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# The Labor Market Effects of Rising Health Insurance Premiums

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# THE LABOR MARKET EFFECTS OF RISING HEALTH INSURANCE PREMIUMS\*

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## **ABSTRACT**

We use variation in medical malpractice payments driven by the recent “medical malpractice crisis” to identify the causal effect of rising health insurance premiums on wages, employment and the distribution of part-time and full-time work. We estimate that a 10 percent increase in health insurance premiums reduces the aggregate probability of being employed by 1.2 percentage points, reduces hours worked by 2.4 percent, and increases the likelihood that a worker is employed only part-time by 1.9 percentage points. For workers covered by employer provided health insurance, a 10 percent increase in premiums results in an offsetting decrease in wages of 2.3 percent. Thus, rising health insurance premiums may both increase the ranks of the unemployed and place an increasing burden on workers through decreased wages for those with employer health insurance and decreased hours for those who may be moved from full time jobs with benefits to part time jobs without.

## I. INTRODUCTION

In the United States, two-thirds of the non-elderly population is covered by employer-provided health insurance (EHI), either directly or as a dependent through a family member's coverage.<sup>1</sup> According to a national survey conducted by the *Kaiser Family Foundation*, the cost of EHI has increased by over 59 percent since 2000 with no accompanying increase in the scale or scope of benefits; between 2003 and 2004 the price of premiums increased 11.2 percent, a nine percentage point increase over the 2.3 percent increase in workers' hourly earnings.<sup>2</sup> Increases in health insurance premiums may have significant effects on labor markets, including changes in the number of jobs, hours worked per employee, wages, and compensation packages. Indeed, it is possible that a significant portion of the increase in the uninsured population may be a consequence of employers shedding this benefit as health-insurance premiums rise (Porter, 2004). Simple correlations are consistent with this mechanism: despite strong economic growth in the 1990s, the number of non-elderly uninsured grew by 3 percentage points to 15.7 percent of the population, while the price of health-insurance premiums grew by 34 percent.

Understanding how labor market characteristics affect adjustments to increased health insurance costs is of growing policy importance. Proposals to cover the uninsured often rely on "employer mandates" that would require employers to cover eligible workers.<sup>3</sup> For example, California's Senate Bill 2 (also known as Proposition 72, narrowly defeated in November, 2004) would have required all employers with more than 20 employees to provide health insurance to their workers (who work more than 100 hours per month). Other policy proposals include the provision of tax credits for the purchase of non-group health insurance, differentially changing

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<sup>1</sup> These tabulations are from the Annual Demographic Files of the Current Population Survey (CPS) for 1988-2003. We define the non-elderly population as those under the age of 65.

<sup>2</sup> These figures are obtained from Kaiser Family Foundation (2003). In Figure 1 we use these data to illustrate the growth of premiums since 1996 for family and single-person policies.

<sup>3</sup> Yelowitz (2004) provides a thorough discussion of this legislation and estimates its economic impact.

eligible employees' valuation of benefits provided by their employer versus wages.

The magnitude of the effects of increases in benefit costs on employment, wages, and health insurance coverage will be driven by the elasticities of labor supply and demand, institutional constraints on wages and compensation packages, and how much workers value the increase in health insurance costs. Since employers currently provide such coverage voluntarily, if workers fully value these benefits then they will bear the cost of the increase in reduced wages, with no accompanying change in employment, employment costs, or employee utility.<sup>4</sup> In a world where workers value benefits at their cost and are able to sort between firms based on their preferences, and without other institutional constraints, increases in the costs of benefits should be fully offset by decreases in wages.

There are many reasons to believe that firms are limited in their ability to offset increases in the price of health insurance premiums through lower compensation. Institutional constraints, such as the minimum wage, union rules, and other anti-discrimination provisions of labor law (unrelated to non-discriminatory provision of tax-advantaged benefits) that prohibit different demographic groups from being paid differently, limit a firm's ability to reduce compensation. For these reasons, increases in the cost of providing health insurance may not be neutral in terms of their effects on employment and the structure of work. However, identifying the magnitude of these effects is difficult. Data on premiums and wages are usually not jointly available at the individual level. Additionally, most micro-datasets (such as the CPS) do not allow the researcher to control adequately for worker characteristics, such as ability, that might simultaneously influence the outcome under study. In this paper we uncover the causal effect of increases in the cost of benefits on labor market outcomes by exploiting an exogenous source of variation in the

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<sup>4</sup> This view is explicitly studied in the literature estimating the wage-fringe tradeoff (for example, Gruber (1994)). A \$1 increase in the value of fringes may offset by a \$1 reduction in fringe benefits – or, in the case of most tax-favored benefits, a  $\$1/(1-t)$  reduction, where  $t$  is the tax rate.

cost of providing health insurance: the recent “medical malpractice crisis” where malpractice costs for physicians grew dramatically in some states but not in others. As we discuss in more detail below, the growth of malpractice payments affects both malpractice insurance premiums and the cost of health insurance: if the demand for health care is relatively inelastic (because of health insurance or public insurance programs), the increased cost of malpractice will be borne by consumers in the form of higher health insurance premiums, rather than primarily by physicians in the form of lower compensation (see Baicker and Chandra, 2005).

In Section II we outline a conceptual framework for our analysis. Section III examines econometric challenges to estimating the hypothesized effects that we predict and provides a justification for our use of malpractice payments as an instrumental variable for health premiums. In Section IV we describe the data that use. In Section V we present empirical results, including specification checks that provide validation for our use of malpractice payments as a plausible instrument for health insurance premiums. We find that the cost of increases in health insurance premiums is borne by workers through decreased wages (for those with employer health insurance) and by decreased hours for those moved from full time jobs with benefits to part time jobs without. These results have strong implications for the distributional impact of many different health care reform proposals. Finally, in Section VI we conclude with a discussion of the policy implications of our findings.

## **II. CONCEPTUAL FRAMEWORK**

Summers (1989) examines the effects of mandated benefits (versus taxes) on wages and employment, highlighting the importance of the employees’ valuation of the benefit. The provision of a benefit that is fully-valued by workers should not change employment – but should decrease wages by the cost of the benefit. Gruber and Krueger (1991) discuss this model more

formally. In their framework, let  $L_s = f(W + \alpha C)$  and  $L_d = (W + C)$  be the labor supply and demand curves respectively.  $W$  represents wages and  $\alpha C$  represents employees' monetary valuation of health insurance. It is straightforward to demonstrate that:

$$(1) \quad dW/dC = -(\eta^d - \alpha\eta^s)/(\eta^d - \eta^s)$$

where  $\eta^d$  and  $\eta^s$  are the price elasticities of labor demand and supply. If  $\alpha=1$ , then wages fall by the full cost of the mandated benefit, and if  $\alpha=0$ , then the results are identical to those obtained for the incidence of a payroll tax. Additionally, the proportional change in employment will be given by:

$$(2) \quad dL/L = \eta^d (W_0 - W_1 - \Delta C) / W_0$$

where  $W_0$  and  $W_1$  represent the initial and final levels of wages. Equation (2) demonstrates that the effect of rising health insurance costs on employment is inversely proportional to the wage offset caused by the employer provision of health insurance, and proportional to the elasticity of labor demand.

