol{\beta} = [\gamma(\boldsymbol{\beta}_m - \boldsymbol{\beta}_s), -\boldsymbol{\beta}_c]$, and $v_i = (\gamma(v_{mi} - v_{si}) - v_{ci})$. The decision rule (5) 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. The expected value of worker i's wage conditional on observed characteristics and mobility status is:

$$E(\ln Y_{mi}|\mathbf{W}_i, I_i = 1) = \boldsymbol{\beta}'_m \mathbf{X}_i + E(v_{mi}|\mathbf{W}_i, I_i = 1), \quad i = 1, ...m, \tag{6}$$

$$E(\ln Y_{si}|\mathbf{W}_i, I_i = 0) = \boldsymbol{\beta}'_s \mathbf{X}_i + E(v_{si}|\mathbf{W}_i, I_i = 0), \quad i = m+1, ...n. \tag{7}$$

Knowledge of the functional form of the conditional mean errors allows estimation of the model parameters. Assuming that the error terms (v_{mi}, v_{si}, v_i) are independent of $(\mathbf{X}_i, \mathbf{W}_i)$ and have a trivariate normal distribution, with a zero mean vector and unknown variance covariance matrix:

$$\sum = \begin{bmatrix} \sigma_m^2 & \sigma_{sm} & \sigma_{vm} \\ \sigma_{ms} & \sigma_s^2 & \sigma_{vs} \\ \sigma_{mv} & \sigma_{sv} & 1 \end{bmatrix},$$

equations $(6) - (7)$ may be rewritten as:

$$E(\ln Y_{mi}|\mathbf{W}_i, I_i = 1) = \boldsymbol{\beta}'_m \mathbf{X}_i + \sigma_{mv}\lambda_{mi}, \quad i = 1, ...m, \tag{8}$$

$$E(\ln Y_{si}|\mathbf{W}_i, I_i = 0) = \boldsymbol{\beta}'_s \mathbf{X}_i + \sigma_{sv}\lambda_{si}, \quad i = m+1, ...n, \tag{9}$$

where $\lambda_{mi} = \frac{\phi(\beta'\mathbf{W}_i)}{\Phi(\beta'\mathbf{W}_i)}$ and $\lambda_{si} = -\frac{\phi(\beta'\mathbf{W}_i)}{1-\Phi(\beta'\mathbf{W}_i)}$ are the inverse Mills' ratios, with $\phi(\cdot)$ and $\Phi(\cdot)$ being the standard normal density and cumulative distribution function respectively. Selectivity bias in wage equations estimation arises from any correlation between the unobserved determinants of interfirm job mobility and wages. Only if such a correlation were not present, the usual ordinary least square method could be used to consistently estimate β_j on the selected subsample. In general, however, this does not occur. Consistent estimates of the above model are obtained by applying Heckman's (1979) two-stage method. Wage equations' estimated coefficients are then used to predict log-wage earnings for each individual i, given his/her own characteristics $\mathbf{X}_i$:

$$\ln \tilde{Y}_{mi} = \hat{\boldsymbol{\beta}}'_m \mathbf{X}_i + \hat{\sigma}_{mv}\hat{\lambda}_{mi}, \quad i = 1, ...m, \tag{10}$$

$$\ln \tilde{Y}_{si} = \hat{\boldsymbol{\beta}}'_s \mathbf{X}_i + \hat{\sigma}_{sv}\hat{\lambda}_{si}, \quad i = m+1, ...n, \tag{11}$$

and to compute the individual ex-ante *structural wage differential*:

$$\ln \tilde{Y}_{mi} - \ln \tilde{Y}_{si} = (\hat{\boldsymbol{\beta}}'_m - \hat{\boldsymbol{\beta}}'_s)\mathbf{X}_i + (\hat{\sigma}_{mv}\hat{\lambda}_{mi} - \hat{\sigma}_{sv}\hat{\lambda}_{si}), \quad i = 1, ...n. \tag{12}$$

This measure has two components: the first term is the structural mobility wage gain, representing the difference between systematic components of wages in the alternative as well as in current job, while the second term accounts for random differences not captured by wage equations but important in determining the job mobility decision. The structural wage differential is then substituted in (2) to obtain a structural probit function:

$$I_i^* = \gamma(\ln \tilde{Y}_{mi} - \ln \tilde{Y}_{si}) - \boldsymbol{\beta}'_c \mathbf{X}_{ci} + \varepsilon_i, \quad i = 1, ...n, \tag{13}$$

where: $\varepsilon_i = \gamma(\hat{v}_{mi} - \hat{v}_{si}) - v_i$.

