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THE IMPACT OF EMPLOYER-PROVIDED HEALTH INSURANCE ON DYNAMIC EMPLOYMENT TRANSITIONS

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ABSTRACT

We estimate the impact of employer-provided health insurance (EPHI) on the job mobility of males over time using a dynamic empirical model that accounts for unobserved heterogeneity. Previous studies of job-lock reach different conclusions about possible distortions in labor mobility stemming from an employment-based health insurance system: a few authors find no evidence of job-lock, while most find reductions in the mobility of insured workers of between 20 and 40%. WE use data from the National Longitudinal Survey of Youth which describes the health insurance an individual holds, as well as whether he is offered insurance by his employer. This additional information allows us to model the latent individual characteristics that are correlated with the offer of EPHI, the acceptance of EPHI, and employment transitions. Our results provide an estimate of job-lock unbiased through correlation with positive job characteristics and individual specific turnover propensity. We find no evidence of job-lock among married males, and produce small estimates of job-lock among unmarried males of between 10 and 15%.

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1 Introduction

Job-lock is described in the economics literature as a reduction in worker mobility arising from the perceived risk of losing health insurance. More specifically, if wages do not perfectly offset differences in the valuation of health insurance across different jobs, then individuals with employer-provided health insurance are described as job-locked if they do not change jobs even when new employment opportunities with higher match-specific productivity arise (Gruber and Madrian, 1994). These employees stay in their current jobs for fear of losing and being unable to obtain health insurance coverage.[1] If employer-provided health insurance (EPHI) is preventing the reallocation of workers to productivity-enhancing jobs, then it is likely to have negative welfare consequences. Given the large proportion of Americans under age 65 who are covered by EPHI, should we be concerned about possible distortions in labor mobility stemming from our employment-based health insurance system?

Despite very little research among economists prior to 1993 that attempted to measure whether employees were locked into their jobs by acceptance of their employer's health insurance coverage, the federal government passed the Consolidated Omnibus Budget Reconciliation Act (COBRA) in 1985 which provides employees who leave their jobs with access to their employer's health insurance coverage.[2] The federal government has continued to make health insurance accessible to individuals changing jobs by passage of the Health Insurance Portability and Accountability Act (HIPAA) in 1996. The prime objective of this legislation was to make health insurance portable and continuous for employees, and to eliminate the ability of insurance companies to reject coverage for individuals because of a pre-existing condition.[3] Although such laws have made it easier for

[1] An individual might risk losing health insurance (or his preferred health insurance plan) for several reasons: insurance may not be portable from job to job; it is common for insurance policies to exclude pre-existing conditions; there may be a waiting period for coverage on new jobs, regardless of pre-existing condition status; he may lack insurance during unemployed job search; or he may have a preference for a particular plan which might not be offered by another employer.

[2] In particular, it requires that employers with 20+ employees allow employees who leave their jobs for any reason (other than gross misconduct) or their dependents to have continuing coverage in the employer's health insurance plan for 18 (or 36) months with the insured person paying the full cost of coverage at no higher than 102% of the employer's costs.

[3] While the statute has exceptions, the ability to deny health insurance to new employees because of pre-existing conditions has been considerably limited. For all plan years starting after June 30, 1997, employers and health insurers now may, with respect to a participant or beneficiary, impose a pre-existing condition exclusion only if: the exclusion relates to a condition (whether physical or mental) for which the participant or beneficiary received medical advice, diagnosis or treatment within the last six months; the exclusion lasts for no more than 12 months after the enrollment date; and the length of the exclusion is also reduced by the

individuals to make employment transitions, there is no consensus in the economics literature as to whether such legislation was necessary. That is, estimates of job-lock (the reduced probability of exiting one's current job) range from 0% to as high as 50% for some groups of workers. We assert that our empirical approach, which is different from methods used in this literature, allows for improved estimates of job-lock by including important job characteristics, modeling the dynamic employment transitions over time, and (unrestrictively) controlling for unobserved heterogeneity.

We use data from the National Longitudinal Survey of Youth (NLSY) to estimate yearly transitions from employment to the same job, a new job, or non-employment from 1989 to 1993. Our work offers two contributions to the brief but controversial literature on job-lock. 1.) We use data from a source that has not been used in published studies of job-lock to reconcile the extent to which health insurance influences employment transitions. The NLSY data allow for longitudinal, dynamic analysis of employment behavior as well as inclusion of important job characteristics (such as the offer of EPHI) that have been omitted from previous studies. We find no evidence of job-lock among married males, and produce small estimates of job-lock among unmarried males of between 10 and 15%. 2.) We employ an estimation technique that accounts for the possibility that the holding of employer-provided health insurance, as well as the offer of such insurance, is endogenous to employment transitions: the unobserved factors that affect employment decisions may be correlated with the unobserved determinants of the offer and the acceptance of employer coverage. In addition to finding little to no evidence of job-lock among married males when we account for unobserved heterogeneity, we find smaller estimates of job-lock among unmarried males when the heterogeneity is modeled.

In Section 2 we discuss the evolution of previous approaches to measuring job-lock and the contradictory findings. We describe a theoretical model of the dynamic employment behavior of individuals in Section 3. We approximate the theoretical value functions describing employment transitions to form our dynamic empirical model which is detailed in Section 4. The data used in estimation of the empirical model are described in Section 5, and Section 6 discusses our findings. We conclude in Section 7.

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period of time for which the participant or beneficiary had health insurance coverage before the enrollment date.

2 A Review of Methods and Findings

A significant obstacle to accurately measuring job-lock is the lack of data that combine extensive employment information with measures of health, health care consumption, and health insurance. The potential market failure described as job-lock is a result of heterogenous individuals valuing health insurance differently. If job-lock implies that own employer-provided health insurance (EPHI) binds the policyholder to the job, then individuals in poor health (or with families in poor health) are more likely to experience job-lock than healthy workers due to larger expected medical care expenditures. Reliable health data are therefore desirable in testing for the presence of job-lock. Similarly, accurate measurement of job-lock depends crucially on observed and unobserved job characteristics, which undoubtedly influence an individual's employment decisions and may be correlated with expected future health care expenditures.

Cooper and Monheit (1993) provide the first empirical results addressing job-lock. Using the 1987 National Medical Expenditure Survey (NMES), the authors examine how an individual's health insurance on the current job and how his probability of gaining or losing health insurance in an alternate job affect his quit probability. The authors assign workers to three categories — those likely to gain employer coverage, those likely to lose employer coverage, and those likely to have no change in coverage — based on predictions generated by those individuals for which health insurance is observed prior to and after a job transition. Their results from a probit analysis of the decision to leave the current employer indicate support for the job-lock hypothesis; married and single men with EPHI are significantly less likely (around 23%) to change jobs than those men without health insurance from their employers.

Using NMES data, Madrian (1994) employs a difference in difference (DD) estimator — the empirical approach followed by most subsequent researchers — to measure job-lock. The DD approach compares the mobility rates of individuals with combinations of EPHI and spousal health insurance. That is, in the empirical model a coefficient on this own/spouse insurance interaction term indicates whether having spousal health insurance increases the probability of a quit more for workers holding own EPHI than for those without it.[4] The use of the DD estimator addresses the

[4]The assumption that large expected medical expenditures should increase job attachment more for workers with EPHI is used in two additional tests for job-lock. The second and third tests are identical to the first, with the exception that variables measuring family size and the presence of a pregnant wife, respectively, are used in place of the variable indicating an alternate (non employer-provided) source of health insurance.

concern that EPHI is correlated with unobserved positive job characteristics which reduce labor mobility. Specifically, Madrian asserts that the DD estimation procedure negates the influence of other employment factors which affect mobility, such as pensions, by comparing two groups which presumably have similar characteristics. She finds that married men with EPHI only are 26-31% less likely to change jobs than those with another source of health insurance.

The approach taken by Holtz-Eakin (1994) is similar to the one taken by Madrian (1994). He uses the 1984 Panel Study of Income Dynamics to estimate a probit equation for the probability of a quit among workers and, like Madrian, he considers the interaction term between spousal and employer-provided health insurance as the proper test for job-lock. Unlike Madrian, however, his results provide no evidence of job-lock. The only result which suggests job-lock is a 1.6% decrease in mobility for married men from 1984 to 1985, but the result is not statistically significant.

Buchmueller and Valletta (1996) also estimate a DD model in their study of job-lock, but recognize that the approaches taken by previous authors rely on the unlikely assumption that men who are observed to have health insurance from a source other than their own employers are in jobs that are similar to men who have no health insurance. That is, men covered by another source (in this case, their wives' employers) may have been offered health insurance from their own employers but chose not to take it. If this assumption is not true, then the unmeasured characteristics of good jobs that are correlated with the offer of health insurance are not differenced away with the DD approach. Also identified as an omission from previous work on job-lock is the failure to account for possible correlation between EPHI and individual specific turnover propensity. Buchmueller and Valletta argue that because turnover is costly to a firm providing health insurance (due to reasons such as enrollment costs), employers may prefer workers with low quit propensity and thus require a probationary period prior to coverage by EPHI or screen applicants based on job history. As a result, part of the lower mobility observed among employees holding EPHI may be attributable to low turnover propensity, not job-lock.

Using the Survey of Income and Program Participation (which contains more complete employment information than the NMES), Buchmueller and Valletta attempt to capture the effects of "good jobs" by including a vector of fringe benefits and to control for individual turnover propensity by including tenure. In addition, they raise the concern that the own/spouse insurance interaction term may be proxing for characteristics of dual earner couples. To account for this potential bias in

the DD estimator, the authors model job changes of married men and women jointly. Their results provide weak support for the job-lock hypothesis among dual earner married men, while strong evidence of job-lock among dual earner married women is found. Their measures of job-lock lie very close to those of Cooper and Monheit (1993) and Madrian (1994). Modeling spousal job change does not significantly alter the estimates of job-lock and the authors conclude that the failure to account for the correlation between husband and wife turnover propensity does not significantly bias estimates of job-lock. The authors also conclude that inclusion of tenure and a full vector of fringe benefits remedies the potential bias in the coefficient on EPHI; however, neither of these explanatory variables are treated as endogenous.[5]

Kapur (1998) uses the NMES data and the DD technique to suggest that published estimates of job-lock may be flawed for two reasons. First, comparable control and experimental groups are essential for unbiased results in DD estimations. She examines groups that are more comparable to one another than groups used in previous job-lock papers; that is, she compares the mobility rates of married dual earner males who have EPHI only to those who have EPHI and spousal health insurance. Second, a good measure of expected medical care expenses as a cost factor in changing jobs is important when studying the effects of health insurance on mobility decisions. Using the extensive health information contained in the NMES, she constructs detailed measures of family illness. Little support for the job-lock hypothesis is found: results that include measures of family illness indicate that job-lock is not influencing mobility decisions. These results stand in marked contrast to the earlier job-lock research using the NMES data. In addition, Kapur replicates Madrian's DD estimations using family size and the presence of a pregnant wife. The family size test is implemented with a correction to the original specification, while the pregnant wife test is executed with improved data. Again, she finds no evidence of job-lock. The author reconciles these differences as the result of improperly defined control and experimental groups and incomplete measures of the explanatory variables in the earlier papers.

Employing data from the National Longitudinal Survey of Youth (NLSY), Anderson (1998) expands the scope of previous research by examining not only job-lock, but also job-push. Job-push, as she defines it, is a parallel phenomenon to job-lock in which individuals who lack EPHI exit current jobs in order to obtain such insurance from another employer. She estimates a proportional

[5] An estimate of job-lock is also produced for non-dual earner couples and singles. Single women are found to suffer from job-lock, while the results are less significant for single and sole earner married men.

hazard model that incorporates unobserved heterogeneity in individual job mobility propensities and finds mobility effects (ranging from 20 to 40%) which are comparable to many earlier studies. However, Anderson concludes that approximately 50% of this effect is attributable to job-push. Using the detailed information on sources of health insurance in the NLSY, several DD estimations which separately test for job-lock and job-push are performed. These empirical results support the job-push hypothesis and provide additional evidence that estimates of job-lock which fail to account for job-push are biased by the inclusion of the job-push effect.

