DP 2008– 04

Worker Sorting, Health Insurance and Wages: Further Evidence from Displaced Workers in the United States

Steven F. Lehrer
Nuno Sousa Pereira

September 2008

CETE – Centro de Estudos de Economia Industrial, do Trabalho e da Empresa
Research Center on Industrial, Labour and Managerial Economics

Research Center supported by Fundação para a Ciência e a Tecnologia, Programa de Financiamento Plurianual through the Programa Operacional Ciência, Tecnologia e Inovação (POCTI)/Programa Operacional Ciência e Inovação 2010 (POCI) of the III Quadro Comunitário de Apoio, which is financed by FEDER and Portuguese funds.

Faculdade de Economia, Universidade do Porto
http://www.fep.up.pt /investigacao/cete/papers/DP0804.pdf

Worker Sorting, Health Insurance and Wages: Further Evidence from Displaced Workers in the United States

Steven F. Lehrer[a]
Queen's University and NBER

Nuno Sousa Pereira[b]
University of Porto and CETE

September 2008

Abstract

The United States has the distinction of being the only industrialized nation without universal health insurance. Health insurance may have impacts on the US labor market. We use data on displaced workers over a 25 year period to document how the role of health insurance on wages and worker sorting has evolved. We find that the provision of health insurance increasingly influences wage inequality. Our results indicate that the portion of the unadjusted wage gap due only to selection bias from unobserved (to the analyst) characteristics, such as ability or innate health status has grown rapidly since 2000. Further, while there have been substantial changes in how displaced workers sort to firms that offer health insurance benefits over the last 25 years, many of the patterns have reversed directions over the past six years. Finally, we discuss the policy implications of our results.

Keywords: Health insurance; Worker sorting; Displacement; Comparative advantage; Non-linear instrumental variables.
JEL classification: I11; J33; C23.

Lehrer wishes to thank SSHRC for research support. Pereira gratefully acknowledges support from CETE. CETE, Research Center on Industrial, Labour and Managerial Economics, is supported by the Fundação para a Ciência e a Tecnologia, Programa de Financiamento Plurianual, through POCTI of the Quadro Comunitário de Apoio III, which is financed by FEDER and Portuguese funds. The usual caveat applies.

[a] School of Policy Studies and Department of Economics, Queen's University, Kingston, ON, K7L 3N6, Canada, lehrers@post.queensu.ca and NBE

[b] Department of Economics, University of Porto, Rua Dr. Roberto Frias, 4200-464 Porto Portugal, npereira@fep.up.pt and CETE.

1 Introduction

The United States has the distinction of being the only industrialized nation without universal health insurance. The majority of workers in the United States receive health insurance through their employer. With the US election looming in 2008, the politics of health care are heating up and many of the presidential candidates are proposing ambitious policies to either reform the current health insurance system or introduce universal health insurance. These proposed policies and the attention paid to health insurance in current political debates are driven by a large number of trends that are emerging in the economy. First, employment-based coverage is declining due in part to the rapidly rising costs of insurance premiums each year.[1] Fewer employers are now offering health insurance, and among those that provide these benefits, cost sharing has been introduced which increases shares of the premium cost, co-pays, deductibles that employees are responsible for.[2] Further, numerous companies including General Motors and IBM are eliminating coverage for many of their retirees. As the number of uninsured continues to increase there are increased concerns that costs for the uninsured will be shifted to the insured through higher premiums and some believe that this could lead to a partial unravelling of the current system

Standard economic theory would predict that the higher costs of health insurance will be passed on to workers in the form of lower wages. Yet existence of a wage health insurance compensating differential has been difficult to establish.[3] This paper extends our earlier work (Lehrer and Pereira (2007)) by updating our understanding of the connection between health insurance provision and the labor market using over 25 years of data. In

[1] See Baicker and Chandra (2006) for details.

[2] The share of all businesses offering health benefits declined from 69 percent in 2000 to 60 percent by 2005, driven largely by decreases among small to mid-size firms.

[3] In his review of the compensating differentials literature, Pauly (2001) sustains the existing studies do not provide compelling evidence, either in favor, or against the existence of this trade-off. Currie and Madrian (1999) also present a survey of this literature and reach a similar conclusion.

earlier work, we used data from 1984-2002 and introduced an empirical strategy that allows observed and unobserved characteristics to be rewarded differently in firms that provide and do not provide health insurance, and it generates estimates robust to both employer and employee selection on unobservables to the health economics literature. The empirical results indicated substantial changes both in how displaced workers sort across firms when seeking reemployment and how firms select workers for employment between 1982-1992 and 1994-2002. During the latter period, the importance of selection bias in explaining the unadjusted wage gap has diminished by over 40%, on the other hand, the portion of this bias due only to unobserved (to the analyst) characteristics, such as ability or innate health status more than doubled. Finally, evidence was presented that recently displaced workers searched nearly three weeks longer for jobs that provide health benefits after 1994, suggesting that those who need health insurance shop for it.

The key contribution of this paper is to update several of our findings from using additional data covering workers displaced between 2001-2006 regarding i) the existence and robustness of any potential wage and health insurance trade-off and ii) decompose the wage gap between firms that offer and do not offer health insurance yielding insights into how workers sort into new jobs. Recent years were characterized by a remarkable amount of inflation in health care costs and health insurance premiums. Between 2001 and 2005 health insurance premiums grew by no less than nine percent each year, ranging between 9.2 percent and 13.9 percent annually for premiums for a family of four. Over these five years the number of uninsured increased by 12.3% to 47 million in 2006. Alot of public attention has been to the increasing number of uninsured children totaling 8.7 million, or 11.7 percent, in 2006. The percentage of people who received health benefits through an employer declined to 59.7% in 2006, from 66.0% in 2000.

Understanding how the provision of health insurance affects the labor market has substantial policy and human resource implications. While surveys of workers consistently rank health insurance as far and away the most important among all benefits offered in

the workplace (Salisbury, 2001) there is little evidence on how health insurance influences a number of labor market decisions at the micro and macro level. Many individuals may be reluctant to consider working for companies that do not provide health benefits,[4] and employers armed with knowledge must determine how they respond to the increased costs in providing these benefits. Are current workers willing to accept lower wages for these benefits, and if not how will the composition of employees for a given firm. Our empirical analysis yields new insights on how the provision of health insurance affects wage levels, the variance of wages across firms and the search patterns of newly displaced workers.

The paper is organized as follows. In the next section, we describe the economic model and empirical method introduced to the health economics literature in Lehrer and Pereira (2007) that is employed to estimate the parameters of the model. The data used in our analysis is described in Section 3. Section 4 presents and discusses our empirical results. We find that the provision of health insurance continues to substantially influence wage inequality. However, we find that recent years have been characterized by increasing residual wage dispersion in the sector of firms that does not provide benefits. The results are consistent with decreased coverage for highly compensated workers who would place an increased value to non-wage compensation due to the difference in the tax treatment of wage and non-wage compensation. Empirical patterns of how displaced workers sort across firms when seeking reemployment and how firms select workers for employment has changed markedly over the last 25 years. We observe that the portion of the unadjusted wage gap due only to selection bias from unobserved (to the analyst) characteristics, such as ability or innate health status has grown rapidly since 2000. Finally, we find that recently displaced workers continue to search nearly three additional weeks for jobs that provide health benefits, continuing to suggest that those who need health insurance shop for it. Yet, we also find that the unobserved productivity attributes of workers in the health insurance sector has undergone a dramatic rise in recent years and correspond-

[4]Madrian (1994) finds that among married men with pregnant wives, those without health insurance are twice as likely to switch jobs.

ingly, the returns to those characteristics in that sector have also grown. A final section summarizes our findings and discusses the implications for proposals that aim to reform the health insurance system in the US.