In this framework, an increase in the price of EHI results in an inward shift of the labor demand curve, lowering employment and wages. As long as  $\alpha$ , which measures workers valuation of marginal health benefits, is positive, workers will value a portion of the increased value of benefits, and the labor supply curve will shift out. Wages will fall further, but the adverse employment effects from the demand shift will be mitigated, and will be zero if the benefit is fully valued. There are a few groups for whom we expect to see larger employment losses: employers may not be able to reduce wages for workers near the minimum wage.<sup>5</sup> There are also other anti-discrimination provisions of labor law (unrelated to non-discriminatory provision of tax-advantaged benefits) that prohibit different demographic groups from being paid differently.

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<sup>5</sup> Using data from the February CPS we focused on two samples: a) workers within 3 dollars of the minimum wage in their state, and b) workers who earn less than \$10. For these samples, the fractions who are eligible or covered for EHI are 52.6% and 60.5% respectively (the fractions covered by EHI are 31.7% and 38.5% respectively).

Union rules and workplace norms about differential pay for different demographic groups make it difficult for an employer to perfectly fine-tune the wage response to rising EHI premiums. For such groups, we expect to see a decrease in employment.

In Summer's model labor supply is treated as a discrete choice; there is no distinction between employment and hours worked. If this division is introduced, the effect on hours worked and employment are ambiguous. This is because increases in the price of EHI raise the fixed-costs of employment, which would predict that employers would want more hours from fewer workers.<sup>6</sup> In this case, hours for workers with EHI will increase while their wages decrease. This effect ought to be concentrated in employees who work few hours, because it is precisely this group who would become more costly as a result of an increase in health insurance premiums. On the other hand, since part-time workers are typically not covered by EHI, we might also expect employers to replace fulltime workers eligible for EHI with part-time employees without EHI.<sup>7</sup> In this situation, total employment may increase. In both cases, we do not expect to see an increase in wages, or a decrease in hours, for workers with EHI. Nor do we expect to see an increase in full-time employment; although the effect on employment is ambiguous.

In contrast to the above scenario that is predicated on the belief that  $\alpha$  is positive, a

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<sup>6</sup> Cutler and Madrian (1998) develop such a model and find that when health insurance costs go up, the firm will find it advantageous to increase the hours of work per employee and reduce the number of employees. They find that increased health-insurance costs in the 1980s led to a 3% increase in hours worked for those with EHI (and a decline in hours worked for those without EHI). However, in the Cutler-Madrian model it will cost the firm more in wages/benefits to encourage workers to supply more labor at the intensive margin. Thus, even with their highly stylized model, the net effect of an increase in the cost of benefits on both hours and employment is ambiguous: The firm will want to increase the hours worked by its employees if the marginal increase in compensation is less than the average hourly cost of providing benefits, but it will want to decrease hours worked and hire more workers in if the opposite is true.

<sup>7</sup> As noted by Carrington, McCue and Pierce (2002) nondiscrimination rules require that (a) a substantial portion (typically 55-70%) of employees participate in the plan and (b) the plan does not allow the firm's "highly compensated individuals" to be more eligible than others. Firms are allowed to offer different benefits to different groups of workers as long as the workers are grouped by business rationale and not by compensation level. Workers who are covered by a collective bargaining agreement, those with less than three years of service, those younger than 25 years, and part-time workers are not covered by the nondiscrimination stipulations. Nondiscrimination provisions increase the incentives to move workers with different preferences for benefits than their coworkers, i.e. "anomalous workers," into part-time positions.



negative value for this parameter would shift the labor supply curve inwards. This would be a situation where the new compensation package (comprising lower wages and higher fringes) is less attractive to workers than the package prior to the increase in EHI premiums. This is most likely to happen for workers who do not value EHI and are unwilling to accept the lower wages that accompany the reorganization of compensation. Married women, who typically refuse EHI because they receive coverage from their spouse, would be an example of such workers.

In light of these ambiguous analytical predictions on hours, employment, and the fraction of full time and part time jobs, assessing the labor market effects of increases in health insurance premiums is fundamentally an empirical question.

### **III. EMPIRICAL STRATEGY**

Evaluating the effect of rising health premiums on employment, wages, hours worked and the composition of employment (the share of jobs that are full time or part time) empirically is an exercise with numerous challenges. Datasets such as the Census and the CPS do not contain information on the employer costs of health insurance or the generosity of plans. Additionally, even if this information were available, such datasets do not allow the researcher to control adequately for worker characteristics that might also influence the outcome under study.<sup>8</sup> In principle, a large-scale social experiment that does not suffer from attrition or agents attempting to compensate for their treatment regime may solve selection problems of this nature, and an instrumental variable estimation strategy can reproduce the experimental estimate if the underlying assumptions behind IV estimation are satisfied.

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<sup>8</sup> These limitations are identical to those that have plagued the literature on identifying the wage-fringe tradeoff. Currie and Madrian (2000) provide a comprehensive overview of this literature.

To motivate our analysis, consider the following structural equation for a worker  $i$  in state  $j$  and in year  $t$ :

$$(3) \quad Outcome_{ijt} = \beta_0 + \beta_1 HI_i + X_i \Pi + S_j + T_t + \varepsilon_{ijt}$$

Here,  $Outcome_i$  is the labor market outcome of interest (hours worked, wages, wage income, unemployment, part-time/full-time status, or receipt of health insurance).  $X_i$  measures person-level covariates including controls for family structure, marital status and industry.  $S_j$  and  $T_t$  are state and year fixed effects respectively, and  $\varepsilon_{ijt}$  is a person-specific idiosyncratic term.<sup>9</sup>  $HI_i$  measures the employer costs of providing individual  $i$  with EHI.<sup>10</sup> The above equation can be modified to include interaction effects and indicator variables for certain demographic groups that may be of particular interest (for example, hourly workers, married women, workers near the minimum wage, or workers with EHI).

The first problem inherent in OLS estimation of (3) is that  $cov(Cost\ of\ HI_i\ \varepsilon_i) \neq 0$ . For example, workers with high ability may work at firms that offer generous health benefits, and, therefore, high premiums. Second, datasets such as the SIPP or CPS do not report the value or generosity of the health-insurance plan received by a worker.<sup>11</sup> Empirical researchers have

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<sup>9</sup> Cutler and Madrian do not include state fixed effects. Yelowitz (1994) examines data from California; his analysis is therefore comparable to one where state fixed effects are included.

<sup>10</sup> Technically,  $HI_i$  should measure the difference between employer premiums and premiums for policies purchased in the non-group market. The non-group market is small relative to the size of the group market, and it is also highly individually rated. Using data from the 2005 March CPS we found that 16.9 million individuals under the age of 65 (6.6 percent of this group) were covered by directly purchased health insurance. In contrast, 161 million individuals (63.2 percent) were covered by EHI. This ten-fold difference suggests that the non-group market is small. In contrast to the group market, prices in the non-group market are affected by smoking, age, alcohol consumption, weight, and pre-existing conditions such as diabetes, hepatitis, AIDS, Asthma, high cholesterol, liver conditions. We made this determination by pricing individual premiums on [www.eHealthInsurance.com](http://www.eHealthInsurance.com). For the purpose of estimation, the above discussion makes it clear that we must include state fixed-effects. These fixed-effects will control for state-level differences in the price of EHI and insurance purchased in the non-group market. However, to the extent that the price of insurance in the non-group market is highly idiosyncratic to the individual, our IV strategy will remove any correlation between premiums for EHI, from premiums for non-group health insurance.