In conclusion, a major concern in the existing job-lock literature is devising a method for estimating job-lock which overcomes the almost certain correlation between EPHI and factors which affect mobility independently from health insurance. As shown above, the literature identifies two primary explanations for why the coefficient on EPHI may be biased. First, as emphasized in Madrian (1994), health insurance is likely correlated with unobserved positive job characteristics which tend to reduce mobility. The use of difference in difference techniques in the literature is a direct response to this concern. Second, as first noted by Buchmueller and Valletta (1996), EPHI may be correlated with individual specific turnover propensity. The inclusion of tenure as a proxy for turnover propensity has been the dominant response to this issue.

3 A Dynamic Model of Employment Transitions

In this section, we present a simple theoretical model of the dynamic employment decisions of individuals in the presence of uncertainty about medical care expenditures.[6] While such decision-making behavior is likely to be associated with other life changing choices such as marriage and fertility, these endogenous transitions are not modeled explicitly. The purpose of the model is to demonstrate that *availability* of health insurance through one's own employer and the ability to secure insurance through an alternate source have important dynamic consequences that affect job mobility.

[6]See Blau and Gilleskie (1997a and 1997b).

3.1 The Decision and Information Sets

The model assumes two possible employment states upon entering period t: employed ($e_t = 1$) and not employed ($e_t = 0$).[7] Three health states exist: good ($H_t = 0$), bad ($H_t = 1$), and deceased ($H_t = 2$). Prior to realization of his health state at the beginning of period t, an individual makes a decision about current period employment and health insurance, conditional on the characteristics of the job offer in hand.

The employment alternatives available to an individual who was previously employed ($e_t = 1$) are to be non-employed, to take a new job, and to continue working in his period $t-1$ job, and are denoted $j = 0, 1, \text{and } 2$ respectively. Individuals who were previously non-employed ($e_t = 0$) do not have the third employment option. The alternatives available in both employment states include the option of taking a new job. Characteristics of this new job may include number of hours, health insurance coverage, pension coverage, and wage rates, among other things. For simplicity we focus only on the availability of health insurance at this new job. Let $O_t = 1$ indicate that health insurance is offered; $O_t = 0$ otherwise. An individual chooses to be uninsured, to hold health insurance that is not tied to his current employer, or to hold EPHI through his current employer. Alternatives are denoted $i = 0, 1, \text{and } 2$. An indicator function, d_t^{ij}, indicates the health insurance and employment decision of an individual in period t. That is, $d_t^{ij} = 1$ if alternatives i and j are available and are chosen during period t and $d_t^{ij} = 0$ if alternatives i and j are not available or are not chosen during the period. Alternatives are mutually exclusive (i.e. $\sum_{i=0}^{2} \sum_{j=0}^{2} d_t^{ij} = 1, \forall t$).

The state variables should define the information available to an individual at the beginning of each period t. For computational simplicity, exogenous information not relevant to the issues being discussed is omitted from the vector of state variables. The information available to an individual upon entering period t includes: the previous health state (H_{t-1}), the previous employment state (e_{t-1}), accumulated tenure in the current employment state (x_{1t}), accumulated work experience (x_{2t}), an indicator of whether EPHI is available from one's period $t-1$ employer (I_t), and the availability of an alternate source of health insurance (A_t).

An individual's employment status at the beginning of period t is defined by his employment choice in the previous period. The transition from health state $H_{t-1} = h$ in period $t-1$ to health state $H_t = a$ in period t is denoted π_t^{ha} where $\pi_t^{h0} + \pi_t^{h1} + \pi_t^{h2} = 1 \ \forall h, \forall t$. Accumulated tenure

[7] No distinction is made between being unemployed and being out of the labor force.

at period t measures the number of uninterrupted periods that the individual has been employed with the same employer up to period t. Work experience, on the other hand, measures all periods in an employed state. Although the offer of insurance is considered exogenous (but stochastic), the availability of insurance from one's current employer, I_t, is endogenous because the individual makes the decision to be employed in a particular job or not.[8] Alternate sources of health insurance, A_t, are exogenous and include, for example, insurance through a spouse's employer. The space of all possible states at the beginning of period t is S_t, where $\mathbf{s}_t = (H_{t-1}, e_{t-1}, x_{1t}, x_{2t}, I_t, A_t) \in S_t$. The way in which these state variables influence current decisions as well as future expectations is described below.

3.2 An Individual's Optimization Problem

The per-period utility associated with each alternative available during period t is given by $U^h(C_t, \mathbf{d}_t, \mathbf{Z}_t, \epsilon_t^h) = \overline{U}^h(C_t, \mathbf{d}_t, \mathbf{Z}_t) + \epsilon^{hij}$ where C_t is consumption of a composite commodity, $\mathbf{d}_t$ is a vector of the current choice indicators, $\mathbf{Z}_t$ is a vector of observed exogenous characteristics, and ϵ_t is a vector of utility shocks. Preferences are allowed to depend on health and employment status. The utility of a deceased individual is assumed to be zero.

The budget constraint is given by

$$C_t = N_t + w_t(x_{1t}, x_{2t})(1 - d_t^{i0}) - c_t d_t^{i1} - p_t^{ij}(1 - d_t^{0j}) - m_t(H_t, d_t^{ij}) \quad \forall t, i, j \tag{1}$$

where N_t is non-earned income and earnings, $w_t(x_{1t}, x_{2t})$, depend on tenure and experience. There is a cost, c_t, associated with taking a new job (e.g., loss of accumulated, non-transferable fringe benefits) and a premium, p_t^{ij}, associated with health insurance. Out-of-pocket medical expenses, $m_t(H_t, d_t^{ij})$, depend on health and health insurance in the current period.

Because the characteristics of new jobs are known by the individual but unobserved to the econometrician, it is assumed that individuals compare expected discounted lifetime utility associated with each employment and insurance alternative for each new job type. New jobs are differentiated by whether they offer health insurance ($O_t = 1$) or not ($O_t = 0$).

We employ a dynamic programming formulation implied by Bellman's Principal. The Expected Present Discounted Value (EPDV) of lifetime utility consists of the known (to the individual)

[8] Without loss of generality, we assume that the same employer does not rescind insurance offers or begin making insurance offers across periods.

current period utility from entering the period in health state h and choosing alternatives i and j, plus the discounted expected value of the optimal employment-insurance decision in period $t+1$ given the probabilistic health transition during period t. More specifically, the EPDV of lifetime utility from choosing health insurance i and employment j in period $t < T$, given health status h and new job characteristics O_t, is written

$$\begin{aligned} V_{ij}^{h}(\mathbf{s}_t, \epsilon_t \mid O_t) &= \pi_t^{h0}\left[\overline{U}_{ij}^{0}(C_t) + \epsilon_t^{0ij} + \beta V^{0}(\mathbf{s}_{t+1})\right] \\ &\quad + \pi_t^{h1}\left[\overline{U}_{ij}^{1}(C_t) + \epsilon_t^{1ij} + \beta V^{1}(\mathbf{s}_{t+1})\right] \end{aligned} \tag{2}$$

where β is the discount factor and the value of utility in the deceased health state, $V^2(\mathbf{s}_t)$, is zero. Maximal expected value of lifetime utility at the beginning of period t, conditional on entering the period in health state h and conditional on the characteristics of the new job, is

$$V^{h}(\mathbf{s}_t|O_t) = E_{t-1}\left[\ \max\left[V_{ij}^{h}(\mathbf{s}_t, \epsilon_t|O_t), \forall i, \forall j\right]\right]\ . \tag{3}$$

Unconditional on the characteristics of the new job, the EPDV of lifetime utility is

$$V^{h}(\mathbf{s}_t) = \sum_{\ell=0}^{1} p(O_t = \ell) V^{h}(\mathbf{s}_t|O_t = \ell) \tag{4}$$

where $p(O_t = \ell)$ is the probability a new job offers health insurance. With a few simplifying assumptions one can derive implications of the model.[9] We find that availability of EPHI (whether a firm offers insurance or not) increases the value of lifetime utility and decreases the probability of leaving the current job. Similarly, insurance from an alternate source increases the probability of leaving one's current job.

4 The Empirical Model

In this section we introduce two new strategies for generating unbiased estimates of job-lock. Our first strategy involves a unique feature of the National Longitudinal Survey of Youth in relation to the data sources used in previous papers: the availability of information on whether EPHI is *offered* by the respondent's current employer, as well as whether such insurance is *held* by a respondent.

[9]Specifically, we assume that employment is preferred to non-employment and that being insured is preferred to having no insurance. Basically these assumptions imply that work provides positive returns and that individuals benefit from provision of group insurance by an employer (i.e., $p_t^{ij} \leq \pi^{h1}(1-\theta^{ij})m$, where θ^{ij} is the percent of total medical care costs for which the employee is responsible).

We include variables indicating both the offer of EPHI and the holding of EPHI (henceforth referred to as "offered EPHI" and "holds EPHI") in our empirical model. There are two ways to interpret the coefficient on the "offered EPHI" variable in the context of job-lock. Our first interpretation rests on the assumption that the offer of insurance should not hinder mobility; job-lock becomes an issue only if insurance is accepted. The offer of insurance will, however, be associated with positive job characteristics which reduce mobility. It is not the holding of health insurance that is correlated with positive job characteristics, but the offer of such insurance. The coefficient on the "offered EPHI" variable therefore indicates the magnitude of the mobility-restraining effects of the unobserved positive job characteristics associated with the offer of insurance, while the coefficient on the "holds EPHI" variable provides an estimate of job-lock unbiased through correlation with positive job-characteristics. We refer to this interpretation as the correlation interpretation. Our second interpretation of the "offered EPHI" variable suggests that the offer of EPHI has value independent of holding EPHI. As suggested by the theoretical model, the option to accept EPHI in the future may hold positive utility for an individual. Under this option-value interpretation, the marginal effect of the offer of EPHI on mobility is correctly considered a component of the full job-lock effect: the coefficients on both the offer and holding of EPHI are used in the estimate of job-lock. Each interpretation has a potential weakness. The correlation interpretation possibly misses the option value of EPHI and may thereby understate the magnitude of job-lock, whereas the option value interpretation may capture the correlation between the offer of EPHI and unobserved positive job characteristics and thereby overstate the magnitude of job-lock. The two interpretations should therefore be viewed as generating a conservative and liberal estimate of job-lock, respectively.

Regardless of the interpretation, inclusion of the "offered EPHI" variable eliminates the bias in the coefficient on the "holds EPHI" variable only if one is willing to believe that the offer of EPHI is an exogenous variable that is correlated with the latent "good job" characteristics. While correlation is likely, exogeneity is not. Thus, we explore a second strategy that admits the endogenity of the offer of EPHI, as well as other important variables influencing mobility decisions. As mentioned above, individual specific turnover propensity which influences observed employment transitions, is captured in the literature by previous employment status and tenure. These variables, however, are endogenous. In order to avoid bias associated with the correlation between employer-provided insurance and unobserved "good job" characteristics and individual

specific turnover propensity, we use the longitudinal observations on individuals from the NLSY and a discrete factor random effects procedure to model the permanent unobserved heterogeneity of these individuals. This strategy is detailed below.

