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EMPLOYMENT AND ADVERSE SELECTION IN HEALTH INSURANCE

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1 Introduction

There is a widespread belief among economists that the employment relationship ameliorates the adverse selection problem in health insurance. A job is a place where people come together for reasons other than health insurance.[1] For example, the leading health economics text says "group purchase by employers addresses the problem of adverse selection," (Folland, Goodman, & Stano 2004) but this sentiment is repeated in many places (Gruber, 2000; Cutler, 2000; Buchmueller & Valetta, 2001).

Understanding the connection between health insurance provision and the labor market is important. The labor market is the principal source for the private provision of health insurance in the United States, presumably because of the large subsidy for it in the tax code.[2] A common justification for this system is that employer provision ameliorates the adverse selection problem in health insurance provision. However, to our knowledge no one has explored the conditions under which the labor market solves the adverse selection problem in health insurance.

In our theory, employers, ignorant of workers' health status, choose whether to provide health insurance. Workers, knowing their current health status and the distribution over future health status changes, allocate themselves among employers. As workers transition among health states, they may change insurance status by switching among employers. However, switching costs generate stickiness in the employment relationship. We seek an equilibrium in which both sick and well workers choose jobs with insurance. The main conclusion from the theory is that the labor market solves the adverse selection problem if jobs are stickier than is health status.

In our empirics we use the Current Population Survey (CPS) in conjunction with data from the U.S. Census and O*NET, a survey collected by the Dept of Labor, to explore

[1] We thank David Balan (repeating George Deltas) for this formulation.

[2] The favorable tax treatment of employer health insurance provision results in subsidy of over $100 billion dollars (Gruber, 2001). Approximately 80% of the under-65 population who are insured receive their insurance through their employers. (Authors' calculations using Statistical Abstracts, 2003, Table 152). Of the 41 million uninsured, about three fifths are employed adults.

the determinants of health insurance offering by firms. We find that firms in industries characterized by fluid labor markets, lower job-specific human capital, low unionization, and low patience are less likely to offer health insurance. These finding are consistent with the predictions of our theoretical model.

2 Background

Many economists believe that adverse selection in health insurance leads many people to be uninsured. However, such equilibrium uninsurance is not consistent with traditional models of adverse selection (Rothschild & Stiglitz, 1976; wilson, 1977). When equilibria exist in those models, they call for separating equilibria in which both low and high risk types are insured, low risk types are underinsured.

Because uninsurance is such an important phenomenon in health insurance markets and because traditional theory models do not accommodate uninsurance, we specify a model with alternative assumptions which is capable of generating uninsurance. Our theory differs from the traditional approach in our assumption of fixed insurance characteristics. Insurers are not permitted to offer less generous insurance: they may offer either full insurance or no insurance at all.

In fact, there is only limited heterogeneity in the financial characteristics of health insurance offerings, that is in deductibles, copayments, coinsurance, disease coverage exclusions, out of pocket maxima, and lifetime limits. Further, the plans which are most generous in financial characteristics are HMOs which are extensively documented to receive *favorable* selection. (c.f. Cutler, 2000)

This limited heterogeneity may arise due to a number of factors. First, in order to qualify for favorable tax treatment, employers are limited in their ability to offer different health benefits to different employees. (Gruber, 2000) Second, there is both federal and state legislation mandating the coverage of various conditions and procedures. (Kaestner & Simon, 2002; Gruber, 1994) Finally, courts frequently fail to enforce exclusions in coverage (Epstein, 1997).

The model of adverse selection ours is most similar to is that of Cutler and Zeckhauser. In their model, there are two fixed types of insurance, a generous type and a stingy type. Employees allocate themselves between these two types according to the employees' health status. They examine adverse selection in the choice of plans offered by the same employer; they do not examine adverse selection in the choice of employers. Empirical examinations of this model appear in Cutler & Reber (1998) and Buchmueller & DiNardo (2002).

Another closely related model is provided by Crocker and Moran (2003). They study the ability of labor market stickiness to solve the commitment problem discussed in Cochrane (1995). They find that increasing labor market stickiness increases the ability of the labor market to solve the commitment problem. However, they assume from the beginning that there is no asymmetric information problem.

Empirically, our approach bears some similarity to that of the job lock literature (Gruber & Madrian, 1997; Gruber, 2000). That literature documents a link between turnover and health insurance provision. Employees who receive health insurance from their employers are less likely to turn over.

3 Model of Health Insurance in the Labor Market

We construct a two period model of the labor and health insurance markets. In the first period, firms set wages and health insurance offerings and then workers choose among employers. Each worker but no firm can observe which of two types, sick or well, he is. After the job choice, each worker receives a health shock which induces a demand for medical care. Sick workers draw their health shocks from a worse distribution than do well workers. Uninsured workers pay for their use of medical care while insured workers' employers pay for their use.

At the start of the second period, with some probability workers may change health states. After this change, with some probability each worker experiences involuntary turnover. A turned over worker then may choose a new employer. Next, each worker who did not turn over involuntarily may choose to turn over voluntarily in order to change his health insurance status. To do so, he must incur a switching cost. Then, another health shock is realized and medical care consumption decisions are made again.

3.1 Assumptions

The timing of the model is:

1. Period 1

   i. Employers set wage and benefit levels

   ii. Workers see health state sick/well

   iii. Workers choose employer

   iv. Health shock realized, medical care consumption

2. Period 2

   i. Workers see new health state

   ii. With probability τ workers involuntarily turn over and may seek a new employer

   iii. Workers choose whether to switch employers

   iv. Health shock realized, medical care consumption

3.1.1 Sickness Transitions

At period 1ii, workers are assigned to the health state sick with probability P_S and to the health state well with probability $P_W = 1 - P_S$. At period 2i, workers in health state well change to health state sick with probability P_{SW} and workers in health state sick change to health state well with probability P_{WS}.

We assume that the original distribution of health states is the steady-state distribution of health states induced by these transition probabilities, so that $P_S = \frac{P_{SW}}{P_{SW}+P_{WS}}$ and P_S is the same in both the first and second periods.

Furthermore, we assume that there is stickiness in health states. That is that the probability of being sick in period 2 is higher for workers who were sick in period 1:

$$P_{WS} < P_{WW} \tag{1}$$

3.1.2 Consumers' Utility

Consumers derive utility from consumption of health, H and from consumption of other goods, C according to a utility function $U(C, H) = u(C) + v(H)$. The initial health stock is H_0, and health is produced from medical care, m, by a health production function. The health production function is subject to a random shock, ϵ. For a consumer lacking health insurance, the utility maximization problem and its solution are:

$$max_m u(Y - m) + v(H_0 + f(m, \epsilon))$$
$$\overset{*}{m} \text{ given by } v' f_1 - u' = 0$$
$$\overset{*}{m} = \overset{*}{m}(Y, H_0, \epsilon)$$

We also consider a consumer covered by health insurance, and we model health insurance in a very simple way. We assume that health insurance is "first-dollar" insurance and that no effort is made by the insurer to control moral hazard, so that the problem and solution for an insured consumer are:

$$max_m u(Y) + v(H_0 + f(m, \epsilon))$$
$$\hat{m} \text{ given by } f_1 = 0$$
$$\hat{m} = \hat{m}(\epsilon)$$

Now, we assume that there are two types of consumers, sick and well, and that these two types differ in their distribution functions for ϵ, so that F_S is larger than F_W in the sense of first-order stochastic dominance. The cost of insuring a sick person is therefore $C_S = E_{F_S}(\hat{m}(\epsilon))$, while the cost of insuring a well person is $C_W = E_{F_W}(\hat{m}(\epsilon))$.

Finally, we make conventional assumptions on the utility and production functions:

1. $u' > 0$, $u'' < 0$, $v' > 0$, $v'' < 0$

2. $f_1 > 0$, $f_2 < 0$, $f_{12} > 0$, f concave.

3. $f_1 \leq 0$ for $m > \tilde{m}(\epsilon)$. The futility point is $\tilde{m}(\epsilon)$.

There are four possible combinations of sickness and insurance status, with four associated levels of utility:

$$
\begin{aligned}
U_{SU}(Y) &= E_{F_S} max_m U(Y - m, H_0 + f(m, \epsilon)) \\
U_{SI}(Y) &= E_{F_S} max_m U(Y, H_0 + f(m, \epsilon)) \\
U_{WU}(Y) &= E_{F_W} max_m U(Y - m, H_0 + f(m, \epsilon)) \\
U_{WI}(Y) &= E_{F_W} max_m U(Y, H_0 + f(m, \epsilon))
\end{aligned}
$$

We denote the optimal levels of m conditional on ϵ for the insured and uninsured as $\tilde{m} = \tilde{m}(\epsilon)$ and $\overset{*}{m} = \overset{*}{m}(\epsilon)$, respectively.

Because $F_S \overset{FOSD}{>} F_W$ and by the assumptions on f and U, it is easy to see that:

$$
\begin{aligned}
C_S &\geq C_W \\
U_{SI} &\leq U_{WI} \\
U_{SU} &\leq U_{WU}
\end{aligned}
$$

Now, we want to argue for a single-crossing property for health insurance. Consider that health insurance is being sold at a price p to an individual with income Y. We seek to show that the sick type has a higher value for insurance than does the well type.

Consider, viewed as a function of ϵ, the *ex post* utility value of insurance:

$$max_m U(Y, H_0 + f(m, \epsilon)) - max_m U(Y - m, H_0 + f(m, \epsilon)) \tag{2}$$

The derivative of this expression is, by the envelope theorem:

$$v'(H_0 + f(\tilde{m}(\epsilon), \epsilon))f_2((\tilde{m}(\epsilon), \epsilon)) - v'(H_0 + f(\overset{*}{m}(\epsilon), \epsilon))f_2((\overset{*}{m}(\epsilon), \epsilon)) \tag{3}$$

We denote these $\tilde{v}'\tilde{f}_2$ and $\overset{*}{v}'\overset{*}{f}_2$. Since health is higher when insured and since v is concave, $0 < \tilde{v}' < \overset{*}{v}'$ Since $f_{12} > 0$ and since health care consumption is higher when insured $\overset{*}{f}_2 < \tilde{f}_2 < 0$ Combining these yields $\overset{*}{v}'\overset{*}{f}_2 < \tilde{v}'\tilde{f}_2 < 0$

Thus, the *ex post* value of insurance is increasing in ϵ. Now, since $F_S \overset{FOSD}{>} F_W$ we can pass to the conclusion that the *ex ante* value of insurance is higher for the sick than for the well. Furthermore, since income and premium played no role in the argument above (by virtue of the additive separability of U), this is true for any income level and for any insurance premium.

In the second period, each worker has an identical utility function, except that he suffers a switching cost of c utils should he choose to switch employers. Each worker's utility for the whole game is the first period utility plus a discount factor, β, times his second period utility.

Finally, we will assume that there are gains to insurance but that these gains are small enough that the well workers would prefer not to have insurance at the pooling price. Denoting the willingness to pay for insurance of type i, W_i, we assume

$$C_W < W_W < P_S C_S + P_W C_W < C_S < W_S \tag{4}$$

It is efficient for each worker to be insured, but at the one-shot pooling price the well workers would choose not to be.

3.1.3 Employers

There are many identical, risk-neutral employers, having access to a constant-returns production function of the single input labor. Each worker supplys a single unit of labor per time period, which has a marginal value product to the employer of M.

Each employer sets a wage and a benefits policy (health insurance or no health insurance) in the first period. The wages and benefits policy then applies to all workers who work for this employer in each of periods 1 and 2.

An employer not offering insurance and paying a wage of W earns profits of $M - W$ on each worker choosing him in period 1 and profits of $\beta(M - W)$ on each worker choosing him in period 2.