<sup>11</sup> The SIPP offers several advantages over the CPS and we explored the possibility of using the SIPP in the early stages of our project. The ability to use a fixed-effects estimator makes its use appealing. It also has a few disadvantages that concerned us: (a) The length of a given SIPP panel (four years for the 1996 SIPP, and three years for the 2001 SIPP) is short relative to the seven years of analysis that the CPS analysis allows; (b) Even after the

responded to this limitation by imputing health insurance premiums to each respondent based on industry (Cutler and Madrian, 1998) and based on industry, firm-size and family/single status (Yelowitz, 2004). These imputations solve the missing data problem and can in principle reduce the potential endogeneity problem. We first discuss the identification strategy implicit in this approach, and then contrast it with our alternative strategy.

Imputed premium data may be thought of as representing premiums that have been obtained using the match characteristics (such as industry and family structure) as instruments. That is, assuming that data on  $HI_i$  was available, we could, in principle, estimate:

$$(4) \quad HI_{dfs} = \gamma_0 + Industry_d + Firm\ Size_f + Family\ Structure_s + v_{dfs}$$

The  $dfs$  subscripts make explicit the notion that (4) is estimated at the level of Industry  $d$ , Firm Size  $f$ , and Family Structure  $s$  and not at the level of a person  $i$ . Equation (4) could also be estimated at the state level. One could use the fitted values from (4)  $\overline{HI}_{dfs}$  as the key regressor in the estimation of (3). Implicitly, these fitted values may be thought of as characterizing the relationship:

$$(5) \quad HI_i \equiv \overline{HI}_{dfs} + m_i$$

Here,  $m_i$  represents the portion of health-insurance premiums that are idiosyncratic to person  $i$ .

Therefore, it is probably the case that  $cov(\varepsilon_{ijt}, m_i) \neq 0$  (that is,  $m_i$  is determined by factors other than industry, firm-size and family structure). If the instruments are valid, then  $cov(\varepsilon_{ijt}, \overline{HI}_{dfs}) = 0$ , and we may estimate:

$$(6) \quad Outcome_{ijt} = \beta_0 + \beta_1 \overline{HI}_{dfs} + X_i\Pi + S_j + T_t + \varepsilon_{ijt}$$

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1996 redesign, SIPP samples are considerably smaller than those in the CPS (there are approximately 95,000 people in the 1996 SIPP, relative to the CPS sample of 340,000). Large sample sizes are key if the IV strategy is to yield meaningful results; (c) its use relies on the assumption that attrition from the SIPP panel is a random event (in theory, this is testable).

The central problem with estimating (6) in lieu of (3) is the possibility that  $cov(\overline{HI}_{dfs}, \varepsilon_i) \neq 0$ .

This would be true if the “instruments” (industry, firm-size, family structure) are correlated with  $\varepsilon_i$ , the unobservable characteristics of the worker. If workers in a certain sector of the economy, or those who are married, are systematically more likely to have different levels of unobservable characteristics that affect health insurance premiums, then such a correlation is possible. This problem is identical to the standard endogeneity problem in program evaluation, where receipt of the treatment is correlated with unobservable characteristics of the person receiving treatment.

A solution to this problem is to instrument for imputed premiums using variables that are uncorrelated with  $\varepsilon_i$  and  $m_i$  but are correlated with imputed health insurance premiums. In our analysis we use state level per-capita medical malpractice payments as an instrument for imputed premiums. For malpractice payments to provide a valid instrumental variable for imputed premiums, it must be the case that the instruments affect health premiums. Second, it should also be the case that malpractice payments are not correlated with unobservable characteristics of workers. In the next subsection, we explore the *prima facie* validity of these assumptions.

### **The Medical Malpractice Crisis**

The “medical malpractice crisis” that began at the turn of the 21<sup>st</sup> century refers to the dramatic increase in physician premiums for malpractice insurance. Chandra, Nundy and Seabury (2005), and Mello, Studdert, and Brennan (2003) provide an overview of this crisis and its underlying causes and consequences. Both the American Medical Association (AMA) and the Physician Insurers Association of America (PIAA) attribute the dramatic increase in physician malpractice insurance premiums to the growth in malpractice payments (see AMA (2004a, 2004b) and Smarr (2003)). Whereas other factors such as declines in insurers investment income – including the presence of an underwriting cycle, a less competitive insurance market, and

climbing reinsurance rates – are acknowledged to have contributed to this medical malpractice crisis, insurer losses from increases in malpractice payments are believed to be the primary contributor to the growth of malpractice premiums. Indeed, a General Accounting Office (GAO) study of seven states concluded that the growth of insurer’s losses from payments is the primary driver of the growth of premiums (see GAO, 2003a and 2003b).

If the demand for health services is inelastic, then the effect of increasing malpractice payments on malpractice premiums will have little effect on net physician compensation. Indeed, Baicker and Chandra (2005) argue that because of the nature of health insurance (which insulates the patient from the marginal costs of seeking care and which is subsidized by the tax code), the demand for medical services is relatively inelastic. The demand for health services by Medicare beneficiaries is likely to be even less elastic, as they are further insulated from even a wage-fringe benefit tradeoff. Consumers of health care are therefore likely to bear the brunt of the cost through increases in the price of health care (and, consequently, health insurance premiums).<sup>12</sup> With this preliminary validation, we use increases in malpractice payments as an instrument for health insurance premiums to estimate the following first-stage equation:

$$(7) \quad \overline{HI}_{ijt} = \gamma_0 + \gamma_1 \text{Malpractice Payments}_{jt} + X_i \Pi + S_j + T_t + v_i$$

where, as discussed below, malpractice payments are broken down by the size and number of payments for different specialties. Instrumenting for imputed premiums removes the bias from any residual correlation between  $\varepsilon_i$  and  $\overline{HI}_{ijt}$ . This is because the instrument only picks up that part of the (within-state) variation in imputed premiums that is attributable to (within-state) changes in malpractice climate. It may be tempting to reason that the correlation of premiums

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<sup>12</sup> In theory we could also use malpractice premiums as an instrument for health insurance premiums. However, there is no systematic source of malpractice insurance data. There is an annual survey conducted by the publication *Medical Liability Monitor*, but the survey does not rely on administrative data, does not cover all states or medical specialties, and varies year-to-year in the number of insurers who are surveyed.

with the instrument, malpractice payments, is potentially spurious because states with high malpractice payments may have workers who are systematically more or less abled. This is not the case, however, as all of our specifications include state fixed effects.

It is particularly important in the context of this source of variation to understand the way that workers will value benefits. Our use of this instrument does not rely on the fact that workers get more or better health care as their premiums rise. Rather, as malpractice costs rise, the price of purchasing health care through any source – employer insurance, non-group insurance, or out of pocket – will increase. Workers may be willing to accept lower wages in exchange for costlier health insurance because they would have to pay more on the open market for it, whether or not the increase in premiums is associated with higher value health care.

#### **IV. DATA**

##### **A. Health Insurance Premiums**

We use annual state-level data on health insurance premiums by type of policy (family or single) and employer size from the Kaiser Family Foundation/HRET survey for 1996 to 2002 (see Kaiser Family Foundation, 2003).<sup>13</sup> We assign premiums to workers based on their state of residence and year. In most specifications we also match based on family structure (with single respondents given the single premium) and on firm size (with employees of small firms given the small firm premium, and unemployed respondents given the average premium) – although we also test the sensitivity of our results to potential changes in the composition of family size and

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<sup>13</sup> The Kaiser Family Foundation/Health Research and Educational Trust 2004 Annual Employer Health Benefits Survey (Kaiser/HRET) reports findings from a telephone survey of 1,925 randomly selected public and private employers. Firms range in size from small enterprises with a minimum of three workers to corporations with more than 300,000 employees. The Kaiser/HRET Employer Health Benefits Survey is based on previous surveys sponsored by the Health Insurance Association of America from 1986–1991 and Bearing Point (KPMG at the time of the surveys) from 1991–1998.

employment.