2 Economic Model

The model underlying our empirical analysis involves two sectors in which workers could be employed. The sectors differ solely in whether the firms within provide health insurance to their workers. The expected log wage of worker i at time t in the two sectors is given by

$$\ln w_{it}^N = \alpha^N + x_{it}^{'}\beta^N + \varepsilon_{it}^N \quad (1)$$

$$\ln w_{it}^H = \alpha^H + x_{it}^{'}\beta^H + \varepsilon_{it}^H \quad (2)$$

where x_{it} is a vector of observed (to the market and the econometrician) characteristics, β^N and β^H respectively represent how firms that do not provide health insurance and firms that offer these benefits reward characteristics, $\alpha^H = \alpha^N + HI_{it}^{'}\beta^{HI}$, and HI_{it} is an indicator variable that equals one when the individual is employed in the sector of firms that offers health insurance and ε_{it}^H and ε_{it}^N reflect sector specific residuals. These residuals follow a one way error component structure

$$\varepsilon_{it}^N = \theta_i^N + \eta_{it},\ \eta_{it} \tilde{} IID(0, \sigma^2) \quad (3)$$

$$\varepsilon_{it}^H = \theta_i^H + \eta_{it},\ \eta_{it} \tilde{} IID(0, \sigma^2)$$

where θ_i^N and θ_i^H are the return of the individual time invariant unobserved (to the econometrician) characteristics in the respective sectors. This formulation explicitly permits the returns to observed and unobserved characteristics to vary across sectors. Further, we do not impose any restrictions on the joint distribution of $(\theta_i^N,\ x_{it})$ or $(\theta_i^H,\ x_{it})$, allowing for arbitrary correlations permitting workers to have both absolute advantage and comparative advantage in the sectors.

Lemieux (1998) demonstrates that one can create an estimable wage equation as

$$\ln W_{it} = \alpha^N + x_{it}^{'}\beta^N + \theta_i^N + HI_{it}^{'}[HI_{it}^{'}\beta^{HI} + x_{it}^{'}(\beta^H - \beta^N) + \theta_i^H - \theta_i^N] + \xi_{it} \qquad (4)$$

from which, the raw wage differential between sectors can be decomposed into two main terms, given by

$$WG = \left[\beta^{HI} + \overline{x}_H^{'}\left(\beta^H - \beta^N\right) + (\psi - 1)\,\overline{\theta}_H\right] + \left[\left(\overline{x}_H^{'} - \overline{x}_N^{'}\right)\beta^N + \left(\overline{\theta}_H - \overline{\theta}_N\right)\right] \qquad (5)$$

where β^{HI} is the direct compensating wage differential. The first term in square brackets of equation (5) reflects the mechanism by which workers pay for receiving health insurance, while the second term in square brackets reflects average skill differences between the workers that select jobs that offer health insurance and the workers that prefer jobs without health insurance as part of the compensation package. Similarly, the variance of the wage gap can be decomposed into three components, given by

$$\begin{aligned} VG \;=\; & \left[\left(\beta^{H\prime}\Sigma_{XH}\beta^H - \beta^{N\prime}\Sigma_{XN}\beta^N\right) + \left(\psi^2 - 1\right)\sigma_{\theta H}^2 + 2\left(\psi\beta^H - \beta^N\right)^{\prime}\Sigma_{X\theta_H}\right] + \qquad (6) \\ & \left[\beta^{H\prime}\left(\Sigma_{XH} - \Sigma_{XN}\right)\beta^H + \left(\sigma_{\theta H}^2 - \sigma_{\theta N}^2\right) + 2\beta^{H\prime}\left(\Sigma_{X\theta_H} - \Sigma_{X\theta_N}\right)\right] + \left[\sigma_H^2 - \sigma_N^2\right]. \end{aligned}$$

The components in square brackets respectively reflect, the impact of health insurance on the dispersion of wages in that sector, the differential heterogeneity in workers between sectors, and the difference in residual variance.

GMM is used to estimate the structural parameters in equation (4), where we first remove θ_i from the wage equation via quasi-differences between wage equations in successive periods. Specifically, we estimate

$$\ln W_{it} = g(z_{it}) + \xi_{it}\frac{1 + HI_{it}(\Psi - 1)}{1 + HI_{it-1}(\Psi - 1)}\{\ln W_{it-1} - g(z_{it-1}) - \xi_{it-1}\} \qquad (7)$$

where $g(z_{is}) = \alpha_s^N + x_{is}^{'}\beta^N + HI_{is}^{'}[HI_{it}^{'}\beta^{HI} + x_{is}^{'}(\beta^H - \beta^N)]$ and Ψ is a coefficient vector that captures differentials rewards to unobserved skills across sectors. The inclusion of a lagged dependent variable presents a challenge to estimate equation(7). Consistent

estimates can be obtained by GMM provided one has access to an instrumental variable for W_{it-1}. Following our earlier work, we use annual state level information on the previous job's union coverage rate at the industry level making the hypothesis that industries with higher union coverage rates should be associated with higher wages in the jobs prior to displacement. We argue that it is unlikely that these state level aggregate measures are related to the individual specific time varying unobservables in equation (7). Finally, as a technical detail, the structural parameters are identified provided the unobserved time invariant individual specific component of the residual is normalized to zero as a constraint on the optimization of equation (7).[5]

An important feature of this empirical model is that it can nest several assumptions that underlie many econometric estimation procedures in the health economics literature that evaluates whether compensating differentials exist. For instance, if one sets the $\Psi = 1$, this is equivalent to a first differenced estimation procedure and imposes the assumption that unobserved attributes are rewarded in exactly the same manner in both sectors. The assumption of constant rewards to unobserved attributes also underlies fixed effects strategies.

Unlike control function or selection correction estimation strategies, this model permits selection of workers to a job to be on both sides of the market. Selection of a new job is based in part on factors unobserved to the analyst, and intuitively it seems excessively restrictive to assume that it operates exclusively on the workers' side of the labor market. Employers in the health insurance sector may prefer to select individuals who have higher

[5]The estimates of β^{HI}, β^{H}, β^{N} and ψ are obtained from equation (7) and summary statistics provide information on $\overline{x}_H = E[x_{it}|HI_{it} = 1]$ and $\overline{x}_N = E[x_{it}|HI_{it} = 0]$. Similarly, $\overline{\theta}_H = E[\theta_i|HI_{it} = 1]$ and $\overline{\theta}_N = E[\theta_i|HI_{it} = 0]$ where θ_i is calculated using the predicted regressors. The gap in the variance of wages can also be decomposed using the same information, and considering that $\Sigma_{XH} = Var[x_{it}|HI_{it} = 1]$, $\Sigma_{XN} = Var[x_{it}|HI_{it} = 0]$, $\sigma^2_{\theta H} = Var[\theta_i|HI_{it} = 1]$, $\sigma^2_{\theta N} = Var[\theta_i|HI_{it} = 0]$, $\Sigma_{X\theta_H} = Cov[x_{it}, \theta_i|HI_{it} = 1]$, $\Sigma_{X\theta_N} = Cov[x_{it}, \theta_i|HI_{it} = 0]$, $\sigma^2_H = Var[\epsilon_{it}|HI_{it} = 1]$, and $\sigma^2_N = Var[\epsilon_{it}|HI_{it} = 0]$. Full details are provided in Lehrer and Pereira (2007).

values of θ_i^H, which could represent among other factors ability, motivation and health status. A wedge in the labor market may develop if individuals with low values of θ_i^H shop for jobs with health insurance provision, but employers prefer individuals with higher values of θ_i^H.