An employer offering insurance and paying a wage of $W - p$ earns a profit of $M - W + p - C_W - P_1(C_S - C_W)$ on each worker choosing him in period 1 and profits of $\beta(M - W + p - C_W - P_2(C_S - C_W))$ on each worker choosing him in period 2. The probability (in equilibrium) that a worker is sick given that they are working at an insuring employer at period 1 is P_1 and the probability that a worker is sick given that he is working at an insuring worker at period 2 is P_2.

3.2 Solution

We will search for conditions under which there is a "pooling" equilibrium. For us, a pooling equilibrium is a symmetric subgame perfect Nash equilibrium in pure strategies with the properties that:

1. In period 1, both sick and well workers choose an employer offering insurance
2. In period 2, neither sick nor well workers *voluntarily* turn over to change their insurance status

By symmetric, we mean that all sick consumers play the same strategy, all well consumers play the same strategy, all insuring firms pay the same wages, and all non-insuring firms pay the same wages.

Our strategy will be constructive. We will build the equilibrium, noting as we go conditions sufficient to induce the desired behavior. Then, we will argue that no firm and no consumer has any incentive to deviate from the constructed equilibrium. Then, we will argue that if any of our sufficient conditions fail then some firm or consumer will have an incentive to deviate, and this will allow us to conclude that our conditions are necessary and sufficient.

Because there is Bertrand competition among firms at 1i, firms will earn zero profits, $W = M$, and p will be set at the average discounted cost of providing insurance. In a pooling equilibrium, in the first period, all workers are insured. In the second period, all non-turned-over workers are insured and all turned-over workers who are sick are insured—the only uninsured workers are involuntarily turned-over workers who are well. With competitive conditions among employers offering insurance, employers will earn zero profits on insurance:

$$\begin{aligned} \hat{p} + \beta\left[(1-\tau)\hat{p} + \tau P_S \hat{p}\right] &= P_S C_S + P_W C_W + \beta\left[(1-\tau)(P_S C_S + P_W C_W) + \tau P_S C_S\right] \\ \hat{p} &= \frac{(1+\beta(1-\tau))(P_S C_S + P_W C_W) + \beta\tau P_S C_S}{1 + \beta(1-\tau) + \beta\tau P_S} \end{aligned} \tag{5}$$

3.2.1 Workers, Period 2

Consider a worker at 2ii who has involuntarily turned over. Let W be the highest prevailing wage at a firm not offering insurance and p be the difference between W and the highest prevailing wage at a firm offering insurance. Then, the turned-over worker will choose an employer with insurance if:

$$\text{if well}: U_{WI}(W-p) > U_{WU}(W) \tag{6}$$

$$\text{if sick}: U_{SI}(W-p) > U_{SU}(W) \tag{7}$$

By the assumptions already made, at the pooling price, $\hat{p}$, the turned-over sick worker chooses insurance and the turned-over well worker does not.

Now, let's consider an insured worker who is not involuntarily turned-over but is considering turning over. This worker will turn over if:

$$\text{if well} : U_{WU}(W - p) - c > U_{WI}(W) \tag{8}$$

$$\text{if sick} : \ U_{SU}(W - p) - c > U_{SI}(W) \tag{9}$$

By the single crossing property, it will be enough to argue that the well worker will not turn over in this situation in order for the sick worker also not to turn over. To get the well worker not to turn over here, we do need to assume that the switching cost is great enough:

$$U_{WU}(W - p) - c < U_{WI}(W) \tag{10}$$

Therefore, a sufficient condition for pooling behavior in period 2 at the pooling equilibrium price is for equation 10 to hold at a price $\hat{p}$.

3.2.2 Workers, Period 1

Next, we seek conditions to ensure that both sick and well workers will choose insurance in period 1. We will first develop the relevant value functions for the decision, then we will argue that if the well workers choose insurance then so will the sick workers. Finally, we will derive conditions sufficient for the well workers to choose insurance.

Consider the value of the game at the start of period 2ii, after the determination of the period 2 health state but before worker's turn over:

$$V_{WI} = \tau U_{WU} + (1 - \tau) max \{U_{WU} - c, U_{WI}\} \tag{11}$$

$$V_{WU} = \tau U_{WU} + (1 - \tau) U_{WU} \tag{12}$$

$$V_{SI} = \tau U_{SI} + (1 - \tau) U_{SI} \tag{13}$$

$$V_{SU} = \tau U_{SI} + (1 - \tau) max \{U_{SU}, U_{SI} - c\} \tag{14}$$

Now, let's consider a well worker in period 1iii, who is considering which employer to choose. If he chooses an employer with insurance (ie the insuring firm with the highest $W - p$), he will receive:

$$U_{WI}(W-p) + \beta\left[P_{WW}V_{WI} + P_{SW}V_{SI}\right] \tag{15}$$

And, if he chooses an employer without insurance (ie the non-insuring firm with the highest W), he will receive:

$$U_{WU}(W) + \beta\left[P_{WW}V_{WU} + P_{SW}V_{SU}\right] \tag{16}$$

Therefore, he will choose insurance if:

$$U_{WI}(W-p) - U_{WU}(W) + \beta\left[P_{WW}(V_{WI} - V_{WU}) + P_{SW}(V_{SI} - V_{SU})\right] > 0 \tag{17}$$

Similarly, a sick worker will choose to be insured if:

$$U_{SI}(W-p) - U_{SU}(W) + \beta\left[P_{WS}(V_{WI} - V_{WU}) + P_{SS}(V_{SI} - V_{SU})\right] > 0 \tag{18}$$

We seek to show that if well workers choose insurance, then so do sick workers. As we argued above, single crossing implies $U_{SI}(W-p) - U_{SU}(W) > U_{WI}(W-p) - U_{WU}(W)$. Furthermore, the only difference in the terms under the β is that, for the sick, higher weight is placed on $V_{SI} - V_{SU}$ relative to $V_{WI} - V_{WU}$, by inequality 1. Thus, the term under the β is bigger for sick workers if $(V_{WI} - V_{SU}) - (V_{WI} - V_{WU}) > 0$, but this is clearly the case since $(V_{WI} - V_{WU}) < 0$ and $(V_{SI} - V_{SU}) > 0$.

Therefore, we will only seek conditions which guarantee that well workers choose insurance. Again, the well worker chooses insurance if inequality 17 holds. Since $U_{WI} - W_{WU} < 0$ and $V_{WI} - V_{WU} < 0$ at the pooling price, we need:

$$
\begin{aligned}
P_{WW} &< \frac{\frac{1}{\beta}(U_{WI} - U_{WU}) + V_{SI} - V_{SU}}{V_{SI} - V_{SU} + V_{WU} - V_{WI}} \\
&= \frac{V_{SI} - V_{SU}}{V_{SI} - V_{SU} + V_{WU} - V_{WI}} - \frac{\frac{1}{\beta}(U_{WU} - U_{WI})}{V_{SI} - V_{SU} + V_{WU} - V_{WI}}
\end{aligned}
$$

So, the conditions we have derived thus far call for the following inequalities to hold at the pooling price, $\hat{p}$:

$$
U_{WU} - c < U_{WI} \tag{19}
$$

$$
P_{WW} < \frac{V_{SI} - V_{SU}}{V_{SI} - V_{SU} + V_{WU} - V_{WI}} - \frac{\frac{1}{\beta}(U_{WU} - U_{WI})}{V_{SI} - V_{SU} + V_{WU} - V_{WI}} \tag{20}
$$

3.2.3 Sufficiency and Necessity

Now, we seek to show that no firm and no worker has an incentive to deviate from the putative pooling equilibrium, given our assumptions and conditions 19 and 20. By construction of the conditions, this is true for workers.

For the firms, in the constructed putative equilibrium, insuring firms are paying wages $M - \hat{p}$ and non-insuring firms are paying wages M, and all firms are earning zero profits (by construction of $\hat{p}$. Since firms are indifferent between offering and not offering insurance at these prices, there is no incentive for any firm to switch from offering to not offering or vice versa.

Among non-offering firms, a wage increase would result in either negative profits (if any workers subsequently chose them) or zero profits (if no worker did). A wage decrease would result in zero profits since no workers would continue to choose them.

Among offering firms, a wage decrease would result in zero profits, as all workers would choose other offering firms instead of the wage decreasing one. A wage increase would result in all workers choosing the now higher-wage firm in period 1. Period 2 behavior by workers would also be the same, except possibly for turned-over well workers. By reducing $\hat{p}$ below the pooling price, it is conceivable that the deviating firm could induce turned-over well workers to choose to be insured. However, to do this, $\hat{p}$ would have to fall below W_W and this would ensure that the firm earns negative profits.

Since neither firms nor consumers have an incentive to deviate under conditions 19 and 20, we conclude that these conditions are sufficient for the pooling equilibrium. Furthermore, the conditions are plainly necessary. Without condition 19, the well workers will not pool ex post and without condition 20, the well workers will not pool ex ante.

3.3 Discussion

We explore how the likelihood that a pooling equilibrium exists varies with the parameters. First, consider the role of c in the two conditions, 19 and 20. Obviously, the higher is c, the more likely is condition 19 to hold.

Consider condition 20. The quantity $V_{SI} - V_{SU} = (1-\tau)\left[U_{SI} - max\left\{U_{SU}, U_{SI} - c\right\}\right]$ is increasing in c. On the other hand, the quantity $V_{WU} - V_{WI} = (1-\tau)\left[U_{WU} - U_{WI}\right]$ is invariant to c. The second term in condition 20 is decreasing in c since the numerator is positive and invariant to c and the denominator is positive and increasing in c. Since the second term is subtracted, raising c tends to increase the right-hand-side of the condition. The first term is increasing since, as c increases, the numerator and denominator increase by the same amount and the numerator is smaller than the denominator and both are positive. Thus, the higher is c, the more likely is a pooling equilibrium.

Turning to τ, it is easy to see that the first term of condition 20 is invariant to τ, as $(1-\tau)$ factors out of both numerator and denominator and cancels. The second term is increasing in τ since the denominator is proportional to $(1-\tau)$ and the numerator is invariant to τ. Since the second term is subtracted, its effect is decreasing in τ. So, as τ increases, it is less likely that there is a pooling equilibrium.

Now consider β. As β increases, the second term falls, as the numerator is multiplied by $\frac{1}{\beta}$. Since the second term is subtracted, as β rises, the right-hand-side of the condition rises, making a pooling equilibrium more likely.

Finally, consider the effect of a frictionless labor market on the possibility of pooling. The labor market is frictionless if either $c = 0$ or $\tau = 1$. As c falls to zero, condition 19 fails to hold and the well workers fail to pool in period 2. In addition, as c falls to zero, the right-hand-side of condition 19 goes to minus infinity as the differences in V but not $\frac{1}{\beta}(U_{WU} - U_{WI})$ go to zero. Thus, there is no pooling equilibrium with c near zero.

Similarly, as τ goes to 1, the right-hand-side of condition 19 goes to minus infinity as the differences in V but not $\frac{1}{\beta}(U_{WU} - U_{WI})$ go to zero. Thus, there is no pooling equilibrium with τ near 1.

So, the factors conducive to a pooling equilibrium are:

- high job switching costs, c
- low exogenous turnover, τ
- high patience, β
- low health state persistence: low P_{WW}

4 Empirical Test of the Turnover Hypothesis

Our model makes predictions about the relationship between turnover rates within labor markets and employer provision of health insurance rates. In addition, it makes further predictions about how the patience of workers, the proportion of healthy workers, and competitiveness of labor markets are each correlated with employer provision of health insurance. We use cross-sectional data from the Current Population Survey to test these predictions.

4.1 Data

To test whether our model's predictions about worker health insurance coverage and turnover, we use data from the 1991-1998 March Current Population Survey (CPS) Supplements merged with information from the Occupational Information Network (O*NET). The CPS is collected every month by the Census Bureau, with over 50,000 respondents each month of every year.