In Figure 1 we illustrate the steady growth in premiums for family premiums and single premiums over the time-period of our study. All dollar figures are expressed in year 2001 dollars. Family premiums grew from an average of \$5,000 in 1996 to well over \$8,000 in 2002. Premiums for single policies also grew substantially—from an economy-wide average of \$2,000 in 1996 to over \$3,000 in 2002. In Figure 2 we illustrate the details of family and single policies for the 10 states with the largest population in 2000— Panel A reports the level of premiums in 1996 and Panel B in 2002. We see that family premiums grew between 40 and 60 percent over this time period in these states. The growth in single person premiums was relatively smaller but still considerable: in states such as Florida, Georgia, Michigan and Ohio, premiums for single people grew by over 40 percent. Both panels also show the share of total premiums that were paid for by employee and employer contributions—even though premiums increased substantially, the share paid by employees remained relatively stable.

## **B. Labor Market Data**

The Current Population Survey (CPS) is a monthly survey of about 50,000 households conducted by the Bureau of the Census for the Bureau of Labor Statistics. The survey has been conducted for more than 50 years and is the primary source of information on the labor force characteristics of the U.S. civilian non-institutional population. The March (Annual Demographic Survey) files of the CPS contain information on hours worked, wage and salary income, unemployment, and health insurance coverage in the past year.

We use data from the 1996-2002 March CPS, supplemented with information from the 1997, 1999, and 2001 February survey. Because individuals are included in the CPS in two 4-month cycles, our February samples include only three-quarters of the respondents from that

year's March sample. We use information on demographics (such as age, gender, race, marital status, family size, and education), labor market variables (such as wage and salary, employment status, firm size, and hours worked), and health insurance coverage (such as source of coverage, and, from the February supplement, whether coverage was offered by the respondent's employer and whether the respondent was eligible). Because we expect premiums from last year to affect current labor market outcomes, we measure hours worked, full-time/part-time status and unemployment during the reference week of the survey (typically the second week of March). We include all respondents between the ages of 22 and 64, although we further limit the sample in some of our analyses. Our data are summarized in Table 1.

### **C. Medical Malpractice Payments**

We obtain data on malpractice payments from the National Practitioner Data Bank (NPDB) for the 1996-2002 period.<sup>14</sup> We calculate the size and number of payments resulting from medical treatments (including diagnosis, medication, and other medical treatment), surgical treatments (including surgery and anesthesia), obstetrical treatment, and other treatments (including monitoring, equipment, intravenous and blood, and all others). Table 1 shows the growth of per-capita malpractice payments at the state level between 1996-99 and 2000-02. The variability of payments (over time within states) is the source of our identification. For example, over the 2001-03 period, per-capita payments were highest in the states of New York, Pennsylvania, New Jersey, Connecticut, West Virginia and Delaware. In these states the burden

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<sup>14</sup> Noncompliance is subject to civil penalties codified in 42 U.S.C. 11131-11152. We examine payments that resulted from either a court judgment against the provider or a settlement made outside of the courts. We exclude payments that were linked to dentists, pharmacists, social workers or nurses. In a small fraction of payments, there are multiple physician defendants (and thus multiple reports) but only the total payment by all defendants is reported. In these cases we average the payment by the number of physicians involved. In the NPDB, 5 percent of payments are made by state funds in addition to other payments made by the primary insurer for the same incident. We match such payments based on an algorithm that uses unique physician identifiers, state of work, state of licensure, area of malpractice, type of payment (judgment or settlement) and year of occurrence.



of malpractice liability was almost twice the US average of \$13.5 per person. See Chandra, Nundy and Seabury (2005) for more details on the growth of malpractice payments as measured by the NPDB.<sup>15</sup>

## V. RESULTS

We begin with an examination of the effect of increases in health insurance premiums on employment, wages, and hours worked. The odd columns of Table 2 show the results of OLS estimation of equation (6). All regressions include state and year fixed effects and the individual-level controls outlined above, and are weighted using the March CPS final weights. Standard errors are clustered at the state level (clustering at the state-year level yields marginally smaller standard errors). Premiums, income, and hours are all measured in logs. The OLS effect of increases in health insurance premiums on labor market outcomes suggests that a 10 percent increase in premiums leads to a 1.3 percent decrease in wage and salary income and a 0.1 percent decrease in hours worked. As discussed above, however, the OLS results are likely to be biased by omitted individual characteristics (such as ability) and economic conditions. We use medical malpractice payments (including real per capita dollars and the number of payments per capita, by specialty, current and lagged) to instrument for health insurance premiums. Table 3 reports first stage regressions for these instruments as in equation (5). For the two-stage least squares estimates that follow, we use the most flexible form of the instruments (which provides the greatest power in the first stage, with a joint F-statistic of 8.75), but here we show more

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<sup>15</sup> One of the major criticisms of the NPDB is the “corporate shield.” This is a loophole that makes payments made on behalf of a hospital or other corporation exempt from inclusion in the NPDB, as long as any individual practitioner is dropped as part of a settlement agreement. Chandra, Nundy and Seabury (2005) provide evidence that this is not a first-order source of bias in the databank. Even if it were these omissions would only serve to weaken the estimated first-stage. A more problematic source of bias occurs if there is state-level variation in the magnitude of the corporate shield (a hypothesis on which there is no formal or anecdotal evidence). We include state-fixed effects in our analysis to help ameliorate this potential problem. We are grateful to Aaron Yelowitz for recommending this discussion.

constrained forms to aid in interpretation (since payments by different specialties are highly correlated). The results suggest that when per capita malpractice payments double, health insurance premiums increase by 1 to 2 percent. This is consistent with previous estimates that malpractice payments comprise around 1 percent of total health expenditures (Kessler and McClellan, 1996). We show the results of a similar regression at the state-year (rather than individual) level graphically in Figure 3.

Results from two-stage least squares estimation of equation (6) are shown in the even columns of Table 2. Here, a 10 percent increase in premiums reduces wages and salary by 0.9 percent. There is a large effect of premiums on hours worked – coming partly from increases in the probability of unemployment but also through increases in the probability of part time work. This is consistent with our expectation that as the cost of providing health insurance benefits increases, firms will substitute part time workers with limited benefits for full time workers with benefits. In fact, in our data only 22 percent of part time workers have employer health insurance, while 64 percent of full time workers do. Consistent with the reduction in full-time jobs, there is also an overall decline in employment rates and a (statistically insignificant) decline in being covered by employer provided health insurance.<sup>16</sup> In contrast to the OLS results, all the IV results are consistent with the predictions of a model where workers partially value health benefits or where firms are constrained in their ability to adjust wages.

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<sup>16</sup> Ideally, we would also examine the extent to which employers offers EHI. Unfortunately, we are unable to explore this aspect of compensation in more detail. Questions about whether or not an employee is offered EHI are only asked of the 1997, 1999 and 2001 February supplements. In these years, we can match  $\frac{3}{4}$  of the March respondents to the February survey, but this represents 30 percent of our original sample. In this smaller sample we do not have the power to detect changes in EHI being offered to employees. To shed more light on this issue we examined the Kaiser data. These data show that between 1996 and 2002 (the period of our study), the percentage of firms offering EHI *increased* from 59% to 66%. There for no change for larger firms (defined as those who employ over 200 workers) which), whose rates of offering coverage stayed at 99%. These firms account for approximately 60% of total employment.