The value functions defined in the previous section explicitly detail how past behavior, current decisions, and future expectations influence the value of utility associated with each alternative in each period. A Taylor series approximation to the explicit functions detailed above allow us to specify the value of choosing employment alternative j in period t, conditional on having been in employment state k in period $t-1$. The approximation is $V_{kjt} = \mathbf{X}_{t-1}\gamma_{kj} + \rho_{kj}\mu + u_{kjt}$ where $\mathbf{X}$ is a vector of state variables, including the offer of own-employer health insurance and job tenure if currently employed. These variables have direct effects on the current period decision but also may affect current behavior because they determine expectations of future values of random variables (e.g., the employment and insurance choice set and wage rates). We recognize that the error terms in the theoretical model (utility function errors, as well as insurance offer probabilities and health transition probabilities) should be decomposed into a permanent unobserved component (μ) and random noise (u) and that this permanent heterogeneity may affect different outcomes differently (hence, the factor loadings, ρ, on the permanent factor, μ). This unobserved permanent error captures individual characteristics that are correlated with having a "good job" and latent turnover propensity. The probability of making a transition from employment state k to destination j in period t is

$$\mathrm{p}\ (d_t^j = 1|k, \mathbf{s}_t) = \mathrm{p}\ (V_{kjt} > V_{kj't}, \forall j' \neq j) = \frac{\exp(\mathbf{X}_{t-1}\gamma_{kj} + \rho_{kj}\mu)}{\sum_{j'=1}^{J_k} \exp(\mathbf{X}_{t-1}\gamma_{kj'} + \rho_{kj'}\mu)} \tag{5}$$

where J_k is the number of employment alternatives available to an individual in state k, and the u's are assumed to be independently Extreme Value distributed. These assumptions yield a pair of dynamic multinomial logit models of transitions from employment and from non-employment.[10]

We sequentially explore the effect of our two strategies on the measure of job-lock. That is, we first explain transitions from employment to the same job, a new job, or non employment, allowing both the offer of employer-provided health insurance and the coverage by such insurance to influence employment choices. Estimation of this single multinomial logit equation includes no

[10]The models are dynamic because of the (testable) assumption that the probability of choosing employment alternative j today depends on the employment state occupied in the previous period, and because $\mathbf{X}$ contains lagged endogenous variables such as whether a current employer offers EPHI or not and tenure.

attempt to explicitly model the unobserved individual heterogeneity that likely biases the coefficients of interest. We do, however, follow suggestions in the literature to control for "good job" characteristics and turnover propensity by including other observed job attributes and variables describing an individual's employment history. The purpose of this initial analysis is to illustrate how inclusion of the "offered EPHI" variable influences estimates of job lock.[11]

We improve our preliminary analyses by employing our second strategy that models the correlation among unobserved individual characteristics that affect the employment transition decision, the offer of EPHI, the holding of EPHI, and the holding of health insurance from a non-employer source. If these latent characteristics affect current employment decisions, then they are likely to be correlated with initial tenure and employment status which summarize the individual's employment history up to the first year of our data. We further believe that marital status might be endogenous and hence, model it jointly with the other equations and separately explain transitions from employment by marital status. We allow the nine equations of our empirical model to be linked by dependence on the common unobserved factor which is treated as a random effect and is integrated out of the model. We follow Mroz (1998), Mroz and Guilkey (1992), and Heckman and Singer (1984) in approximating the distribution of the unobserved permanent heterogenity (μ) by a step function. The points of support of the distribution, the factor loadings in each equation, and the probabilities associated with each point of support are estimated jointly with the other parameters. This procedure addresses the joint endogeneity of outcomes arising from common unobserved factors, but imposes no distributional assumption (such as joint normality) on the unobserved factors. As demonstrated by Mroz, this method creates little bias or efficiency loss when normality is the correct distribution and performs better than maximum likelihood estimators when the true distribution of the unobservables is not normal. In Section 6, we refer to the single multinomial logit equation as our non-heterogeneity model and the set of jointly estimated equations as our heterogeneity model.

The dual strategies we employ allow us to generate a coefficient on the health insurance variable which is unbiased by the problems identified in the literature. As a result, we depart

[11] We recognize that most of the literature does not distinguish between different destinations from one's current job, but, rather, models quit probabilities only. Although we estimate and discuss results from simple logit models of quit decisions in the appendix, the multinomial logit specification is consistent with our fuller set of jointly estimated equations described below, and is therefore the form of our main equation. It also allows for a wider range of analysis than the simple logit specification (see Section 6.3).

from the literature and interpret the coefficient on the "holds EPHI" variable as a measure of job-lock.[12] We are able to generate an unbiased measure of job-lock without resorting to a difference in difference (DD) test. DD tests are very sensitive to the way in which they are specified and when specified correctly the range of analysis possible is often quite limited. For instance, in order to obtain a strictly correct DD specification, Kapur (1998) is forced to restrict her analysis to married, dual-earner respondents who hold health insurance. In addition, the reliance on DD tests has forced authors of previous papers to estimate the *incremental* effect on job-lock of various conditions such as having a pregnant spouse or holding insurance through a spouse's employer. They do not provide a *general* estimate of job-lock. Our estimation strategy allows us to avoid the sample selection issues inherent in DD tests and to produce measures of job-lock that are applicable to a broad segment of the labor market without fear that our broad inclusion has biased our results.

5 Description of Data

We estimate our model using data from the National Longitudinal Survey of Youth (NLSY). The NLSY is a nationally representative sample of 12,686 young men and women interviewed on a yearly basis since 1979. Detailed health insurance questions are first available in 1989 and, hence, our sample covers 1989-1993. We restrict our analysis to males who are not in school, in the armed forces, or self-employed.[13] We are forced to drop a small number of observations for missing tenure and for an observed health insurance status that does not agree with employment status, marital status, or health insurance availability at the current job. Finally, because our empirical model is dynamic and we model the accumulation of state variables over time, we retain only respondents for

[12]Buchmueller and Valletta (1996) tentatively accept the coefficient on health insurance as a measure of job-lock for sole-earner married and single respondents.

[13]The sample used in estimation includes the oversample of civilian Hispanics, blacks, and economically disadvantaged white youth that are not eliminated due to other restrictions. The respondents are age 24 to 35 over our sample period, and thus our estimates of job-lock refer to young males. In fact, quit rates among these young workers are 22% for married males and 36% for unmarried males. Quit rates from other data sources used in this literature are between 16 and 24%.

whom a continuous panel of observations can be constructed.[14] We are left with 4422 individuals who contribute up to three employment transitions for a total of 10,700 person-year observations.[15]

The main dependent variable measures an individual's employment destination in year $t+1$ given his employment status in year t. Although weekly employment information is available in the NLSY, important variables pertaining to health insurance coverage are available only during the survey week for which the Current Population Survey (CPS) is replicated for the NLSY respondents. In order to utilize the health coverage information, we define labor market transitions in yearly increments with employment status corresponding to the week of the CPS replication. If a respondent who is employed at the time of the CPS replication has a different employer at the subsequent replication, then he is coded as having transitioned to a new employer. If he is not employed at the subsequent replication, then he is coded as having transitioned to non-employment.[16] The top panel of Table 1 describes the transitions pooled over all years. Individuals who are not married are more likely to change jobs if employed and less likely to enter employment if not employed. The bottom panel indicates year to year transitions by year. The noticable differences are a smaller reentry to employment from 1990 to 1991 and a smaller exit from employment from 1992 to 1993. The former is likely to be correlated with the relatively higher unemployment rates in the early 1990s. The latter is likely to be correlated with the large censoring of non-employed individuals by 1992 and the subsequent retention of individuals who are employed.[17]

The health insurance variables are a major focus of this research in terms of explaining employment transitions. They are also key endogenous (and therefore dependent) variables in the set of jointly estimated equations that allows for and estimates the unobserved heterogeneity

[14]Although information on employment transitions is available every year, several important health insurance questions are not asked in 1991. Thus, we cannot measure the extent to which EPHI explains employment transitions from 1991 to 1992. The construction of all variables is performed prior to eliminating observations for the 1991-1992 transition. That is, tenure, the number of jobs, and employment status for 1992 (which explain the 1992-1993 transition) are determined correctly using all of the available information. We simply do not attempt to explain the 1991-1992 transition. Results using an imputed value of health insurance in 1991 and including the 1991-1992 transition in estimation were not different from the results reported in the paper.

[15]More specifically, we have observations on 4422 individuals in 1989, 3574 individuals in 1990, and 2704 individuals in 1992.

[16]It is possible that some respondents transitioned multiple times during the year. Due to the lack of health insurance variables for jobs held subsequent to the CPS interview but before the CPS interview of the following year, we are unable to use these transitions in our empirical model.

[17]We do not jointly estimate an equation for attrition in our set of estimated equations in the heterogeneity model. Failure to model the endogeneity of attrition does not bias our results if the attrition can be explained by observable variables.

Table 1: Employment Transitions of Males

		Transition in year $t+1$ to:		
Employment state at t	Percent	Same Job	New Job	Not Empl
Employed	88.90	71.49	21.80	6.71
Not Employed	11.10		39.90	60.10
Married				
Employed	94.71	77.90	17.88	4.22
Not Employed	5.29		50.18	49.82
Not married				
Employed	83.08	64.18	26.28	9.54
Not Employed	16.92		36.69	63.31

		Transition in year $t+1$ to:				
Employment state at t	Percent	Same Job	New Job	Not Empl	Censored	Total
Year: 1989						
Employed	86.57					
Number		2577	1020	231		3828
% of non-censored		67.32	26.65	6.03		
Not Employed	13.43					
Number			255	339		594
% of non-censored			42.93	57.07		
Year: 1990						
Employed	88.19					
Number		2272	618	262	700	3852
% of non-censored		72.08	19.61	8.31		
Not Employed	11.81					
Number			121	301	148	570
% of non-censored			28.67	71.33		
Year: 1992						
Employed	93.64					
Number		1951	436	145	307	2839
% of non-censored		77.05	17.22	5.73		
Not Employed	6.36					
Number			98	74	563	735
% of non-censored			56.98	43.02		

of individuals. Table 2 presents summary statistics relevant to health insurance coverage. The summarized variables include the offer of health insurance from the current employer, the acceptance of such insurance (i.e., the respondent holds EPHI), and the holding of coverage from a source other than the respondent's employer. A significant proportion of the sample who are offered EPHI decline the coverage (about 13% for both married and unmarried males). Married individuals are more likely to hold insurance from another source and this insurance is likely to be obtained through an employed spouse. Both married and unmarried males are less likely to leave their employer if they hold EPHI. However, the quit rate is essentially unchanged for those offered EPHI regardless of whether they accept it or not. Males who decline EPHI are more likely to leave their employer than those accepting EPHI. Married men tend to switch jobs rather than enter non-employment; unmarried men transit to new jobs as well as to non-employment.

Appendix Table A1 displays summary statistics for the demographic and employment variables included in the empirical models. The NLSY contains a wide range of work-related variables that are important in controlling for possible correlation between individual specific turnover propensity, employer-provided health coverage, and employment. In the non-heterogeneity model these variables may be correlated with "good jobs" and turnover propensity, but are treated as exogenous. Our estimated set of equations, however, allows for permanent unobserved heterogeneity and these employment-related variables serve as additional controls to our explicit modeling of the unobserved individual characteristis that affect mobility. Although their inclusion in our model follows Buchmueller and Valletta (1996) and Anderson (1998) (who also uses the NLSY), we include a more extensive vector than either of these earlier papers. The most significant employment-related variables are the vector of fringe benefits and two variables for tenure. The offered fringe benefits include pensions, training/educational opportunities, sick leave, life insurance, and profit sharing.[18] We include a continuous tenure variable as well as a dummy for less than one year of tenure. Exploiting the panel structure of the NLSY, we further control for turnover propensity by including variables for the number of jobs ever held by the respondent interacted with age dummies.[19]

[18]See appendix Table A2 for the correlation among offered fringe benefits, including the offer of employer-provided health insurance. While positively correlated, there is substantial variation in the fringe benefit packages offered by employers.