The O*NET data are collected by the U.S. Department of Labor, and are intended to provide information about skill requirements and occupational characteristics for a comprehensive set of occupations to people looking for work, to students, to career counselors, and others. The O*NET database supersedes the *Dictionary of Occupational Titles*, which was last updated in 1991. We use version 5.1 of the O*NET database, which was last updated in 2004.[3]

The O*NET data includes a wide variety of information about what sorts of skills are required and what sorts of activities are performed in each job. We focus, however, on measures of job-specific human capital provided in the O*NET data. In particular, the O*NET questionnaire assesses the number of months of formal on-site or in-plant training required to do the job (on-site), as well as the number of months of informal on-the-job training required (ojt). In addition, the O*NET questionnaire assesses the number of years of formal education (required education) and related work experience in other jobs (related work) required to perform the job.[4]

While the O*NET data are measured at the occupation level, to conduct our tests, we need measures of employment "stickiness" at the industry level. Since our theory is about the provision of health insurance by firms, an occupational level measure of "stickiness" would be inappropriate. To convert the O*NET variables to the industry level, we need information on the proportion of workers in each industry in every occupation. We derive this information from the 100% Census 2000 Public Use Microdata Sample (PUMS).[5] Because of the large sample sizes in the Census data, we are able to derive precise industry-level occupation weights, where industry is classified using the North American Industrial Clas-

[3]Detailed information about the O*NET database can be found at http://www.doleta.gov/programs/onet/

[4]O*NET reports the values of these variables in ranges, along with the probabilities that employees in each occupation fall within these ranges. We construct means by taking the mid-point of each range as the value for each range as a whole.

[5]We thank the Minnesota Population Center at the University of Minnesota (http://www.ipums.umn.edu) for making these data available.

sification System (NAICS), and occupation is classified using the Census 2000 occupational coding system. We calculate industry-level estimates of on-site, ojt, required education, and related work using these occupation weights.

In some of our analyses, we need information on industry-level occupational turnover rates. Unfortunately, this information are not available in the O*NET database and cannot be derived from the PUMS data, as these data are a cross-section. Instead, we use data from merged CPS March Supplement surveys from 1991-1998. The sampling strategy of the CPS involves administering four monthly questionnaires to a family, followed by an eight month recess, and then four more months of interviews. Because of this sampling technique, all households who are interviewed in March of, say, year t are also interviewed in March of year $t+1$. Using unique household identifiers provided in the CPS data, and a probability match within each household based upon the age, sex, and race of the respondents, we merge eight consecutive years of the March CPS Supplements.[6] We restrict the sample to adults in the labor force who report an industry of employment in the first year of the merge.

From these merged files, we construct an industry-level turnover measure. Unfortunately, there is no direct question asking if individuals changed jobs between interviews in the CPS data. Our measure, *turnover* (employment), considers an individual as turned over if working in year one, but not in year two. This measure is obviously an underestimate of turnover rates, as individuals who change employers between year one and two but remain employed would be considered not turned over by this measure. To assess the extent of the bias, we link these industry level turnover data to the 2000 and 2001 CPS February Supplements, which contain individual-level information on job tenure with an employer. Tenure is strongly negatively correlated with turnover.

We link the industry-level variables (onsite, ojt, required education, related work, and *turnover*) to the 1991-1998 CPS March Supplements.[7] Because of the nature of the monthly CPS surveys, which focus on different themes every month, employer provision of health

[6]We use eight years of merged data because the industry specific sample sizes are too small with fewer years.

[7]This link requires cross-walks between the NAICS and the SIC coding systems. We use a cross-walk provided by the National Crosswalk Service Center (http://www.xwalkcenter.org).

insurance questions can only be assessed using the March CPS. The March CPS is the principal data set that other researchers have used to study uninsurance rates. We drop individuals from the analysis if they are unemployed or out of the labor force. Furthermore, we drop people who receive insurance through any source other than their employer, including through their spouse, or through Medicaid or Medicare. All of our tests of the hypotheses involve individual-level regressions using this data set.

4.2 Empirical Design

We organize our model tests in three sets. In the first set, we report the results from probit regressions of employer offers on the *turnover* variables. In the second set, we report the results from probit regressions of employer offers of health insurance on the O*NET measures of industry-level training requirements. Finally, in the third set, we report the results from probit regressions of employer offers on both the job-specific human capital measures and *turnover*.[8] These three sets of regressions constitute a test of our main hypotheses, which is that employers will be less likely to offer insurance in industries with high exogenous turnover and in industries with low levels of job-specific human capital (that is, low job switching costs).

Our measure of *turnover* does not distinguish between job changes caused for exogenous and endogenous reasons. For example, there is a large literature arguing that unhealthy workers with health insurance delay job changes because they would have difficulty finding coverage at the same level of benefits and at the same price in a new job (see Gruber and Madrian, 1995). The implication of this literature in this context is that the first regression set will not measure the effect of exogenous turnover alone on health insurance offer probabilities (which is what our theory makes predictions about).

Our second regression set seeks to address this difficulty by removing *turnover* from the regression set, and replacing it with the O*NET measures of job-specific human capital requirements. Of the four measures (ojt, on-site, related work, and required education),

[8] We report the marginal effect of each variable on the probability of employer insurance offers, rather than probit coefficients. We adjust all standard error estimates for intra-industry clustering.

ojt and on-site are most closely related to job-specific human capital, while the other two variables tend to measure general human capital requirements. These regressions directly test our hypothesis that the probability of employer insurance provision should increase with the costs of switching jobs, since high levels of job-specific human capital requirements will increase the costs of switching.

In the last regression set, we we include both the O*NET measures of human capital requirements and *turnover*. The idea motivating this regression is that by including the human capital requirement measures, we isolate the effect of *turnover* caused for exogenous reasons.

As a further test of our main hypothesis, we include union membership as a covariate in all three regression sets. To the extent that union membership increases workers' rents,[9] it also increases the costs of job switching. Consequently, our theory predicts that union membership should increase health insurance offer probabilities. Unfortunately, the March CPS supplements only asks about union membership to less than a quarter of eligible respondents. For our main results, we include this variable in all regression sets, at a cost of a large decrease in sample size. To provide a check of how this sample size decrease affects our results, we include alternate versions of the main regressions in the Appendix, where we include the full sample of CPS respondents, but exclude union membership as a covariate.

In addition to these regressors, we include other variables designed to test our other hypotheses, namely that in industries where workers' good health status is persistent and where the typical worker is relatively impatient, employers will be less likely to offer insurance We construct measures of industry level health status persistence (P_{ww}) from the linked 1990-1998 March CPS. Respondents are queried about their general health on a five point scale (where 1 is excellent health, 2 is very good health, 3 is good health, 4 is fair health, and 5 is poor health). We define a transition from a well to a sick state as when a respondent reports excellent health in year t, and then reports less than excellent health in year $t + 1$.[10] We

[9]Efficiency wage theories provide one motivation for such a notion.

[10]We experimented with alternate definitions of well and sick, In particular, we estimated our models defining a respondent as well if in excellent or very good health. There were no qualitative changes in our regression results using this alternate definition of health status.

calculated average levels of P_{ww} in each industry, and merged this variable back to our main sample. In addition to P_{ww}, we include a measure of worker patience in our models—the proportion of workers in each industry who report earning no interest income in the previous year from savings . We calculate this variable using the 1991-1998 March CPS surveys. Our theory predicts that firms in industries where levels of this variable are high should be less likely to offer insurance.

We also include a number of variables in all three sets as controls. For all but the smallest employers, health insurance provided to workers is not taxed. Workers' in higher marginal tax brackets benefit more from the exemption of health insurance from taxation, thus, workers' *income* is an important control variable, as is employer size.[11] We view these variables as controls for unmeasured aspects of the employment relationship that affect employers' decisions to offer health insurance. Both the reasoning based upon tax benefits and upon unmeasured aspects of employment lead us to expect higher *income* workers who work at larger firms to be more likely to receive health insurance offers.[12] Finally, the regressions include demographic variables—whether the worker is $female$, age of the worker, dummies indicating the general health status of the worker ($health$), and dummies indicating whether the worker is black, white, or of some other race (that is neither white nor black).

We exclude people from our sample who are under age 18, those who are unemployed or out of the labor force, and those who receive health insurance from public sources, such as Medicaid or Medicare. Table /reftab:means shows means and standard deviations for all of the variables that we include in our models.[13] This table shows these statistics for two different subsamples—the set of CPS respondents who were queried about their union membership status, and the expanded set of people who were not. There are no economically or statistically significant differences between these subsamples, at least on the basis of these variables, though respondents who were asked about union membership were more likely to

[11]In the CPS, employer size is reported as a series of dummy variables, with category 1 representing the smallest employers (< 10 employees) up to category 6 representing very large firms ($> 1,000$ employees).

[12]We adjust reported income by the consumer price index to adjust for inflation. All results are denominated in 1998 dollars.

[13]We use sample weights for these calculations.

Table 1: Descriptive Statistics

	Sample with union		Sample without union	
	mean	sd	mean	sd
union member	0.2049	0.4035		
Female	0.442	0.496	0.423	0.494
Age	40.3	11.8	40.9	12.1
Black	0.105	0.307	0.0976	0.296
Non-White, Non-Black Race	0.0378	0.1908	0.0381	0.191
Total Earnings (000s of $)	32.1	27.0	33.2	30.3
Employer Size: 10-24	0.0752	0.264	0.0761	0.265
Employer Size: 25-99	0.133	0.340	0.128	0.334
Employer Size: 100-499	0.157	0.364	0.142	0.349
Employer Size: 500-999	0.131	0.338	0.118	0.323
Employer Size: 1000+	0.424	0.494	0.395	0.488
Health: Very Good	0.213	0.409	0.211	0.408
Health: Good	0.130	0.336	0.130	0.337
Health: Fair	0.0256	0.157	0.0267	0.161
Health: Poor	0.00390	0.0623	0.00427	0.0652
Employer Offers Health Insurance	0.949	0.218	0.916	0.275
% with No Savings	0.392	0.115	0.396	0.117
P_{ww}	0.549	0.0903	0.548	0.0904
One-Year Turnover Rate	0.0470	0.0184	0.0482	0.0192
Req. OJT (yrs)	0.772	0.380	0.774	0.392
Req. Education (yrs)	13.1	0.704	13.1	0.724
Req. Related Work (yrs)	2.15	0.708	2.15	0.728
Req. In-Plant Training (yrs)	0.753	0.428	0.758	0.449
Observations	62,144		281,632	

report an offer of health insurance from their employer (by about 3 percentage points).

4.3 Results

We start the discussion of our results by plotting each of our key variables against employer health insurance offer probabilities in each industry. These graphs present means unadjusted for any covariate. Our motivation in presenting these graphs is to give the reader a visceral sense for how strongly the data support our hypotheses in the absence of fancy statistical adjustments.

