Does Health Insurance Cause Job Lock for Workers With Chronic Illness?

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September 15, 2023

Abstract

Employment-contingent health insurance may create incentives for ill workers to remain employed at a sufficient level (usually full-time) to maintain access to health insurance coverage. We study employees, comparing the labor supply responses to new diagnoses of workers dependent on their own employment for health insurance with the responses of workers who are less dependent on their own employment for health insurance, because of actual or potential access to health insurance through their spouse's employer. We find evidence that workers who depend on their own job for health insurance reduce their labor supply by less after a new diagnosis. In the estimates that best control for unobservables associated with health insurance status, the hours reduction for women who continue to work is 8 to 11% smaller. Women's subjective responses to questions about working more to maintain health insurance are consistent with the conclusions from observed behavior.[rewrite]

JEL Classification: JEL I21, I23, J23
Keywords: health insurance, labor supply, diagnosis.

1 Introduction

When diagnosed with a chronic health condition, workers who have employer-sponsored health insurance (ESI) benefits face a labor supply dilemma. On the one hand, newly diagnosed workers may want to reduce labor supply or stop working, altogether because they may need to take time off from work for treatment and convalescence. They may also want to reduce work hours as work stress can exacerbate their health problems. On the other hand, workers with chronic health conditions also face increased risk of health care expenses and subsequently, increased demand for health insurance. Since a majority of workers in the U.S. obtains health insurance from full-time employment[1], most workers with health problems must remain sufficiently employed to maintain health insurance coverage. This incentive to work may constrain labor supply changes desired by workers with chronic health conditions.

While workers with no ESI may obtain health insurance in the individual markets, such options are more expensive compared to prices paid if workers obtain it through their own employment. Participants in the individual markets are worse off than workers with ESI for a number of reasons. Because insuring firms pool the risks of their employees, employers pay lower premiums from reduced adverse reduction and lower administrative expenses. Moreover, the health insurance costs of employers are also tax-deductible, further reducing the cost of ESI relative to insurance from individual markets.

Prior to the implementation of the Patient Protection and Affordable Care Act (otherwise, known as the Affordable Care Act (ACA)), the price gap between individual markets and pooled markets was greater for individuals with pre-existing conditions.[2] For firms offering health insurance to their workers, the worker and the employer pay a share of the health insurance premiums of the worker. The premiums paid by workers with pre-existing conditions does not vary with premiums paid by workers without pre-existing conditions because the Health Insur-

[1] In 2008, 61.1 percent of workers had coverage through their own employer (Rho et al. (2010)). Most of these workers have to be full-time workers to be eligible for health insurance benefits.

[2] The Kaiser Family Foundation studied the efforts that seven hypothetically ill individuals would have to make to find health insurance. The average annual premium offered was $3,996, a significant increase from the standard average annual rate of $2,998 (Pollitz et al. (2001)). With the ACA, there are some reports that individual rates may be even lower than group rates because individual health plans must cover all individuals regardless of health and new subsidies are available for qualifying employees. (For example, see https://www.zanebenefits.com/blog/bid/322844/why-individual-health-insurance-is-more-affordable-than-group-health-insurance.)

ance Portability Accountability Act (HIPAA) prohibits employers from charging some employees more based on medical conditions, claims experience, receipt of health care services, genetic information or disability. Pre-ACA, individuals with pre-existing conditions who does not have health insurance through their employer would have difficulty finding insurance companies that offer affordable individual insurance plans because no law prevents insurance companies from charging higher rates for pre-existing conditions.

Regaining much-needed coverage through new employment is also challenging. First, employees with health problems may have a lower likelihood of finding a job in firms offering health insurance. Discrimination against less healthy individuals can arise from insurers' practice of experience rating when setting a company's health insurance premiums. This matters more for small firms wherein one major illness may increase the group's insurance costs. Although the American Disabilities Act (ADA) prohibits screening for health in hiring, such law does not prohibit insurers from charging exorbitant high rates to account for expected higher medical expenses for workers with a poor health history. To avoid high cost, firms may refuse to hire workers with pre-existing conditions. Second, even if they get employed by businesses offering health insurance, coverage is subject to length of service requirements. Although this is only temporary, immediate coverage is essential for workers who require medicines and/or medical services.

Legal provisions set in place to temporarily protect workers from losing their health insurance coverage along with their employment do not guarantee protection. The Consolidated Omnibus Reconciliation Act of 1985 (COBRA) mandates previous employers to provide coverage for recently unemployed workers for 18 months. However, only a few take continued coverage from previous employers because the employee must pay the full cost of the coverage, which is defined as 102 percent of the average cost of providing coverage. Doty, Rustgi, Schoen and Collins (2009) found that although most unemployed workers are eligible, fewer than one in ten extends coverage under this option for cost reasons.

The HIPAA also provides little additional protection. After exhausting coverage from COBRA extension, the HIPAA enables workers to convert their group coverage into a renewable individual policy without exclusion for pre-existing conditions. However, this option may not be desirable as HIPAA does not cap the premium that the offering insurer may charge. With

the HIPAA, employees may also add to their insurance policy a spouse or other dependent who loses job-related coverage, without waiting until the next open enrollment cycle. This protection, however, is not beneficial to workers with medical conditions whose spouses are not employed and those with employed spouses whose employer does not offer health insurance coverage for family members.

The Family Medical Leave Act (FMLA) also entitles eligible employees of covered employers to take 12 workweeks of unpaid, job-protected leave for specified family and medical reasons with continuation of group health insurance coverage (United States Department of Labor,Wage and Hour Division, 2012). Although the Family Medical Leave Act(FMLA) may help workers feel less constrained to stay at work and remain insured, not all workers are covered[3] and covered workers may not want to use FMLA for fear of adverse effects in the workplace. In summary, these legislative measures may not keep ill workers from being locked into their jobs to keep their health insurance.

To see whether employment-sponsored health insurance creates incentives for ill workers to supply labor to maintain access to health insurance coverage, this paper compares the labor supply changes made after a diagnosis by workers who depend on their employers for health insurance to the changes in labor supply made by workers who are dependent on their spouse's employment for their insurance. I use the latter as the comparison group instead of workers with no health insurance because these two groups are more likely to be homogeneous in terms of observable and unobservable variables. I focus on the following labor supply changes made 0, 6, 12 and 24 months after the diagnosis: changes in hours worked, the probability of remaining employed and the probability of working from full-time to part-time. As Bradley et. al (2012), I also provide an analysis to control for confounding effects of severity of health condition.

This paper addresses one of the limitations of the previous studies and presents a new number of analyses. First, the scope of earlier studies was limited to either a single state, a single disease or a particular gender or age group which limits the generalizability of conclusions to other settings. This paper addresses such limitation by using the national NLSY data which

[3]According to the US Department of Labor, employees are eligible to take FMLA leave if they have worked for their employer for at least 12 months, and have worked for at least 1,250 hours over the previous 12 months, and work at a location where at least 50 employees are employed by the employer within 75 miles.

reports information on diagnosis of various illnesses. A large percentage of the diagnoses reported in NLSY were hypertension, diabetes, arthritis, and mental health problems, which is more reflective of the national distribution of chronic health conditions faced by residents in the US. These conditions were not included in any of the previous studies done on this topic. The information from the NLSY dataset enables the examination of ESI effects by illnesses although insufficient observations for other diseases poses a challenge. Since most of the diseases in the NLSY are not life-threatening compared diseases investigated in previous studies, this paper contributes analysis for the effects of ESI for workers with a diagnosis of less severe conditions.

The results of the paper confirm most of the findings of previous studies that ESI creates incentives for workers with chronic health conditions to remain employed at a sufficient level to maintain access to health insurance. Workers with their own employer-sponsored insurance are 3 percentage points more likely to stay employed than workers who are dependent on their spouse's employer for their health insurance at the time of diagnosis. This likelihood persists up to 24 months post-diagnosis and is significant 0 to 6 months after diagnosis. For workers who have remained employed after their diagnosis, workers who are dependent on their spouse's employer for their health insurance reduced their labor hours by more than workers with their own employer-sponsored insurance. This difference in percentage reduction is 3 percent for the time of diagnosis, and it increases with time (to 5.4 percent 24 months after diagnosis). There is also evidence that the likelihood of employees who have insurance through their own employer are less likely to become part-time workers.

The rising incidence of prevalence of chronic illness in the workplace[4] and the strong dependence of these workers on their employers for health insurance highlights the importance of the incentives and possible pitfalls that ESI creates. This paper aims to help policy makers understand some of these and the effectiveness of existing legislation in muting or exacerbating the effects of ESI on how workers make labor supply adjustments in response to health problems.