[19]The number of jobs held in a lifetime is correlated with turnover propensity. However, this correlation is dependent on age. The younger the individual, the more likely that a given number of previous jobs indicates a high turnover propensity. We address this concern by interacting the number of jobs ever held with three age dummies.

Table 2: Health Insurance Characteristics of Employed Males

	Married (5068)	Not Married (4444)
Offered EPHI at current job	86.11	73.87
Accepted EPHI	86.37	87.54
EPHI covers spouse	53.71	0
EPHI covers children	45.84	4.61
Insurance from other source	20.05	9.90
Of those with EPHI at t	(3769)	(2874)
Employment choice at $t+1$		
Same Job	82.99	74.18
New Job	13.80	19.21
Non employed	3.21	6.61
Of those without EPHI at t	(1299)	(1570)
Employment choice at $t+1$		
Same Job	63.13	45.86
New Job	29.72	39.24
Non employed	7.16	14.90
Of those offered EPHI at t	(4364)	(3283)
Employment choice at $t+1$		
Same Job	81.26	71.31
New Job	15.35	21.17
Non employed	3.39	7.52
Of those offered EPHI at t who declined	(595)	(409)
Employment choice at $t+1$		
Same Job	70.25	51.10
New Job	25.21	34.96
Non employed	4.54	13.94

6 Results and Discussion

In this section we first present and discuss the estimation results from the non-heterogeneity model in order to motivate the use of the "offered EPHI" variable. We then discuss results from the heterogeneity model that allows for endogeneity of several important variables that explain employment transitions. Because we offer different interpretations of the "offered EPHI" variable, we provide several measures of job-lock to reflect these interpretations. Based on the estimated coefficients in either model, we construct predicted probabilities of employment outcomes. The matrix below

	Offered EPHI		
Holds EPHI	No: $O_t = 0$	Yes: $O_t = 1$	
No: $I_t = 0$	A	B	E
Yes: $I_t = 1$	-	C	-
	-	D	-

depicts the probabilities that can be predicted conditional on whether or not an individual was offered EPHI and whether or not such EPHI was accepted. Note that it does not make sense for an individual to hold EPHI if it was not offered. The correlation interpretation measure of job-lock is constructed as the percent difference in turnover probability between those who were offered EPHI and accepted it (element C) versus those who were offered and declined EPHI (element B). Both groups were offered EPHI and, as a result, this measure of job-lock does not contain the effect of the offer of insurance. The difference between the elements B and C measures only the effect of holding EPHI. This measure presumes that the "offered EPHI" variable serves only to measure positive job characteristics. The option value interpretation measure of job-lock is constructed as the percent difference in mobility between those who were offered and accepted EPHI (element C) and those who were not offered EPHI (element A). This measure contains the full effect of holding insurance — the value of actually being insured as well as the option value. Including the effect of the "offered EPHI" variable in this measure allows for the offer itself to have value, but also reflects

the offer variable's correlation with positive job characteristics. Finally, we construct a job-lock measure which we view as an average, or compromise, between the correlation and option value measures. The average measure is constructed as the percent difference in mobility between those who were offered and accepted EPHI (element C) and those who do not hold EPHI (element E) regardless of whether it was offered or not. We also calculate the pure effect of the "offered EPHI" variable on mobility. Under the correlation interpretation, the calculation serves as an estimate of the extent to which the "holds EPHI" coefficient would be biased, in the absence of the "offered EPHI" variable, through correlation with positive job characteristics. While the existing literature universally assumes that this correlation exists, we are able to quantify it. The effect is calculated as the percent difference between elements A and B. Table 3 summarizes these measures.[20]

6.1 The Non-Heterogeneity Model

Table 4 presents results based on the estimation of our empirical model without permanent unobserved heterogeneity. It should be emphasized that these results are potentially biased due to the failure to address the potential endogeneity of key explanatory variables. The results serve as an illustration of the effect of the "offered EPHI" variable using controls for the bias associated with positive job characteristics and turnover propensity that are comparable to the rest of the job-lock literature. Coefficient estimates, with standard errors in parentheses, are presented for the "same job" and "non-employed" outcomes; the "new job" outcome is the base case. The joint significance of the coefficients, based upon likelihood-ratio tests, is included. We calculate each (relevant) measure of job-lock (as described in Table 3) and quantify the effect of the offer variable when appropriate. In addition, we discuss the marginal effect of holding non-EPHI health insurance on turnover propensity.[21]

[20]Of the three measures of job-lock constructed, the correlation interpretation measure is our clear preference for two reasons. First, it avoids the issue of correlation with unobserved positive job characteristics. Second, estimation of our model strongly suggests that the offer of EPHI has importance only through its correlation with positive job characteristics and does not hold significant option value for the individuals in our sample. Unless explicitly stated, all future references to the estimate of job-lock refer to our preferred correlation interpretation estimate.

[21]The predicted probabilities for the elements of the mobility matrix and those reflecting the effect of the "offered EPHI" and "holds non-EPHI" variables are constructed as follows. Once we obtain parameter estimates we can predict the probability of each outcome for each individual. In the simulations, we allow individuals in our sample to retain all of their individual characteristics and recode only the variable or variables of interest for the entire sample. For example, in order to generate the transition probability for

Table 3: Measures of Job-Lock

Name	Description	Formula
Job-Lock 1	Correlation Interpretation	$\frac{p(d_t^2\neq 1\|O_t=1,I_t=1)-p(d_t^2\neq 1\|O_t=1,I_t=0)}{p(d_t^2\neq 1\|O_t=1,I_t=1)}$
Job-Lock 2	Option Value Interpretation	$\frac{p(d_t^2\neq 1\|O_t=1,I_t=1)-p(d_t^2\neq 1\|O_t=0,I_t=0)}{p(d_t^2\neq 1\|O_t=1,I_t=1)}$
Job-Lock 3	Average Measure	$\frac{p(d_t^2\neq 1\|O_t=1,I_t=1)-p(d_t^2\neq 1\|I_t=0)}{p(d_t^2\neq 1\|O_t=1,I_t=1)}$
Job-Lock 4*	Effect of Holding EPHI	$\frac{p(d_t^2\neq 1\|I_t=1)-p(d_t^2\neq 1\|I_t=0)}{p(d_t^2\neq 1\|I_t=1)}$
Offer Effect	Pure Effect of "Offered EPHI"	$\frac{p(d_t^2\neq 1\|O_t=1,I_t=0)-p(d_t^2\neq 1\|O_t=0,I_t=0)}{p(d_t^2\neq 1\|O_t=1,I_t=0)}$
Non-EPHI Effect	Effect of Ins from Other Source	$\frac{p(d_t^2\neq 1\|A_t=1)-p(d_t^2\neq 1\|A_t=0)}{p(d_t^2\neq 1\|A_t=1)}$

Note: $*$ This measure is calculated for Specifications 1 and 4 only; these specifications do not include the "offered EPHI" variable.
The probability of *not* staying in the same job is denoted $p(d_t^2 \neq 1|\cdot)$.
In the multinomial logit model, this probability is calculated as $(1 - p(d_t^2 = 1|\cdot))$.
We also estimate two logit models that capture quits and do not separately model destinations. The first logit model classifies both transitions to a new job and transitions to non-employment as quits. The second logit model drops transitions to non-employment and defines only transitions to a new job as quits.
See Appendix Tables 4a and 4b for the logit estimation results.

Table 4: Selected Parameter Estimates from the Non-Heterogenity Employment Model
(Outcome is transition from employment to listed destination)

	Specification 1			Specification 2			Specification 3			Specification 4			Specification 5		
	Same job	Not Empl		Same job	Not Empl		Same job	Not Empl		Same job	Not Empl		Same job	Not Empl	
Offered EPHI				0.319	-0.426	*	-0.070	-0.356					-0.142	-0.060	
				(0.138)	(0.263)		(0.154)	(0.288)					(0.149)	(0.214)	
Holds EPHI	0.440	0.239	*	0.254	0.528	**	0.110	0.580	***	0.125	0.578		0.520	-0.208	*
	(0.104)	(0.196)		(0.133)	(0.269)		(0.136)	(0.272)		(0.144)	(0.295)		(0.134)	(0.195)	
Holds non-EPHI	-0.242	0.266	*	-0.283	0.317	*	-0.310	0.335	*	-0.288	0.342	*	0.037	-0.149	
	(0.111)	(0.205)		(0.113)	(0.206)		(0.113)	(0.206)		(0.140)	(0.270)		(0.128)	(0.189)	
Pension							0.185	-0.066		0.147	-0.162		0.032	-0.281	
							(0.108)	(0.214)		(0.112)	(0.223)		(0.107)	(0.172)	
Training							0.163	-0.117		0.163	-0.097		0.240	-0.028	
							(0.094)	(0.193)		(0.101)	(0.207)		(0.095)	(0.156)	
Sick Leave							0.264	-0.367		0.263	-0.149		0.352	0.124	
							(0.097)	(0.188)		(0.107)	(0.210)		(0.094)	(0.145)	
Life Insurance							0.293	0.134		0.247	0.110		0.179	0.365	
							(0.117)	(0.227)		(0.122)	(0.240)		(0.112)	(0.174)	
Profit Sharing							0.134	-0.049	* †	0.202	0.024	* †	0.083	0.022	* †
							(0.100)	(0.209)		(0.105)	(0.220)		(0.102)	(0.167)	
ln(Likelihood)	-2838.9364			-2832.9288			-2800.3999			-2201.5511			-3331.8011		
Simulations															
Job-Lock 1				-0.1231			-0.0094						-0.3583		
Job-Lock 2				-0.4410			0.0016						-0.2775		
Job-Lock 3				-0.1796			-0.0088						-0.3356		
Job-Lock 4	-0.3054									-0.0254					
Offer Effect				-0.2831			0.0109						0.0595		
Non-EPHI Effect	0.1371			0.1587			0.1692			0.1817			-0.0360		

Note: Standard errors are in parentheses. * indicates joint significance at the 1% level; ** 5% level; *** 10% level.
† indicates that joint significance test refers to vector of five fringe benefits.

Following the previous literature, we begin our analysis by focusing on married men. Specification (3) of Table 4 is our preferred empirical model.[22] Specification (1) is our preferred model minus the vector of fringe benefits and the "offered EPHI" variable. The coefficients on "holds EPHI" are jointly significant and imply a 31% reduction in mobility for those who hold employer-provided insurance. In light of our discussion above and suggestions from the literature, this estimate of job-lock is undoubtedly biased. Specification (2) adds the "offered EPHI" variable. The offer variable is jointly significant at the 1% level. The correlation interpretation measure of job-lock is 12% — a substantial reduction from the job-lock measure based on specification (1). The likelihood ratio test indicates that the coefficients on the "holds EPHI" variable are jointly significant only at the 10% level as opposed to significance at the 1% level when the "offered EPHI" variable was not included. The simulations suggest that the offer of insurance reduces mobility by 28%. For our sample of married men this figure represents the bias in the "holds EPHI" variable that would result in the absence of information on the offer of insurance. The differences between specifications (1) and (2) suggest that the "offered EPHI" variable has considerable power to reduce the bias in the coefficient on employer coverage arising from correlation with positive job characteristics. Of course, this specification does not allow us to interpret the significance of the "offered EPHI" variable as capturing correlation with positive job characteristics or as the offer itself having value.