Figure 1: HI Offers Decline with One-Year Turnover Rates in Industry

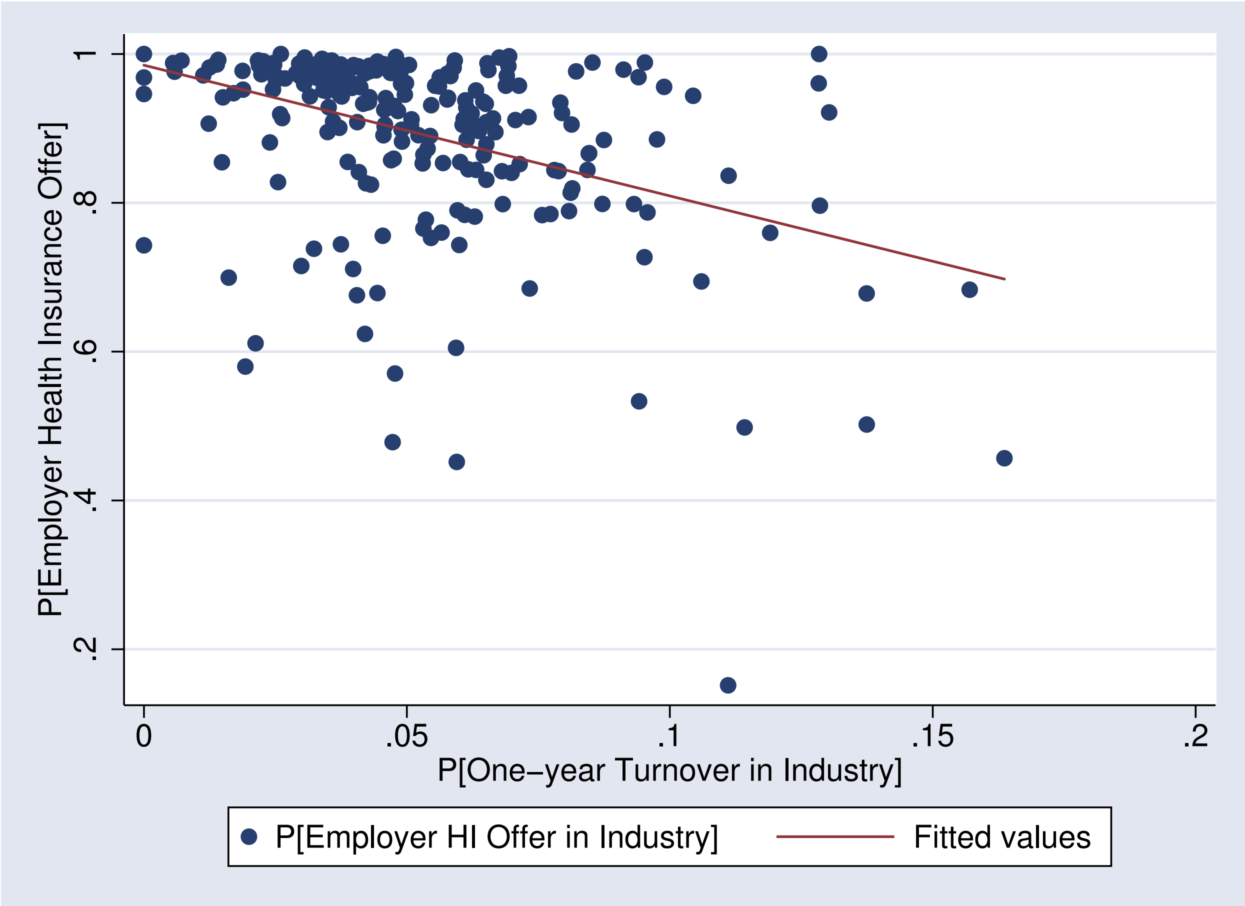


Figure 1 plots mean one-year job turnover rates against the mean employer health insurance offer probabilities within each industry. It should be evident from the figure that while in many industries, nearly all workers receive health insurance offers from their employers, this is clearly not true in all industries. For nearly all industries, save one, health insurance offer probabilities are above 40%. The outlier is shoe repair. Roughly 12% of workers receive health insurance offers from their employers in that industry. Figure 1 also plots the best fitting line through the raw means. Consistent with our hypothesis that high turnover reduces the likelihood of pooling, workers in industries in which there is high turnover are substantially less likely to receive health insurance offers.

Figures 2 - 5 plot the relationship between the four O*NET measures of job-specific human capital requirements in each industry (ojt, on-site, related work, and required education) against offer probabilities. All four of these variables show a strong positive relationship with employer health insurance offer probabilities. While the results from all four figures are consistent with our hypothesis that pooling is more likely in industries where the costs of job-switching are higher, Figure 2 (which plots ojt against offer probabilities) and Figure 4 (which plots formal in-plant training requirements) are of particular interest. Requirements for on-the-job training and formal in-plant training are good measures of job-specific human capital, and hence are strongly and positively correlated with the costs of job switching. To be sure, related work experience (Figure 5) and general education (Figure 3) both generate some job-specific human capital, but primarily generate general human capital, and hence are less positively correlated with the costs of job switching.

We examine the relationship between industry-level one-year job turnover rates and the O*NET measures of required human capital more closely by regressing *turnover* on each of the O*NET measures in turn, and then regressing *turnover* on all four of the variables together. We include a full set of individual-level control variables in these regressions.[14] In interpreting these regressions, recall from Table 4.2 that mean one-year turnover rates are roughly 4.7%.

The regressions predict that increasing on-the-job training requirements in an industry by one year would reduce turnover rates by roughly 0.3 percentage points. Increasing required years of education by one year, on the other hand, reduces turnover rates by between 1.3 and 1.9 percentage points. The direction of the effect on turnover of increasing required years of related work by one year depends upon the regression. In the regression where required years of related work enters by itself, increasing it by one year reduces turnover by 0.3 percentage points. In the regression where all four O*NET variables are entered, increasing required related work by one year counter intuitively increases turnover by 1.5 percentage points. This result suggest that we should not consider required related work experience as a particularly good measure of job-specific human capital. Finally, the effect of increasing required formal in-plant training by one year on turnover rates ranges from

[14] We estimate linear regressions and adjust the standard errors for clustering by industry.