The remainder of the paper proceeds as follows. In Section 2, I present a review of related literature. This is followed by Section 3 which explains the empirical strategy. Section 4 which describes the data while Section 5 reports the results and interpretation. Section 6 concludes

[4]The incidence of chronic illness in the workplace is estimated by Hoffman and Schwartz (2008) to have grown by 25% over the past 10 years to a total of nearly 58 million in 2006.

and provides suggestions for future studies.

2 Review of Relate Literature

This investigation is related to following three strands of the literature: 1) research on the labor supply of individuals who have ESI 2) research on the effects of health on labor supply 3) research on the effects of the interaction of health status and ESI.

The first strand of literature focuses on testing for "job lock" or the hypothesis that workers are locked into their job to keep their health insurance. Gruber and Madrian (2002), in their review of the literature on ESI, labor supply, and job mobility, conclude that there is convincing evidence that health insurance plays a major role in job mobility decisions. Older workers, for example, would not opt to retire unless there is an alternative coverage after retiring from continued health insurance from employers or Medicaid.[5] There is also evidence that such job immobility is also exhibited by married women. Buchmueller and Valletta (1999), Olson (1998), Wellington and Cobb-Clark (2000) and Schone and Vistnes (1997), among others, find that the availability of spousal health insurance reduces labor participation and job choice decisions of married women.

This paper is also broadly related to the research on the labor supply effects of health which, for the most part, finds that poor health decrease labor supply.[6] For example, results of Bradley et al. (2007b) show that women with breast cancer, except those having in situ cancer, were less likely to work 6 months following diagnosis relative to a control sample of women. In the case of workers with psychiatric disorders, Ettner et al. (1997) find that such disorders significantly reduced employment among men and women. This result has also been observed in workers with diabetes (Vijan et al. (2004)).

Most closely related to my study is the third strand which directly analyzes the changes in labor supply after a health shock. Previous studies show that the interaction of employment-based health insurance (ESI) and health shocks constrain labor supply in the short-run. Using Cox proportional hazard models, Stroupe et al. (2001) find that chronic illness reduced job mobility

[5]For examples, see Gruber and Madrian (2007), Gruber and Madrian (1995), Gustman and Steinmeier (1994), Rogowski and Karoly (2000) and Blau and Gilleskie (2001).

[6]Currie and Madrian (1999) provide a review on the effects of health on labor hours.

of workers in Indiana who relied on their employer for coverage by about 40 percent as compared with otherwise similar workers who did not rely on their employer for coverage. Bradley et al. (2012) and Bradley et al. (2007a) collected primary data from a sample of married women who were newly diagnosed with breast cancer in Virginia and Detroit, respectively. Both studies find that women with ESI were significantly more likely to remain employed and less likely to cut weekly hours worked than were women with insurance from spouse's employer. Tunceli et al. (2009) examine the labor market supply changes of older men and women from Pennsylvania diagnosed with all types of cancer from 1997 through 1999 compared to a non-cancer sample drawn from the Health and Retirement Study (HRS). They report higher employment rates after a cancer diagnosis for those with ESI compared to those who had an alternative source of health insurance or who were uninsured. Bradley et al. (2012) focus on older married men and study the effects of cancer, congestive heart failure, stroke, lung disease, stroke and angina on labor supply. The study finds that for some specifications of health shocks ESI encourages continued employment of men, although not of women.

In this handful of studies that analyzes the changes in labor supply after a health shock, the scope of earlier studies was limited to either a single state, a single disease or a certain gender or age group which limits the generalizability of conclusions to other settings. The main contribution of the paper is that it uses the NLSY dataset which includes more medical conditions and has national distribution. This paper focuses its analysis on the effects of ESI for workers with benign and/or more common chronic diseases like hypertension, arthritis and mental conditions.

3 Empirical Strategy

In this paper, I study the effects of having ESI before diagnosis on labor supply outcomes of newly diagnosed workers 0, 6, 12 and 24 months after diagnosis. I consider a sample of workers who are fully employed at the baseline (pre-diagnosis) period. One is considered a full-time worker if he or she works at least 32 hours per week.[7] The labor market outcomes considered are employment status (E), change in mean weekly hours worked (CH) and change from full-time to part-time work ($FT2PT$). E_{it} is equal to 1 if worker i is employed $t = 0, 6, 12, 24$ months

[7] As in Bradley et al. (2007a).

after diagnosis and 0 otherwise. CH_{it} is the growth rate of H_{it} or the average work hours of worker i at time $t = 0, 6, 12, 24$ months after diagnosis relative to H_{ib} or the average work hours of worker i at the baseline period b. CH_{it} is calculated using the following equation:

$$CH_{it} = \frac{H_{it} - H_{ib}}{H_{ib}} * 100 \tag{1}$$

$FT2PT_{it}$ is equal to 1 if worker i was fully employed at the baseline period b but is partially employed t months after diagnosis and 0 otherwise.

The labor supply outcomes are modeled as functions of worker i's source of health insurance before diagnosis (ESI_{ib}), a vector of control variables observed in the baseline period (X_{ib}) and unobserved influences (ϵ_{it}). ESI_{ib} is equal to 1 if worker i has ESI at the baseline period b or 0 if worker i depends on spouse's employer for health insurance at the baseline period. In particular, Equation 2 estimates the effects of ESI (and other exogenous variables) for labor supply outcome, Y, of workers who are fully employed ($FT_{ib} = 1$) and have insurance (i.e. $INS = 1$) either from own or spouse's employer at the baseline period. I separately estimate Equation 2 for different labor market outcomes, $Y = E_{it}$, CH_{it} and $FT2PT_{it}$ at each period t (0, 6, 12, 18 months after the diagnosis). For Y_{it} =CH_{it} and $FT2PT_{it}$, I estimate Equation 2 conditional on the worker being employed post-diagnosis. This condition is imposed to separate any employment effects on these two labor supply indicators.

$$Y_{it} = \alpha_{yt} + \beta_{yt} ESI_{it} + X_{ib}\gamma_{yt} + \epsilon_{yit} \mid \text{INS}_{ib} = 1,\ FT_{ib} = 1,\ t = \ 0,\ 6,\ 12\ ,\ 24 \tag{2}$$

Equation 2 is estimated as a linear probability model.

I am interested in the coefficient of ESI, β. For estimated models with Y equals to E_{it} and Y equals CH_{it}, a positive and significant β indicates significant effects of ESI in locking workers with a diagnosis to employment and to a certain amount of work hours in order to secure health insurance. For estimated models with Y equals to E_{it}, a positive β implies that workers with ESI tend to remain employed relative to workers with no ESI. For estimated models with Y equals to CH_{it}, a positive β implies that the reduction in mean hours worked is smaller for workers with ESI than for workers with no ESI if both groups of workers reduced their labor hours. For estimated models with Y equals to change from full-time to part-time employment, a negative

and significant β indicates significant effects of ESI in preventing workers with a diagnosis from becoming part-time workers in order to secure health insurance.

To control for observable differences between workers with ESI and workers insured through their spouse, I include the following control variables in X_{ib}: year of diagnosis, gender, race, an indicator of whether there are any children in the household and its interaction with gender, marital status, age, age squared, education level measured by highest grade completed and AFQT score which is a proxy for ability.[8]

Jobs that offer ESI may employ workers that are more dedicated and are more likely to remain at work regardless of their cancer diagnosis. To account for variation in hours worked in the pre-diagnosis period, I include the mean labor hours worked during the baseline period in the vector of control variables and estimate the model using full-time workers alone.[9] Workers with ESI may also tend to have lower income and/or tend to be the breadwinner and hence, their labor supply would tend to decrease less compared to a comparatively ill worker who does not have ESI. To control for this, I also include pre-diagnosis household income in $2002 dollars and pre-diagnosis share of worker $i's$ annual income to household income.

To control for any differences in job characteristics, I also include job tenure, location of residence (urban or rural), number of employees at workplace and industry category. It is possible that jobs that offer health insurance benefits require less physical strength. If this is the case, workers with ESI may appear to reduce labor supply less than workers with no ESI. This difference may be incorrectly attributed to the difference in the source of health insurance. In view of this, I also include occupation category in the vector of control variables, X_{ib}.