As health insurance costs have risen, popular concern has grown over increases in required employee contributions to health insurance premiums. In fact, between 1996 and 2002, employee contributions to health insurance premiums remained relatively stable at just under 20 percent. This fraction does not seem to respond to increases in health insurance premiums – using our IV specification in column 12, the fraction of premiums paid by employees (and consequently employers) does not respond to increases in premiums.

We also examined whether our results were robust to the inclusion of industry and occupation controls, or the inclusion of state specific unemployment trends, and found that our results are robust to the inclusion of these additional variables. Specifically, the IV coefficients (standard-errors) on the probability of being part-time with these additional controls entered simultaneously was 0.17 (0.07), on hours it was 0.199 (0.106), on employment it was -0.10 (0.065), on the probability of receiving EHI it was -0.04 (0.07). These estimates are very similar to those reported in Table 2. We believe that these results are best reported as a specification check as opposed to comprising our primary specification. This is because we believe that state-by-year unemployment trends, industry, and occupation and all potentially endogenous variables. Similarly, when EHI premiums rise, the decline in employment may manifest itself as an increase in short-run unemployment. The shift towards part-time work may also be the consequence of employers shifting women from certain occupations others.

As previous models and empirical research have suggested, we might expect certain groups to be more sensitive in changes in the cost of health insurance. First, workers with health insurance should see a much bigger offset in their wages than workers without, who should see none. The first column of Table 4 tests this hypothesis by including the interaction of health insurance premiums and an indicator for coverage by employer health insurance. We see that, in fact, all of the reductions in income are borne by employees with health insurance. The

magnitude of the elasticity of -0.20 is consistent with dollar-for-dollar offset (since premiums (paid with pre-tax dollars) are about 20 percent of wage and salary income at the mean) – implying that covered workers bear the full incidence of increases in health insurance premiums. Similarly, as the results for part-time workers in columns (3) and (4) illustrate, part time workers see an increase in wages when health insurance premiums increase – consistent with workers moving from full time jobs with benefits to part time jobs with higher wages instead of benefits. These results also suggest that we should see differential effects of increases in premiums on employer health insurance coverage, and column (4) finds support for this view. We note that both the results for part-time workers are insignificant, and we are therefore reluctant to make much of them.

If our theory's predictions are correct, we should also see declines in wages and salary income (and health insurance coverage from an employer) for workers in sectors where the demand for labor is particularly elastic. Because manufacturing goods are nationally traded and the labor demand for manufacturing workers is a derived demand, we would expect the local demand for such workers to be particularly sensitive to the price of health insurance. Columns (5) and (8) verify that in addition to the large predicted wage declines for this group, we also observe a decrease in the probability of employment and an increase in the probability of being shifted to part-time work.<sup>17</sup>

Which workers would be most likely to give up employer health insurance (in exchange for higher wages) as premiums increase? Married women are likely to have a lower value of employer health insurance, as they may have access to insurance through their husbands (Berger, Black, Chandra and Scott, 2002). In the last panel of Table 4, these women are indeed more likely

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<sup>17</sup> Employment in the manufacturing sector is measured as major industry of employment last year, while the dependent variable is measured as employment last week. For this reason, we cannot include interactions with hours or employer health insurance, also measured currently as opposed to last year, using this variable.

to lose employer health insurance when premiums go up. They are also more likely to be employed (recall that our model predicted that total employment might increase if there was a shift to part-time jobs) and more likely to be part-time jobs. In contrast to the results for married women, we found that there was a large wage offset for married men (coefficient on interaction term was -0.04), and that there was no effect on the probability of being part-time for this group (coefficient on interaction term was 0.009 and insignificant) or the probability of being employed. That the results for married men and women are different in a manner that accords with economic theory is reassuring. It provides further evidence that our instrument is not picking up spurious underlying trends in labor market outcomes.

In Table 6 we explore the robustness of our identification strategy. We study the relationship between predicted health-insurance premiums and variables that should not be predicted by our instruments. (The predicted premium captures the variation in our instruments that is used in the IV estimation.) Columns (1) to (5) of Table 6 demonstrate that the instruments are unable to predict variation in percent black, educational attainment, gender, marital status and health. Compositional changes in the levels of these variables could potentially affect the labor market outcomes that we study, but should not be affected by the increase in malpractice payments – and they are not. To further test our identification strategy, we also include as a dependent variable the probability that an employee is included in an employer pension plan, shown in column (6) of Table 6. This could be viewed as a falsification test – health insurance premiums might not be expected to affect pension benefits – but it is possible that when health plan costs go up, all other forms of compensation (wages and other benefits) are reduced to absorb the cost. This does not seem to be the case: the probability of an employee having a pension benefit does not respond to increases in health insurance premiums in the IV specification, with an insignificant coefficient estimate. Finally, in the last three columns, we note

the lack of relationship between predicted premiums and health outcomes (measured at the state-year level).<sup>18</sup> This finding rules out a class of explanations wherein the population of states with relatively higher malpractice payments is relatively sicker—and as sickness levels increase, health premiums rise. Population illness levels are not the driving factor here. Table 6 also notes that predicted premiums are not associated with higher cesarean-section rates (a procedure that is widely believed to be affected by the use of “defensive medicine”).<sup>19</sup>

We can use our estimates to study the economy-wide impact of the growth of health-insurance premiums. Using the estimates in Tables 2 and 4, we can calculate the effect of rising health insurance premiums on the probability of being employed, employed as a full-time worker, average hours worked and annual income. These estimates are summarized in Table 7. A 20 percent increase in health insurance premiums (smaller than the increase seen in many areas in the last 3 years) would reduce the probability of being employed by 2.4 percentage points—the equivalent of approximately 3.5 million workers. A similar number of workers would move from full time jobs to part time, reducing the average number of hours worked per week by a little over an hour. Annual (wage) income would be reduced by \$1,700 for those who are employed and have EHI. Together, these estimates demonstrate that the labor market effects of rising health insurance are far from neutral.

## VI. CONCLUSION

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<sup>18</sup> Data on aggregate mortality come from the *Area Resource File* (reported at the county-year level, aggregated to the state-year level by the authors)

<sup>19</sup> Baicker and Chandra (2005) and Baicker, Fisher and Chandra (2004) demonstrate that increases in medical malpractice liability are not associated with changes in physician flows or the greater use of surgical procedures. This finding rules out a situation where increases in malpractice payments affect both the price and quantity of healthcare received by workers; changes in the malpractice climate appear to only affect the price of healthcare as measured by health insurance premiums.

Rising health insurance premiums, unemployment, and uninsurance have led to increased scrutiny of the labor market consequences of rising benefits costs. These relationships are, however, difficult to disentangle without a source of exogenous variation. We use variation in medical malpractice payments to derive the causal effect of rising health insurance premiums on wages, employment, and health insurance coverage.

We find that the cost of increasing health insurance premiums is borne primarily by workers in the form of decreased wages for workers with employer health insurance – so that they bear the full cost of the premium increase, but do not face labor market distortions. Our analysis implies that workers do at least partially value health insurance benefits, but that there are impediments to full adjustment through wages, particularly for certain groups. Non-discrimination clauses that prevent firms from discontinuing coverage only for those workers who value it least mean that firms and workers have an incentive to move from full time jobs with benefits to part time jobs without as the costs of benefits rise. We see exactly this adjustment, with an increase in part time work (and increased wages and lower health insurance coverage rates for those workers). Workers who value coverage the least will have the greatest incentive to move into jobs that do not offer coverage as premiums rise. We find that groups that are likely to have low value of health insurance coverage through their employer, such as married women, are more likely to lose coverage as premiums rise. Some workers, particularly low wage hourly workers whose wages cannot be reduced, may face even greater risk of becoming uninsured as the cost of health insurance increases.