Figure 2: HI Offers Increase with Required On-the-Job Training

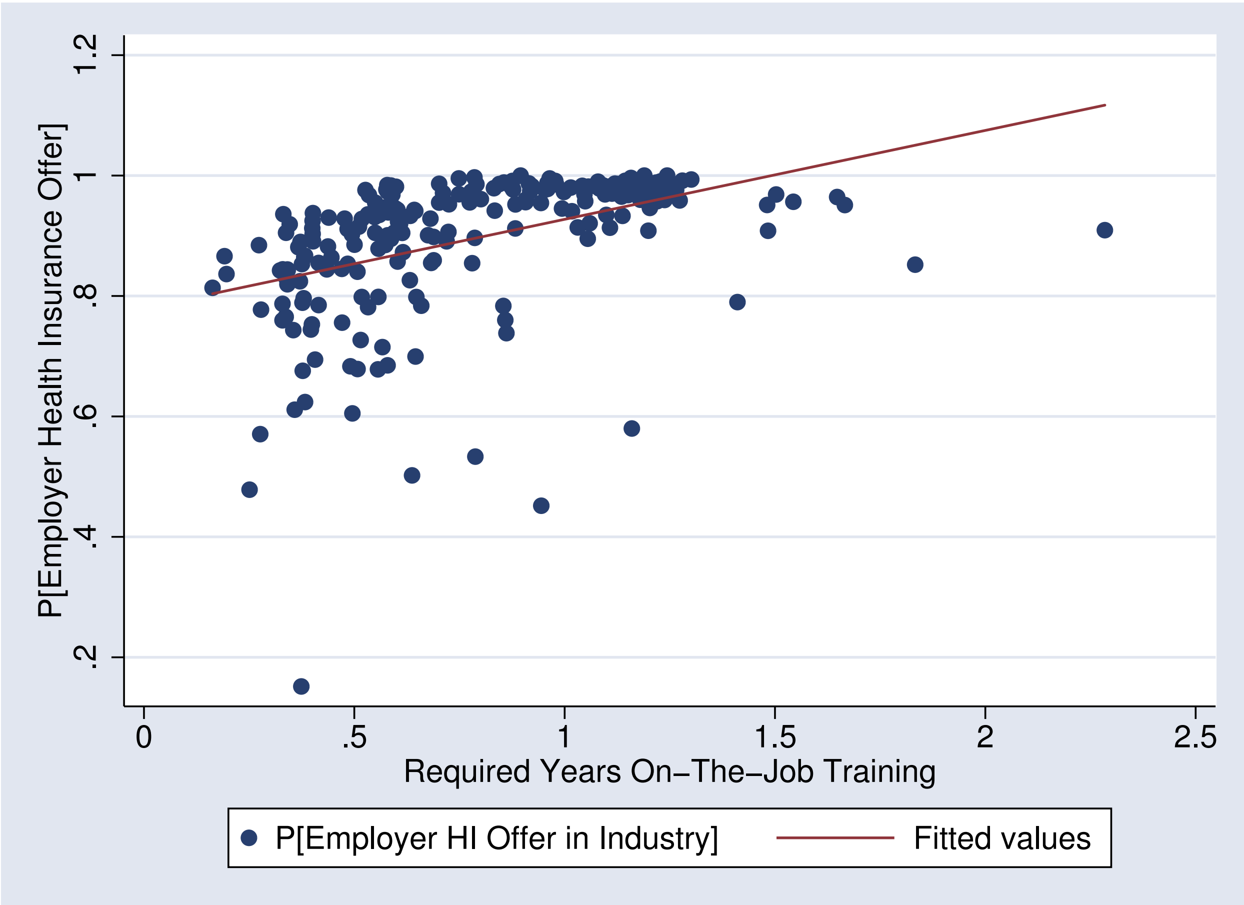


Figure 3: HI Offers Increase with Required Years of Education

Figure 4: HI Offers Increase with Require Years of Formal In-Plant Training

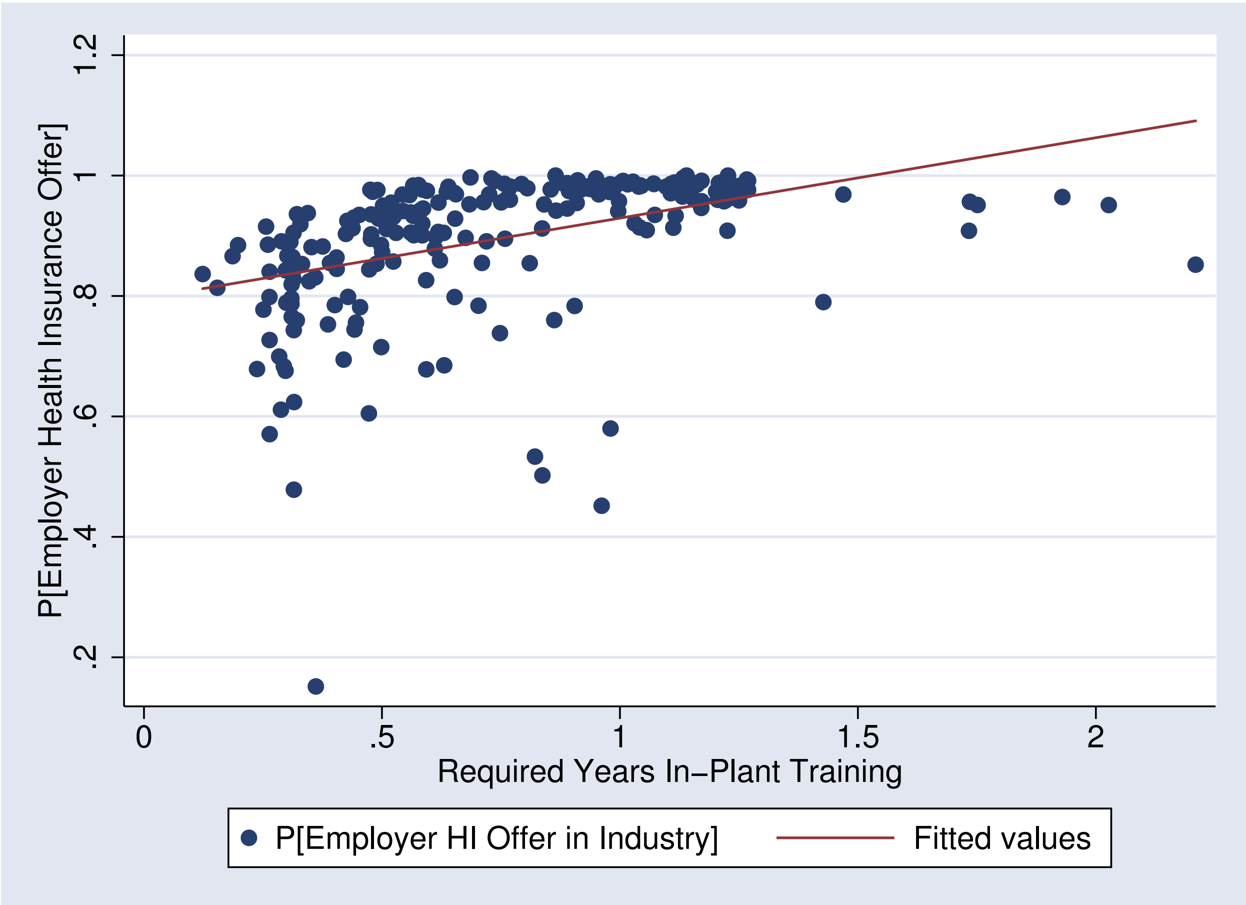
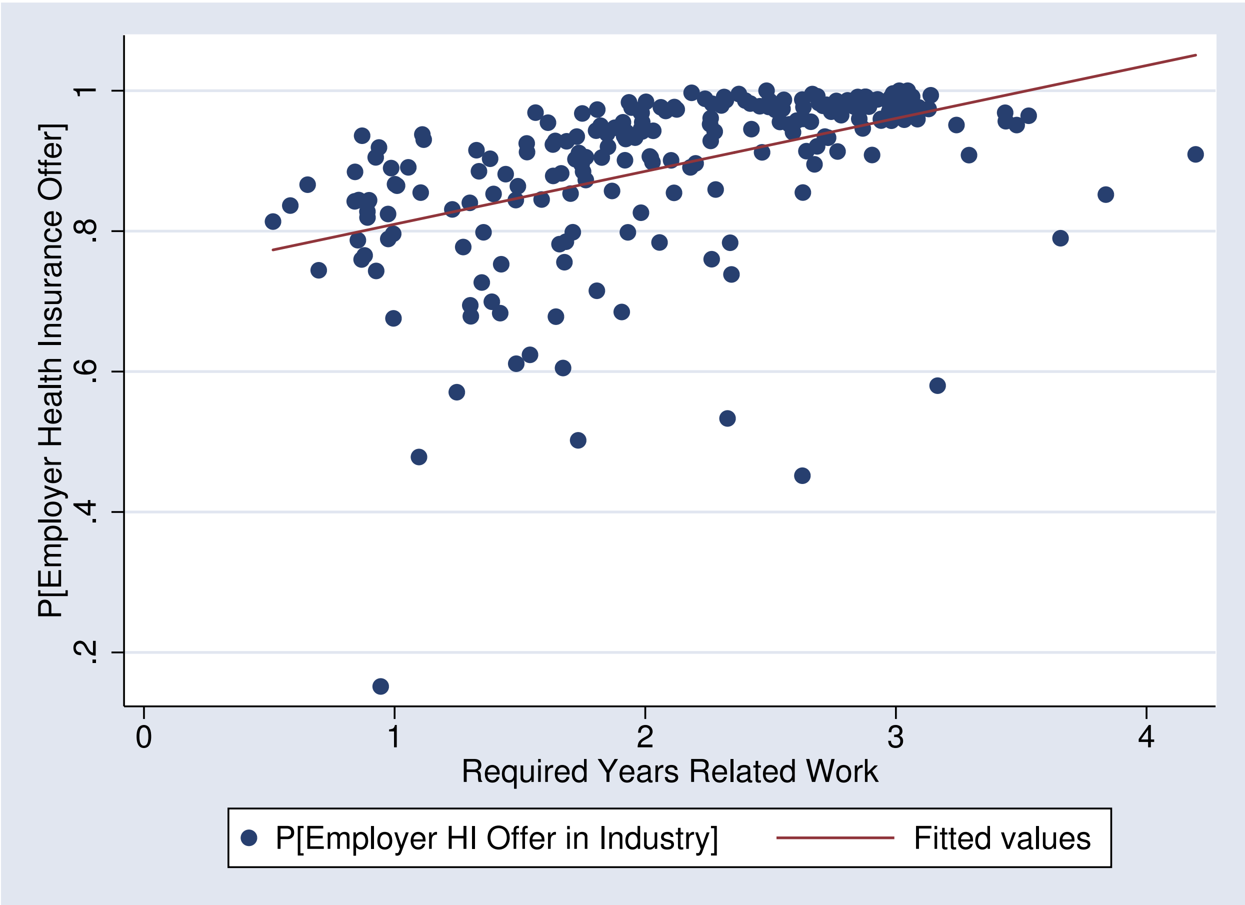


Figure 5: HI Offers Increase with Required Years of Related Work in Industry



roughly zero—in the regression where it enters by itself–to a reduction of 2.2 percentage points. Required in-plant training is clearly a better measure of job-specific human capital than required related work experience.

Figure 6 plots unionization rates in each industry against employer health insurance offer probabilities. Clearly, workers in heavily unionized industries have a good chance of receiving offers of health insurance from their employers. In less heavily unionized industries, there is considerable variance—in some of those industries, workers are quite likely to receive health insurance offers, while in others (such as the shoe repair industry), few workers receive health insurance offers. On average, increases in unionization rates tend to increase offer probabilities. To the extent that unionized workers' costs of job turnover are higher, this evidence provides support for our main hypothesis about the conditions under which health insurance pooling is likely to occur.

Figure 7 plots our measure of P_{ww}, derived from the linked CPS data, against health insurance offer probabilities. While our theory predicts that industries in which P_{ww} is highest are less conducive to pooling, the data do not strongly confirm this prediction. At almost every level of P_{ww}, there is a lot of variation in offer probabilities across industries. On average, the relationship between P_{ww} and offer probabilities appears flat, or slightly downward sloping. On the other hand, the data do not directly contradict our theory either—we do not observe a positive relationship between P_{ww} and offer probabilities, for instance.

Finally, Figure 8 plots the proportion of workers in each industry with no income from interest (and hence no savings) against offer probabilities. Again, at any level of the savings variable, there is considerable variability across industries. On average, however, offer probabilities decline as the proportion of workers in an industry with no savings grow. To the extent this savings variable measures the patience of workers within an industry, it provides support for our hypothesis that pooling is less likely when workers in an industry are more impatient. Given the well-known precautionary motive for saving, our savings variable could also be a measure of the average risk aversion of workers in each industry. (Increasing

Table 2: Determinants of One-Year Turnover in Industry

	(1)	(2)	(3)	(4)	(5)
female	-0.0005	0.0012	-0.0014	-0.0001	0.0016
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)	(0.0001)**
$age/10$	-0.0124	-0.0094	-0.0115	-0.0127	-0.0088
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
$(age/10)^2$	0.0013	0.0010	0.0012	0.0013	0.0009
	(0.0000)**	(0.0000)**	(0.0000)**	(0.0000)**	(0.0000)**
black	-0.0000	0.0005	-0.0000	0.0000	0.0005
	(0.0001)	(0.0001)**	(0.0001)	(0.0001)	(0.0001)**
other race	0.0020	0.0024	0.0019	0.0021	0.0021
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
income (000s of $)	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001
	(0.0000)**	(0.0000)**	(0.0000)**	(0.0000)**	(0.0000)**
Emp. Size: 10-24	-0.0051	-0.0042	-0.0050	-0.0050	-0.0046
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
Emp. Size: 25-99	-0.0088	-0.0062	-0.0085	-0.0088	-0.0065
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
Emp. Size: 100-499	-0.0123	-0.0081	-0.0120	-0.0123	-0.0083
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
Emp. Size: 500-999	-0.0132	-0.0087	-0.0130	-0.0131	-0.0089
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
Emp. Size: 1000+	-0.0135	-0.0091	-0.0134	-0.0134	-0.0093
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
Health: Very Good	0.0007	0.0004	0.0007	0.0006	0.0004
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
Health: Good	0.0021	0.0015	0.0022	0.0020	0.0014
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
Health: Fair	0.0037	0.0030	0.0038	0.0037	0.0028
	(0.0002)**	(0.0002)**	(0.0002)**	(0.0002)**	(0.0002)**
Health: Poor	0.0039	0.0031	0.0039	0.0038	0.0029
	(0.0005)**	(0.0004)**	(0.0005)**	(0.0005)**	(0.0004)**
Req. OJT (yrs)	-0.0014				-0.0017
	(0.0001)**				(0.0003)**
Req. educ. (yrs)		-0.0133			-0.0186
		(0.0000)**			(0.0001)**
Req. related work (yrs)			-0.0033		0.0152
			(0.0000)**		(0.0002)**
Req. plant trn. (yrs)				0.0004	-0.0224
				(0.0001)**	(0.0002)**
Constant	0.0916	0.2524	0.0957	0.0906	0.3067
	(0.0003)**	(0.0005)**	(0.0003)**	(0.0003)**	(0.0007)**
Observations	453394	453394	453394	453394	453394
R-squared	0.13	0.32	0.14	0.13	0.34

Notes: Linear regressions results. Industry-cluster adjusted standard errors in parentheses. Regressions include a full set of year dummies (results not shown).
+ significant at 10%; * significant at 5%; ** significant at 1%.