Instrumental variables procedure have a advantage over longitudinal estimators such as first differenced or fixed effects if we believe the regressors are measured with error. As we describe in the next section, many of our explanatory variables could be subject to recall error, since they are based on retroactive questions. An instrumental variables procedure to correct for the endogeneity of past variables such as pre-displacement wages, should reduce concerns of biases attributable to measurement error. In contrast both fixed effects and first differenced models are well known to generate biased estimates when variables are measured with error and the size of the bias would be particularly large in short panels such as that in this paper which consists of only two observation per individual.

3 Data

The data used in this study comes from the Displaced Worker Supplement (DWS) of the Current Population Survey (CPS). The CPS is a comprehensive, cross-sectional survey of approximately 50,000 households in the United States. The DWS is a biennial supplement to the CPS presenting a nationally representative cross-sectional survey of displaced workers (those who have lost jobs because of plant closings, business failures, and layoffs) and includes retrospective data several years prior to the administration of the survey. Among these workers, their job loss resulted from exogenous decisions that were unrelated to both their particular performance and preferences over the structure of the compensation package.[6] Most important for this study, the DWS contains informa-

[6]Hammermesh (1987) presents evidence from early DWS surveys that these displacements indeed come as a surprise to the worker and firm.

tion on wage rates and health insurance status, both on their job prior to and following displacement.[7] The DWS also includes detailed information on demographic characteristics and individual labor market variables pre and post displacement for a large sample of displaced workers.

We use data from DWS supplements collected from 1984 to 2006 and largely follow the sampling criteria used in Simon (2001), deleting observations where workers were either employed part-time, self-employed or held seasonal jobs.[8] Relative to the nationally representative CPS, displaced workers are disproportionately male, previously employed in semi-skilled blue collar labor and are less likely to be a college graduate (particularly in the 1980s). The data was supplemented with information from both the January and March CPS to obtain additional controls in our analysis. For instance, tenure information comes from the January Basic dataset, and is calculated as the number of years the individual have been employed in the current job.

Despite the many advantages of using the DWS data for estimating wage/health insurance trade-offs, there are a number of limitations that should be noted. First, the DWS treats health insurance as a homogeneous good and there are many dimensions across which plans vary such as annual deductible, and co-payments. We cannot accurately measure the cost of health insurance or the part paid by the employee.[9] Second, the data set lacks information on other fringe benefits such as employer provided pension plans,

[7] The DWS does not contain hourly wage rates and we had to calculate this variable. We assumed that health insurance is obtained from an individual's primary position and calculated the hourly wage rate for this position using information in the DWS. Specifically, we took the difference between total wages and earnings from other jobs and divided that by the average hours worked per week *weeks worked in a year.

[8] Simon (2001) used data from 1984 to 2000 in her analysis.

[9] In all waves of the survey, the health insurance information about the old job refers to health insurance from the worker's own employer. From 1984 to 1992, the new job health insurance variable asked for whether any group health insurance was held, and from 1994 onwards asked whether any private health insurance was held at the present time.

employer provided retirement health insurance that are likely correlated with health insurance benefits. Third, data on pre-displacement firm characteristics such as firm size and profitability are not collected. As we will discuss, this limitation is likely the most severe. Fourth, the data lacks information on skill transferability. Fifth, the survey only asks whether a person has private health insurance coverage but does not ask the source that provides these benefits which could lead to biases, particularly for individuals that have spouses with family health benefits. To mitigate these biases we use the March CPS supplement as it contains more detailed information on whether employer insurance is in their own name allowing us to verify whether this insurance is really from their own primary employer. Unfortunately, due to the rotational structure of the CPS we lose approximately 43% of our sample when we match respondents.[10]

There are two additional features of the DWS worth noting as they are related to changes in the data collection. First, effective 2003, the CPS incorporated revised industry and occupation classifications based on the Census 2000 industry and occupation codes. The codes represent a totally new classification system not consistent with the old one and we had to create matches by hand to make the codes consistent in constructing occupation and industry codes at the two digit level.[11] Second, there was a change in the recall period for which information on job loss was collected. Until 1994 workers were asked if they had lost a job in the last five years, while, after 1994, the time frame was limited to three years only. These changes, together with a shift in the political and health sector

[10] Approximately 6% of matched individuals privately purchased insurance and nearly 31% received health insurance from a spouse. This subsample was removed from the analysis. Note, our qualitative and quantitative results were robust if this subsample were included in the estimation sample. This should reduce concerns regarding our implicit assumption that for those individuals who could not be matched with the March CPS, health insurance reported in the DWS was obtained from the primary employer.

[11] We believe that while there may be some errors in conversion at the three digit level, at the two digit level we should properly classify all industries and occupations. Our conversion metric is available upon request.

environment,[12] help us define sample periods to evaluate separately in our analysis.

Table 1 presents summary statistics for portions of the sample used in this study. In the top panel, the full sample is divided into four groups, based on their health insurance provision pre and post displacement. The majority of the sample (62.7%) corresponds to workers that received health insurance on both jobs and are called "Always". Workers gaining health insurance following displacement constitute 14.8% of the sample, similarly 12.3% of the sample lost health insurance benefits with displacement and the remaining 10% did not receive health insurance at either job.

There are substantial differences between these groups in terms of their level of education, earnings, race and probability of switching industry and occupation following displacement. The two groups of the sample that did not receive health insurance prior to displacement have, on average, a lower level of education, a lower pre-displacement wage and are more likely to be African American than groups which received health insurance in both periods. Further, losing health insurance following displacement is associated with both large wage losses and a higher likelihood of switching industry or occupation. Notice that jobs pre and post displacement that offer health insurance provide higher wages. The usual explanation for this finding is that those employed in good jobs are likely to differ from those in worse jobs on both observable and unobservable characteristics.

In the second part of Table 1, we examine how the characteristics of the sample differ between 1984-92 and 1994 onwards. There are no significant differences in any characteristics between pre and post 2000 conditional on being post 1994. After 1994, displaced workers are more educated, slightly older, contain more females, are less likely to have children or receive unemployment benefits following displacement. While age and education would suggest an increase in the propensity to receive health benefits, not

[12] Health care reform was a major component of Bill Clinton's campaign in 1992. This year also saw a marked slowdown in medical spending and the end to a period of rapid growth in enrollment in managed care plan. While 5% of the privately insured were in managed care in 1980 it had risen to approximately 75% in 1992 and that percentage has been fairly stable since 1992.

having children could serve to reduce the benefits from receiving health coverage from an employer. Interestingly, more workers in our sample over the last twelve years received health insurance following displacement, which is the opposite of the pattern in the general labor market.

4 Results

Using GMM estimates of equation (7) we decompose the unadjusted health insurance wage gap into a true effect of health insurance on wages and a selection bias component following equation (5). The results are presented in Table 2 and the first column conducts the decomposition for the entire sample period. Health insurance has substantial impacts on workers in the health insurance sector that primarily operate through differential returns to observed characteristics. For the full sample, over 80% of the effect of health insurance on workers in the health insurance sector operates through this channel. Further, the role of unobserved factors is limited.

The change in the components of the wage decomposition between 1984-1992 and 1994-2006 as well as 2000-2006 is respectively presented in columns 2, 3 and 4 of Table 2. Between these periods, the unadjusted wage gap has grown, which is, in part, (and consistent with Farber and Levy (2000)) due to firms which stopped offering benefits over this time period tended to be clustered in low-paying industries. The prime component that explains the growth in the unadjusted wage gap between sectors is the substantial increase in the returns to observed skills. The returns to these skills have more than doubled between periods. Examining the second, third and fourth columns of Appendix Table 1, it is clear that these rewards are being driven by the increased returns to a college education as well as returns to age, which may proxy for total labor market experience.[13]

[13]This suggests that, conditional on characteristics, some workers may have a comparative advantage in the health insurance sector, which, based on the differences in the magnitude of the coefficient between columns two and three, appears to be of increasing importance in recent years.