The severity of a chronic illness may limit the kind or amount of work that a person can do and subsequently, labor supply response. To see whether the labor supply response differential associated with ESI varies by severity, I also estimate Equation 3 using a sample that only includes respondents who have no work limitation during the baseline period and include interactions of an indicator of post-diagnosis work limitation and ESI. The proxy indicator for severity of illness is a dummy variable, $limit_{i,after}$ that is set equal to 1 if the respondent

[8]Most of these covariates were used in wage models used by Cowan and Schwab (2011) that also used the NLSY79 dataset.

[9]As in Bradley et al. (2007a).

experienced any work limitation in the NLSY survey period after diagnosis. The empirical model that models the the main and interactive effects of severity of the condition and health insurance source on labor supply indicators t months following diagnosis is represented by Equation 3. As usual, β measures the main effect of having ESI while δ measures the main effect of having work limitation (that is likely caused by the severity of illness). The coefficient, μ, measures the interactive effect of having work limitation and ESI.

$$Y_{it} = \alpha_{yt} + \beta_{yt} ESI_{it} + \delta_{yt}\ limit_{i,after} + \mu_{yt}\ limit_{i,after} * ESI_{it} + X_{ib}\gamma_{yt} + \epsilon_{yit} \\ | \ \text{INS}_{ib} = 1,\ FT_{ib} = 1,\ \ t = \ 0,\ 6,\ 12\ ,\ 24 \tag{3}$$

I also test using Equation 4 to see whether newly diagnosed workers whose employers also cover insurance of their spouse and/or child are more locked in their jobs than workers who have ESI but no dependents. To do this, I introduce new variables: $ESI_{it}^{dependents}$ which is equals to 1 if worker i has other family members who have the same ESI coverage and 0 otherwise and ESI_{it}^{only} which is equals to 1 if worker i has no other family members who have the same ESI coverage and 0 otherwise. If δ_{yt} is statistically greater than β_{yt}, then this means that workers with dependents are more locked in their jobs than workers who have ESI but no dependents. I also use the F-test to test the null hypothesis, $\delta_{yt} \neq \beta_{yt}$. If the null hypothesis is rejected and δ_{yt} is greater than β_{yt}, then there is evidence of greater job/hour lock effects of ESI for ill workers with dependents than ill workers with no dependents.

$$Y_{it} = \alpha_{yt} + \beta_{yt} ESI_{it}^{only} + \delta_{yt} ESI_{it}^{dependents} + X_{ib}\gamma_{yt} + \epsilon_{yit} \\ | \ \text{INS}_{ib} = 1,\ FT_{ib} = 1,\ t = \ 0,\ 6,\ 12\ ,\ 24 \tag{4}$$

4 Data

I use data from the National Longitudinal Survey of Youth (NLSY) which is a nationally representative sample of 12,686 people aged 14-22 years in 1979. The NLSY was administered annually until 1994, and biennially through 2014. Respondents were asked to answer the first health module upon reaching 40 years old and another health module upon reaching 50 years

old. These modules ask whether the respondent was ever diagnosed with a chronic illness and if yes, when (month and year) he or she was diagnosed. The chronic diseases covered in the modules were hypertension, diabetes, arthritis, cancer, mental health problems, heart attack, heart failure and stroke. In 2014, all the respondents reached 50 years old and had answered these health modules. As of 2014, about 4,892 respondents reported having one of the diagnoses mentioned above. There were multiple diagnoses to other respondents, but I restrict my sample to the first chronic illness diagnosis.

The NLSY asks whether respondents have health insurance policy and if yes, the source of the policy. The source of the policy could be from the current employer, previous employer, spouse's current employer, spouse's previous employer, individual markets, government or others. Unfortunately, only take-up data is available, and there is no information on whether the respondent or the spouse was offered any health insurance coverage from other sources.

I only use post-1988 data because the earlier years of the survey did not include questions on health insurance status. Since I am only interested in the comparative effects of ESI and insurance from spouse's employer on the labor supply of workers with diagnosis, I limit my main analysis to the sample to workers who get their coverage through their own employer or their spouse's employer.[10] After these restrictions, I am left with 2,336 respondents with a diagnosis.

The NLSY provides weekly data from 1979 to 2014 on the respondent's employment status and hours worked. I collapse the weekly data on hours worked into monthly data. From this data, I am able to derive the outcome variables, CH_{it}, E_{it} and $FT2PT_{it}$. CH_{it} is the growth rate of hours worked from baseline to t months after diagnosis. The baseline period is 6 months before diagnosis. As mentioned earlier, I restrict the sample to individuals who are fully employed 6 months before diagnosis with full employment defined as working at least 32 hours per week. The respondent is considered employed for the month (i.e. E_{it} is equal to 1) if he or she was employed at least a week of that month. If the respondent was partially employed t months after diagnosis, then $FT2PT_{it}$ is set equal to 1 and 0 otherwise.

The NLSY also provides a rich source of control variables. As mentioned earlier, I control

[10]Survey respondents can indicate more than one source of coverage. For those respondents who have ESI and insurance from spouse's employer, I consider them to have spouse's employer.

for the year of diagnosis, gender, race, marital status, whether the worker has children, age, education level, AFQT score, location of residence, household income, share of annual income to household income, firm size, job tenure, industry, occupation categories and labor hours supplied in the baseline period. Unfortunately, except for hours worked and the employment status that is provided by the the NLSY on a weekly basis, the rest of the variables needed for this study are given on a yearly basis from 1989 to 1994 and biennially, after that. As proxies for the baseline values for most of the control variables (excluding household income and annual income), I use the values of the controls one or two years before diagnosis depending on the year of diagnosis. For workers who were diagnosed in 1990 to 1994, I use information from the prior year.[11] For workers who were diagnosed after 1994 and during the years when the NLSY was administered, I use NLSY data two years prior. For workers who were diagnosed after 1994 and during the year when the NLSY was not administered, I use information from the previous year (See Figure 3.1). For the annual income of the worker (which I used to calculate the % share to household income) and household income, I use data supplied in the survey year when the worker was diagnosed because the survey questionnaire asked about income in the past year. For workers who were diagnosed when the NLSY was not administered, I use values from the previous year. Thus the baseline variables are pre-determined and should not be correlated to the error term in Equations 2-4.

Figure 1: Source of Baseline Values of Control Variables

Notes: t=1989, ...,2012 in this diagram. This figure does not pertain to household income and annual income variables.

After exclusions for missing data for control variables and key study variables, the "Full" sample includes 1,384 observations. I also construct a "Married Only" restricted to married individuals alone. This alternative sample contains 890 observations.

5 Results

5.1 Descriptive Statistics

Table 1 contains information on the distribution of diagnoses received by respondents in the "Full" and "Married Only" samples. In the "Full" sample, there are 1,384 eligible respondents

[11] For workers who were diagnosed in 1989, I use information from the same year. Insurance data is not available before 1989.

that had a first diagnosis. 45.4% of the sample has been diagnosed with hypertension, 22.1% have been diagnosed with arthritis, 16.8% have been diagnosed with any mental health condition[12] and 10.5% had diabetes diagnosis. A small share (about 5%) had cancer, heart problems or stroke. Most of the health problems in the sample are chronic illnesses that, although may lead to more severe conditions, are benign. Since the most of the sample are mild illnesses, this sample can be used to examine ESI effects on workers with more common chronic illnesses like hypertension, mental illness, and arthritis which were not included in past studies. The distribution of the "Married Only" sample mirrors that of the "Full" sample.

Figure 3.2 also shows the distribution of the year of diagnosis. 97% of the respondents in the sample were diagnosed on or before 2010, the year the ACA was signed by President Barack Obama into law. Since the ACA was not fully implemented until 2014, it is then safe to assume that the effects estimated are not convoluted by the significant change in health policies during the Obama administration.