Maximum likelihood estimation[18] of equation (13) allows us to obtain estimates of

[18] While we do not correct the variance covariance matrix of these estimates for the fact that the

the structural parameters related to the principal determinants of the individual mobility choice. Estimation of the model requires identifying exclusion restrictions. First, identification of wage equations parameters requires that at least one exogenous variable determining mobility cost ($\mathbf{X}_{ci}$) not be a determinant of wages ($\mathbf{X}_i$)[19]. Second, identification of the wage differential parameter (γ) in the structural probit equation requires that at least one exogenous variable determining wages ($\mathbf{X}_i$) be excluded from the structural mobility cost ($\mathbf{X}_{ci}$). Both these conditions are satisfied by our underlying economic model. The reduced form selection index contains variables included in $\mathbf{X}_{ci}$ but excluded from $\mathbf{X}_i$. In particular, demographic information, pension, union and health coverage, expected pension loss, employer provided training and firm size dummies - all referring to first period of observation - are included in the reduced form probit but excluded from the wage equations providing appropriate and statistically significant instruments to identify the coefficients of the latters. The wage equations include residential and location dummies, pension, union and health coverage dummies as well as occupation and industry information - all referring to the second period job - which are excluded from the mobility cost vector ($\mathbf{X}_{ci}$). A further identifying covariance

structural wage differential is only an estimate of the true one (see Murphy and Topel, (1985), Greene (2000), or Peracchi (2001)), we do allow for heteroskedasticity by applying White's Variance-Covariance Matrix Correction.

[19] 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.

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 seeming lack of robustness of the parameters estimates to mispecification of the maintained distributional assumptions[20]. The most recent literature proposes a semiparametric approach, in that 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. However, recent evidence provided by Newey, Powell and Walker (1990) and Lanot and Walker (1998) indicates that semiparametric methods give similar results to Heckman's two-step parametric procedure. Although this evidence should be taken cautiously, it provides us with a rationale for using the parametric approach.

[20] See Heckman and Honoré (1990).

4 Data: The Survey of Income and Program Participation (SIPP)

The Survey of Income and Program Participation (SIPP) is a set of independent short panels. In each survey, the data are collected every four months usually for 8 waves. As a result, a typical survey year covers a time span of 32 months. In each survey one can differentiate between the *core module* and *topical module* information. The core data are collected in every wave, while the topical module contains an additional set of questions addressing a particular research topic which does not require updating with each wave. This paper focuses on the mobility of males aged between 31 and 50 working at least 30 hours per week in the private non-agricultural sector. We use the survey years 1984, 1986, 1990 and 1992 for which detailed topical module information on pensions is available. The actual period covered by the pooled sample spans the 10 years between 1984 and 1994. We start the empirical analysis by providing some preliminary evidence on pension coverage rates and on the relationship between pensions, wages and job mobility.

Table 1 presents evidence of a decline in male pension coverage over the 1980s[21], while figures reported in Table 2 are consistent with the well known shift from defined benefit to defined contribution coverage, in particular toward 401(k) plans. One should

[21] Pension coverage is defined here as any form of employer provided pension coverage, without distinction between defined benefit and defined contribution, profit sharing or 401(k) plans. Statistics are computed on the selected sample.

interpret the latter table carefully as it reports individual coverage by plan type following the structure of the SIPP pension questionnaires[22]. While 401(k) and profit sharing plans are included in the usual definition of defined contribution coverage by the Bureau of Labor Statistics, the SIPP pension topical modules include specific questions for each of these plan categories. However, the question on profit sharing coverage is not asked in 1992. This could explain the strong rise of the 401(k) share in the 1992 pension coverage distribution. In order to adopt a consistent definition for each survey year, we include profit sharing and 401(k) in our definition of defined contribution coverage. This grouping is meaningful given the defined contribution nature of 401(k) and profit sharing plans, although it confounds the different contributory rules between the plans.

Although the information necessary to differentiate quits from layoffs is available in the SIPP data, it does not appear to be very reliable. Therefore, we consider that a transition has occurred if we can identify a separation from the initial job during the one year time window between wave 4 and wave 7. As pointed out by Gustman and Steinmeier (1993), several variables, such as the randomly assigned job number or direct questions to employees, could be used to identify mobility in the SIPP data. However, the mobility information derived from these variables is often contradictory. Therefore, following Gustman and Steinmeier (1993), we adopt a broad definition of mobility, that defines a transition to a new job to have occurred as long as one of those

[22]See Gustman and Steinmeier (1993).

variables indicates a job change.