Not only did the returns to observed skills rise across periods, but there was also a large decrease in the amount of the gap that is attributable to selection bias. Overall selection bias dropped by nearly 30%, from 0.179 to 0.107 driven by the differences in observed skills across sectors. Information on the portion of selection bias attributable to observables and unobservables is presented in rows six and seven of Table 2, respectively. Selection bias due to unobservables measures the similarity in average unobserved attributes between workers in the two sectors (i.e. $\overline{\theta}_H$ and $\overline{\theta}_N$). The fifth row of Table 2 indicates that the gap in these attributes has become smaller between periods pre and post 1993. On average, workers employed in firms that offer health insurance have larger values associated with unobserved attributes related to productivity $\left(\overline{\theta}_H\right)$ than those employed in firms that do not offer these benefits $\left(\overline{\theta}_N\right)$. Yet, the portion of selection bias due to unobserved skills that cannot be accounted for by estimators such as OLS and matching has risen markedly since 2000. In fact, in the last six year period, it has grown by more than 150% relative to the period between 1994-1999. Since $\overline{\theta}_H > \overline{\theta}_N$, and the health insurance wage gap is slightly higher for individuals with higher unobserved skills, we would predict that the OLS estimates of the compensating wage differential would be biased upwards. This indicates that over the last six years we have seen a great increase in the unobserved productivity attributes of workers in the sector that provides health insurance.

The first row of Table 2 presents estimates of the compensating wage differential. Health insurance is not significantly related to workers wage in any of the samples. The sign of the coefficient estimate is never consistent with the compensating wage differential theory. While this result does not differ from most estimates found in the compensating differential literature, Lehrer and Pereira(2007) suggest that is likely due to the existence frictions in the labor market and substantial heterogeneity regarding preferences for health insurance benefits among workers within firms.

Our GMM estimates are also used to decompose the unadjusted gap in variance of wages between sectors following equation (6). The results are presented in Table 3. The

unadjusted gap appears small and indicates that health insurance reduces the dispersion of wages between sectors.[14] While the overall size of the difference between the variance of wages between sectors becomes smaller after 1994, the role of the two major components of the decomposition, the effect of health insurance on health insurance workers and selection bias, increases markedly. In particular, the portion of selection bias due to differences in unobserved skills and the direct effect of both observed and unobserved skills on the variance of wages increase by over 50% between the periods. However, following 2000 how unobserved skills affects the variance of wages undergoes a dramatic transformation. That is, while they decreasingly affect the effect of health insurance in the health insurance sector, they play a drastically different role in terms of selection bias. In particular, the residual wage dispersion in the non-health insurance sector expands rapidly in part since a large number of high paid workers who previously had benefits no longer receive them. It appears that the firms who are dropping coverage over the last six years are not clustered among low paying jobs which is opposite the pattern that came about between 1994 top 2000. Taken together, while workers appeared on average to be increasingly more homogeneous across sectors in Table 2, the results in the fifth row of Table 3 suggest that there is substantially more heterogeneity in the unobserved skills of individuals working in the health insurance sector (relative to the other sector) after 1994, yet the direction of these changes in heterogeneity varies over the 12 year period.

In Table 3, we found that employers in the health insurance sector did not pay workers differently on the basis of these unobserved skills and increasingly rewarded observed skills. If employers assume that observed productivity skills are highly positively correlated with unobserved skills it may be the case that this heterogeneity has led employers to increase the reward to observed characteristics. While this should suggest that the variance in the wages between the sectors would increase across the two sample periods, there is, as reported in the second row of Table 4 a large offset. This offset arises since unobserved

[14]Recall this is the gap in the variance of log hourly wages. This gap is small relative to the gap in average log hourly wages.

skills have significantly reduced the variance of wages for health insurance workers in the health insurance sector.

The findings in Table 3 are also consistent with selection operating on both sides of the labor market, which rules out traditional selection correction or control function estimators. The negative covariance in the sixth row indicates that observed and unobserved skills are positively correlated in the sector that does not provide health insurance, but negatively correlated in the health insurance sector. This is consistent with positive selection among workers with low unobserved skills in the health insurance sector and negative selection among workers with high observed skills. This selection becomes more important over time as the size of the covariance terms increases by over 50% between the sample periods. This positive selection may be a result of increased worker shopping for positions that offer health insurance benefits and may have partially contributed to the recent health insurance cost spiral for employers.

In our estimation, we used the average unionization rate in the industry the worker was employed in pre-displacement to instrument for previous period wage. To assess the suitability of our instrument we consider a simple OLS regression of the first stage regression and run an F-test for the joint significance of the instrument. The results are presented in Table 4 for the case with information on unionization coverage rates. Coefficients on the instrument and exogenous regressors in both columns are reasonable in sign and magnitude. The instruments are statistically significant predictors of pre-displacement wages and the F-statistics on its significance is respectively above current cutoffs (i.e. Staiger and Stock (1997)) for weak instruments for both the full sample and pre-1994 sample. Since the reliability of our estimates depends directly on the validity of our instrument, the low F-statistic over post 1994 period and post 2000 was a concern we followed Lehrer and Pereira (2007) and conducted a number of diagnostics that i) rejected weak identification driving the results, ii) demonstrated the robustness of the results to alternative specifications.

Finally, we used estimates from the model to test whether assumptions that underlie alternative estimation approaches used to estimate the wage - health insurance tradeoff are supported. First, we find for the full pooled sample, Ψ is statistically different from one at the 1% confidence level, suggesting that we can directly reject the assumption that $\theta_i^N = \theta_i^H$, implying that unobserved skills are rewarded differently in the two sectors of the economy. The assumption that unobserved heterogeneity has a constant impact across sectors underlies fixed effects, first difference and difference in difference propensity score matching estimators. Imposing the constraint that Ψ =1, would introduce an omitted selection effect that will bias the impacts reported using traditional longitudinal estimators. Second, our results in Table 2 clearly demonstrated that there is substantial selection bias due to unobserved skills. the presence of these factors would affect OLS and cross sectional matching estimates of the impact of health insurance on wages. We examined a simple OLS estimate of the impact of health insurance in a simple wage equation and it does exceed the true effect of health insurance on wages reported in Table 2.[15] Finally, the findings in Table 3 are also consistent with selection operating on both sides of the labor market, which rules out traditional selection correction or control function estimators. The negative covariance in the sixth row indicates that observed and unobserved skills are positively correlated in the sector that does not provide health insurance, but negatively correlated in the health insurance sector. This is consistent with positive selection among workers with low unobserved skills in the health insurance sector and negative selection among workers with high observed skills.

4.1 Indirect Evidence on Worker Sorting Patterns

Testing directly for worker sorting is difficult without more detailed information on firms. We use difference in difference strategies to present additional evidence that is consistent

[15] The OLS estimate may also suffer from bias if there are correlations between observed attributes and θ_i.

with the hypothesis of an increase in worker sorting. We reexamined whether there were changes in the job search patterns between post displacement health insurance receipt conditional on pre displacement health insurance receipt over time pre and post 2000 conditional on post 1994. We found no evidence of any shifts in change patterns as recently displaced workers continue to search nearly three weeks longer for jobs that provide health benefits since 1994.[16] While there was no additional effect, this time period was one of high economic growth and low unemployment (with the exception of a brief period between 2001-2002) so one can argue that the macro conditions would be biased against us finding a positive impact.