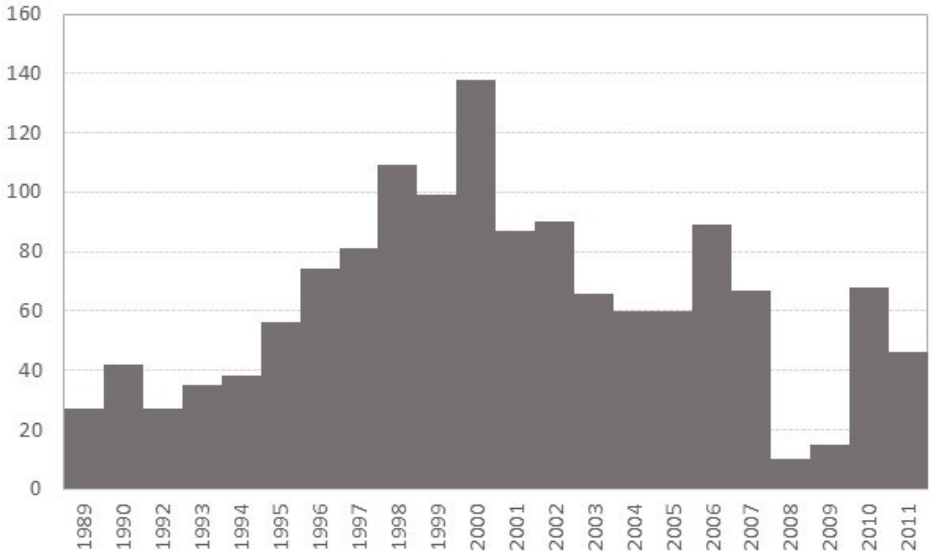
Table 1: Sample Distribution of Diagnoses, by Source of Health Insurance

	Full Sample			Married Only Sample		
	Any Ins N=1,384	ESI N=1,114	Spouse ESI N=270	Any Ins N=890	ESI N=626	Spouse ESI N=264
% Share						
Hypertension	45.4	38.8	6.6	45.4	35.3	10.1
Diabetes	10.5	8.3	2.2	10.3	6.9	3.5
Cancer	3.8	2.8	0.9	3.6	2.2	1.3
Mental	16.8	12.1	4.7	17.0	9.9	7.1
Arthritis	22.1	17.3	4.8	22.1	14.8	7.3
Heart Failure	0.2	0.1	0.1	0.2	0.1	0.1
Heart Attack	0.8	0.7	0.1	0.9	0.8	0.1
Stroke	0.4	0.3	0.1	0.4	0.3	0.1
Total	100.0	80.5	19.5	100.0	70.3	29.7

Notes: Any Ins refers to Any Insurance.

[12]Emotional, nervous or psychiatric problems

Figure 2: Number of Diagnoses, by Year



Notes: The sample only includes the first diagnosis of a chronic illness of each eligible respondent.

The summary statistics of labor supply indicators are presented in Table 2. Column 2 describes the "Full" sample while column 4 describes the "Married Only" sample. Columns 3 and 4 compare respondents with and without ESI for the "Full" sample while columns 6 and 7 do the same for the "Married Only" sample. To be able to make causal inferences from the samples, the group with ESI and the group without ESI should only differ in terms of health insurance and should be similar in terms of other pre-diagnosis unobservable and observable characteristics.

For the "Full" sample, about 80% have health insurance from their own employer (i.e. ESI=1), and 20% have coverage through their spouse's employer. For the married sample, 70% have health insurance from their own employer, and the other 30% are covered through their spouse employment-based insurance. This distribution is about the same as the national distribution.

On average, respondents in the "Full" and "Married Only" samples work 46 hours per week 6 months before diagnosis. This number is the same as the reported average number hours worked per week by full-time employees in a 2014 Gallup Survey (see Saad (2014)). The mean work hours are almost the same for those with ESI and those with insurance from spouse's employer. This indicates that workers in both groups have the same labor market supply before

diagnosis. This similarity of labor supply at the baseline bodes well with the choice of using these two groups who differ in the source of insurance to detect any differential effect of insurance source.

Table 2: Mean Values of Labor Supply Indicators

	Full Sample			Married Only Sample		
	Any Ins N=1,384	ESI N=1,114	Spouse ESI N=270	Any Ins N=890	ESI N=626	Spouse ESI N=264
Has own ESI	0.80	1.00	0.00	0.70	1.00	0.00
Hrs wrked 6 mos bef	46.19	46.18	46.23	46.42	46.45	46.35
Employed=1						
0 mos after diagnosis	0.96	0.96	0.94	0.97	0.98	0.94
6 mos after diagnosis	0.93	0.94	0.88	0.93	0.95	0.88
12 mos after diagnosis	0.91	0.92	0.88	0.92	0.94	0.88
24 mos after diagnosis	0.90	0.91	0.88	0.91	0.92	0.88
% Change in hrs worked						
0 mos after diagnosis	-5.68	-4.41	-10.90	-5.07	-2.59	-10.96
6 mos after diagnosis	-8.35	-6.66	-15.34	-7.90	-4.73	-15.42
12 mos after diagnosis	-9.65	-8.41	-14.77	-8.08	-5.22	-14.89
24 mos after diagnosis	-11.71	-10.47	-16.85	-11.01	-8.52	-16.93
% Change in hrs worked, Conditional						
0 mos after diagnosis	-1.70	-0.94	-4.91	-1.87	-0.68	-4.83
6 mos after diagnosis	-1.06	-0.40	-3.96	-1.12	-0.10	-3.75
12 mos after diagnosis	-0.68	-0.07	-3.31	-0.36	0.74	-3.15
24 mos after diagnosis	-2.17	-1.35	-5.67	-2.23	-0.92	-5.47
Changed from FT to PT						
0 mos after diagnosis	0.08	0.06	0.15	0.07	0.04	0.15
6 mos after diagnosis	0.10	0.08	0.19	0.10	0.06	0.19
12 mos after diagnosis	0.13	0.11	0.19	0.11	0.08	0.19
24 mos after diagnosis	0.15	0.14	0.21	0.14	0.11	0.22
Changed from FT to PT, Conditional						
0 mos after diagnosis	0.04	0.03	0.09	0.04	0.02	0.09
6 mos after diagnosis	0.03	0.02	0.08	0.03	0.02	0.08
12 mos after diagnosis	0.04	0.03	0.08	0.04	0.02	0.08
24 mos after diagnosis	0.06	0.05	0.11	0.06	0.04	0.11

Notes: Any Ins refers to Any Insurance. Except for "Hrs wrked 6 mos bef", "Change in hrs worked" and "Change in hrs worked, Conditional", the variables are all dummy variables. Conditional means conditional on being employed.

At the time of diagnosis (0 month after diagnosis), about 96% of workers with ESI in the "Full" sample remained employed compared to 94% for workers with insurance from spouse's employer. Two years after diagnosis, this proportion decreases to 91% for the former and 88% for the latter. The difference is slightly greater in the "Married Only" sample where almost all (98%) of the workers with ESI remained employed compared to 94% for workers with insurance from spouse's employer at the time of diagnosis.

Without accounting for employment effects (i.e., workers who are no longer employed during and after diagnosis and hence, supply zero work hours), the mean hours worked for workers in the "Full" sample increasingly declines post-diagnosis. The mean hours worked of workers with ESI is lower by 4.4% during the time of diagnosis, lower than the 10.9% decline for workers with coverage from spouse's employer. Mean hours worked drops further 6, 12 and 24 months after diagnosis, reaching 10.5% 24 months post-diagnosis for the workers with ESI and 16.9% for workers without ESI. The 10.5% decline is equivalent to about 5 hours relative to the baseline mean labor hours and the 16.9% is equivalent to 8 hours relative to the respective baseline value. Such difference is more defined in the married only sample.

Conditional on being employed and hence, accounting for employment effects, the decline of mean work hours between workers with ESI and workers with no ESI is now lower at any period (0 to 24 months after diagnosis). At the time of diagnosis, the 0.9% decline for workers with ESI is equivalent to only half an hour decline relative to the baseline mean hours worked, and the 4.9% for the other group is equivalent to 2 hours relative to the respective baseline value. The decline is more defined 24 months after diagnosis.

Conditional on being employed post-diagnosis, 9% of respondents who gets coverage from spouse's employer changed from being fully employed to partially employed, thrice the proportion of respondents with ESI who became part-time workers (3%). The gap in the fraction of people who became partially employed between these two groups does not narrow down even two years post-diagnosis. This pattern in the change of labor hours and the transition from being a full-time to a part-time worker, conditional and unconditional to being employed post-diagnosis, is also observed in the "Married Only" sample. Without controlling for other factors that may affect labor supply outcomes, the summary statistics indicates that workers' labor supply tends to be lower for workers with non-ESI than workers with ESI.

In a visual manner, Figures 4a, 8a, 14a also show that workers with ESI compared to workers with non-ESI tend to remain employed and for those who have remained employed, tend to have lower change in mean hours worked and to be less likely partially employed. These patterns are also observed for subgroups of workers with hypertension (see Figures 4b, 8b, 14b),

These figures also show the confidence interval. Confidence interval for workers with coverage from spouse's employer is relatively wider because of smaller number of observations.

mental disorders (see Figures 4e, 8e, 14e) and arthritis (see Figures 4f, 8f, 14f). This is not the case for cancer and diabetes. However, the sample of workers with cancer or diabetes is very small (less than 10% of the overall sample) and thus, it is relatively hard to interpret the figures. The pattern observed in the whole sample is very similar to the married only sample (see 6a, 10a, 12a).