In Tables 3 to 6, we present basic statistics on mobility rates and wages by pension coverage status. A number of interesting findings emerges from these tables. We find the well-known negative relationship between defined benefit pension coverage and mobility rates. Non covered workers have mobility rates ranging from 27.8 to 32.7 percent while much lower mobility rates characterize pension covered workers. In particular, this negative relationship holds not only for workers covered by defined benefit pensions but also for those covered by defined contribution plans. Workers reporting double coverage have the lowest mobility rate in all survey years.

Pension covered workers, either stayers or movers, are on average better paid than workers without pensions in all the survey years[23]. This could reflect either worker specific or job specific attributes. If the entire wage differential between workers with and without pension 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 the 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 non-pension jobs, either as a result of rent-sharing or because of some productivity enhancing-scheme requiring efficiency wage payments. Raw evidence from tables 3 to 7 is consistent with the latter interpretation. In particular, table 7

[23] This gap is particularly large for people reporting double coverage.

indicates that most (86 percent) pension covered movers lose pension coverage[24] and thus move to jobs associated with lower average wages.

5 Empirical Results

The model is estimated on the pooled sample of the four surveys with a set of panel dummies[25]. Table 8 reports results from first-step reduced form probit estimation. The estimates provide very limited information about the validity of the theoretical framework captured by equations $(2)-(4)$, 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, and the estimated coefficient values are difficult to interpret. The reduced form estimates are however the necessary first step to derive Heckman's (1979) two-steps consistent estimates of the wage equations.

5.1 Selection Corrected Wage Equations

In Table 9 we present the estimated sample-selection corrected wage equations for movers and stayers. The dependent variable is the log of hourly wages expressed in 1992 constant dollars. The reported t-values are computed correcting the variance-

[24] Information on pension coverage on the new job is collected by means of a topical module in wave 7 only for the 1984 and 1986 survey years. Alternatively, no wave 7 pension topical module was asked in the 1990s surveys. Pension coverage in wave 7 is an important variable in the estimation of our empirical model. We impute this variable for the 1990s running a probit for pension coverage status change among movers in the 1980s.

[25] We have tested the pooling of data from different combinations of panels and in no case the data reject the null hypothesis of common parameters. The year dummy variables are not reported in the tables.

covariance matrix of the estimated coefficients with the Heckman procedure[26]. Most of the selection of individuals into the observed mover/stayer status seems to come from unobservables, although the selection effect captured by $\hat{\sigma}_{mv}\hat{\lambda}_{mi}$ and $\hat{\sigma}_{sv}\hat{\lambda}_{si}$ is negative both for movers and for stayers. The coefficients of "measurable" variables obtained in the wage equation (either for stayers or movers) confirm a priori expectations. More precisely, being white, married, professional, employed in a medium or large firm (over 100 employees) as well as in a manufacturing firm and living in a SMSA are all significantly associated with higher earnings. Similarly, the returns to education are positive and statistically significant.

The wage equations include dummy variables for defined benefit and defined contribution pension coverage. These provide a test for the existence of a wage premium accruing to pension covered workers after controlling for individual and job specific characteristics. The regression results corroborate the correlation reported in the descriptive statistics: being in a pension covered job (either in defined benefit or defined contribution plan) generally gives positive and statistically significant returns in wages. The regression results reveal that the premium associated with being covered by a defined benefit plan (or by a defined contribution plan) is much smaller for stayers than for movers. Interestingly, a similar result is found for both employees with health cover-

[26] See Heckman (1979). The routine for computation of the correct standard errors, programmed in Stata - version 7 - is available upon request from the authors. Reported t-values followed by one (two) asterisks are significant at 90 (95) percent level.

age and those member of a union. The positive returns to pension coverage contradict the predictions of the theory of equalizing differences and of the spot contract pension literature[27].

5.2 Structural Probit Estimates

The final step in the procedure is the maximum likelihood estimation of the individual probability of interfirm job mobility, as expressed by the structural probit equation (13)[28]. This requires computation of the predicted log wage differential for each individual given his/her own characteristics, as in (12). The structural probit allows us to disentangle the coefficients of the mobility costs equation from effects working through wages. The estimated structural equation has a significant power in explaining job mobility decisions. A likelihood ratio test strongly rejects the null hypothesis that all slope coefficients are equal to zero. The parameter estimates reported in Table 10 represent the effect of a one unit change in the independent variable on the probability of job mobility, evaluated at the sample mean[29].