Figure 6: HI Offers Increase with Unionization

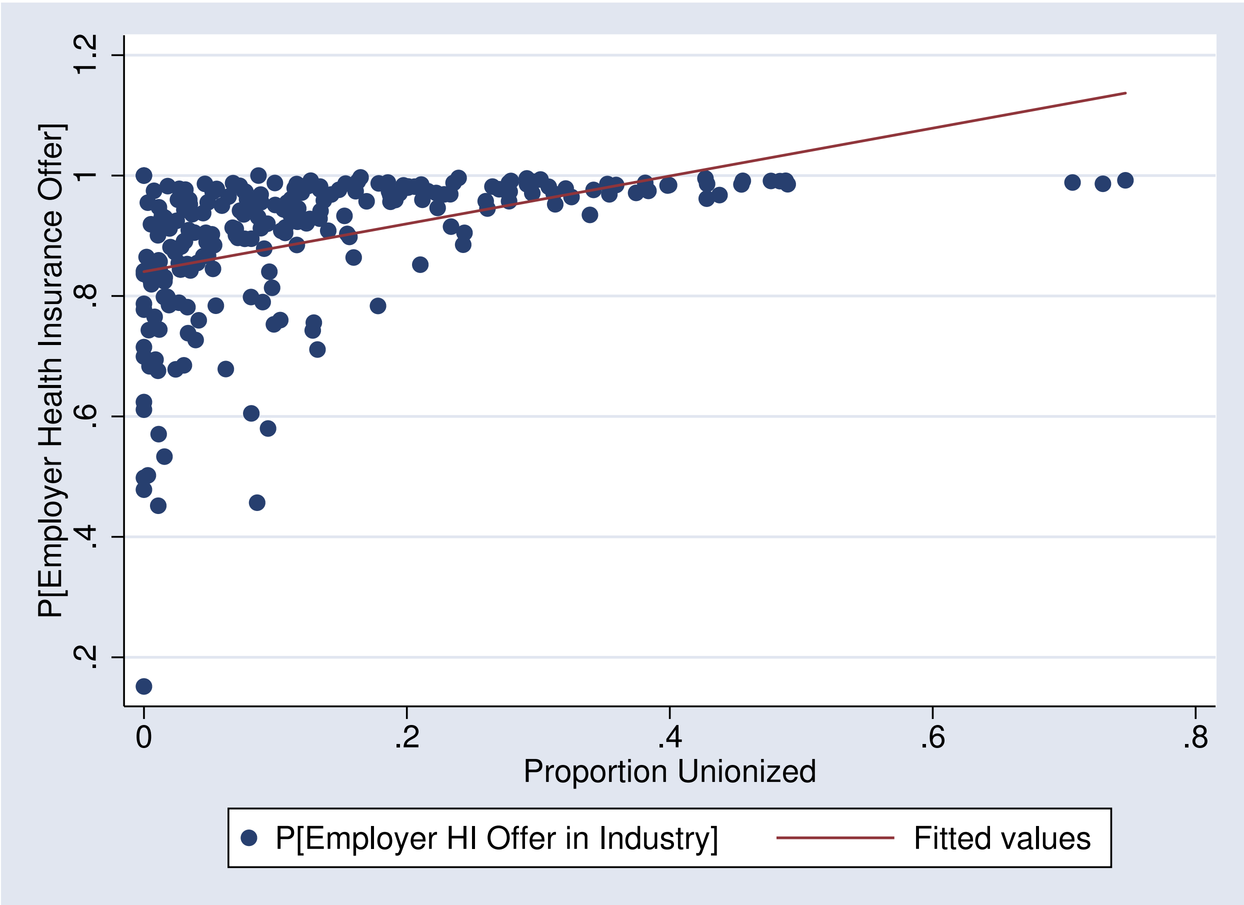


Figure 7: HI Offers Decline (slightly) with P_{ww}

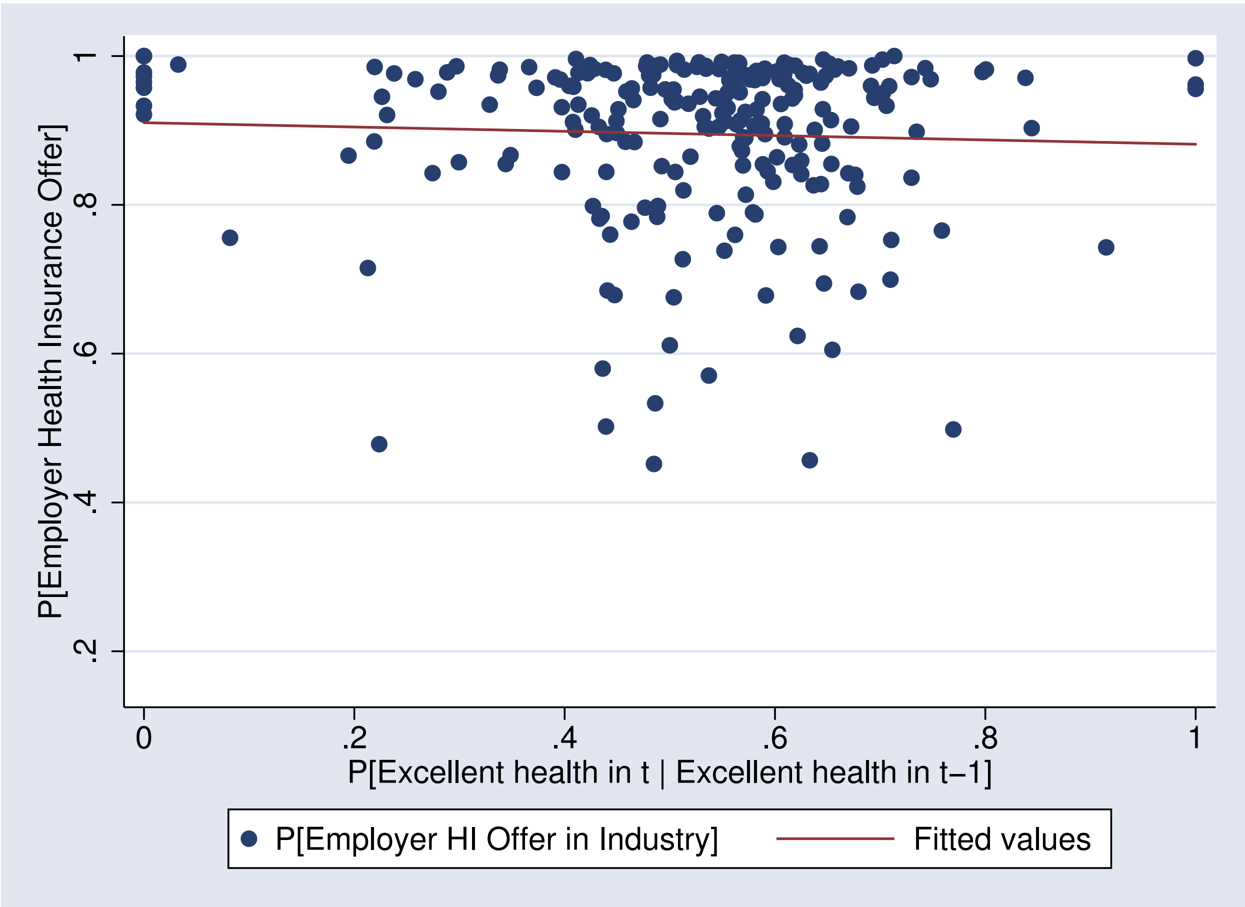
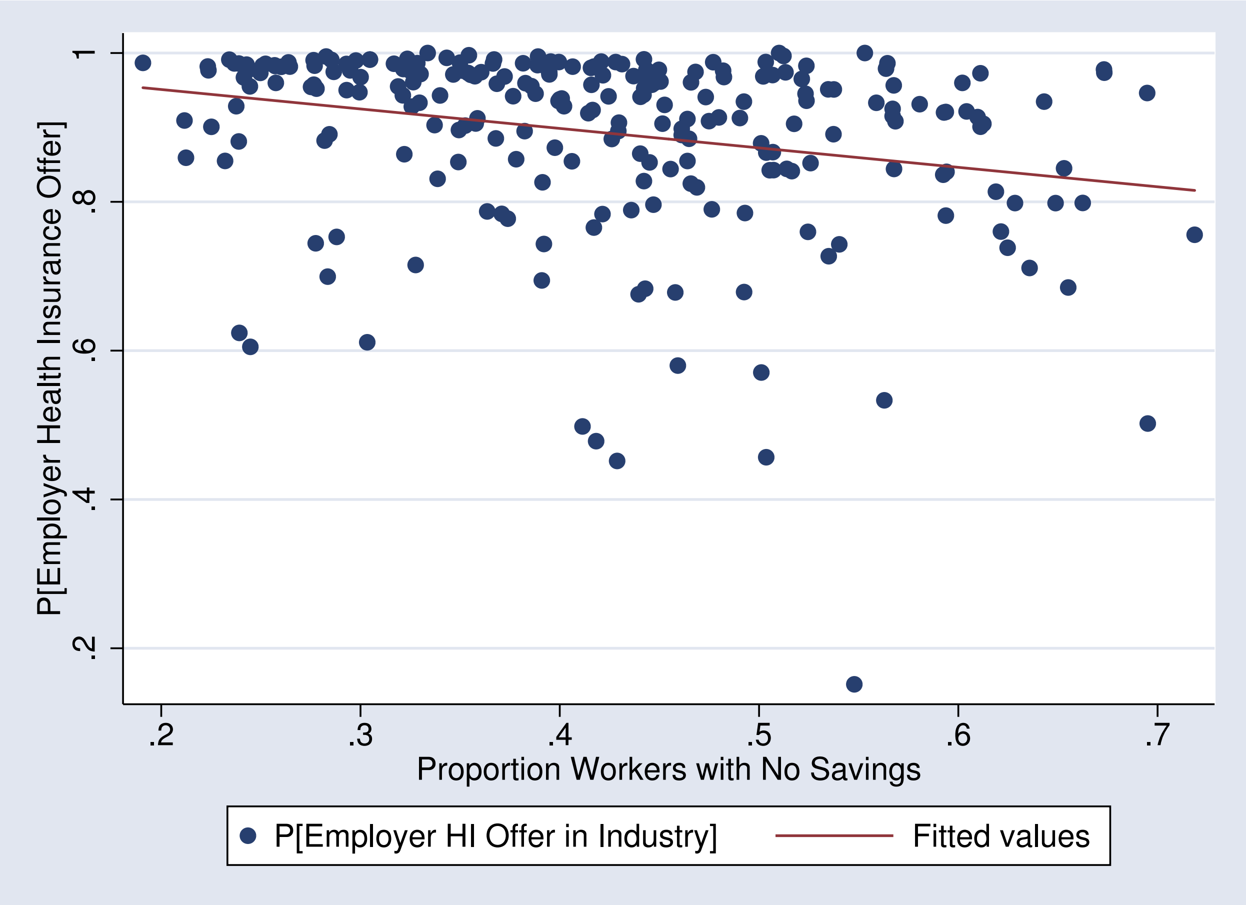


Figure 8: HI Offers Decline with Proportion of Workers in Industry with No Savings



proportions of workers with no savings would imply decreasing risk aversion). This figure, then, should be interpreted as showing that employer offers of insurance increase with risk aversion. Though this interpretation does not contradict our theory, it does not test our their either. Most likely, our savings variable measures both patience and risk aversion, and hence should be seen as a partial test of our theory—a test which our theory passes.

We turn next from the unadjusted bivariate relationships to our health insurance offer probit regressions. Table 3 is distinguished from the other tables by the fact that it includes *turnover* in the regression, but none of the O*NET job-specific human capital variables. In this regression, increases in turnover have a large and negative effect on the probability of health insurance offering—a one percentage point increase in turnover probability is associated with a 44 percentage point decrease in the probability of health insurance offering. Our measure of the cost of job switching in this regression—union membership—has the effect predicted by our theory. A one percentage point increase in union membership is associated with a 2.2 percentage point increase in health insurance offering. Our measure of impatience, the proportion of workers with no savings in each industry, is negatively associated with health insurance offering. Finally, our measure of health status persistence, P_{ww}, has a negative but statistically insignificant effect on the probability of health insurance offering. The size of the effect is more substantial than the graphical evidence of Figure 7 would indicate. A one percentage point increase in health "stickiness" in an industry is associated with a 1.7 percentage point decline in health stickiness. A comparison of these results with Table A1, which is the same regression excluding union membership shows a similar qualitative finding of evidence consistent with our theoretical predictions.

Table 4 shows a set of regressions that removes *turnover*, but adds the O*NET variables. When ojt, required education, and in-plant training are entered singly, they are all positively and statistically significantly associated with health insurance offering. Related work is also positively associated, but the result is statistically insignificant. When all of these variables are entered together in the regression, all of them are positively related with health insurance offering, save related work, but all these coefficients are statistically insignificant. Recall that related work is negatively associated with turnover rates, so the fact that it performs poorly in these regressions is not surprising. Overall, this regression provides substantial evidence that high levels of job-specific human capital are conducive to employer health insurance offering. The findings for the effect of union membership, proportion of workers with no savings, and P_{ww} are qualitatively similar to the findings in Table 3, and consistent with our theoretical predictions. The results from Table A2, which replicates the regressions in Table 4 but excludes union membership, produce qualitatively similar results.