Table 3 presents the summary statistics of control variables. On average, workers in the "Full" and "Married Only" samples received their first diagnosis at age 39, with no significant difference in age between workers with ESI and workers with spouse employment-based insurance. While almost half of the full sample are women, the proportion of women in the group of workers with ESI is lesser than the proportion of women in the group of workers with coverage from spouse's employer. In terms of race, the fraction of black workers in the group with ESI is greater than the proportion in the other group. In the "Full" sample, the proportion of workers who have children is greater for the group with coverage from spouse's employer. However, in the "Married Only" sample, this proportion is the same. In the full sample, 56% of workers with ESI are married, 24% were formerly married, and about 20 were never married. The other group of workers that depend on spouse employer for coverage, by definition of the group, consist of almost 100% married individuals (with about 2% formerly married). In terms of educational attainment, the proportion of workers with higher education seems to be insignificantly higher for the group of workers with ESI compared to workers with non-ESI. There is no clear pattern in the distribution of AFQT score (which is an indicator of ability) between ESI and non-ESI groups although in the married sample, it seems that workers with lower ability tend to be slightly higher in non-ESI group and workers with higher ability tend to be slightly higher in the ESI group.

Table 3: Summary Statistics of Control Variables

	Full Sample			Married Only Sample		
	Any Ins N=1,384	ESI N=1,114	Spouse ESI N=270	Any Ins N=890	ESI N=626	Spouse ESI N=264
Age	39.30	39.40	38.89	39.28	39.45	38.90
Female=1	0.50	0.46	0.66	0.46	0.37	0.66
Race: Black	0.29	0.31	0.23	0.22	0.22	0.23
Race: Hispanic	0.17	0.18	0.16	0.18	0.19	0.16
Race: White	0.53	0.52	0.61	0.60	0.60	0.61
Any children in HH==1	0.67	0.63	0.84	0.81	0.81	0.84
Never married=1	0.16	0.20	0.00	0.00	0.00	0.00
Formerly married=2	0.20	0.24	0.02	0.00	0.00	0.00
Married==1	0.64	0.56	0.98	1.00	1.00	1.00

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Table 3 – Continued

	All			Married		
	Any Ins N=1,384	ESI N=1,114	Spouse ESI N=270	Any Ins N=890	ESI N=626	Spouse ESI N=264
Education: <9 years	0.01	0.01	0.01	0.01	0.01	0.02
Education: 9-12 years	0.47	0.46	0.49	0.48	0.47	0.49
Education: 13 years and over	0.52	0.53	0.49	0.51	0.52	0.50
AFQT: 0-25	0.29	0.30	0.27	0.26	0.26	0.27
AFQT: 25-50	0.29	0.28	0.33	0.28	0.26	0.33
AFQT: 50-75	0.22	0.22	0.20	0.23	0.25	0.20
AFQT: 75-100	0.20	0.20	0.20	0.22	0.23	0.20
Job Tenure: 0-1 years	0.11	0.09	0.19	0.11	0.08	0.19
Job Tenure: 1-3 years	0.20	0.18	0.28	0.20	0.16	0.28
Job Tenure: 3-6 years	0.20	0.20	0.24	0.21	0.20	0.23
Job Tenure: 6+ years	0.49	0.54	0.29	0.48	0.56	0.29
Urban residence=1	0.73	0.74	0.69	0.69	0.69	0.70
Employer size: 0-9 emps	0.14	0.11	0.27	0.17	0.13	0.27
Employer size: 10-24 emps	0.12	0.11	0.17	0.13	0.11	0.17
Employer size: 25-49 emps	0.11	0.11	0.13	0.12	0.11	0.13
Employer size: 50-999 emps	0.47	0.51	0.33	0.45	0.50	0.33
Employer size: 1000+emps	0.14	0.15	0.10	0.13	0.14	0.11
HH Income: $0 - $30K	0.17	0.20	0.05	0.07	0.08	0.05
HH Income: $30,001 - $50K	0.27	0.28	0.22	0.21	0.22	0.20
HH Income: $50,001 - $100K	0.43	0.41	0.52	0.54	0.54	0.53
HH Income: >$100K	0.13	0.11	0.21	0.18	0.16	0.22
Annual Inc <50% of HH Inc	0.29	0.20	0.64	0.41	0.31	0.65
Annual Inc >50% of HH Inc	0.71	0.80	0.36	0.59	0.69	0.35
Industry: Agriculture	0.01	0.01	0.01	0.01	0.01	0.01
Industry: Mining	0.01	0.01	0.00	0.01	0.01	0.00
Industry: Construction	0.04	0.04	0.06	0.05	0.04	0.06
Industry: Manufacturing	0.19	0.22	0.09	0.18	0.22	0.09
Industry: Transportation	0.09	0.09	0.07	0.08	0.08	0.07
Industry: Trade	0.11	0.10	0.14	0.12	0.11	0.15
Industry: Finance	0.07	0.06	0.09	0.07	0.06	0.09
Industry: Busines Serv	0.05	0.05	0.07	0.05	0.04	0.08
Industry: Personal Serv	0.02	0.02	0.06	0.03	0.02	0.05
Industry:: Entertainment	0.01	0.01	0.01	0.01	0.01	0.02
Industry: Professional	0.27	0.25	0.33	0.27	0.24	0.33
Industry: Public Admin	0.10	0.11	0.04	0.10	0.13	0.04
Occupation: Managerial	0.33	0.33	0.35	0.35	0.35	0.34
Occupation: Technical	0.06	0.07	0.05	0.07	0.08	0.05
Occupation: Sales	0.06	0.06	0.06	0.06	0.06	0.06
Occupation: Admin Support	0.17	0.16	0.21	0.17	0.16	0.20
Occupation: Service	0.11	0.11	0.13	0.10	0.09	0.13
Occupation: Farming	0.00	0.00	0.00	0.00	0.01	0.00
Occupation: Production	0.12	0.12	0.11	0.12	0.13	0.11
Occupation: Machine	0.07	0.08	0.03	0.06	0.08	0.03
Occupation: Transportation	0.05	0.05	0.03	0.04	0.04	0.03
Occupation: Handlers	0.02	0.02	0.02	0.02	0.01	0.02

Notes: Any Ins refers to Any Insurance. HH Income and Annual Income are in 2002 dollars. Industry and occupation categorizations are based on the 3-digit 1980 Census Industry and Occupational Codes.

In the "Full" and "Married Only" samples, workers with ESI tend to have longer tenure in their pre-diagnosis job compared to workers with no ESI. 54% respondents with ESI work 6+ years in their pre-diagnosis job, significantly higher than the proportion of respondents without ESI with the same tenure. Also, workers with ESI tend to work in firms that are relatively bigger

in terms of the number of employees compared to workers with no ESI. In the full sample, workers with ESI are more likely to have lower pre-diagnosis household annual income relative to workers depending on spouse employer for coverage. However, for the married sample, the distribution of household income between the two groups are very similar. A more striking difference between the group of workers with ESI and the group of workers with no ESI is the share of worker's income to household income. Income of workers with spouse insurance tends to have a lower share of household income compared to the share of workers with ESI.