Generally, the coefficient estimates are consistent with a priori expectation. In particular, home owners are less likely to move. Experience and family size negatively

[27] See Bulow (1982).

[28] In the reported estimates, the base case individual is white, not married, without children, house tenant, not enrolled in any individual pension plan nor in any employer provided pension or health insurance plan, not receiving firm specific training, not unionized, working in a small firm.

[29] Standard errors are derived from a standard White variance covariance matrix. Reported t-values followed by one (two) asterisks are significant at 90 (95) percent level.

affect mobility. Similarly, being married, having children under 18, working in a large firm and receiving employer provided training have a negative impact on job mobility. However, these estimates are not statistically significant at any standard level.

Our model assumes that an individual's decision to change jobs responds positively to wage differential defined as her/his lifetime earning gains from moving. The positive and highly significant wage differentials estimate constitutes a robust evidence in support of this model. However, our model suggests that the response to wage differentials accounts on average for a modest 1.7 percent of the observed mobility. In our model, the effect of pension coverage is captured by pension coverage dummies (either defined benefit or defined contribution). In addition, our specification also includes a pension loss variable to disentangle the effect of backloading of defined benefit pensions on mobility.

Our results reveal that being employed in a pension covered job, regardless of the nature of the plan, significantly reduces the probability of moving by about 20 percent. On the contrary, our estimation results suggest that on average, pension backloading further reduces the mobility of defined benefit pension covered workers only by 0.5 percent. In addition, the coefficient is not statistically significant. This result gives very little support to the implicit contract view that potential pension wage losses deter mobility. Our finding that the effect of defined contribution plans is equally important than the overall effect of defined benefit plans in shaping mobility decisions reinforces this conclusion. Indeed, if backloading loss were the main cause of the lower mobility of pension covered workers, one would observe a much larger mobility rate among workers covered by defined contribution plans than among those covered by defined benefit plan.

Our estimated effect of the pension variables seems to corroborate earlier findings reported by Gustman and Steinmeier (1993). These authors argue that rather than pension losses, it is the existence of a compensation premium associated with pension covered jobs which mostly affects mobility. Our finding of the existence of positive wage returns accruing to workers covered by employer provided pension is further evidence supporting the view that compensation premiums are an important factor in explaining the lower mobility rate of pension covered workers. Additional support for the idea that fringe benefits associated with pension covered jobs play an important role in the job mobility decision is found in the estimated coefficients on the health insurance and union coverage variables, which are found to be negative and statistically significant.

Previous research on the question of whether workers covered by employer provided health insurance are "locked" into their jobs has produced contradictory results despite the widespread similarity in methodological approaches and the use of similar datasets. In particular, two previous studies have used SIPP data: while Penrod (1995) produces little empirical evidence of a mobility impeding role of employer provided health insurance, Buchmueller and Valletta (1996) find evidence of job lock among women, but not among men[30]. While not addressing explicitly the "job lock" hypothesis and its identification strategies, our results provide further evidence that employer provided health insurance represents a valuable fringe benefit to workers which significantly deters job mobility.

As mentioned earlier, the Tax Reform Act of 1986 reduced, starting from 1989, the vesting period required to be entitled to any pension benefit. This policy change reduced the loss incurred by workers covered by defined benefit plans associated with a job change[31]. Therefore, one should expect a lower impact of pension portability loss on moving after the implementation of the reform. We try to capture this effect by predicting the change in mobility that can be attributed to the policy change for workers who have been in the same job between five and ten years and who are covered by defined benefit plan in the 1992 survey year. Our basic results are reported in Table 12. We find that the effect of the reform on the average pension loss is important reducing the later by 46 percent, or $5430. However, our model also suggests that each 1000 dollars of pension loss reduces the probability of switching jobs by about 0.03 percent. Thus, on average the reform increased the mobility probability by only 0.015 percent. This result suggests that the dramatic reduction of the vesting period imposed

[30] See Currie and Madrian (1999) for a review of the "job lock" literature.

[31] The portability loss variable is computed on a typical final salary defined benefit plan, whose characteristics are reported in table 11. Table 11 also reports the actuarial assumptions needed for the calculation.

by the Tax Reform Act had an insignificant impact on mobility choices.

6 Conclusions

This paper provides an empirical analysis of occupational pension portability in the United States, grounded on a structural econometric model of interfirm job mobility.