Specification (3) reflects our preferred specification, which includes a vector of five fringe benefits offered by employers in addition to health insurance coverage. An important finding based on estimation of (3) is the ability of the vector of fringe benefits to completely eliminate the explanatory power of the "offered EPHI" variable. The coefficient for this variable in the same job outcome approaches zero and jointly the coefficients are statistically insignificant. On the other hand, the vector of fringe benefits is significant at the 1% level. These results suggest that the offer of EPHI does not hold significant option value for the individuals in our sample. We conclude that the significance of the "offered EPHI" variable in specifications (1) and (2) is due to the failure to properly control for job characteristics. Specification (3) therefore provides support for a correlation

state A in the mobility matrix, we set the "offered EPHI" and "holds EPHI" variables to zero. We then predict the transition probabilities for each individual and average over the full sample.

[22]Please refer to appendix Table A3 for the complete list of estimated coefficients from our preferred specification. Complete tables of estimation results for specifications other than the preferred specification are available upon request from the authors.

interpretation of the "offered EPHI" variable, as opposed to an option value interpretation. We also find that the inclusion of a multitude of job specific variables, particularly fringe benefits, results in no evidence of job-lock for married men.[23] The difference between (2) and (3) provides additional evidence that Buchmueller and Valletta's (1996) emphasis on the inclusion of fringe benefits in a properly specified model of job-lock is correct. An unreported specification which omits the fringe benefit variables, with the exception of pensions, suggests that, at least for our sample of relatively young individuals, the inclusion of only pensions, as in Buchmueller and Valletta (1996), may be insufficient. A more complete vector of fringe benefits is required to properly control for the bias associated with positive job characteristics.[24]

A noteworthy feature of (1), (2), and (3) is the significance of the non-employer provided health insurance coefficients. In specification (3), the coefficients are jointly significant at the 1% level. Non-employer coverage produces a positive marginal effect on mobility of 17%. The result suggests that individuals who hold non-employer insurance are more likely to transition than those who do not hold such coverage. Specification (4) is useful in interpreting this result; it is the preferred specification restricted to only those who were offered EPHI by their current employer.

The results from specification (4) are similar to those from (3) with regard to the non-employer coverage variable. One could interpret the significance of this variable as reflecting that individuals who lack access to employer coverage find coverage from a non-employer source and leave their current employer in hope of obtaining employer-provided health insurance. Finding significance of the non-EPHI variable in a model estimated only on those offered EPHI (specification (4)) reveals that this interpretation may be flawed and suggests two refinements. First, it is possible that individuals who hold non-employer coverage when they have access to employer coverage do so because they are dissatisfied with the employer coverage. They transition at a higher rate in order to obtain better employer coverage. We refer to this phenomenon as job-push, but it

[23] We run a number of unreported specifications to check the robustness of our conclusions. Specifically, we run separate specifications which exclude those who transitioned involuntarily, include coverage of spouse and children by the respondent's employer-provided insurance plan, and omit linear tenure to address the concern it may be capturing part of the job-lock effect (Buchmueller and Valletta (1996)). None of these specifications changes the results or our conclusions from Table 4.

[24] It should also be noted that the addition of the "offered EPHI" variable to specification (2) (as compared to specification (1)) doubles the positive effect of holding EPHI on transitions to non-employment. The vector of additional fringe benefits (specification (3)) alters the coefficient for this destination very little as opposed to the large reduction in the estimated coefficient on "holds EPHI" for the same job outcome. These results provide additional evidence that explanations of job mobility benefit from the knowledge of whether EPHI is offered to, as well as whether it is held by, an employee.

is important to distinguish this from Anderson's (1998) job-push. Anderson defines job-push as affecting individuals who lack health insurance. They exit jobs in which they do not have access to employer-provided health insurance because they do not hold insurance from another source. Our version of job-push works in an opposite manner — indeed our estimated coefficient is opposite in sign from Anderson's.[25] The second possibility is that individuals who intend to exit their current job in the near future hold other insurance so as not to experience a spell where they are uncovered. The non-employer coverage variable acts as an indicator of a high turnover propensity. We turn to the discrete factor random effects model, which explicitly models turnover propensity, for clarification between the job-push and indicator theories.[26]

Specification (5) is the preferred specification estimated on the sample of unmarried men. The results are different from those for married men. Although, as in (3), the inclusion of fringe benefits eliminates the power of the "offered EPHI" variable, it does not eliminate the significance of the "holds EPHI" variable. The coefficients on the "holds EPHI" variable are jointly significant (at the 1% level) and result in an estimate of job-lock of 36%. Unlike married males, an alternate source of health insurance has no effect on mobility of unmarried males. Our results suggest that the situation faced by married and unmarried males is very different. There may be several reasons for this. Married males may have unobserved characteristics that make them more productive (and more likely to be married) relative to unmarried men (see Korenman and Neumark (1990) and Mroz (1998)). As a result, married men may generally find and retain better jobs which tend to offer health insurance. Additionally, married men potentially have another source of health insurance in their spouses. Even if their spouses do not work or hold employer-provided coverage of their own, the potential for them to do so is always there.

[25]In order to further explore the different effect of the other health insurance variable in our and Anderson's results, we run an unreported specification restricted to those who were not offered EPHI. This is the group, under Anderson's job-push theory, which would be most susceptible to job-push. Anderson's theory would predict that holding other health insurance would reduce the probability of turnover. Instead, holding other health insurance increases mobility by 10% (although the vector of coefficients is significant only at the 10% level). In general, Anderson produces mobility effects of between 20 and 40%, but attributes up to half of this job-lock as her job-push. Our different results may be due to a different methodology, analysis of different years of the NLSY sample, and inclusion of fewer fringe benefits by Anderson.

[26]Specification (4) also provides verification that our preferred measure of job-lock (Job-lock 1) is unbiased through correlation between the "offered EPHI" variable and positive job characteristics. The possibility of positive job characteristic bias is greatly reduced because every individual in the sample holds a job which offers EPHI. The estimate of job-lock is very similar to that produced by specification (3).

In order to provide a more direct comparison to the job-lock literature, we perform a number of unreported DD tests based on Madrian's (1994) methodology. Using specification (3), we run separate DD tests which interact the "holds EPHI" variable with "holds another source of health insurance", "holds spousal employer-provided coverage", and "number of children". We also perform two very precise DD tests by interacting "holds EPHI that covers the respondent's children" with the "number of children" and "holds EPHI that covers the respondent's spouse" with a variable denoting a pregnant spouse. The interaction term fails to obtain statistical significance in any of these runs. In addition, the inclusion of the interaction terms produces little change in the estimated coefficients on our key explanatory variables. While the row difference job-lock estimates range from 18% to -.05%, the simple and adjusted difference-in-difference estimates all approach zero and most have the incorrect sign. Finally, we include a DD test interacting "holds EPHI" and "holds another source of health insurance" in specification (1) which is the most similar to Madrian's specification. Again, the DD test provides no evidence of job-lock.[27]

To summarize, our results suggest that young married men do not suffer from job-lock. One explanation is that as a relatively productive and, in our sample, young group, they have little difficulty obtaining health coverage at alternative employers and are therefore not job-locked. Health insurance is, however, important to them as shown by the importance of the non-employer health coverage variable. For married men, the issue is a form of job-push or indication of turnover propensity, not job-lock. Unmarried males, on the other hand, do suffer significant levels of job-lock. It is important to note that these conclusions are tentative. With the exception of the inclusion of variables for tenure, we have not controlled for latent individual specific turnover propensity, nor have we modeled the endogeneity of important explanatory variables. We turn to our discrete factor approximation model for a more complete examination of employment transitions and its effect on our estimates of job-lock.

[27]Appendix Tables A4a and A4b contain results for specifications (1) - (5) estimated using a logit model as opposed to a multinomial logit model. In Table A4a, a transition is defined as a move from employment to a new employer or to non-employment (i.e., a quit). This definition follows Madrian (1994), Holtz-Eakin (1994), and Buchmueller and Valletta (1996); it appears that Kapur (1998) and Anderson (1998) also define transitions in this manner, although neither explicitly states this. The results are remarkably similar to the multinomial logit results. In Table A4b, a transition is defined as a move from employment to a new employer; those who transition to non-employment are dropped from the sample. The estimates of job-lock for married men are somewhat stronger than the multinomial logit estimates. However, the estimate of job-lock from specification (3) is only 10% using the correlation interpretation measure and 3% using the option value interpretation measure, and these estimates are based on statistically insignificant coefficients. The results for the unmarried men are very similar to the multinomial logit results.

6.2 The Heterogeneity Model

An important aim of our analysis is to account for the possibility that the holding of health insurance, as well as the offer of health insurance, is endogenous; the results from the non-heterogeneity model are likely to be biased if the endogeneity of explanatory variables is ignored. That is, something unobserved about the individual may be affecting both an endogenous variable (e.g., the holding of EPHI) as well as the outcome of interest (e.g., the employment transition). Such permanent unobserved heterogeneity is likely to influence observed health insurance coverage ("holds EPHI"), the offer of health insurance ("offered EHI"), and health insurance coverage from a non-employer source ("holds non-EPHI").[28] Because we have observations on individuals over time, the employment transitions themselves define endogenous tenure and the employment state in each period. An individual's employment state and tenure entering the first year of our sample, however, are defined by the same employment transition process that is being modeled, and are therefore likely to be influenced by the permanent unobservables.[29] We jointly estimate these initial conditions with the per-period transitions from employment and from non-employment, the per-period offer of EPHI, the per-period acceptance of EPHI if employed and offered insurance, and the per-period insurance status from an alternate source. A likelihood ratio test confirmed that we should allow separate equations for transitions from employment by marital status. Because marital status is endogenous and possibly affected by the same unobservables influencing employment transitions, job characteristics, and observed health insurance choices, we include an equation for marital status.[30]

[28] Admittedly, holding health insurance from a non-employer source depends on the availability of such insurance which should be treated as endogenous in a manner similar to the offer of EPHI. Unfortunately we do have such information. We attempt to control for the availability by including an indicator of whether the spouse works in the heterogeneity model. This variable is assumed (incorrectly) to be exogenous; perhaps replacement of this variable with the spouse's age and education (the reduced form) would be more appropriate.

[29] The use of a permanent factor accounts for correlation between the endogenous explanatory variables and the employment transitions that is induced by permanent unobserved heterogeneity, but it does not account for correlation due to time-varying unobservables.

[30] There are three sources of identification in this estimated set of equations: exclusion restrictions, covariance restrictions, and the non-linearity of the logit and multinomial logit equations and the discrete factor specification. The factor structure imposed on the unobservables defines the covariance restrictions. Variables included in the reduced-from equations for the initial conditions and endogenous variables, but excluded from the employment transition equations, are body mass index, crack use, ever convicted of a crime, spouse's age, and household status at age 14 (lived with both parents, one parent/two adults, one parent only, other).

Table 5 presents results based on joint estimation of the set of nine equations with controls for unobserved heterogeneity.[31] We discuss the same health insurance and fringe benefits variables presented in Table 4 above; estimates and standard errors for all variables in each of the nine equations are presented in appendix Tables A5a and A5b.

Table 5: Selected Parameter Estimates from the Heterogenity Model

	Married					Not Married				
	Transitions from employment to:					Transitions from employment to:				
	Same job		Not empl			Same Job		Not empl		
Offers EPHI	-0.055	(0.155)	-0.373	(0.553)		-0.143	(0.150)	-0.044	(0.339)	
Holds EPHI	-0.011	(0.144)	0.838	(0.523)	**	0.522	(0.141)	-0.072	(0.343)	*
Holds non-EPHI	-0.198	(0.122)	0.075	(0.355)	**	0.033	(0.145)	-0.436	(0.437)	
Pension	0.173	(0.112)	-0.045	(0.466)		0.032	(0.108)	-0.261	(0.248)	
Training	0.159	(0.098)	-0.095	(0.413)		0.235	(0.096)	-0.027	(0.173)	
Sick Leave	0.264	(0.098)	-0.374	(0.284)		0.351	(0.094)	0.123	(0.172)	
Life Insurance	0.289	(0.118)	0.145	(0.387)		0.179	(0.116)	0.367	(0.435)	
Profit Sharing	0.137	(0.104)	-0.049	(0.435)	* †	0.084	(0.102)	0.028	(0.221)	* †
Simulations										
Job-Lock 1	0.0360					-0.1462				
Job-Lock 2	0.0364					-0.1078				
Job-Lock 3	0.0358					-0.1351				
Offer Effect	0.0004					0.0353				
Non-EPHI Effect	0.1225					-0.0712				

Note: Standard errors are in parentheses.
* indicates joint significance at the 1% level; ** 5% level; *** 10% level.
† indicates that joint significance test refers to vector of five fringe benefits.