We also examined if individuals with lower unobserved productivity attributes are continuing to increasingly sort to jobs that provide health insurance benefits. Since there does not exist a single data set that can directly address whether individuals in poorer health status labor market sorting is contributing to the rise in health insurance costs, we examine whether the correlations between workers' unobserved productivity characteristics of workers and health insurance are increasing. To accomplish this goal we consider estimation of

$$\widehat{\theta}_i = \gamma_1 + HI'_{it}\gamma_2 + (HI_{it} * t_2)'\gamma_3 + t'_2\gamma_4 + (HI_{it} * t_3)'\gamma_5 + t'_3\gamma_6 + v_{it} \tag{8}$$

where t_2 is a dummy for the period after 1994, t_3 is a dummy for the period after 2000 and $\widehat{\theta}_i$ is the predicted individual time invariant characteristics obtained from OLS estimation of the following equation

$$\theta_{it} = \delta_1 + \theta_{it-1}\delta_2 + \varpi_{it} \tag{9}$$

where ϖ_{it} is a random unobservable, θ_{it} is calculated using GMM estimates from the first column of Appendix Table 1. Intuitively, $\widehat{\theta}_i$ can be thought of as a estimate of the true signal of unobserved attributes from an equation that corrects for measurement error

[16] A table of results are available upon request but the numbers are similar to those in Table 6 of Lehrer and Pereira (2007). The key finding is that this impact did not undergo any additional change over the last six years.

from two mismeasured variables whose errors are unrelated. After all, θ_{it} and θ_{it-1} are measured with error since they include ξ_{it} and ξ_{it-1} respectively. Since the model described in Section 2 assumes that η_{is} in equation (3) is distributed iid over time, estimating equation (9) corresponds to regressing two variables with classical measurement error on each other and obtaining the true signal as the predicted outcome.

Table 5 present estimates of equation (8) based on samples defined by pre-displacement health insurance status and age. In the top panel we restrict $\gamma_5 = 0$ and $\gamma_6 = 0$.In the middle panel $\gamma_3 = 0$ and $\gamma_4 = 0$ are the restrictions imposed. The bottom panel presents estimates of the unrestricted model. For the full sample in column one, we notice that, while health insurance is associated with higher unobserved attributes ($\gamma_2 > 0$), the recipients in the second time period actually have lower values of θ_i ($\gamma_4 < 0$). This indicates that individuals who have health insurance in the period post 1994 have on average values of θ_i that are 0.033 lower then the earlier time period. This effect is large and approximately equal to a 4% of the standard deviation of θ_i. Columns four and seven present evidence that the magnitude of this negative impact is not heterogeneous with respect to whether or not an individual had health insurance pre-displacement. When we examine subsamples that are defined by age several interesting patterns emerge. The estimates of γ_3 in the third, sixth and ninth columns demonstrate that there is a large decrease in θ_i associated with receiving health insurance after 1994 for workers above 45. In contrast workers under the age of 45 either have γ_3 estimates that are statistically insignificant (column eight) or of limited economic significance (columns two and five). Yet, there has been some dramatic changes after 2000 recipients in the second time period actually have higher values of θ_i ($\gamma_5 > 0$). The positive impact is driven primarily by younger workers indicating that firms in the health insurance sector may be responding to worker sorting by being more careful in their selection. We hypothesize that an employer could get a more accurate signal of θ_i from younger workers than older workers. Since the employers are recognizing sorting they have increased the rewarded paid to unobserved

attributes in the last five years as reported in the first row of Table 5.

The results in Table 5 suggest that while on average unobserved productivity attributes are greater in the period following 1994, there is a significant negative association between these unobserved productivity attributes and receiving employer provided health insurance after 1994. This effect is driven by workers that are at least 45 years of age. Yet, the reversal of this trend in the last five years is driven by younger workers. Taken together, we hypothesize the results in this section suggest that, among individuals who have health insurance in the period post 1994, they have i) lower values of θ_i, unobserved productivity attributes that may include health status, and ii) the search for another position that provides these benefits lasted an additional two weeks. These individuals are most likely familiar with health insurance benefits and may have increasingly seeked out jobs that offer this amenity. Yet, since firms are aware of this behavior they have been better able to identify unobserved productivity attributes from prospective candidates particularly among young workers which as a result led to the increased returns to unobserved skills on wage levels since 2000.

5 Conclusions

In this paper, we extended our earlier work and examined how health insurance affects wages in the US labor market. One of the striking features of the US labor market is how both workers and firms have adjusted their employment patterns in response to changes in the costs of health insurance. While previous research has documented that the recent rise in health insurance premiums have impacts on several dimensions of the labor market including how premiums are transferred to workers (e.g. Gruber and Lettau (2004)), hours worked and employment rates (e.g. Cutler and Madrian (1998) and Baicker and Chandra (2006)), mixed impacts on wage levels (Pauly and Herring (1999) and Simon (2001)); our work further indicates there are also substantial impacts on wage inequality and

worker sorting.[17] Specifically, our evidence indicates that the provision of health insurance increasingly affect is the dispersion of wages across sectors, but the direction in which this operates is changing as more high wage workers are not receiving health insurance benefits from their employers. Thus, the variance of wages in the non-health insurance sector has grown dramatically contributing to selection bias from unobserved factors. Estimates from our model are also used to decompose the wage gap between the sectors and we find there are substantial changes in the selection of workers to firms that provide health insurance benefits. Specifically, we observe that there has been increased sorting based on comparative advantage since 1994. Finally, we find that recently displaced workers are searching nearly three weeks longer for jobs that provide health benefits but while these workers on average had lower unobserved productivity attributes between 1994 to 2000, relative to pre 1994; a reversal has occurred over the last five years. It appears that firms are increasingly responding to the costs of higher health insurance in their hiring patterns of displaced workers. As a result, they have also increased the reward workers receive based on these characteristics.

An important limitation of this study is that the impacts we estimate are applicable to displaced workers only. The composition of displaced workers not only differs from other workers in the labor market, but has also changed over time.[18] Yet, our findings have some limited external validity as they are in general consistent with much of the recent health economics literature indicating impacts on a variety of labor market outcomes.

As the politics of health care show no signs of cooling off, our analysis suggests that

[17] There is, indeed, some evidence of worker sorting in the context of health insurance within the health economics literature. Several studies (Marquis and Long (1995), Monheit and Vistnes (1999) and Levy (1998)) show that workers with low preferences for health insurance are disproportionately employed in firms that do not offer coverage. Similarly evidence of employees sorting to firms based on health insurance benefits is shown in Scott, Berger and Black (1989), Dranove, Spier and Baker (2000), and Levy (1998). Yet, the evidence also indicates that sorting of workers to firms on the basis of preferences for the compensation package is imperfect.

[18] Farber (2003) describes how the characteristics of displaced workers have changed over time.

in proposing policies to reform the US health insurance system one must consider the consequences for both the labor market and wage inequality. While work examining the staggered introduction of national health insurance in Canada (Gruber and Hanratty, 1995) concluded that after the introduction employment rose, wages increased and average hours were unchanged; these reforms occurred in a different era. Our empirical evidence indicates that the role of health insurance on the workers in the health insurance sector has grown by 78% since 1994, there is increased sorting that does not follow a consistent trend and increased impacts on wage inequality.