To demonstrate the size of the effect of on-the-job training requirements on offer probabilities, we conduct a simulation in which we hold all other variables at their mean, vary ojt from its minimum to its maximum, and use equation (1) in Table 4 to calculate predicted

Table 3: HI Offer Probit—Turnover (with Union Membership)

female	-0.0017
	(0.0023)
$age/10$	0.0501
	(0.0055)**
$(age/10)^2$	-0.0065
	(0.0006)**
black	0.0030
	(0.0023)
other race	-0.0061
	(0.0055)
income (000s of $)	0.0006
	(0.0002)**
Emp. Size: 10-24	0.0202
	(0.0015)**
Emp. Size: 25-99	0.0301
	(0.0018)**
Emp. Size: 100-499	0.0361
	(0.0022)**
Emp. Size: 500-999	0.0341
	(0.0020)**
Emp. Size: 1000+	0.0618
	(0.0042)**
Health: Very Good	0.0054
	(0.0024)*
Health: Good	0.0024
	(0.0031)
Health: Fair	0.0058
	(0.0048)
Health: Poor	-0.0065
	(0.0142)
union member	0.0218
	(0.0024)**
P_{ww}	-0.0165
	(0.0143)
% with no savings	-0.0174
	(0.0252)
turnover	-0.4485
	(0.1255)**
Observations	62336

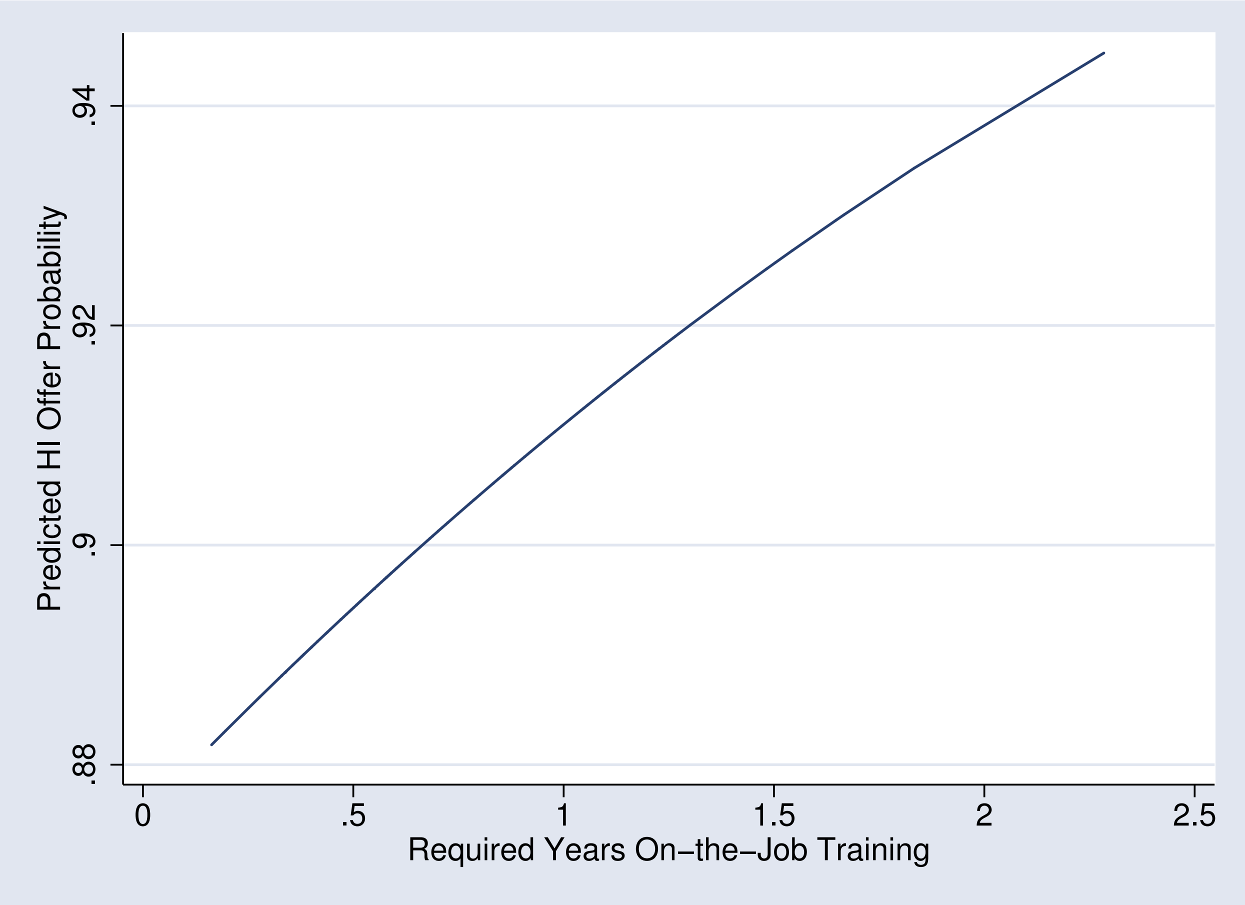
Notes: Probit regressions results—marginal effects are reported. Industry-cluster adjusted standard errors in parentheses. Regressions include a full set of year dummies (results not shown).
+ significant at 10%; * significant at 5%; ** significant at 1%.

Table 4: HI Offer Probits—Job-Specific Human Capital (with Union Membership)

	(1)	(2)	(3)	(4)	(5)
female	-0.0003	-0.0028	-0.0006	-0.0004	-0.0008
	(0.0024)	(0.0024)	(0.0025)	(0.0023)	(0.0023)
$age/10$	0.0512	0.0521	0.0511	0.0513	0.0509
	(0.0056)**	(0.0060)**	(0.0057)**	(0.0056)**	(0.0055)**
$(age/10)^2$	-0.0066	-0.0067	-0.0066	-0.0066	-0.0065
	(0.0006)**	(0.0007)**	(0.0006)**	(0.0006)**	(0.0006)**
black	0.0036	0.0031	0.0033	0.0035	0.0031
	(0.0025)	(0.0024)	(0.0025)	(0.0025)	(0.0024)
other race	-0.0059	-0.0068	-0.0062	-0.0058	-0.0062
	(0.0058)	(0.0061)	(0.0058)	(0.0058)	(0.0059)
income (000s of $)	0.0006	0.0006	0.0006	0.0006	0.0006
	(0.0002)**	(0.0002)**	(0.0002)**	(0.0002)**	(0.0002)**
Emp. Size: 10-24	0.0209	0.0211	0.0209	0.0210	0.0209
	(0.0018)**	(0.0017)**	(0.0018)**	(0.0019)**	(0.0018)**
Emp. Size: 25-99	0.0311	0.0311	0.0309	0.0311	0.0309
	(0.0023)**	(0.0022)**	(0.0023)**	(0.0023)**	(0.0022)**
Emp. Size: 100-499	0.0372	0.0372	0.0371	0.0373	0.0369
	(0.0026)**	(0.0026)**	(0.0025)**	(0.0026)**	(0.0024)**
Emp. Size: 500-999	0.0351	0.0350	0.0350	0.0351	0.0348
	(0.0024)**	(0.0023)**	(0.0023)**	(0.0024)**	(0.0023)**
Emp. Size: 1000+	0.0647	0.0639	0.0644	0.0649	0.0643
	(0.0043)**	(0.0043)**	(0.0043)**	(0.0044)**	(0.0044)**
Health: Very Good	0.0055	0.0056	0.0056	0.0056	0.0056
	(0.0023)*	(0.0024)*	(0.0023)*	(0.0023)*	(0.0023)*
Health: Good	0.0025	0.0027	0.0025	0.0026	0.0025
	(0.0030)	(0.0031)	(0.0030)	(0.0030)	(0.0030)
Health: Fair	0.0054	0.0056	0.0054	0.0054	0.0054
	(0.0047)	(0.0048)	(0.0047)	(0.0047)	(0.0047)
Health: Poor	-0.0059	-0.0061	-0.0062	-0.0060	-0.0063
	(0.0140)	(0.0142)	(0.0141)	(0.0139)	(0.0142)
union member	0.0220	0.0229	0.0219	0.0218	0.0221
	(0.0028)**	(0.0028)**	(0.0028)**	(0.0028)**	(0.0028)**
P_{ww}	-0.0115	-0.0155	-0.0093	-0.0116	-0.0116
	(0.0166)	(0.0176)	(0.0167)	(0.0165)	(0.0165)
% with no savings	-0.0665	-0.0581	-0.0624	-0.0681	-0.0567
	(0.0209)**	(0.0273)*	(0.0216)**	(0.0202)**	(0.0239)*
Req. OJT (yrs)	0.0125				0.0081
	(0.0053)*				(0.0211)
Req. educ. (yrs)		0.0030			0.0059
		(0.0026)			(0.0038)
Req. related work (yrs)			0.0064		-0.0089
			(0.0022)**		(0.0080)
Req. plant trn. (yrs)				0.0110	0.0173
				(0.0046)*	(0.0164)
Observations	62136	62136	62136	62136	62136

Notes: Probit regressions results—marginal effects are reported. Industry-cluster adjusted standard errors in parentheses. Regressions include a full set of year dummies (results not shown).
+ significant at 10%; * significant at 5%; ** significant at 1%.

Figure 9: Predicted HI Offer Probabilities and OJT Requirements



health insurance offering levels. Figure 9 shows the results from this simulation. A large change in ojt requirements induces a small change in insurance offering—from 88% to 94% of workers offered insurance.

Finally, Table 5 includes both *turnover* and the job-specific human capital measures. The findings for the effect of the O*NET variables are broadly similar to the findings in Table 4 and support our theoretical predictions. As in Table 3, *turnover* has a large negative effect on offering rate. The same can be said for P_{ww}, union membership, and our measure of impatience. The exclusion of union membership, in Table A3, does not change our qualitative conclusions.

Table 5: HI Offer Probits—Job-Specific Human Capital and Turnover (with Union Membership)

	(1)	(2)	(3)	(4)	(5)
female	0.0003	-0.0016	-0.0000	0.0003	0.0002
	(0.0023)	(0.0023)	(0.0023)	(0.0023)	(0.0022)
$age/10$	0.0491	0.0501	0.0491	0.0491	0.0491
	(0.0051)**	(0.0054)**	(0.0052)**	(0.0050)**	(0.0051)**
$(age/10)^2$	-0.0063	-0.0065	-0.0063	-0.0063	-0.0063
	(0.0006)**	(0.0006)**	(0.0006)**	(0.0006)**	(0.0006)**
black	0.0032	0.0030	0.0030	0.0031	0.0031
	(0.0024)	(0.0023)	(0.0024)	(0.0024)	(0.0023)
other race	-0.0056	-0.0060	-0.0058	-0.0055	-0.0055
	(0.0053)	(0.0056)	(0.0054)	(0.0053)	(0.0054)
income (000s of $)	0.0006	0.0006	0.0006	0.0006	0.0006
	(0.0002)**	(0.0002)**	(0.0002)**	(0.0002)**	(0.0002)**
Emp. Size: 10-24	0.0200	0.0202	0.0200	0.0201	0.0201
	(0.0016)**	(0.0015)**	(0.0016)**	(0.0016)**	(0.0016)**
Emp. Size: 25-99	0.0299	0.0301	0.0298	0.0299	0.0299
	(0.0018)**	(0.0018)**	(0.0018)**	(0.0018)**	(0.0018)**
Emp. Size: 100-499	0.0359	0.0361	0.0358	0.0359	0.0359
	(0.0021)**	(0.0022)**	(0.0021)**	(0.0021)**	(0.0020)**
Emp. Size: 500-999	0.0340	0.0341	0.0339	0.0340	0.0340
	(0.0019)**	(0.0020)**	(0.0019)**	(0.0019)**	(0.0019)**
Emp. Size: 1000+	0.0619	0.0616	0.0617	0.0621	0.0621
	(0.0042)**	(0.0042)**	(0.0041)**	(0.0042)**	(0.0042)**
Health: Very Good	0.0052	0.0052	0.0053	0.0053	0.0052
	(0.0023)*	(0.0024)*	(0.0023)*	(0.0023)*	(0.0023)*
Health: Good	0.0019	0.0022	0.0020	0.0020	0.0020
	(0.0031)	(0.0031)	(0.0031)	(0.0031)	(0.0031)
Health: Fair	0.0054	0.0056	0.0054	0.0054	0.0054
	(0.0048)	(0.0049)	(0.0048)	(0.0048)	(0.0048)
Health: Poor	-0.0077	-0.0077	-0.0079	-0.0078	-0.0078
	(0.0146)	(0.0146)	(0.0147)	(0.0146)	(0.0146)
union member	0.0210	0.0218	0.0211	0.0209	0.0210
	(0.0024)**	(0.0024)**	(0.0024)**	(0.0024)**	(0.0024)**
P_{ww}	-0.0099	-0.0152	-0.0088	-0.0099	-0.0112
	(0.0146)	(0.0153)	(0.0148)	(0.0145)	(0.0146)
% with no savings	-0.0179	-0.0165	-0.0157	-0.0189	-0.0175
	(0.0250)	(0.0278)	(0.0254)	(0.0245)	(0.0259)
turnover	-0.4376	-0.4591	-0.4285	-0.4418	-0.4370
	(0.1215)**	(0.1278)**	(0.1219)**	(0.1233)**	(0.1195)**
Req. OJT (yrs)	0.0109				0.0077
	(0.0039)**				(0.0169)
Req. educ. (yrs)		0.0000			0.0022
		(0.0022)			(0.0029)
Req. related work (yrs)			0.0051		-0.0066
			(0.0015)**		(0.0071)
Req. plant trn. (yrs)				0.0098	0.0134
				(0.0030)**	(0.0126)
Observations	62136	62136	62136	62136	62136

Notes: Probit regressions results—marginal effects are reported. Industry-cluster adjusted standard errors in parentheses. Regressions include a full set of year dummies (results not shown).
+ significant at 10%; * significant at 5%; ** significant at 1%.