Controlling for unobserved heterogeneity results in different coefficient estimates for married and unmarried males compared to the non-heterogeneity model. The significance of the estimates is similar to that from the non-heterogeneity model, except that the ability of the "holds non-EPHI" variable to explain transitions for males falls. The different coefficient estimates produce differences

[31]The results presented are from a model with four points of support in the discrete distribution of one unobserved permanent heterogeneity factor. Five points of support did not significantly improve the likelihood function.

in our predictions of job-lock. The model suggests that job-lock is non-existent for married males even after controlling for possible correlation among unobserved characteristics influencing observed health insurance status, tenure, and employment transitions. This procedure produces smaller estimates of job-lock (10 to 15%) for unmarried males. The estimated impact of non-EPHI falls for both married and unmarried males. That is, married males are 12% more likely to leave their current job (vs. 17% in the non-heterogeneity model) and unmarried males are 7% less likely to leave their job (vs. 4% in the non-heterogeneity model) when they hold another source of health insurance. This reduction in the estimated effect of non-EPHI on the mobility of married males suggests that the results from the non-heterogeneity model may be correlated with a high turnover propensity — our indicator theory. However, job-push, as we define it, is still prevalent for married men.

We can further understand the heterogeneity model by examining the predicted probabilities of each modeled outcome conditional on each discrete mass point of the distribution of unobserved heterogeneity. Table 6 indicates that individuals with unobserved characteristics at the right of the distribution (mass point 4) are more likely to be employed and to have more years of job tenure in 1989. In each year, they are more likely to be offered EPHI, to accept EPHI, and to have another source of health insurance. Similarly, they are more likely to remain in the same job, or to re-enter employment if they become non-employed. These individuals are also more likely to be married. This finding supports that from the simple example of the effect of marriage on wages used in Mroz (1998): unobserved heterogeneity influences both marriage and employment outcomes.

6.3 Examination of Different Destinations

The multinomial logit specification of the main employment transition equations allows us to examine not only the impact of EPHI on quits but also the impact on the type of quit. That is, is EPHI inhibiting moves to a new job or to non-employment? Table 7 summarizes the simulations in Tables 4 and 5, and also reports the percentage change in probabilities associated with movement to the specific destinations. We discuss results from the heterogeneity model and present results from the preferred specification of the non-heterogeneity model for completeness.

The results suggest that EPHI has virtually no impact on the mobility of married males into new jobs. However, married men who hold EPHI are between 13 and 19% *more* likely to enter

Table 6: Heterogeneity Model Predictions by Mass Point

	Initial Employment		Initial Tenure	Offered EPHI		Holds EPHI		Holds Other Ins		Marital Status	
	Y	N		Y	N	Y	N	Y	N	Y	N
Observed	0.866	0.134	3.019	0.804	0.196	0.869	0.131	0.821	0.179	0.500	0.500
Predicted	0.866	0.134	2.947	0.796	0.204	0.768	0.232	0.757	0.243	0.503	0.497
Mass point 1	0.515	0.485	1.443	0.464	0.536	0.126	0.874	0.173	0.827	0.032	0.968
Mass point 2	0.803	0.197	2.451	0.715	0.285	0.599	0.401	0.598	0.402	0.242	0.758
Mass point 3	0.901	0.099	3.018	0.826	0.174	0.852	0.148	0.824	0.176	0.515	0.485
Mass point 4	0.965	0.035	3.759	0.920	0.080	0.977	0.023	0.967	0.033	0.895	0.105

	Married Employed Transitions to:			Not Married Employed Transitions to:			Non Employed Transitions to:	
	Same Job	New Job	Non Emp	Same Job	New Job	Non Emp	Non Emp	New Job
Observed	0.779	0.179	0.042	0.642	0.263	0.095	0.601	0.399
Predicted	0.740	0.189	0.071	0.647	0.268	0.085	0.538	0.462
Mass point 1	0.537	0.214	0.249	0.601	0.238	0.161	0.759	0.241
Mass point 2	0.694	0.208	0.098	0.636	0.260	0.104	0.619	0.381
Mass point 3	0.756	0.190	0.054	0.650	0.270	0.080	0.528	0.472
Mass point 4	0.816	0.161	0.023	0.664	0.281	0.056	0.408	0.592

Estimated Heterogeneity Distribution

	Estimated Mass Point		Transformed Mass Point	Estimated Prob Weight		Transformed Prob Weight
Mass point 1	0.000	(0.000)	0.000	1.906	(0.191)	0.062
Mass point 2	-0.260	(0.067)	0.435	1.492	(0.137)	0.275
Mass point 3	0.754	(0.055)	0.680	1.378	(0.183)	0.417
Mass point 4	1.000	(0.000)	1.000	-	(-)	0.246

Table 7: Simulations of Effects by Destination

	Percentage Change in the Probability of:		
	A Quit	A New Job	Non empl
Results from Heterogeneity Model			
Married			
Job-Lock 1	0.0360	-0.0299	0.1923
Job-Lock 2	0.0364	-0.0026	0.1290
Job-Lock 3	0.0358	-0.0228	0.1749
Offer Effect	0.0004	0.0265	-0.0785
Non-EPHI Effect	0.1225	0.1087	0.1577
Not Married			
Job-Lock 1	-0.1462	-0.1480	-0.1381
Job-Lock 2	-0.1078	-0.1042	-0.1241
Job-Lock 3	-0.1351	-0.1349	-0.1359
Offer Effect	0.0335	0.0382	0.0123
Non-EPHI Effect	-0.0712	0.0206	-0.4862
Results from Non-Heterogeneity Model			
Married			
Job-Lock 1	-0.0094	-0.1132	0.3685
Job-Lock 2	0.0016	-0.0424	0.1617
Job-Lock 3	-0.0088	-0.0943	0.3021
Offer Effect	0.0109	0.0636	-0.3273
Non-EPHI Effect	0.1692	0.1258	0.3135
Not Married			
Job-Lock 1	-0.3583	-0.2868	-0.5816
Job-Lock 2	-0.2775	-0.1909	-0.5474
Job-Lock 3	-0.3356	-0.2579	-0.5779
Offer Effect	0.0595	0.0745	0.0216
Non-EPHI Effect	-0.0360	0.0039	-0.1371

non-employment than those who do not have EPHI. Evidence from Gruber and Madrian (1994) suggests that continuation coverage (COBRA) serves to mitigate job-lock. That is, reductions in job mobility are smaller when COBRA health insurance is available. We agree that COBRA is likely to affect employment transitions. Our multinomial logit approach of distinguishing among employment destinations suggests that one channel through which this occurs is by encouraging job transitions that involve a spell of non-employment. COBRA enables individuals with EPHI to leave their employer for non-employment without forfeiting health insurance (for a period of 18 months). In order for us to infer a positive impact of COBRA on utility-enhancing mobility, COBRA should have a positive effect on re-entry to employment of non-employed individuals. We find that health insurance from a former employer significantly (at the 10% level) increases the probability of moving from non-employment to employment (see appendix Table A5a). The data do not indicate that this insurance is COBRA, but it is likely. COBRA allows transitions that might involve non-employment and is a policy that is less costly, and potentially less distorting to labor demand, than requirements that employer coverage be portable.

It appears that EPHI inhibits transitions from employment to the different destinations equally among unmarried males: transitions to a new job and to non-employment are reduced by 14.8 and 13.8% respectively. Interestingly, however, the non-heterogeneity model suggests that EPHI reduces mobility into non-employment more than it reduces mobility into a new job. This finding may be related to the smaller prevalence of insurance from a non-employer source among unmarried males. Modeling of the endogeneity of a non-employer source appears to reduce the bias associated with correlation with unobserved characteristics that explain the lack of such a source.

7 Conclusion

Our findings convince us that young married men who hold employer-provided health insurance are not locked into their jobs. Such health insurance, however, is likely to reduce the mobility of unmarried males by 10 to 15%. One explanation for the different results by marital status is the idea that something unobserved influences marital status as well as employment choices in such a way that EPHI is "too good" to risk losing. Perhaps these males believe that they would have more difficulty finding a new job that offers health insurance as is suggested by our heterogeniety

model and the results in Table 6. Our controls for unobserved heterogeneity in the estimated set of structural equations that allows the offer of EPHI, as well as accepting EPHI, having another source of insurance, tenure, and marital status, to be endogenous, produce an estimate of job-lock that is substantially smaller than the model that does not control for unobserved individual characteristics.

If insurance-induced job-lock does indeed reduce mobility, we agree with Gruber and Madrian (1994) and Holtz-Eakin (1994) that such job-lock is a short-run problem. (Our estimates from a model of annual transitions indicate that job-lock is not relevant for married males and is small for unmarried males, but analysis of shorter time intervals might produce different findings.) The requirement that EPHI be portable and void of pre-existing conditions clauses, while nobel, has costly implications for employers and might not be necessary to promote unrestricted mobility between jobs. While the NLSY data do not allow us to quantify the effect of COBRA on employment transitions, Gruber and Madrian find evidence that this short-run solution has the ability to increase mobility among those who have insurance. This legislation may be sufficient to alleviate job-lock when it exists. Our results suggest that EPHI *encourages* transitions from employment to non-employment among married males; this movement might be explained by the federal requirement of temporary continuation coverage. We also find evidence that insurance from a former employer (potentially temporary COBRA coverage) promotes re-entry to employment.

As we demonstrate, it is important to have detailed employment characteristics describing both an individual's employment history and the fringe benefits offered by his firm. Few data sets provide this detail for a nationally representative sample. Also deficient in datasets that do offer such detail is useful information on health and medical care expenditures. The 1996 Medical Expenditure Panel Survey, which updates the 1987 NMES with design enhancements and expanded questions, contains interviews with employers and information about other health plans available to, but not chosen by, employed respondents. This information may enable researchers to identify different valuations of health insurance among individuals. This promising dataset should be explored in future studies of health insurance and its effects on job mobility.