Further, if a public health insurance system were introduced, it is likely that it would be financed by a payroll tax shared between employers and employees. The same supply and demand factors will continue to operate and it is reasonable to expect some non-compliance with new taxes. A large empirical literature has independently documented that i) a positive correlation between the size of underground economy and changes in tax rates (e.g. Clotfelter, 1983 Crane and Nourzad, 1986), ii) tax cuts may increase tax revenue (e.g. Feldstein, 1995 or Goolsbee, 2000) and iii) the characteristics of workers who are likely to evade a health insurance tax and work in the informal sector are not just clustered at the bottom of the income distribution but at higher levels who feel as if they are "invited" to participate in this sector. Ignoring the labor supply impacts from a new tax this could have large macroeconomic consequences and transform the importance of several sources that drive increasing wage inequality from factors that are rewarded in the labor market such as college education to factors that affect the likelihood of tax evasion. Such policies may increase sorting based on comparative advantage as workers will not be forced to sort to jobs based on this benefits. However, since health insurance coverage at the workplace is correlated with other non-pecuniary benefits such as day-care, private pension coverage the effects may be limited. Further, it is uncertain if firms with large bills due to retiree health insurance would either increase investment or represent a windfall gain for shareholders. In conclusion, further study is required and a health insurance

experiment that does not simply randomize premiums or co-pays (as in the classic Rand study) but focuses on guaranteed coverage irrespective of employment for treatment group members could be useful to help guide the design of future health insurance policies to minimize labor market distortions and poor macroeconomic consequences.

References

[1] Baicker, K. and Chandra A. 2006. The Labor Market Effects of Rising Health Insurance Premiums. *Journal of Labor Economics* 24, 609–634.

[2] Buchmueller, T. C., DiNardo, J., Valletta, R. G., 2002. Union Effects on Health Insurance Provision and Coverage in the United States. *Industrial and Labor Relations Review* 55, 610–627.

[3] Clotfelter, C. 1993. Tax Evasion and Tax Rates: An Analysis of Individual Returns. *The Review of Economics and Statistics*, 65, 363-373.

[4] Crane, S. Nourzad, F. 1986. Inflation and Tax Evasion: An Empirical Analysis. *The Review of Economics and Statistics* 68, 217-223.

[5] Currie, J., Madrian, B., 1999. "Health, Health Insurance and the Labor Market in D. Card and O. Ashenfelter (eds), *Handbook of Labor Economics* 3C, 3309-3407.

[6] Cutler, D. M. and Madrian, B. 1998. Labor Market Responses to Rising Health Insurance Costs: Evidence on Hours Worked. *RAND Journal of Economics* 29, 509–30.

[7] Dranove, D., Spier, K. E., Baker, L., 2000. Competition Among Employers Offering Health Insurance. *Journal of Health Economics* 19, 121–140.

[8] Farber, H. S., 2003. Job Loss in the United States, 1981-2001. *NBER Working Paper No. 9707.*

[9] Farber, H. S., Levy, H., 2000. Recent Trends in Employer-Sponsored Health Insurance, Are Bad Jobs Getting Worse?. *Journal of Health Economics* 19, 93–119.

[10] Feldstein, M. 1995. The Effect of Marginal Tax Rates on Taxable Income: A Panel Study of the 1986 Tax Reform Act. *The Journal of Political Economy* 103, 551-572.

[11] Goolsbee, A. 2000. What Happens When You Tax the Rich? Evidence from Executive Compensation. *The Journal of Political Economy* 108, 352-378.

[12] Gruber, J., Lettau, M., 2004. How Elastic is the Firm's Demand for Health Insurance. *Journal of Public Economics* 88, 1273–1293..

[13] Gruber, J., Hanratty, M. 1995. The Labor Market Effects of Introducing National Health Insurance: Evidence from Canada. *Journal of Business and Economics Statistics* 13, 163-174.

[14] Hamermesh, D. S. 1987. The Costs of Worker Displacement. *Quarterly Journal of Economics* 102, 51-75.

[15] Lehrer, S. F., Pereira, N. 2007. Worker Sorting, Compensating Differentials and Health Insurance: Evidence from Displaced Workers. *Journal of Health Economics* 26, 1034–1056.

[16] Levy, H., 1998. Who Pays for Health Insurance? Employee Contributions to Health Insurance Premiums. *Princeton University Industrial Relations Section Working Paper 398.*

[17] Lemieux, T., 1998. Estimating the Effects of Unions on Wage Inequality in a Panel Data Model with Comparative Advantage and Nonrandom Selection. *Journal of Labor Economics* 16, 261–291.

[18] Madrian, B. C., 1994. Employment-Based Health Insurance and Job Mobility: Is There Evidence of Job-Lock? *Quarterly Journal of Economics* 109, 27-54.

[19] Marquis, M. S., Long, S. H., 1995. Worker Demand for Health Insurance in the Non-Group Market. *Journal of Health Economics* 14, 47–63.

[20] Monheit, A. C., Vistnes, J.C., 1999. Health Insurance Availability at the Workplace, How Important are Workers Preferences. *Journal of Human Resources* 34, 770–785.

[21] Pauly, M. V., 2001. Making Sense of a Complex System, Empirical Studies of Employment-Based Health Insurance. *International Journal of Health Care Finance and Economics* 1, 333–339.

[22] Salisbury, D. L. 2001. EBRI Research Highlights: Retirement and Health Data Employee Benefit Research Institute (EBRI) EBRI Special Report SR-36, and EBRI Issue Brief No. 229.

[23] Scott, F., Berger, M. C., Black, D., 1989. Effects of the Tax Treatment of Fringe Benefits on Labor Market Segmentation. *Industrial and Labor Relations Review* 42, 216–229.

[24] Simon, K., 2001. Involuntary Job Change and Employer Provided Health Insurance; Evidence of a Wage/Fringe Benefit Tradeoff?. *International Journal of Health Care Finance and Economics* 1, 249–271.

[25] Staiger, D., Stock, J.H., 1997. Instrumental Variables Regression with Weak Instruments. *Econometrica* 65, 557–586.

Table 1: Descriptive Statistics

By Health Insurance Status on Both Jobs	Gainers of HI Post displacement job has Health Insurance		Never Have Neither job has Health Insurance		Always Have Both jobs provided Health Insurance		Losers of HI Pre displacement job has Health Insurance	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Real weekly wage after displacement in US$	519.347	317.878	658.127	383.147	367.226	247.435	415.652	262.314
Real weekly wage pre displacement in US$	526.384	345.894	733.458	419.259	417.867	278.890	579.383	326.019
Age	36.816	10.357	38.856	10.071	35.277	10.778	36.749	10.267
Level of education below college	0.498	0.500	0.440	0.496	0.648	0.478	0.583	0.493
Female	0.467	0.499	0.374	0.484	0.479	0.500	0.406	0.491
Married	0.675	0.468	0.680	0.466	0.484	0.500	0.530	0.499
Black	0.076	0.266	0.074	0.262	0.125	0.331	0.116	0.320
Years of tenure pre displacement	3.669	4.231	6.857	6.851	3.262	3.856	5.459	5.642
Same Industry	0.417	0.493	0.470	0.499	0.459	0.498	0.340	0.474
Same Occupation	0.369	0.483	0.372	0.483	0.349	0.477	0.268	0.443
Number of Observations	2549		1737		10768		2119	