One important limitation of our paper is that we are unable to examine the effect of rising health insurance premiums on the firm's decision to offer EHI. Questions about whether or not an employee is offered EHI are only asked in the 1997, 1999 and 2001 February supplements. In these years, we can match  $\frac{3}{4}$  of the March respondents to the February survey, but this represents

30 percent of our original sample. In this smaller sample we do not have the power to detect changes in EHI being offered to employees. It is not the case that we did not try to explore this question: our results were simply too noisy to allow us to conclude that we were learning anything systematic. We realize that this is an important limitation of our work, and hope that future research will focus on this important question.

Our results on wage-shifting are consistent with those in Gruber (1994): for workers with EHI, we observe full shifting of the increased price of health insurance onto wages. In addition, our results provide further evidence that the effects of increasing costs are borne disproportionately by particular groups.<sup>20</sup> In contrast to Gruber's study and to the results in Gruber and Krueger (1991), we find effects on both hours and employment. These results may appear to be contradictory but they are not: in Gruber's study workers receive new maternity benefits and in Gruber and Krueger they receive more generous workers compensation; both benefits are probably valued by workers, and the empirical finding of full shifting of increased costs to wages with no effect on overall employment is consistent with the insights of Summers (1989). In our paper, however, the increase in the price of health insurance premiums is driven by the medical malpractice crisis; a change that does not enhance the value of health benefits.<sup>21</sup> It is therefore unsurprising that workers do not value this increase in costs as highly, and that the labor market responds with decreased wages and labor utilization.

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<sup>20</sup> Gruber (1994) finds that the cost of the maternity benefits are fully borne by married women. Gruber (1997) finds the payroll decline that accompanied Chilean privatization of social-security was fully manifested in wages. Sheiner (1995) finds that demographic groups with higher ex ante insurance costs (such as older workers) experience full wage shifting when the price of health insurance increases.

<sup>21</sup> Other work by Kessler and McClellan (1996) did not find an effect of increased utilization of medical services stemming from tort reforms on mortality from heart-attacks and ischemic heart disease. There is also a related literature in medicine that notes that increases in marginal medical spending are not associated with improvements in patient satisfaction (Baicker and Chandra, 2004; Fisher 2003a, 2003b).



These results have strong implications for policies designed to cover the uninsured. For example, if employer health insurance mandates raise the cost of employing workers, we should expect most workers to bear the cost through reduced wages. If some classes of workers are exempt from the mandate (such as part time workers or those at particularly small firms), employers are likely to substitute uncovered jobs for covered ones, undermining the net effect of the mandate on insurance rates. More generally, rising health insurance premiums will place an increasing burden on workers and increase the ranks of both the uninsured and the unemployed.

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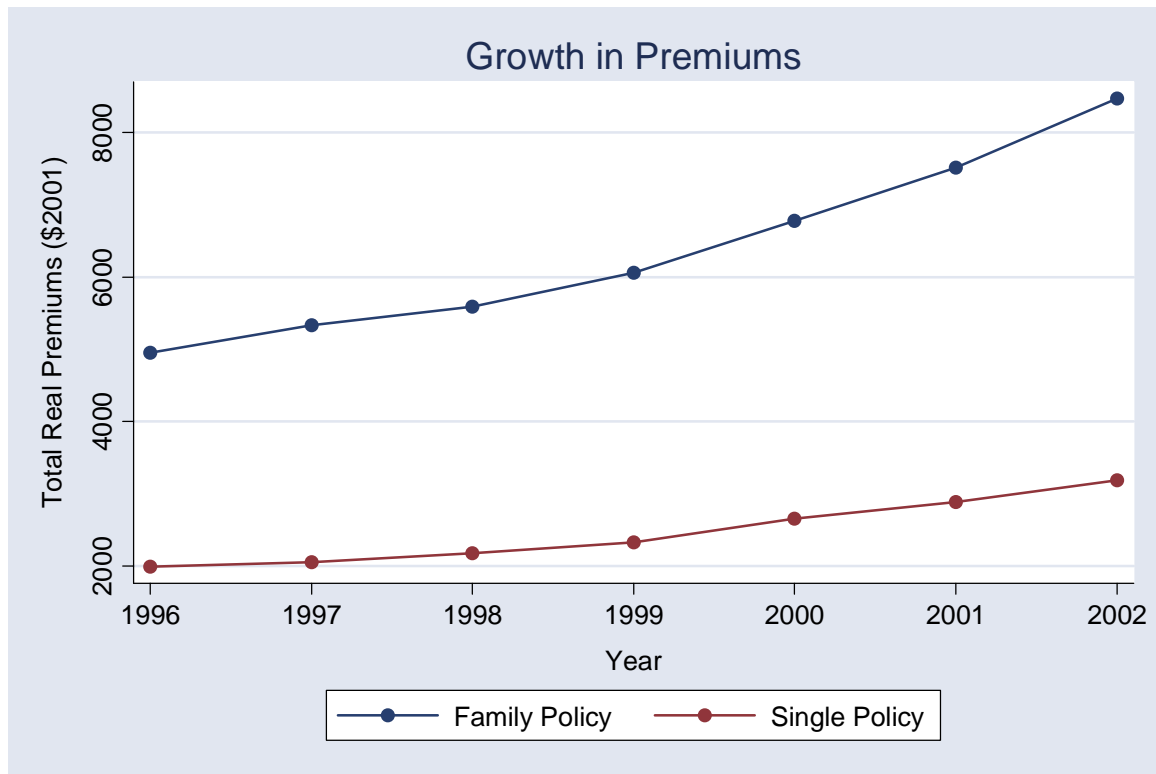
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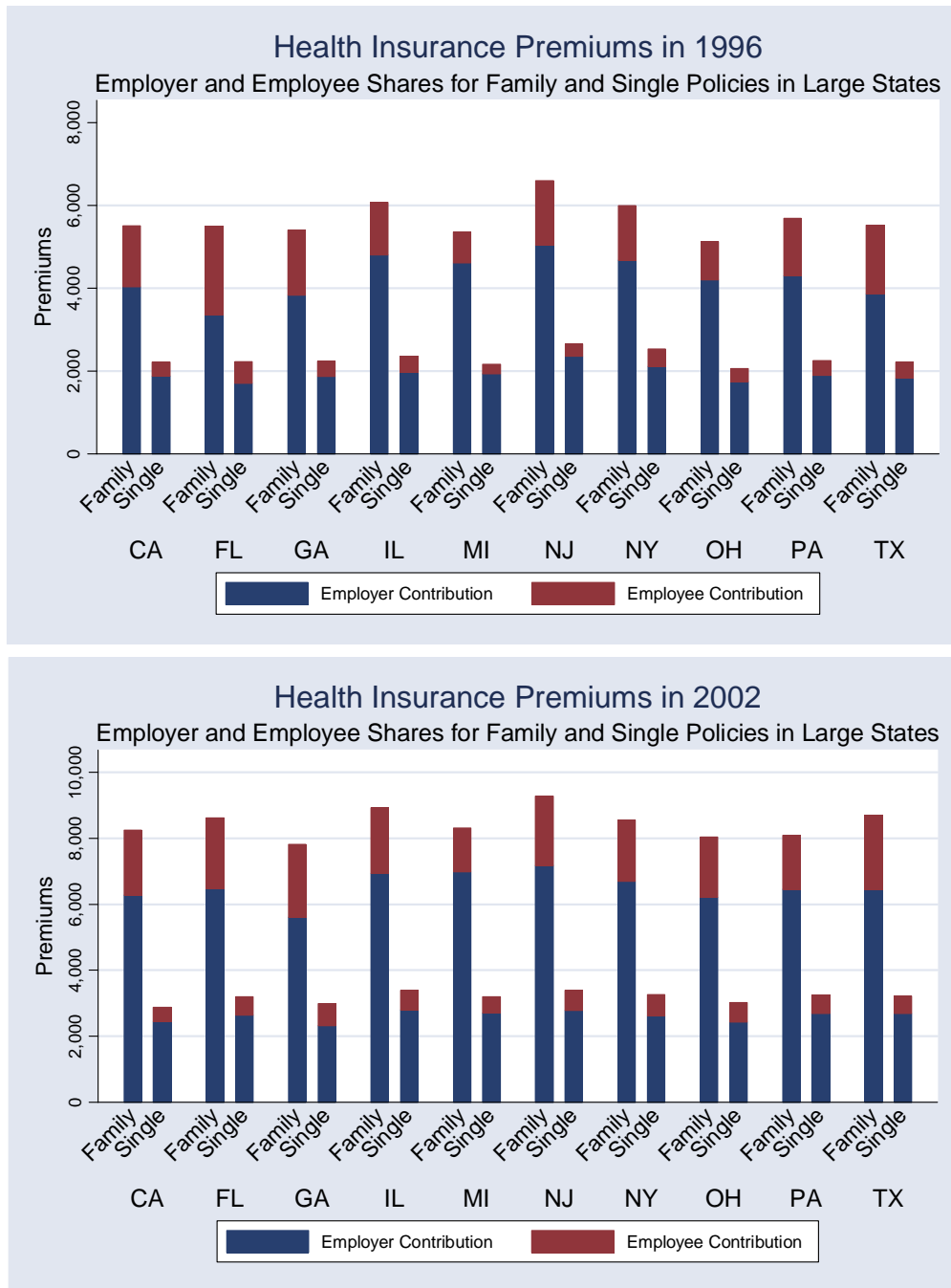
**FIGURE 1**