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Appendix

Table A1: Sample Statistics

Variable	Married		Not Married	
	Employed (5068)	Not Employed (283)	Employed (4444)	Not Employed (905)
Employment Related Variables				
Tenure	4.188	-	2.929	-
Tenure ≤ 1	0.279	-	0.435	-
Service occupation	0.084	-	0.153	-
Manufacturing industry	0.281	-	0.224	-
State/local government	0.100	-	0.087	-
Federal government	0.026	-	0.024	-
Pension	0.649	-	0.495	-
Training	0.523	-	0.404	-
Sick Leave	0.635	-	0.544	-
Life Insurance	0.734	-	0.582	-
Profit Sharing	0.330	-	0.278	-
Maternity Leave	0.469	-	0.401	-
Child Care	0.051	-	0.056	-
Very Unsatisfied with job	0.017	-	0.029	-
Union	0.174	0.117	0.147	0.053
No. of jobs ever held	6.860	7.435	7.320	6.914
<3.0% unem rate	0.021	0.011	0.033	0.023
3.0-5.9% unem rate	0.527	0.484	0.566	0.591
6.0-8.9% unem rate	0.315	0.328	0.292	0.280
>9.0% unem rate	0.137	0.177	0.109	0.106
AFDC	0.013	0.141	0.007	0.015
SSI	0.011	0.085	0.014	0.120
Food Stamps	0.041	0.261	0.027	0.094
Welfare	0.049	0.300	0.034	0.165
Unempl Comp	0.052	0.145	0.065	0.064
Disability	0.041	0.113	0.027	0.071

Table A1: Sample Statistics — continued

Variable	Married		Not Married	
	Employed (5068)	Not Employed (283)	Employed (4444)	Not Employed (905)
Demographic Variables				
Age	29.461	28.767	28.614	28.417
Years of educ = 0-5	0.006	0.004	0.003	0.006
Years of educ = 6-8	0.033	0.085	0.029	0.064
Years of educ = 9-11	0.105	0.230	0.132	0.295
Years of educ = 12	0.449	0.484	0.453	0.450
Years of educ = 13-15	0.196	0.120	0.194	0.122
Years of educ = 16	0.136	0.035	0.133	0.038
Years of educ = 17+	0.075	0.042	0.057	0.027
Black race	0.170	0.265	0.347	0.550
Other race	0.063	0.106	0.052	0.069
South	0.375	0.431	0.367	0.361
Rural	0.230	0.283	0.157	0.178
Health limitation	0.025	0.078	0.034	0.082
Number of children	0.948	1.208	0.134	0.137
Other Variables				
Any crack use	0.007	0.018	0.023	0.053
Crack use missing	0.004	0.014	0.006	0.009
Ever convicted of crime	0.073	0.124	0.077	0.156
Crime info missing	0.031	0.042	0.028	0.053
Body Mass Index (BMI)	25.527	25.121	24.827	25.131
BMI missing	0.030	0.039	0.031	0.025
Spouse's age	27.608	26.367	-	-
Spouse's age missing	0.022	0.046	-	-
Spouse works	0.457	0.332	-	-
Mom's yrs of educ	10.249	9.403	10.215	8.864
Mom's educ missing	0.063	0.071	0.069	0.126
Dad's yrs of educ	9.788	8.491	9.436	7.072
Dad's educ missing	0.113	0.159	0.154	0.283
Lived with whom at age 14				
Both parents	0.753	0.661	0.670	0.513
Two adults (one parent)	0.087	0.113	0.096	0.118
One parent only	0.127	0.155	0.191	0.298
Other	0.028	0.067	0.036	0.062
Missing	0.005	0.004	0.007	0.009

Table A2: Correlation Matrix of Offered Fringe Benefits

	Health Insurance	Pension	Training	Sick Leave	Life Insurance	Profit Sharing
Married						
Health Insurance	1.0000					
Pension	0.4943	1.0000				
Training	0.3247	0.4018	1.0000			
Sick Leave	0.3498	0.3720	0.3366	1.0000		
Life Insurance	0.6227	0.5390	0.3784	0.3693	1.0000	
Profit Sharing	0.2174	0.2938	0.2428	0.1540	0.2631	1.0000
Not Married						
Health Insurance	1.0000					
Pension	0.5348	1.0000				
Training	0.3940	0.4622	1.0000			
Sick Leave	0.4815	0.4359	0.3858	1.0000		
Life Insurance	0.6638	0.5952	0.4133	0.4608	1.0000	
Profit Sharing	0.2914	0.3584	0.3000	0.2420	0.3189	1.0000

Table A3: Results for All Regressors in Non-Heterogeneity Model

Variable	Married Employed Males Transition to: Same Job		Non empl		Not Married Employed Males Transition to: Same job		Non empl	
Demographic Variables								
Age	0.854	(0.398)	-0.153	(0.769)	0.252	(0.391)	0.837	(0.615)
Age squared/100	-1.446	(0.684)	0.257	(1.320)	-0.442	(0.687)	-1.419	(1.076)
Years of educ = 0-5	-0.223	(0.487)	-0.712	(1.088)	0.099	(0.728)	0.519	(0.943)
Years of educ = 6-8	-0.060	(0.214)	-0.010	(0.369)	0.127	(0.227)	0.401	(0.301)
Years of educ = 9-11	-0.060	(0.132)	0.145	(0.225)	0.028	(0.119)	0.259	(0.160)
Years of educ = 13-15	-0.157	(0.110)	-0.208	(0.220)	0.033	(0.106)	-0.298	(0.173)
Years of educ = 16	-0.089	(0.136)	-0.489	(0.330)	-0.197	(0.127)	-0.456	(0.228)
Years of educ = 17+	-0.053	(0.171)	-0.813	(0.493)	-0.370	(0.169)	-0.927	(0.375)
Black race	-0.291	(0.110)	0.323	(0.204)	-0.199	(0.089)	0.425	(0.134)
Other race	0.145	(0.172)	0.510	(0.287)	-0.075	(0.179)	0.168	(0.256)
South	-0.011	(0.088)	-0.118	(0.174)	-0.081	(0.085)	-0.240	(0.133)
Rural	-0.056	(0.100)	0.044	(0.191)	-0.060	(0.108)	-0.261	(0.170)
Health limitation	-0.009	(0.248)	0.937	(0.337)	-0.089	(0.211)	0.214	(0.285)
Number of children	0.086	(0.053)	0.075	(0.104)	-0.041	(0.090)	0.162	(0.117)
Employment Related Variables								
Tenure	0.097	(0.021)	0.014	(0.042)	0.104	(0.027)	-0.010	(0.044)
Tenure ≤ 1	-0.453	(0.108)	0.106	(0.210)	-0.616	(0.107)	-0.117	(0.170)
No. of jobs*age(24-28)	-0.064	(0.012)	-0.010	(0.022)	-0.061	(0.011)	-0.031	(0.016)
No. of jobs*age(29-32)	-0.067	(0.011)	-0.019	(0.019)	-0.054	(0.011)	-0.048	(0.017)
No. of jobs*age(33-36)	-0.069	(0.021)	-0.036	(0.038)	-0.016	(0.026)	0.035	(0.036)
Service occupation	-0.501	(0.142)	-0.159	(0.270)	-0.115	(0.108)	0.252	(0.152)
Manufacturing industry	0.227	(0.100)	0.091	(0.193)	0.352	(0.104)	0.568	(0.156)
Government job	0.481	(0.155)	-0.549	(0.393)	0.502	(0.149)	-0.126	(0.265)
Union	0.325	(0.130)	0.429	(0.240)	0.292	(0.134)	0.252	(0.207)
Very Unsatisfied with job	-1.338	(0.264)	0.152	(0.365)	-1.139	(0.229)	0.505	(0.245)
Welfare	-0.320	(0.169)	0.456	(0.256)	-0.193	(0.205)	0.157	(0.245)
<3.0% unem rate	-0.071	(0.263)	-0.004	(0.564)	-0.256	(0.208)	-0.557	(0.384)
3.0-5.9% unem rate	0.008	(0.100)	0.130	(0.194)	-0.063	(0.095)	-0.160	(0.146)
>9.0% unem rate	-0.014	(0.138)	0.274	(0.255)	-0.037	(0.141)	0.390	(0.201)
Spouse works	0.071	(0.088)	0.047	(0.175)	-	-	-	-
Other Variables								
Year 1989 dummy	-0.366	(0.133)	-0.592	(0.264)	-0.176	(0.128)	-0.227	(0.202)
Year 1990 dummy	-0.161	(0.126)	0.024	(0.235)	0.135	(0.124)	0.451	(0.187)
Constant	-11.091	(5.755)	0.821	(11.152)	-2.687	(5.550)	-13.109	(8.766)

Note: Standard errors are in parentheses.

Table A4a: Selected Parameter Estimates from Logit Non-Heterogenity Employment Model
(Outcome is quitting one's current job, regardless of destination)

	Specification 1		Specification 2		Specification 3		Specification 4		Specification 5	
Offered EPHI			-0.396	*	0.011				0.129	
			(0.130)		(0.145)				(0.137)	
Holds EPHI	-0.390	*	-0.155		-0.001		0.015		-0.578	*
	(0.097)		(0.125)		(0.128)		(0.135)		(0.122)	
Holds non-EPHI	0.298	*	0.348	*	0.378	*	0.363	*	-0.076	
	(0.104)		(0.105)		(0.106)		(0.129)		(0.119)	
Pension					-0.198		-0.180		-0.112	
					(0.100)		(0.104)		(0.098)	
Training					-0.183		-0.180		-0.251	
					(0.088)		(0.093)		(0.086)	
Sick Leave					-0.336		-0.293		-0.313	
					(0.089)		(0.099)		(0.085)	
Life Insurance					-0.268		-0.227		-0.080	
					(0.109)		(0.113)		(0.102)	
Profit Sharing					-0.143	* †	-0.195	* †	-0.076	* †
					(0.093)		(0.097)		(0.092)	
ln(Likelihood)	-2324.3981		-2319.7238		-2289.8086		-1854.0170		-2478.7100	
Simulations										
Job-Lock 1			-0.1132		-0.0008				-0.3619	
Job-Lock 2			-0.4387		0.0067				-0.2782	
Job-Lock 3			-0.1697		0.0008				-0.3387	
Job-Lock 4	-0.3000						-0.0105			
Offer Effect			-0.2924		0.0075				0.0614	
Non-EPHI Effect	0.1379		0.1588		0.1688		0.1845		-0.0365	

Note: * indicates joint significance at the 1% level; ** 5% level; *** 10% level.
† indicates joint significance test refers to vector of five fringe benefits.

Table A4b: Selected Parameter Estimates from Logit Non-Heterogenity Employment Model
(Outcome is transiting to a new job with transitions to non-employment dropped)

	Specification 1		Specification 2		Specification 3		Specification 4		Specification 5	
Offered EPHI			-0.337	**	0.062				0.146	
			(0.139)		(0.155)				(0.150)	
Holds EPHI	-0.455	*	-0.257	***	-0.112		0.127		-0.520	*
	(0.105)		(0.134)		(0.136)		(0.145)		(0.135)	
Holds non-EPHI	0.242	**	0.286	**	0.320	*	0.296	**	-0.010	
	(0.113)		(0.114)		(0.115)		(0.140)		(0.129)	
Pension					-0.173		-0.141		-0.023	
					(0.109)		(0.113)		(0.109)	
Training					-0.171		-0.168		-0.251	
					(0.095)		(0.101)		(0.096)	
Sick Leave					-0.275		-0.263		-0.355	
					(0.097)		(0.107)		(0.094)	
Life Insurance					-0.308		-0.263		-0.183	
					(0.117)		(0.122)		(0.113)	
Profit Sharing					-0.135	* †	-0.196	* †	-0.098	* †
					(0.101)		(0.106)		(0.103)	
ln(Likelihood)	-2037.6949		-2034.7179		-2012.4171		-1625.7818		-2063.2548	
Simulations										
Job-Lock 1			-0.2044		-0.0799				-0.3536	
Job-Lock 2			-0.5127		-0.0349				-0.2498	
Job-Lock 3			-0.2590		-0.0704				-0.3221	
Job-Lock 4	-0.3793						-0.0977			
Offer Effect			-0.2560		0.0416				0.0767	
Non-EPHI Effect	0.1182		0.1380		0.1512		0.1586		-0.0049	

Note: * indicates joint significance at the 1% level; ** 5% level; *** 10% level.
† indicates joint significance test refers to vector of five fringe benefits.