By Time Period	1984-2006		1994-2006		2000-2006	
	Mean	SD	Mean	SD	Mean	SD
Log of Pre Displacement Real Weekly Wage in US$	6.346	0.573	6.465	0.609	6.407	0.609
Log of Post-Displacement Real Weekly Wage in US$	6.199	0.647	6.332	0.720	6.294	0.672
Insurance in Old Job	0.751	0.433	0.748	0.434	0.732	0.443
Insurance in New Job	0.775	0.417	0.792	0.406	0.791	0.407
Female	0.407	0.491	0.440	0.496	0.434	0.496
Married	0.638	0.481	0.610	0.488	0.611	0.487
Black	0.086	0.280	0.089	0.285	0.084	0.277
Age between 35 and 44	0.304	0.460	0.308	0.462	0.315	0.464
Age between 45 and 54	0.205	0.403	0.282	0.450	0.252	0.434
Age over 55	0.084	0.278	0.103	0.304	0.090	0.286
High School Education	0.371	0.483	0.296	0.457	0.307	0.461
Some College Education	0.282	0.450	0.317	0.465	0.322	0.467
College	0.249	0.432	0.328	0.470	0.306	0.461
Children	0.634	0.482	0.429	0.495	0.445	0.497
Tenure on Job Pre-Displacement (in years)	5.913	6.336	6.111	6.473	6.113	6.513
Observations	14968		9429		5539	

Table 2: Decomposition of the Unadjusted Weekly Wage Gap

	1984-2006	1984-1992	1994-2006	2000-2006
Effect of health insurance on workers in health insurance sector:				
1. Compensating Wage Differential, β^{HI}	0.058	0.054	0.029	0.014
2. Effect of observed skills, $\bar{x}_H^{'}\left(\beta^H - \beta^N\right)$	0.223	0.156	0.358	0.347
3. Effect of unobserved skills, $(\psi - 1)\bar{\theta}_H$	0.015	0.000	0.016	0.006
Total effect	*0.238*	*0.210*	*0.374*	*0.352*
Selection bias:				
4. Differences in observed skills, $\left(\bar{x}_H^{'} - \bar{x}_N^{'}\right)\beta^N$	0.096	0.132	0.071	0.046
5. Differences in unobserved skills, $\left(\bar{\theta}_H - \bar{\theta}_N\right)$	0.023	0.047	0.038	0.067
Total bias	*0.118*	*0.179*	*0.109*	*0.114*
Unadjusted wage gap (WG)	***0.414***	***0.389***	***0.455***	***0.452***

Note: The decomposition is based on equation (5) and we use the estimates presented in Appendix Table 1 to construct each component.

Table 3: Decomposition of the Unadjusted Variance of Weekly Wages Gap

	1984-2002	**1984-1992**	**1994-2006**	**2000-2006**
Effect of health insurance on workers in health insurance sector:				
1. Effect of observed skills, $\beta^{H'}\Sigma_{XH}\beta^{H} - \beta^{N'}\Sigma_{XN}\beta^{N}$	0.066	0.043	0.078	0.071
2. Effect of unobserved skills, $\left(\psi^2 - 1\right)\sigma^2_{\theta_H}$	-0.192	-0.047	-0.170	-0.073
3. Covariance term, $2\left(\psi\beta^{H} - \beta^{N}\right)\Sigma_{X\theta H}$	0.004	0.005	0.007	0.009
Total effect	*-0.123*	*0.002*	*-0.084*	*0.007*
Selection bias:				
4. Differences in observed skills, $\beta^{N'}\left(\Sigma_{XH} - \Sigma_{XN}\right)\beta^{N}$	-0.001	0.002	-0.001	0.000
5. Differences in unobserved skills, $\sigma^2_{\theta H} - \sigma^2_{\theta N}$	0.115	0.000	0.057	-0.094
6. Covariance term, $2\beta^{N'}\left(\Sigma_{X\theta H} - \Sigma_{X\theta N}\right)$	-0.024	-0.015	-0.027	-0.026
Total bias	*0.090*	*-0.014*	*0.030*	*-0.121*
Difference in residual variance, $\sigma^2_H - \sigma^2_N$	-0.003	-0.002	-0.002	-0.001
Unadjusted variance gap (WG)	***-0.036***	***-0.014***	***-0.057***	***-0.114***

Note: The decomposition is based on equation (6) and we use the estimates presented in Table 1 to construct each component.

Table 4: First Stage Regressions of Pre Displacement Wage Assuming $\psi = 1$

Time Period	**1984-2002**	**1984-1992**	**1994-2006**	**2000-2006**
Unionization Rate in Pre-Displacement Industry	0.000 (0.000)	0.002 (0.000)***	-0.002 (0.001)***	-0.001 (0.001)*
Health Insurance Pre Displacement	0.000 (0.000)	0.230 (0.000)	0.000 (0.054)***	0.349 (0.086)***
Married	0.068 (0.021)***	0.088 (0.028)***	0.077 (0.032)**	0.123 (0.047)***
Black	-0.075 (0.034)**	-0.087 (0.033)***	-0.036 (0.061)	-0.211 (0.127)*
Age between 35 and 44	0.060 (0.021)***	0.072 (0.028)***	0.054 (0.033)	0.021 (0.053)
Age between 45 and 54	0.080 (0.029)***	0.113 (0.038)***	0.079 (0.043)*	0.032 (0.059)
Over 55 years old	0.002 (0.046)	0.028 (0.053)	-0.019 (0.078)	-0.145 (0.110)
High School Graduate	0.127 (0.023)***	0.118 (0.029)***	0.137 (0.036)***	0.099 (0.053)*
Some College	0.257 (0.025)***	0.241 (0.035)***	0.290 (0.036)***	0.290 (0.060)***
College Degree and above	0.466 (0.032)***	0.387 (0.045)***	0.555 (0.046)***	0.588 (0.077)***
Pre Displacement Tenure	0.028 (0.005)***	0.030 (0.006)***	0.027 (0.009)***	0.031 (0.015)**
Pre Displacement Tenure Squared	-0.001 (0.000)***	-0.001 (0.000)***	-0.001 (0.001)	-0.001 (0.001)
Married* health insurance	0.006 (0.020)	0.017 (0.029)	-0.022 (0.030)	-0.100 (0.048)**
Black* health insurance	0.011 (0.034)	-0.018 (0.035)	0.052 (0.058)	0.087 (0.110)
(Age between 35 and 44)* health insurance	0.031 (0.021)	-0.006 (0.027)	0.081 (0.032)**	0.112 (0.052)**
(Age between 45 and 54)* health insurance	0.046 (0.027)*	-0.040 (0.036)	0.120 (0.040)***	0.142 (0.065)**
(Over 55 years old)* health insurance	-0.011 (0.037)	-0.037 (0.049)	0.044 (0.055)	0.034 (0.080)
High School Graduate* health insurance	0.009 (0.025)	0.003 (0.031)	0.038 (0.044)	0.036 (0.068)
Some College* health insurance	-0.011 (0.028)	-0.043 (0.037)	0.030 (0.045)	0.083 (0.072)
College degree* health insurance	0.050 (0.031)	0.051 (0.042)	0.083 (0.048)*	0.051 (0.075)
Pre Displacement Tenure* health insurance	-0.008 (0.005)	-0.011 (0.006)*	-0.007 (0.010)	-0.019 (0.016)
Pre Displacement Tenure Squared* health insurance	0.000 (0.000)	0.000 (0.000)**	0.000 (0.001)	0.001 (0.001)
Constant	5.716 (0.038)***	5.797 (0.059)***	5.627 (0.054)***	5.532 (0.081)***
Observations	17173	9387	7786	3352
R-Squared	0.38	0.374	0.40	0.41
First Stage F- statistic on the Instrument	15.95	39.84	9.20	2.67

Note: Regressions include information on gender, Hispanic, family composition, employer industry, unemployment insurance use, region of residence indicators and their interactions with health insurance. Robust standard errors in parentheses and . [a], [b] and [c] denote statistically different from zero at the 1%, 5% and 10% confidence levels, respectively.