Notes:

Data from Kaiser Family Foundation/HRET survey. Premiums expressed in real year 2001 dollars.

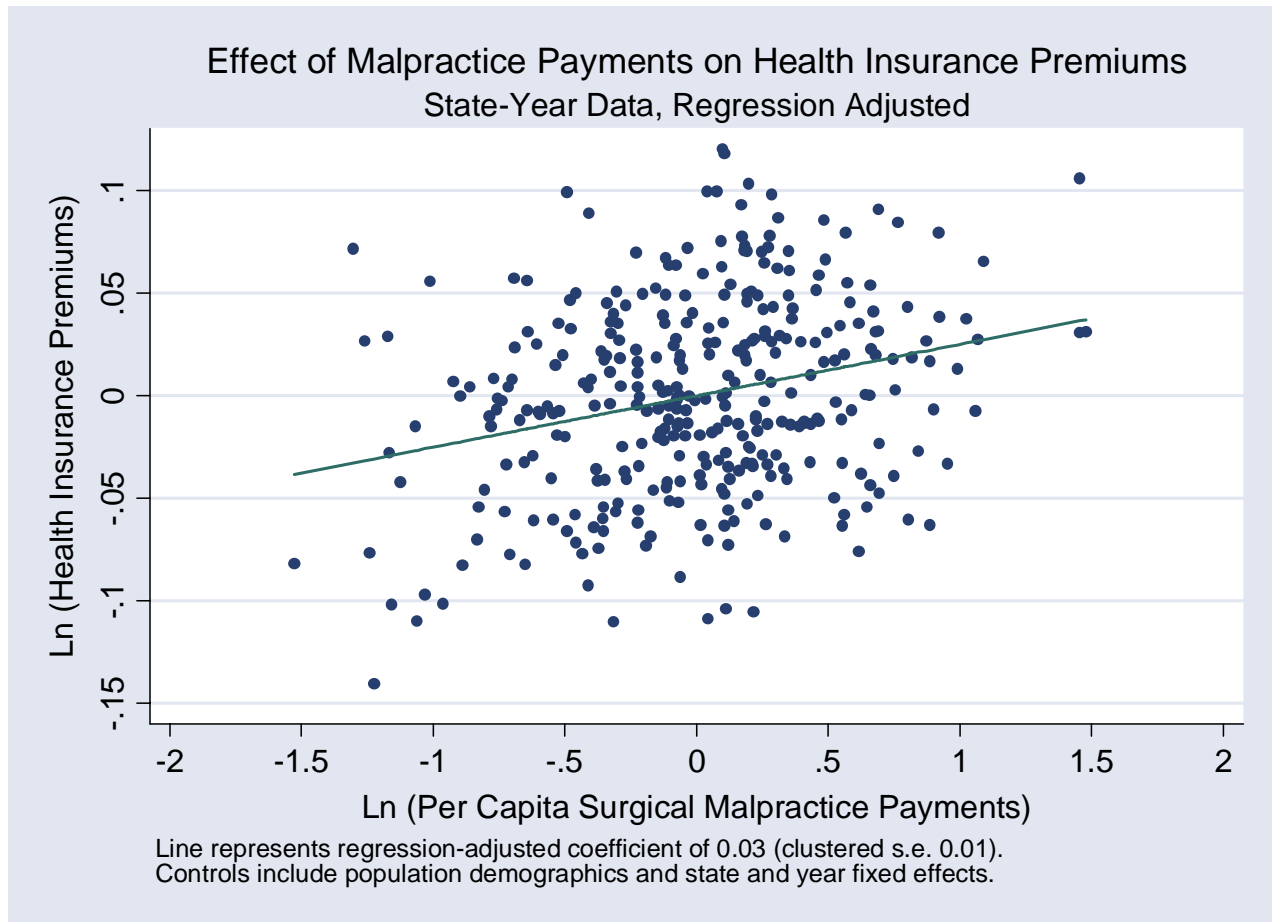
**FIGURE 2**



Notes:

Data from Kaiser Family Foundation/HRET survey. Premiums expressed in real year 2001 dollars. Ten largest states (by population) shown.

**FIGURE 3**



Notes:

Sample includes annual observations of 48 continental US states from 1996 to 2002.

Controls include categorical measures of educational attainment, race, age, marital status, health status, and gender mix (at the state-year level), as well as state and year fixed effects. Standard errors are clustered at the state level.

Malpractice payment data from National Practitioner Data Bank. Health insurance premium data from Kaiser Family Foundation/HRET survey. All dollars expressed in real year 2001 units. Covariates aggregated to state-year level from annual March CPS.