5 Conclusion

The explanation that we provide for the fact that many workers go without health insurance is at once familiar but also new. The main forces at work are asymmetric information in the health insurance market and the linkage between health insurance and labor market decisions. Our model fleshes out how these forces interact to generate separating equilibria in which some firms offer insurance, attracting relatively sicker workers, and some firms offer no insurance, attracting relatively healthier workers. We show that such equilibria are more likely in industries with fluid labor markets and which have impatient workers.

In a setting where some firms offer health insurance to their workers, while other firms do not, workers will base their employment choices on how much they value the provision of health insurance, and upon how much firms charge them for that health insurance. Since firms will be less able to ascertain the health status of their workers than will the workers themselves, the classic adverse selection problem that health insurers face in the usual theory will instead faced by firms making decisions about whether to offer health insurance. Since sick workers are likely to value health insurance more than healthy workers, and since firms are constrained by a lack of information to charge both sick and well workers the same price for insurance, the problem of adverse selection in the health insurance market will "spill-over" into the labor market, and will manifest itself by some employers failing to offer health insurance at all, even if it is efficient (under full information) to do so.

The empirical evidence we glean from CPS data confirms the main predictions of the model: that the provision of insurance by firms is positively associated with job-specific human capital accumulation and negatively associated with turnover and worker impatience.

The literature on adverse selection commonly asserts that one benefit of employer provided health insurance is that it enforces pooling of risks across sick and well people within a firm. This allows the "insurance" aspect of health insurance to work, so long as people do not decide where to work based upon their health status. Another way to interpret the results of our model is that it examines under what conditions the provision of insurance by employers can mitigate adverse selection problems in the health insurance market. Our results indicate that this sort of pooling will only arise in industries that have little labor market flexibility and worker health status that fluctuates from year to year. An implication of our results is that the employer provision of health insurance does not always combat adverse selection in health insurance markets.

Table A1: HI Offer Probit—Turnover (without Union Membership)

female	-0.0026
	(0.0026)
$age/10$	0.0618
	(0.0063)**
$(age/10)^2$	-0.0082
	(0.0007)**
black	0.0072
	(0.0026)**
other race	-0.0041
	(0.0056)
income (000s of $)	0.0003
	(0.0001)**
Emp. Size: 10-24	0.0445
	(0.0022)**
Emp. Size: 25-99	0.0584
	(0.0027)**
Emp. Size: 100-499	0.0657
	(0.0030)**
Emp. Size: 500-999	0.0618
	(0.0028)**
Emp. Size: 1000+	0.1308
	(0.0054)**
Health: Very Good	0.0057
	(0.0013)**
Health: Good	0.0044
	(0.0017)**
Health: Fair	0.0031
	(0.0030)
Health: Poor	0.0011
	(0.0070)
P_{ww}	-0.0162
	(0.0199)
% with no savings	-0.0442
	(0.0238)+
turnover	-0.6604
	(0.1160)**
Observations	282705

Notes: Probit regressions results—marginal effects are reported. Industry-cluster adjusted standard errors in parentheses. Regressions include a full set of year dummies (results not shown).
+ significant at 10%; * significant at 5%; ** significant at 1%.

Table A2: HI Offer Probits—Job-Specific Human Capital (without Union Membership)

	(1)	(2)	(3)	(4)	(5)
female	-0.0005	-0.0040	-0.0008	-0.0010	-0.0006
	(0.0025)	(0.0027)	(0.0025)	(0.0025)	(0.0026)
$age/10$	0.0630	0.0648	0.0628	0.0631	0.0629
	(0.0065)**	(0.0070)**	(0.0065)**	(0.0065)**	(0.0064)**
$(age/10)^2$	-0.0083	-0.0085	-0.0083	-0.0083	-0.0083
	(0.0007)**	(0.0008)**	(0.0007)**	(0.0007)**	(0.0007)**
black	0.0085	0.0079	0.0082	0.0084	0.0084
	(0.0028)**	(0.0028)**	(0.0028)**	(0.0028)**	(0.0028)**
other race	-0.0040	-0.0054	-0.0043	-0.0038	-0.0042
	(0.0059)	(0.0062)	(0.0059)	(0.0060)	(0.0060)
income (000s of $)	0.0003	0.0003	0.0003	0.0003	0.0003
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
Emp. Size: 10-24	0.0454	0.0457	0.0453	0.0455	0.0453
	(0.0028)**	(0.0028)**	(0.0028)**	(0.0029)**	(0.0028)**
Emp. Size: 25-99	0.0595	0.0600	0.0594	0.0596	0.0594
	(0.0035)**	(0.0034)**	(0.0035)**	(0.0036)**	(0.0035)**
Emp. Size: 100-499	0.0670	0.0675	0.0668	0.0671	0.0669
	(0.0037)**	(0.0038)**	(0.0037)**	(0.0038)**	(0.0038)**
Emp. Size: 500-999	0.0630	0.0634	0.0629	0.0631	0.0629
	(0.0035)**	(0.0035)**	(0.0035)**	(0.0035)**	(0.0035)**
Emp. Size: 1000+	0.1355	0.1355	0.1350	0.1358	0.1352
	(0.0066)**	(0.0064)**	(0.0066)**	(0.0066)**	(0.0068)**
Health: Very Good	0.0059	0.0060	0.0059	0.0059	0.0059
	(0.0013)**	(0.0013)**	(0.0013)**	(0.0013)**	(0.0012)**
Health: Good	0.0046	0.0050	0.0047	0.0047	0.0046
	(0.0017)**	(0.0017)**	(0.0017)**	(0.0017)**	(0.0017)**
Health: Fair	0.0032	0.0033	0.0032	0.0033	0.0032
	(0.0029)	(0.0030)	(0.0029)	(0.0029)	(0.0029)
Health: Poor	0.0020	0.0019	0.0018	0.0020	0.0018
	(0.0069)	(0.0071)	(0.0069)	(0.0069)	(0.0070)
P_{ww}	-0.0120	-0.0187	-0.0090	-0.0131	-0.0107
	(0.0231)	(0.0242)	(0.0231)	(0.0233)	(0.0226)
% with no savings	-0.1178	-0.1109	-0.1124	-0.1205	-0.1127
	(0.0221)**	(0.0288)**	(0.0226)**	(0.0214)**	(0.0257)**
Req. OJT (yrs)	0.0162				0.0152
	(0.0061)**				(0.0277)
Req. educ. (yrs)		0.0020			0.0013
		(0.0036)			(0.0054)
Req. related work (yrs)			0.0084		0.0010
			(0.0026)**		(0.0090)
Req. plant trn. (yrs)				0.0127	-0.0007
				(0.0055)*	(0.0214)
Observations	281587	281587	281587	281587	281587

Notes: Probit regressions results—marginal effects are reported. Industry-cluster adjusted standard errors in parentheses. Regressions include a full set of year dummies (results not shown).
+ significant at 10%; * significant at 5%; ** significant at 1%.

Table A3: HI Offer Probits—Job-Specific Human Capital and Turnover (without Union Membership)

	(1)	(2)	(3)	(4)	(5)
female	0.0004	-0.0025	-0.0000	0.0001	0.0007
	(0.0023)	(0.0026)	(0.0023)	(0.0023)	(0.0024)
$age/10$	0.0599	0.0617	0.0599	0.0599	0.0599
	(0.0059)**	(0.0063)**	(0.0059)**	(0.0059)**	(0.0059)**
$(age/10)^2$	-0.0079	-0.0081	-0.0079	-0.0079	-0.0079
	(0.0006)**	(0.0007)**	(0.0006)**	(0.0006)**	(0.0006)**
black	0.0074	0.0071	0.0072	0.0073	0.0076
	(0.0026)**	(0.0026)**	(0.0026)**	(0.0026)**	(0.0026)**
other race	-0.0033	-0.0042	-0.0036	-0.0031	-0.0032
	(0.0054)	(0.0057)	(0.0054)	(0.0054)	(0.0055)
income (000s of $)	0.0003	0.0003	0.0003	0.0003	0.0003
	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**	(0.0001)**
Emp. Size: 10-24	0.0440	0.0444	0.0440	0.0441	0.0440
	(0.0022)**	(0.0022)**	(0.0022)**	(0.0023)**	(0.0022)**
Emp. Size: 25-99	0.0577	0.0583	0.0576	0.0578	0.0578
	(0.0027)**	(0.0027)**	(0.0027)**	(0.0027)**	(0.0028)**
Emp. Size: 100-499	0.0649	0.0655	0.0648	0.0649	0.0650
	(0.0028)**	(0.0030)**	(0.0029)**	(0.0029)**	(0.0029)**
Emp. Size: 500-999	0.0612	0.0617	0.0611	0.0613	0.0613
	(0.0027)**	(0.0028)**	(0.0027)**	(0.0027)**	(0.0027)**
Emp. Size: 1000+	0.1301	0.1305	0.1298	0.1303	0.1302
	(0.0056)**	(0.0055)**	(0.0056)**	(0.0057)**	(0.0058)**
Health: Very Good	0.0055	0.0057	0.0056	0.0056	0.0055
	(0.0013)**	(0.0013)**	(0.0013)**	(0.0013)**	(0.0012)**
Health: Good	0.0042	0.0045	0.0043	0.0043	0.0042
	(0.0017)*	(0.0017)**	(0.0017)*	(0.0017)*	(0.0017)*
Health: Fair	0.0031	0.0032	0.0031	0.0031	0.0031
	(0.0029)	(0.0030)	(0.0029)	(0.0029)	(0.0029)
Health: Poor	0.0002	0.0003	0.0000	0.0002	0.0003
	(0.0070)	(0.0072)	(0.0071)	(0.0070)	(0.0071)
P_{ww}	-0.0050	-0.0137	-0.0034	-0.0058	-0.0057
	(0.0199)	(0.0206)	(0.0200)	(0.0201)	(0.0193)
% with no savings	-0.0420	-0.0444	-0.0388	-0.0438	-0.0482
	(0.0231)+	(0.0254)+	(0.0236)	(0.0228)+	(0.0232)*
turnover	-0.6676	-0.7059	-0.6551	-0.6745	-0.6920
	(0.1169)**	(0.1307)**	(0.1186)**	(0.1192)**	(0.1254)**
Req. OJT (yrs)	0.0149				0.0147
	(0.0042)**				(0.0226)
Req. educ. (yrs)		-0.0019			-0.0038
		(0.0033)			(0.0049)
Req. related work (yrs)			0.0072		0.0042
			(0.0017)**		(0.0084)
Req. plant trn. (yrs)				0.0119	-0.0062
				(0.0036)**	(0.0174)
Observations	281587	281587	281587	281587	281587

Notes: Probit regressions results—marginal effects are reported. Industry-cluster adjusted standard errors in parentheses. Regressions include a full set of year dummies (results not shown).
+ significant at 10%; * significant at 5%; ** significant at 1%.