Table A5a: Results for All Regressors in the Employment Transition Equations of the Heterogeneity Model

Variable	Married Employed Males Transition to: Same Job		Non empl		Not Married Employed Males Transition to: Same job		Non empl		Non employed Males Transition to: Employment	
Employment Related Variables										
Tenure	0.091	(0.022)	0.027	(0.080)	0.104	(0.027)	-0.002	(0.051)	-	-
Tenure ≤ 1	-0.460	(0.113)	0.107	(0.570)	-0.614	(0.109)	-0.106	(0.235)	-	-
No. of jobs*age(24-28)	-0.064	(0.013)	-0.008	(0.042)	-0.061	(0.011)	-0.030	(0.018)	-	-
No. of jobs*age(29-32)	-0.067	(0.011)	-0.019	(0.021)	-0.054	(0.011)	-0.049	(0.017)	-	-
No. of jobs*age(33-36)	-0.067	(0.021)	-0.041	(0.063)	-0.016	(0.025)	0.030	(0.036)	-	-
Service occupation	-0.507	(0.143)	-0.137	(0.460)	-0.115	(0.109)	0.253	(0.169)	-	-
Manufacturing industry	0.228	(0.101)	0.090	(0.284)	0.351	(0.105)	0.545	(0.195)	-	-
Wage rate	0.486	(0.155)	-0.554	(0.433)	0.502	(0.156)	-0.131	(0.598)	-	-
Union	0.344	(0.137)	0.391	(0.485)	0.290	(0.139)	0.233	(0.344)	-	-
Very Unsatified with job	-1.325	(0.270)	0.135	(0.542)	-1.136	(0.232)	0.497	(0.399)	-	-
Welfare	-0.308	(0.170)	0.422	(0.557)	-0.191	(0.206)	0.096	(0.593)	-	-
AFDC	-	-	-	-	-	-	-	-	-0.104	(0.743)
Unemployment Comp	-	-	-	-	-	-	-	-	0.588	(0.874)
Disability	-	-	-	-	-	-	-	-	-0.556	(0.526)
Spouse's EPHI	-	-	-	-	-	-	-	-	0.835	(0.659)
Former employer's ins	-	-	-	-	-	-	-	-	0.894	(0.513)
Spouse's former emp's ins	-	-	-	-	-	-	-	-	1.680	(0.996)
Private insurance	-	-	-	-	-	-	-	-	0.951	(0.723)
Public insurance	-	-	-	-	-	-	-	-	-0.569	(0.475)
<3.0% unem rate	-0.076	(0.266)	0.005	(0.628)	-0.255	(0.209)	-0.525	(0.578)	-0.009	(0.693)
3.0-5.9% unem rate	0.005	(0.102)	0.134	(0.359)	-0.061	(0.095)	-0.157	(0.176)	0.156	(0.230)
6.0-8.9% unem rate	-0.020	(0.142)	0.289	(0.462)	-0.035	(0.143)	0.383	(0.344)	0.199	(0.444)
Spouse works	0.082	(0.089)	0.035	(0.285)	-	-	-	-	-	-

Table A5a: Results for All Regressors in the Employment Transition Equations of the Heterogeneity Model — continued

Variable	Married Employed Males Transition to: Same Job		Non empl		Not Married Employed Males Transition to: Same job		Non empl		Non employed Males Transition to: Employment	
Demographic Variables										
Age	0.904	(0.306)	-0.264	(0.600)	0.253	(0.354)	0.762	(0.583)	-0.285	(0.479)
Age squared/100	-1.518	(0.529)	0.412	(1.109)	-0.443	(0.623)	-1.309	(1.025)	0.476	(0.836)
Years of educ = 0-5	-0.268	(1.399)	-0.571	(1.277)	0.102	(1.412)	0.611	(1.029)	-0.250	(0.997)
Years of educ = 6-8	-0.104	(0.222)	0.140	(0.443)	0.131	(0.230)	0.488	(0.384)	-0.352	(0.726)
Years of educ = 9-11	-0.113	(0.140)	0.280	(0.336)	0.029	(0.123)	0.359	(0.229)	-0.421	(0.219)
Years of educ = 13-15	-0.143	(0.113)	-0.239	(0.337)	0.031	(0.108)	-0.360	(0.235)	0.256	(0.267)
Years of educ = 16	-0.048	(0.139)	-0.602	(0.362)	-0.199	(0.132)	-0.538	(0.501)	0.835	(0.460)
Years of educ = 17+	-0.023	(0.175)	-0.913	(0.516)	-0.373	(0.172)	-1.008	(0.583)	0.756	(0.470)
Black race	-0.374	(0.117)	0.524	(0.409)	-0.196	(0.095)	0.548	(0.174)	-0.766	(0.219)
Other race	0.141	(0.180)	0.493	(0.381)	-0.075	(0.181)	0.170	(0.315)	-0.163	(0.721)
South	0.012	(0.089)	-0.169	(0.302)	-0.081	(0.086)	-0.260	(0.221)	0.211	(0.179)
Rural	-0.041	(0.102)	0.015	(0.362)	-0.060	(0.111)	-0.285	(0.374)	-0.249	(0.256)
Health limitation	-0.023	(0.250)	0.972	(0.388)	-0.088	(0.213)	0.228	(0.473)	-0.159	(0.747)
Number of children	0.141	(0.058)	-0.078	(0.147)	-0.045	(0.098)	0.010	(0.147)	0.274	(0.126)
Married	-	-	-	-	-	-	-	-	-0.656	(0.339)
Other Variables										
Year 1989	-0.378	(0.135)	-0.550	(0.426)	-0.176	(0.128)	-0.230	(0.259)	-0.038	(0.292)
Year 1990	-0.161	(0.129)	0.018	(0.424)	0.133	(0.124)	0.423	(0.230)	-0.679	(0.279)
Constant	-12.678	(4.446)	4.370	(8.441)	-2.677	(5.032)	-11.285	(8.303)	3.463	(6.860)
Factor loading ρ	0.944	(0.335)	-2.221	(0.761)	-0.026	(0.326)	-1.286	(0.554)	1.771	(0.520)

Table A5b: Results for All Regressors in Other Equations of the Heterogeneity Model

Variable	Employed		Tenure		Offered EPHI		Holds EPHI		Holds Other Ins		Married	
Employment Related Variables												
Tenure ≤ 1	-	-	-	-	-0.922	(0.065)	-	-	-	-	-	-
No. of jobs*age(24-28)	-	-	-	-	-	-	-0.032	(0.013)	0.001	(0.010)	-	-
No. of jobs*age(29-32)	-	-	-	-	-	-	-0.048	(0.010)	0.018	(0.009)	-	-
No. of jobs*age(33-36)	-	-	-	-	-	-	-0.041	(0.021)	0.036	(0.017)	-	-
Service occupation	-	-	-	-	-0.158	(0.092)	-	-	-	-	-	-
Manufacturing industry	-	-	-	-	1.431	(0.093)	-	-	-	-	-	-
Government job	-	-	-	-	0.807	(0.131)	-	-	-	-	-	-
Union	-	-	-	-	1.673	(0.139)	-	-	-	-	-	-
<3.0% unem rate	0.312	(0.389)	-0.351	(0.495)	-	-	-	-	-	-	-	-
3.0-5.9% unem rate	-0.279	(0.131)	0.106	(0.113)	-	-	-	-	-	-	-	-
6.0-8.9% unem rate	-0.812	(0.183)	-0.010	(0.170)	-	-	-	-	-	-	-	-
Demographic Variables												
Age	0.068	(0.033)	0.316	(0.022)	0.020	(0.018)	1.099	(0.369)	0.848	(0.301)	0.491	(0.332)
Age squared/100	-	-	-	-	-	-	-1.651	(0.639)	-1.369	(0.520)	-0.519	(0.572)
Years of educ = 0-5	-0.836	(0.983)	-0.435	(0.964)	-1.629	(0.424)	0.354	(0.881)	1.051	(0.830)	-1.031	(0.874)
Years of educ = 6-8	-1.171	(0.262)	-0.372	(0.338)	-1.370	(0.169)	-0.781	(0.336)	0.341	(0.267)	-0.797	(0.393)
Years of educ = 9-11	-0.884	(0.151)	-0.649	(0.140)	-0.792	(0.101)	-0.621	(0.174)	-0.051	(0.142)	-1.289	(0.255)
Years of educ = 13-15	0.631	(0.195)	-0.289	(0.122)	0.601	(0.097)	0.394	(0.144)	0.064	(0.120)	0.629	(0.211)
Years of educ = 16	1.176	(0.396)	-0.326	(0.145)	1.297	(0.132)	0.879	(0.177)	0.336	(0.146)	0.922	(0.228)
Years of educ = 17+	0.362	(0.632)	-1.033	(0.216)	1.512	(0.217)	1.209	(0.369)	0.408	(0.268)	0.957	(0.489)
Black race	-1.264	(0.144)	-0.672	(0.116)	-0.151	(0.081)	-0.480	(0.127)	-0.847	(0.109)	-2.368	(0.203)
Other race	-0.544	(0.278)	-0.230	(0.199)	-0.087	(0.140)	-0.207	(0.212)	0.459	(0.189)	-0.205	(0.293)
South	0.159	(0.116)	0.018	(0.097)	0.154	(0.072)	-0.173	(0.104)	0.372	(0.089)	0.520	(0.139)
Rural	0.095	(0.143)	0.182	(0.113)	0.104	(0.088)	0.063	(0.127)	0.086	(0.108)	0.476	(0.172)
Health limitation	-0.629	(0.331)	-	-	-	-	-0.459	(0.410)	-0.835	(0.174)	-0.033	(0.372)
Number of children	0.322	(0.082)	0.219	(0.054)	0.139	(0.044)	0.472	(0.071)	0.612	(0.055)	3.635	(0.139)
Married	-0.374	(0.231)	-0.224	(0.152)	-	-	-1.244	(0.449)	-2.328	(0.357)	-	-

Table A5b: Results for All Regressors in Other Equations of the Heterogeneity Model — continued

Variable	Employed		Tenure		Offered EPHI		Holds EPHI		Holds Other Ins		Married	
Other Variables												
Any crack use	-0.235	(0.511)	-0.394	(0.593)	-	-	-	-	-	-	-	-
Crack use missing	-0.318	(0.823)	1.241	(0.998)	-	-	-	-	-	-	-	-
Ever convicted of crime	-0.712	(0.163)	-0.880	(0.159)	-	-	-	-	-	-	-	-
Crime info missing	-0.640	(0.480)	0.002	(0.356)	-	-	-	-	-	-	-	-
Body Mass Index (BMI)	-	-	0.049	(0.012)	0.016	(0.009)	-	-	0.007	(0.010)	0.045	(0.015)
BMI missing	-	-	1.278	(0.439)	0.445	(0.328)	-	-	0.505	(0.397)	1.659	(0.555)
Spouse's age	-	-	-	-	-	-	-0.040	(0.015)	-0.042	(0.012)	-	-
Spouse's age missing	-	-	-	-	-	-	-1.089	(0.555)	-0.893	(0.440)	-	-
Two adults (one parent)	-	-	-	-	-	-	-	-	-	-	0.078	(0.182)
One parent only	-	-	-	-	-	-	-	-	-	-	-0.169	(0.145)
Other	-	-	-	-	-	-	-	-	-	-	0.050	(0.336)
Missing	-	-	-	-	-	-	-	-	-	-	-0.704	(0.657)
Year 1989	-	-	-	-	0.173	(0.098)	-0.071	(0.123)	-0.248	(0.101)	-0.376	(0.135)
Year 1990	-	-	-	-	0.094	(0.090)	0.041	(0.112)	-0.046	(0.090)	0.189	(0.114)
Constant	-1.435	(0.920)	-8.230	(0.680)	-2.047	(0.609)	-18.918	(5.355)	-13.969	(4.377)	-20.144	(4.935)
Factor loading ρ	3.678	(0.435)	2.316	(0.306)	3.255	(0.235)	6.630	(0.432)	6.473	(0.297)	11.855	(0.684)