Table 5: Nonparametric difference in difference estimates of the impact of health insurance receipt after 1994 on Unobserved Productivity Attributes

Sample	Full Sample			Health Insurance Pre Displacement			No Health Insurance Pre Displacement		
	All Ages	Aged 20-44	Aged 45-64	All Ages	Aged 20-44	Aged 45-64	All Ages	Aged 20-44	Aged 45-64
Health Insurance post displacement (γ_2)	0.065 (0.006)***	0.064 (0.006)***	0.071 (0.013)***	0.063 (0.007)***	0.063 (0.008)***	0.066 (0.016)***	0.019 (0.010)*	0.016 (0.011)	0.029 (0.025)
Health Insurance post displacement after 1994 (γ_3)	-0.033 (0.009)***	-0.015 (0.010)	-0.077 (0.020)***	-0.037 (0.012)***	-0.026 (0.013)**	-0.064 (0.028)**	-0.032 (0.014)**	-0.006 (0.016)	-0.099 (0.032)***
Indicator variable for Period Following 1994 (γ_4)	0.064 (0.007)***	0.049 (0.008)***	0.110 (0.017)***	0.074 (0.011)***	0.063 (0.011)***	0.106 (0.025)***	0.060 (0.010)***	0.040 (0.010)***	0.121 (0.024)***
Comparing Trends Pre and Post 2000									
Health Insurance post displacement (γ_2)	0.053 (0.005)***	0.055 (0.005)***	0.048 (0.011)***	0.053 (0.006)***	0.053 (0.007)***	0.056 (0.014)***	0.004 (0.008)	0.008 (0.009)	-0.012 (0.020)
Health Insurance post displacement after 2000 (γ_5)	-0.008 (0.011)	0.015 (0.012)	-0.046 (0.024)*	-0.019 (0.016)	0.004 (0.017)	-0.059 (0.035)*	0.003 (0.017)	0.029 (0.019)	-0.033 (0.033)
Indicator variable for Period Following 2000 (γ_6)	0.053 (0.009)***	0.042 (0.010)***	0.077 (0.021)***	0.064 (0.014)***	0.051 (0.015)***	0.094 (0.032)***	0.042 (0.011)***	0.033 (0.012)***	0.058 (0.025)**
Unrestricted Model									
Health Insurance post displacement (γ_2)	0.065 (0.006)***	0.064 (0.006)***	0.071 (0.013)***	0.063 (0.007)***	0.063 (0.008)***	0.066 (0.016)***	0.019 (0.010)*	0.016 (0.011)	0.029 (0.025)
Health Insurance post displacement after 1994 (γ_3)	-0.049 (0.010)***	-0.037 (0.012)***	-0.090 (0.023)***	-0.048 (0.014)***	-0.048 (0.016)***	-0.054 (0.030)*	-0.054 (0.017)***	-0.030 (0.018)	-0.139 (0.039)***
Indicator variable for Period Following 1994 (γ_4)	0.060 (0.008)***	0.045 (0.009)***	0.114 (0.019)***	0.067 (0.012)***	0.060 (0.013)***	0.090 (0.027)***	0.060 (0.012)***	0.037 (0.012)***	0.148 (0.029)***
Health Insurance post displacement after 2000 (γ_5)	0.029 (0.013)**	0.043 (0.015)***	0.021 (0.028)	0.020 (0.019)	0.042 (0.020)**	-0.016 (0.041)	0.042 (0.020)**	0.050 (0.022)**	0.065 (0.040)
Indicator variable for Period Following 2000 (γ_6)	0.007 (0.011)	0.008 (0.011)	-0.007 (0.024)	0.011 (0.017)	0.004 (0.017)	0.025 (0.037)	-0.001 (0.013)	0.006 (0.014)	-0.045 (0.030)
Number of Observations	17233	12258	4975	12934	9066	3868	4299	3192	1107

Note: Robust standard errors in parentheses, ***, ** and * denote statistically different from zero at the 1%, 5% and 10% confidence levels, respectively.

Appendix Table 1: GMM Estimates of the Wage Equation

	1984-2006	1984-1992	1994-2006	2000-2006
Health Insurance	0.058	0.054	-0.029	-0.014
	(0.046)	(0.064)	(0.066)	(0.083)
Point estimates of the returns to unobserved skills (**ψ**)	0.712	0.892[a]	0.747	0.860
	(0.038)	(0.053)	(0.038)	(0.068)
Female	-0.065	-0.071[a]	-0.065	-0.067
	(0.007)	(0.009)	(0.012)	(0.017)
Married	0.026	0.039[a]	0.001	-0.015
	(0.008)	(0.011)	(0.012)	(0.018)
Black	-0.033	-0.025[c]	-0.056	-0.053
	(0.012)	(0.014)	(0.019)	(0.027)
Age between 35 and 44	0.016	0.015	-0.013	-0.009
	(0.008)	(0.010)	(0.014)	(0.020)
Age between 45 and 54	-0.007	-0.027[b]	-0.018	-0.020
	(0.009)	(0.012)	(0.015)	(0.021)
Over 55 years old	-0.058	-0.091[a]	-0.034	-0.028
	(0.014)	(0.017)	(0.022)	(0.030)
High School Graduate	0.095	0.068[a]	0.115	0.112
	(0.011)	(0.013)	(0.021)	(0.031)
Some College	0.139	0.100[a]	0.149	0.133
	(0.012)	(0.014)	(0.021)	(0.031)
College Degree and above	0.207	0.172[a]	0.220	0.216
	(0.012)	(0.015)	(0.022)	(0.032)
Number of children	-0.025	-0.029[b]	0.010	0.012
	(0.008)	(0.013)	(0.012)	(0.018)
Pre Displacement Tenure	0.036	0.046[a]	0.026	0.021
	(0.004)	(0.005)	(0.007)	(0.009)
Pre Displacement Tenure Squared	-0.001	-0.001[a]	-0.001	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)
Female*health insurance	-0.178	-0.177[a]	-0.162	-0.159
	(0.009)	(0.012)	(0.015)	(0.022)
Married*health insurance	0.042	0.052[a]	0.042	0.034
	(0.010)	(0.015)	(0.016)	(0.024)
Black*health insurance	-0.069	-0.072[a]	-0.044	-0.083
	(0.015)	(0.019)	(0.025)	(0.036)
(Age between 35 and 44)*health insurance	0.107	0.088[a]	0.145	0.137
	(0.010)	(0.014)	(0.017)	(0.027)
(Age between 45 and 54)*health insurance	0.137	0.132[a]	0.161	0.131
	(0.012)	(0.018)	(0.020)	(0.029)
(Over 55 years old)*health insurance	0.109	0.119[a]	0.123	0.051
	(0.017)	(0.023)	(0.029)	(0.040)
High School Graduate*health insurance	0.094	0.094[a]	0.110	0.118
	(0.014)	(0.018)	(0.029)	(0.045)
Some College*health insurance	0.183	0.176[a]	0.213	0.234
	(0.015)	(0.020)	(0.029)	(0.045)
College*health insurance	0.445	0.366[a]	0.517	0.511
	(0.017)	(0.021)	(0.031)	(0.047)
Number of children*health insurance	-0.004	-0.042[b]	0.024	0.022
	(0.010)	(0.018)	(0.016)	(0.024)
Pre Displacement Tenure* health insurance	-0.018	-0.033[a]	-0.007	-0.008
	(0.004)	(0.005)	(0.007)	(0.009)
Pre Displacement Tenure Squared* health insurance	0.001	0.001[a]	0.001	0.001
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	17173	9387	7786	4273

Note: Regressions also include indicators on employer industry and region of residence and their interactions with health insurance. Standard errors in parentheses, [a], [b] and [c] denote statistically different from zero at the 1%, 5% and 10% confidence levels, respectively for column 2.