We find that workers covered by defined benefit pensions are significantly less likely to move. However, the potential portability loss arising to workers leaving a defined benefit plan does not seem to play a significant role in explaining job mobility choices. Our results also reveal that defined contribution plans, despite of their complete portability, are as important as defined benefit plans in reducing job mobility. Employer provided health insurance and union coverage are also found to play a major role in deterring job mobility. As in Gustman and Steinmeier (1993), these results undermine the argument that the lack of pension portability is a key factor in explaining the lower mobility rate observed among workers in pension covered jobs. Evidence of compensation premiums in pension and health insurance covered jobs further supports the alternative view that workers in "good jobs" are simply less likely to move. From a policy perspective, these results cast doubt on the effectiveness of reforms aimed at improving labour market efficiency through portability measures.

In the context of a national pension policy focused on the reduction of social security benefits, a more convincing argument in favour of increased pension portability would be to ensure retirement income adequacy for multiple job changers. The effect of the reduction in the vesting period implemented with the 1986 Tax Reform Act clearly illustrates the latter point. Although we found that the reform did not affect mobility, the average pension loss of workers affected by the reform was reduced by 46 percent. On the other hand, one may question the need to increase pension portability since pension covered jobs are also associated with a higher remuneration levels (Gustman and Steinmeier (1993)). If one is concerned with the adequacy of pension income after retirement, a more equitable policy goal may be to address the observed decline in pension coverage.

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Table 1: Pension Coverage by Survey Years

	SIPP84	SIPP86	SIPP90	SIPP92
Not Covered	31.19	34.63	37.46	35.44
Pension Covered	68.81	65.37	62.54	64.56

Source: Our elaboration on SIPP data.

Table 2: Pension Coverage by Plan Type and Survey Years

		SIPP 84	SIPP 86	SIPP 90	SIPP 92
DB plan		39.53	31.38	19.62	23.72
DC plan	Profit Sharing	14.27	15.13	10.45	N/A
	401k	3.50	5.59	13.79	14.88
	Other	5.88	4.70	3.29	7.69
	Total DC	23.65	25.42	27.53	22.57
DB + DC		5.63	8.58	15.40	18.28
Not Covered		31.19	34.63	37.46	35.44

Source: Our elaboration on SIPP data.

Table 3: Job Mobility, Wages and Pension Coverage 1984

	No Pension		DB		DC		DB+DC	
	Stayer	Mover	Stayer	Mover	Stayer	Mover	Stayer	Mover
Mobility Rate		29.1		12.1		15.3		9
Hourly wage	12.8	12.6	16.4	16.1	16.4	15.5	20.4	20.5
ΔWage %	0.6	2.9	-0.7	3.8	1.1	1.6	-0.8	1.4

Source: Our elaboration on SIPP data

Table 4: Job Mobility, Wages and Pension Coverage 1986

	No Pension		DB		DC		DB+DC	
	Stayer	Mover	Stayer	Mover	Stayer	Mover	Stayer	Mover
Mobility Rate		27.8		12.2		13		8.4
Hourly wage	12.9	11.6	15.8	15.2	17.3	15.8	20	16.9
ΔWage %	4.4	9.6	-0.5	-4.8	-6.2	-0.5	0.2	-3.4

Source: Our elaboration on SIPP data

Table 5: Job Mobility, Wages and Pension Coverage 1990

	No Pension		DB		DC		DB+DC	
	Stayer	Mover	Stayer	Mover	Stayer	Mover	Stayer	Mover
Mobility Rate		32.7		15.8		15.3		10.9
Hourly wage	12.7	11.1	15.9	14.6	16.5	16.2	18.5	16.6
ΔWage %	0.4	2.3	0.7	-1.9	-0.6	-1.8	-0.2	-1

Source: Our elaboration on SIPP data

Table 6: Job Mobility, Wages and Pension Coverage 1992

	No Pension		DB		DC		DB+DC	
	Stayer	Move	Stayer	Mover	Stayer	Mover	Stayer	Mover
Mobility Rate		30.9		13.6		14.3		8.1
Hourly wage	12.4	11.9	15.5	14.9	16.4	15.5	20.4	20.4
ΔWage %	0.8	2	-0.1	-7.9	1.1	1.6	-0.8	1.4

Source: Our elaboration on SIPP data

Table 7: Pension coverage of job movers in SIPP 84 and SIPP 86

	Period 2 (wave 7)	
Period 1 (wave 4)	Not covered	Covered
Not covered	90%	10%
Covered	86%	14%

Source: Our elaboration on SIPP data.