**Table 1: Summary Statistics**

	All		1996-1999		2000-2002	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
<b>Health Insurance Variables</b>						
Premiums	5,259	1,968	4,773	1,675	5,938	2,139
HI from Employer	0.62	0.49	0.61	0.49	0.62	0.49
Any HI	0.84	0.37	0.83	0.37	0.84	0.36
<b>Labor Market Outcomes</b>						
Hours	37.2	16.7	35.9	17.8	39.1	14.5
Wage and Salary Income (real)	33,902	37,152	32,896	36,818	35,310	37,570
Part time (<30 hours per week)	0.14	0.35	0.15	0.36	0.14	0.35
Employed	0.88	0.33	0.88	0.33	0.88	0.33
<b>Malpractice Payments (real per cap \$)</b>						
Total	3.27	1.94	3.13	1.79	3.47	2.11
Internal Medicine	1.74	1.31	1.59	1.18	1.96	1.44
Ob-Gyn	7.36	4.44	6.91	4.00	8.00	4.93
Surgery	0.25	0.21	0.26	0.23	0.23	0.18
<b>Malpractice Payments (number per 100,000 pop)</b>						
Total	1.6	0.7	1.6	0.7	1.6	0.7
Internal Medicine	0.4	0.2	0.4	0.2	0.4	0.3
Ob-Gyn	3.1	1.4	3.1	1.4	3.1	1.5
Surgery	0.2	0.2	0.2	0.3	0.1	0.1

Notes: Individual-level observations from 1996-2002 Current Population Survey. Sample limited to those age 22-64. Health insurance premiums from Medical Expenditure Panel Survey (state-year data on premiums by policy type and employer size). Malpractice payments from National Practitioner Data Bank. Labor market outcomes and employer health insurance information from Current Population Survey (March and Fet



**Table 2: Effect of Premiums on Labor Market Outcomes**

	Ln (Wage & Salary Income)		Ln (Hours (if employed))		Part Time (if employed)		Employed		Have HI Through Employer		Employee Share of HI Premium	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<b>Sample: All (with positive hours last year)</b>												
Ln (HI Premium)	-0.129 (0.14)	-0.088 (0.133)	-0.009 (0.023)	-0.236 (0.103)	0.012 (0.026)	0.190 (0.072)	-0.022 (0.014)	-0.120 (0.065)	-0.173 (0.130)	-0.063 (0.077)	-0.129 (0.032)	-0.031 (0.088)
N	346,524	346,524	304,744	304,744	304,744	304,744	346,524	346,524	346,524	346,524	346,524	346,524
Covariates and FEs	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Notes:

Individual-level observations from 1996-2002 Current Population Survey. Sample limited to those age 22-64.

Health insurance premiums from Medical Expenditure Panel Survey (state-year data on premiums by policy type and employer size).

Malpractice payments from National Practitioner Data Bank.

Labor market outcomes and employer health insurance information from Current Population Survey (March).

Part-time workers work less than 30 hours per week.

Covariates include race, age, age<sup>2</sup>, age<sup>3</sup>, marital status, education, gender, and health status.

Instruments include real dollar amount and number of medical malpractice payments per capita for different specialties (surgery, ob-gyn, internal medicine, and other) for current year and previous year.

Premiums assigned based on state, year, family structure (and employer size for employed).

Regressions weighted by March CPS weights, and standard errors clustered at state level.

**Table 3: First Stage Regressions**

	<b>Effect of Growth in Malpractice Payments on Health Insurance Premiums</b>		
	(log-log specification)		
	(1)	(2)	(3)
All Payments	0.011 (.009)	0.021 (.008)	
Surgical Payments			0.014 (.006)
Ob-Gyn Payments			-0.003 (.003)
Internal Med Payments			0.005 (.007)
Other Payments			-0.001 (.001)
Number of Surg Pymts			-0.022 (.008)
Number of Ob-Gyn Pymts			0.005 (.005)
Number of Int Med Pymts			0.008 (.012)
Number of Other Pymts			-0.004 (.003)
F-test significance	0.185	0.054	0.007
Covariates	no	yes	yes
State and year effects	yes	yes	yes

Notes:

Individual-level observations from 1996-2002 Current Population Survey. Sample limited to those age 22-64.

Health insurance premiums from Medical Expenditure Panel Survey (state-year data on premiums by policy type and employer size).

Malpractice payments from National Practitioner Data Bank.

Covariates include race, age, age<sup>2</sup>, age<sup>3</sup>, marital status, education, gender, and health status.

Standard errors clustered at state level.

Growth of payments measured as change in real payments per capita or number of payments per capita.

**Table 4: Differential Effects of Premium**

<b>Interaction Term:</b>	<b>Workers with EHI</b>		<b>Part-Time V</b>
<b>Outcome:</b>	<u>ln(Wage&amp;Sal)</u>	<u>Pr(Emp)</u>	<u>ln(Wage&amp;Sal)</u>
Ln (HI Premium)	0.05 (0.14)	-0.19 (0.08)	-0.12 (0.18)
Main Effect of Interaction Term	2.32 (0.37)	0.34 (0.18)	-0.99 (0.46)
Ln (HI Premium) * Interaction Term	-0.20 (0.04)	-0.01 (0.02)	0.03 (0.06)
R-squared	0.39	0.23	0.33

Notes:

Individual-level observations from 1996-2002 Current Population Survey  
Health insurance premiums from Medical Expenditure Panel Survey (SEI)  
Malpractice payments from National Practitioner Data Bank.

Labor market outcomes and employer health insurance information from  
Part-time work defined as less than 30 hours per week.

Instruments include real dollar amount and number of medical malpractice  
previous year.

Premiums assigned based on state, year, family structure (and employer

**Table 5: Specification Checks**

	<b>Black</b>	<b>College Education</b>	<b>Female</b>	<b>Married</b>	<b>Good Health</b>	<b>Employer Pension</b>	<b>Mortality Rates</b>		<b>C-section Rates</b>
	(1)	(2)	(3)	(4)	(5)	(6)	<b>Overall</b>	<b>Cancer</b>	(9)
	(7)	(8)							
<b>Sample: All</b>									
Ln (HI Premium)	-0.090 (0.061)	0.048 (0.094)	0.002 (0.062)	-0.090 (0.078)	-0.104 (0.099)	0.180 (0.137)	0.001 (0.002)	0.0003 (0.0004)	-0.072 (0.144)
R-squared	0.076	0.068	0.011	0.002	0.072	0.038	0.990	0.091	0.984
N	346,524	346,524	346,524	346,524	346,524	346,524	240	206	240
State and Year FEs	yes	yes	yes	yes	yes	yes	yes	yes	yes
Sample	CPS Micro	CPS Micro	CPS Micro	CPS Micro	CPS Micro	CPS Micro	State-year	State-year	State-year

Notes:

Individual-level observations from 1996-2002 Current Population Survey. Sample limited to those age 22-64.

Health insurance premiums from Medical Expenditure Panel Survey (state-year data on premiums by policy type and employer size).

Malpractice payments from National Practitioner Data Bank.

Labor market outcomes and employer health insurance information from Current Population Survey (March).

Instruments include real dollar amount and number of medical malpractice payments per capita for different specialties (surgery, ob-gyn, internal medicine, and other) for current year and previous year.

Premiums assigned based on state, year, family structure (and employer size for employed).

Regressions weighted by March CPS weights, and standard errors clustered at state level.

Covariates include race, age, age<sup>2</sup>, age<sup>3</sup>, marital status, education, gender, and health status, excluding dependent variable.

**Table 6: Effects of 20 Percent Increase in Premiums**

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	<b>Mean</b>	<b>Coefficient</b>	<b>Effect</b>
Probability of being employed (percentage point)	73%	-0.12	-2.4%
Probability of working full time, conditional on working (percentage point)	84%	-0.189	-3.8%
Average hours per week, conditional on working	41	-0.150	-1.2
Average annual income ( <i>insignificant</i> )	33,750	-0.080	-540
Average annual income, conditional on working and having employer HI	41,442	-0.205	-1,699

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