5.2 Regression Results

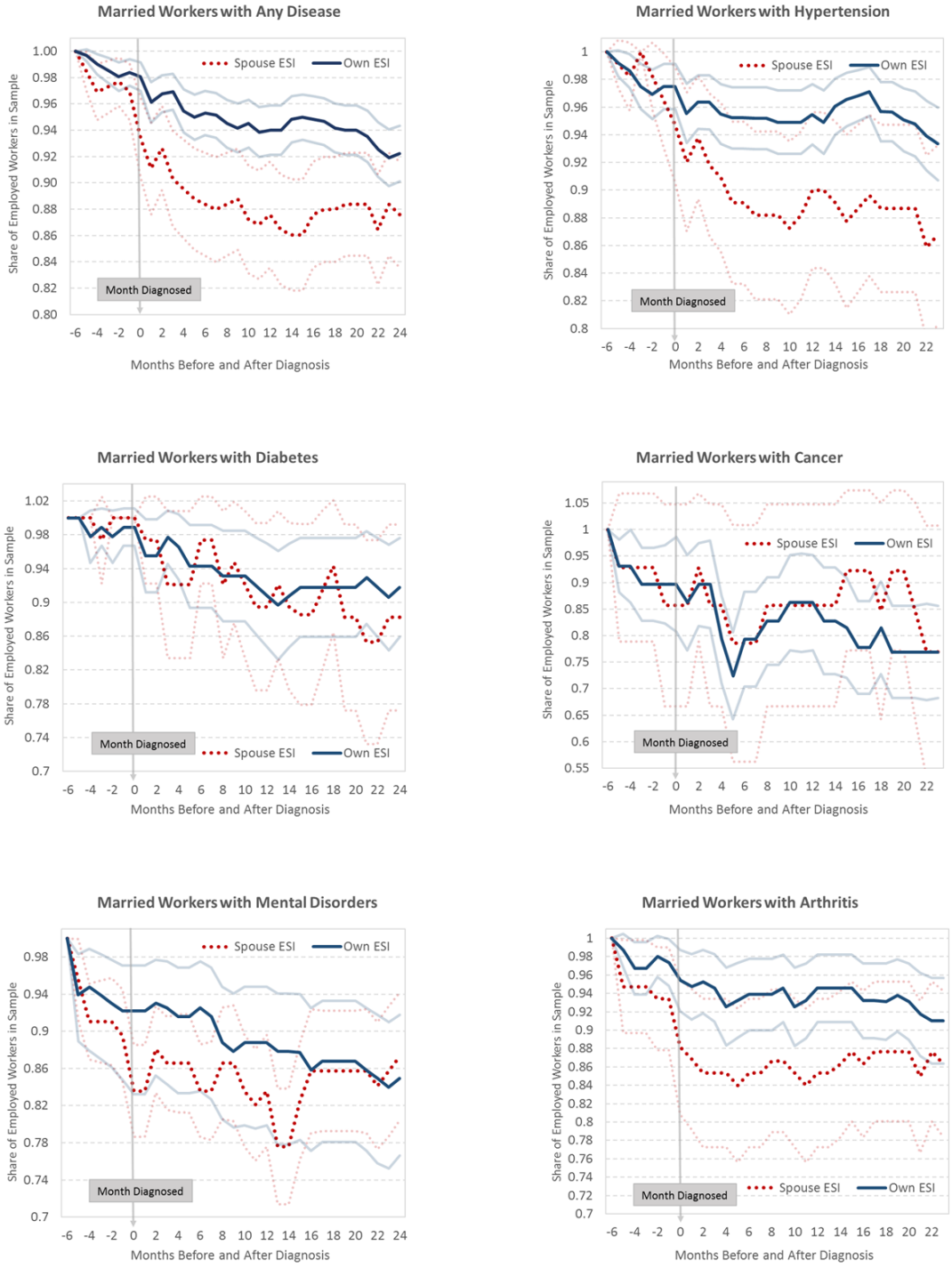
5.2.1 Probability of Remaining Employed

Panel A of Table 4 reports the various estimates of β or the coefficient of ESI in Equation 2. The dependent variable is the probability of remaining employed 0, 6, 12 and 24 months after diagnosis. The specific β for workers diagnosed with diabetes, cancer, heart attack, heart failure and stroke are not estimated because these sub-groups have insufficient observations.

Figure 3: Share of Employed Workers to Sample

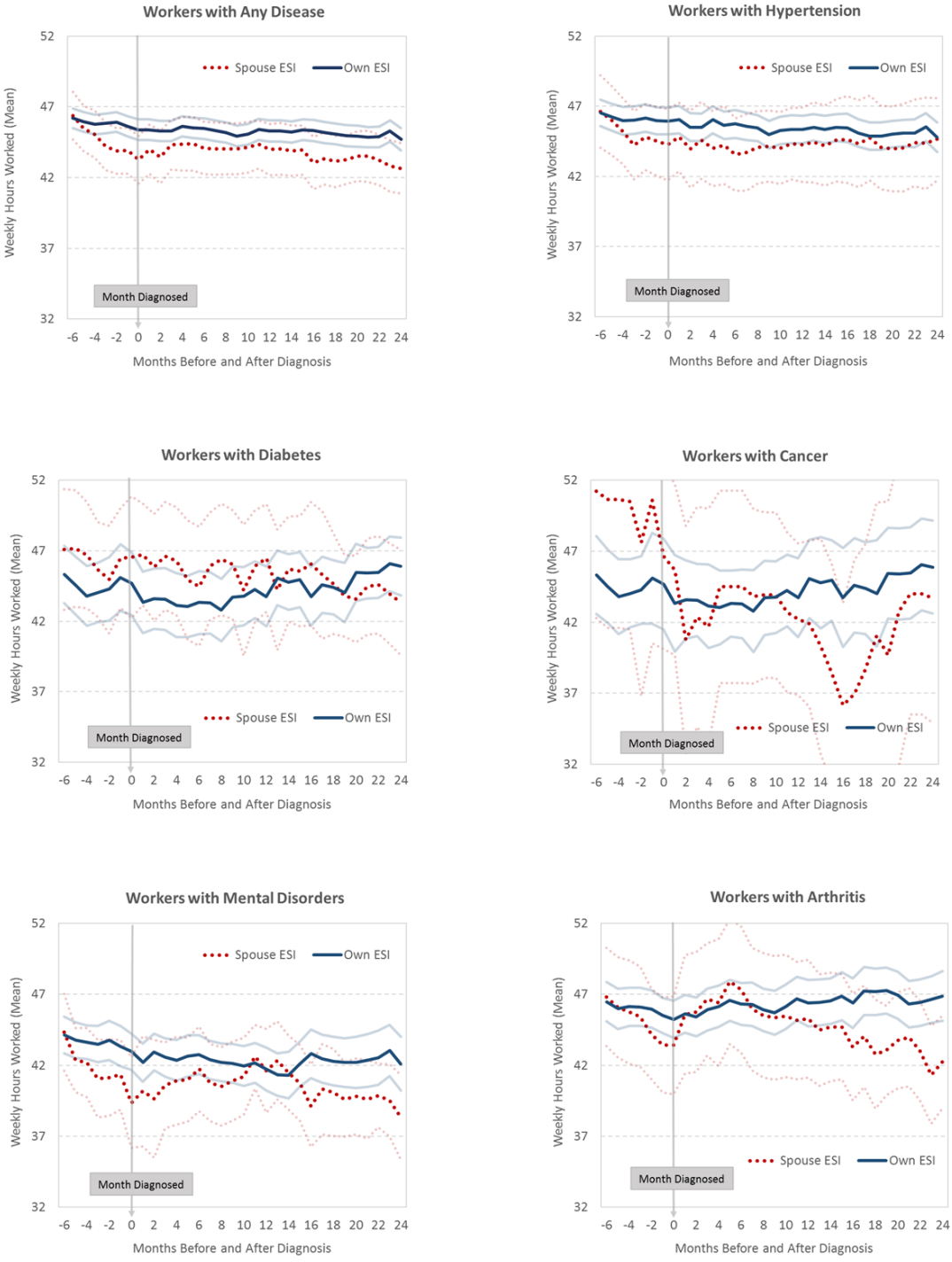
Notes: Dark blue solid line refers to the share of employed workers with ESI to the total number of workers with ESI at baseline; area below and above the light blue lines is the 95% confidence interval. Dark red broke line refers to the share of employed workers with spouse ESI to the total number of workers with spouse ESI at baseline; area below and above the light red broken lines is the 95% confidence interval.