Table 8: Reduced Form Probit Equation

	dF/dx	z
Housing tenure	-0.01772**	-2.3
Married	0.00046	0.05
Family size	-0.00909	-0.93
Children under 18	0.00574**	2.13
Expected portability loss	-0.00054	-0.06
Employer DB pension plan 1	-0.05650**	-5.39
Employer DB pension plan 2	0.39196**	18.22
Employer DC pension plan 1	-0.37144**	-32.64
Employer DC pension plan 2	0.32742**	19.39
Employer health insurance 1	-0.36526**	-32.99
Employer health insurance 2	-0.04538**	-4.4
Employer training	-0.03937**	-3.83
Employer size > 100	0.01769*	1.95
Union member1	0.00133	0.18
Union member 2	0.05036**	3.26
Experience	0.00745	0.54
Experience squared	-0.00023	-0.07
Education	-0.00001	-0.07
Manufacturing	0.00431**	2.82
Managers and professionals	-0.02554**	-3.56
White collars	-0.00158	-0.16
Non-white	-0.00749	-0.92
Smsa	0.01017	1.5
North-east	0.01362	1.41
South	0.01663*	1.94
West	0.01319	1.34
LR	3767.69	
Pseudo R2	0.3783	
Number of observations	10.199	

Table 9: Wage Equation for Stayers and Movers

	Stayer		Mover	
		t-test		t-test
Experience	0.0129**	2.78	0.0155	1.47
Experience squared	-0.0001	-1.24	-0.0003	-1.03
Education	0.0577**	24.88	0.0533**	10.06
Non-white	-0.1892**	-12.17	-0.2032**	-6.08
Employer DB pension plan 2	0.0772**	4.50	0.2773**	4.08
Employer DC pension plan 2	0.0752**	4.28	0.2799**	4.18
Employer health insurance 2	0.1315**	7.71	0.2516**	9.96
Manufacturing	0.0243**	2.34	0.0748**	2.88
Union member 2	0.0835**	6.61	0.1495**	4.62
Managers and professionals	0.1794**	12.58	0.2474**	7.53
White collars	-0.0072	-0.57	-0.0421	-1.50
Smsa	0.1126**	11.03	0.0799**	3.40
North-east	0.0373**	2.72	0.0896**	2.75
South	0.0058	0.47	-0.0125	-0.43
West	0.0814**	5.67	0.0504	1.54
Lambda	0.2359**	4.62	-0.1050**	-4.47
Constant	1.3954**	21.36	1.3407**	9.82
F-test	182.41		44.94	
Adj. R2	0.2948		0.2997	
Root MSE	0.41756		0.47796	
Number of observations	8247		1952	

Table 10: Structural Form Probit Equation

	dF/dx	z
Wage differential	1.3480**	41.62
Housing tenure	-0.0096	-1.21
Married	-0.0043	-0.42
Non-white	0.0362**	3.19
Family size	-0.0028	-0.98
Children under 18	-0.0067	-0.69
Union 1	-0.0840**	-10.56
Expected portability loss * 1000	-0.0003	-1.2
Employer DB pension plan 1	-0.2021**	-17.37
Employer DC pension plan 1	-0.2037**	-25.07
Empoyer health insurance 1	-0.1027**	-10.48
Employer training	-0.0125	-1.42
Employer size > 100	-0.0052	-0.66
Experience	-0.0003	-0.09
Experience squared	0.0001	1.06
Education	-0.0017	-1.18
Log-likelihood	-3373.98	
Wald Chi2	3211.03	
Pseudo R2	0.3224	
Number of observations	10.199	

Table 11: Assumptions for Portability Loss Computation

Annual Accrual Rate	1.5%
Pensionable Wage	Final Wage
Normal Retirement Age	62
Expected Inflation Rate	3%
Expected Nominal Wage Growth Rate	5%
Post-Retirement Indexation	0.33%
Early Leavers' Indexation	no
Nominal Discount Rate	5%
Inflation Adjusted Discount Rate	4%

Table 12: Predicted effect of the change in vesting rule on individual mobility

Defined benefit covered movers in SIPP 1992, $5 \leq$ job tenure < 10	
Average pre-reform pension wage loss	$17.189
Average post-reform pension wage loss	$11.745
Δ in pension wage loss	-46.3%
Δ on predicted individual mobility	-0.015%

Dollar amounts are expressed in 1992 dollars.

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