Figure 5: Share of Employed Workers to Sample (Married Only)



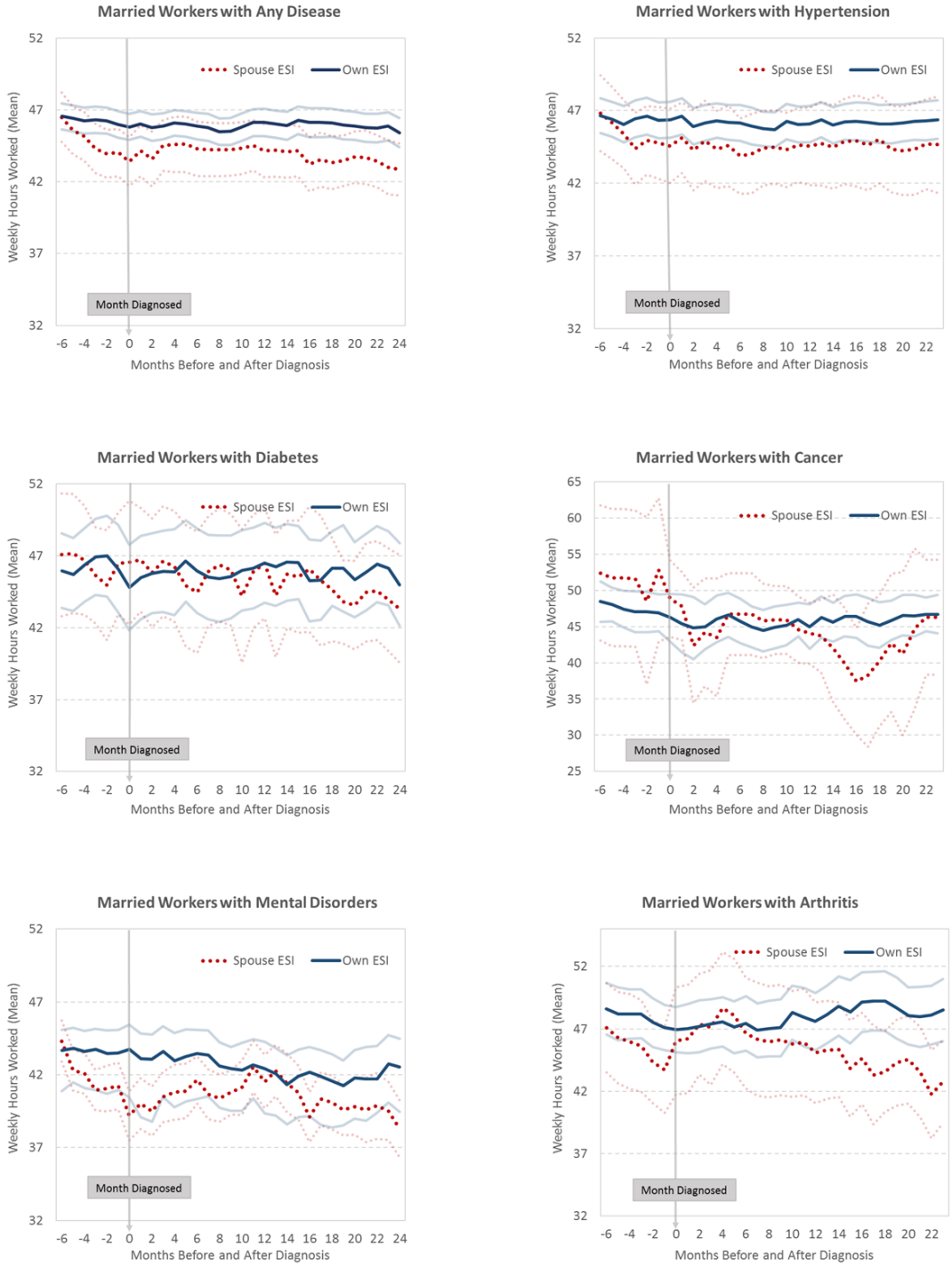
Notes: Dark blue solid line refers to the share of employed workers with ESI to the total number of workers with ESI at baseline; area below and above the light blue lines is the 95% confidence interval. Dark red broke line refers to the share of employed workers with spouse ESI to the total number of workers with spouse ESI at baseline; area below and above the light red broken lines is the 95% confidence interval.

Figure 7: Mean Weekly Hrs Worked, Conditional on Being Employed



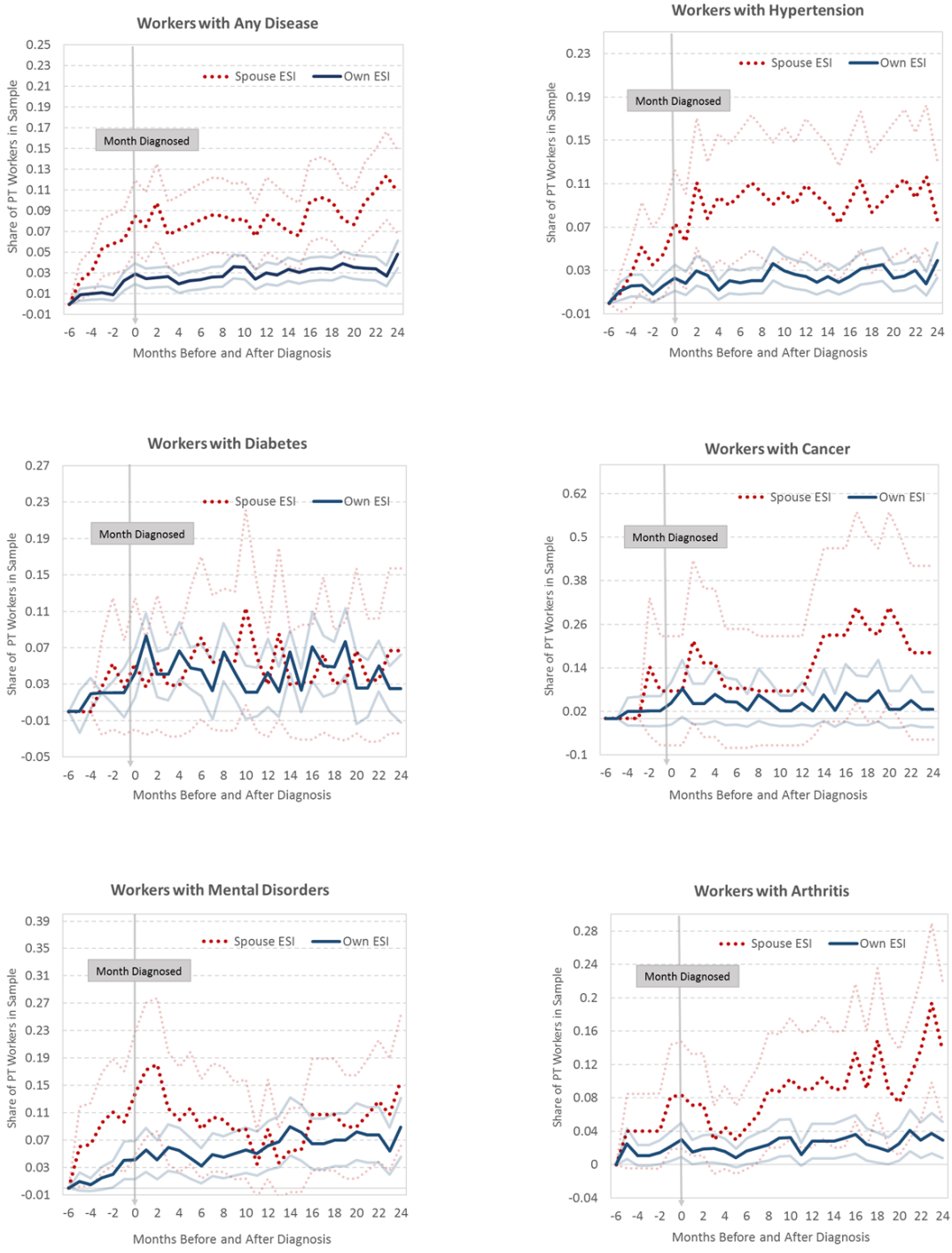
Notes: Dark blue solid line refers to the mean hours worked by workers with ESI provided that they are working; area below and above the light blue lines is the 95% confidence interval. Dark red broke line refers to the mean hours worked by workers with spouse ESI provided that they are working; area below and above the light red broken lines is the 95% confidence interval.

Figure 9: Mean Weekly Hours Worked, Conditional on Being Employed (Married Only)



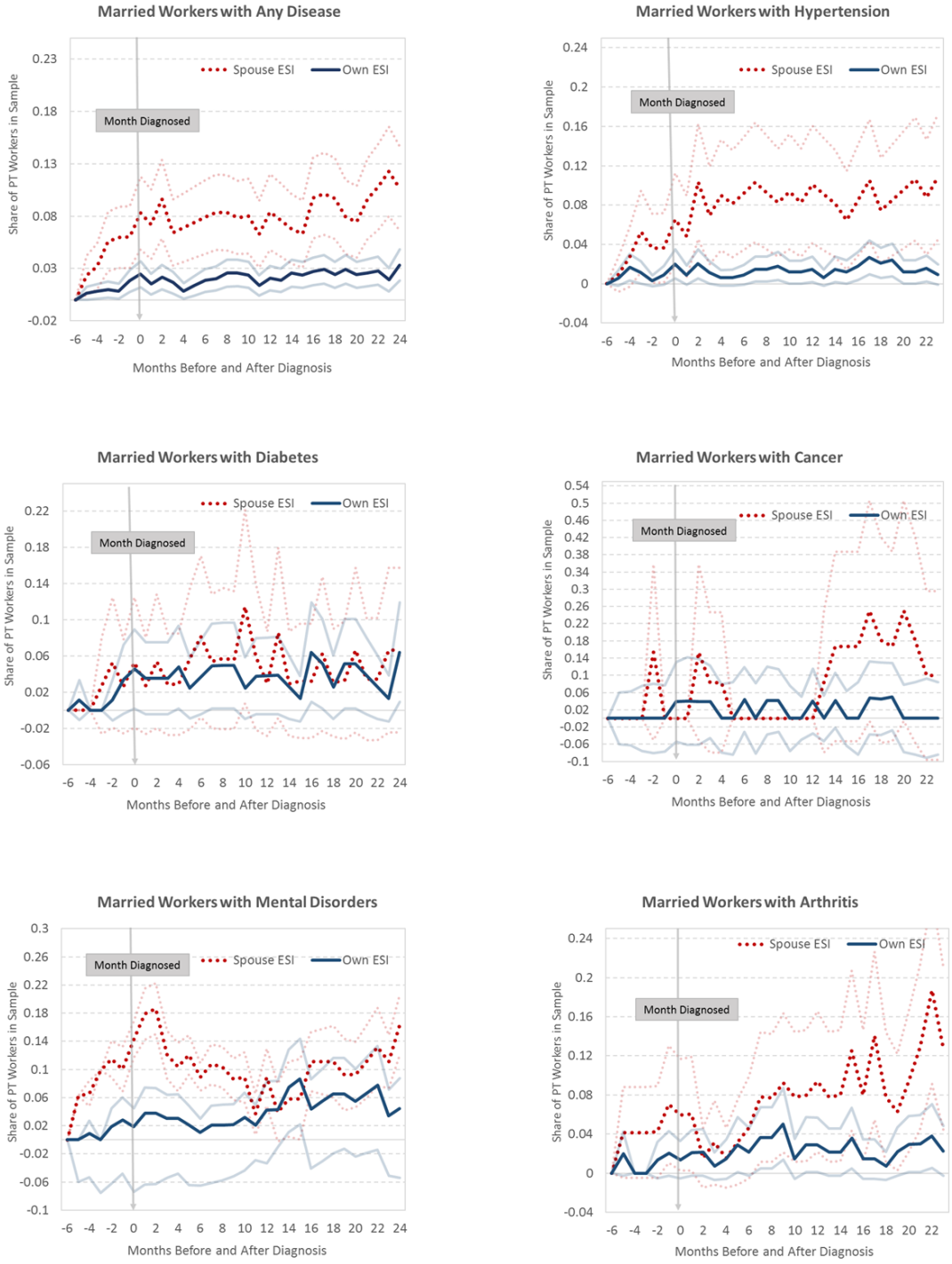
Notes: Dark blue solid line refers to the mean hours worked by workers with ESI provided that they are working; area below and above the light blue lines is the 95% confidence interval. Dark red broke line refers to the mean hours worked by workers with spouse ESI provided that they are working; area below and above the light red broken lines is the 95% confidence interval.

Figure 11: Share of PT Workers to Sample Conditional on Being Employed



Notes: Dark blue solid line refers to the share of part-time employees with ESI to the total number of workers with ESI at baseline; area below and above the light blue lines is the 95% confidence interval. Dark red broke line refers to the share of part-time employees with spouse ESI to the total number of workers with spouse ESI at baseline; area below and above the light red broken lines is the 95% confidence interval.

Figure 13: Share of PT Workers to Sample Conditional on Being Employed (Married Only)



Notes: Dark blue solid line refers to the share of part-time employees with ESI to the total number of workers with ESI at baseline; area below and above the light blue lines is the 95% confidence interval. Dark red broke line refers to the share of part-time employees with spouse ESI to the total number of workers with spouse ESI at baseline; area below and above the light red broken lines is the 95% confidence interval.

For the "Full" and "Married Only" samples, β is positive across all sub-groups (except for workers with mental conditions 24 months after diagnosis), consistent with the hypothesis that newly diagnosed workers with ESI are more likely to remain employed to keep ESI relative to workers who are less dependent on their own employer for health insurance. Looking at "Full" and "Married Only" samples with all types of diagnoses (Panel A (1)), the estimates imply that workers with ESI are 3 percentage points more likely to be employed than workers with health insurance through a spouse at the time of diagnosis, 4 percentage points more likely 6 months after diagnosis before declining to only 2 percentage points more likely 24 months after diagnosis. However, the coefficients are only significant 0 and 6 months after diagnosis.

The estimates are lower than the estimates of Bradley et al. (2007a) and close to the estimates of Bradley et al. (2013) for women with breast cancer. In Bradley et al. (2007a), women with ESI were 10 percentage points more likely to be employed at six months following diagnosis, but this estimate was not statistically significant. At 12 months following diagnosis, women with ESI were 13 percentage points more likely to be employed than women without ESI. The difference in employment lock effects compared to previous studies is probably caused by the composition of health conditions in the samples used. Most of the health conditions in my sample are mild conditions relative to cancer sample used in both studies compared to. Since cancer requires more intense treatment regimen, workers in the cancer sample are more likely to stop working altogether upon and after diagnosis. Nevertheless, I see significant, albeit at a smaller magnitude, for workers diagnosed with milder illnesses.

The effects of having ESI on remaining employed are mostly similar across all types of diagnoses. For workers with hypertension, the coefficient of ESI increases with time. The coefficients are significant for the "Married Only" sample at 6, 12, and 24 months after diagnosis. For workers with mental diagnosis, the coefficients decrease with time and turn negative 2 years after.

5.2.2 Change in weekly hours worked

Panel B of Table 4 provides various estimates of β which represent the effects of ESI on percent changes in weekly hours worked for workers with health problems 0, 6, 12, and 24 months following diagnosis, conditional on remaining employed during the period. The descriptive

statistics in Table 3 show that the mean labor hours worked declines during and after diagnosis for workers with ESI and workers without ESI. Hence, a positive β means that the reduction is lesser for workers with ESI relative to workers with no ESI. The coefficients from the conditional model are positive in most samples and sub-samples which means that while workers on average tend to reduce their weekly labor hours, the reduction tends to be lower for workers with ESI than workers with no ESI. This implies that, relative to workers with insurance from spouse's employer, newly diagnosed workers with ESI are more locked into a certain amount of work hours to keep insurance. For the "Full" and "Married only" samples, the percentage reduction in mean labor hours worked per week is significantly lower by 3 percentage points for workers with ESI relative to workers dependent on spouse's employer at the time of diagnosis (see Panel B (1)). This coefficient slightly increases to 4 percentage points 6 months post-diagnosis and to about 5 percentage points 24 months after.

Conditional on remaining employed, the effects of ESI for workers with hypertension diagnosis on changes in labor hours worked are relatively larger and are significant at the 5% level of significance in the first few months of diagnosis but declines after that (see Panel B (2)). The effects on workers with mental disorders and arthritis are mostly positive but insignificant (see Panel B (3) and (4)).

5.2.3 Change from Full Time to Part-time Work

Panel C of Table 4 shows the ESI effects of getting diagnosed on the probability of becoming partially employed (i.e. working less than 32 hours per week) conditional on being employed post-diagnosis. A negative coefficient of ESI means that workers with ESI tend to remain

Table 4: Estimated Coefficient of ESI, By Type of Diagnosis

	Full Sample				Married Only Sample			
	0 Mo	6 Mos	12 Mos	24 Mos	0 Mo	6 Mos	12 Mos	24 Mos
Panel A. Dependent Variable: Employment								
(1) All Diagnoses	0.0299*	0.0427**	0.0324	0.0189	0.0310**	0.0433**	0.0334	0.0208
	(0.0164)	(0.0214)	(0.0236)	(0.0244)	(0.0154)	(0.0218)	(0.0230)	(0.0250)
	1,384	1,384	1,384	1,384	890	890	890	890
(2) Hypertension	0.0157	0.0298	0.0442	0.0787**	0.0227	0.0562*	0.0546*	0.0868**
	(0.0213)	(0.0337)	(0.0368)	(0.0378)	(0.0204)	(0.0339)	(0.0329)	(0.0405)
	628	628	628	628	404	404	404	404
(3) Mental	0.0628	0.109**	0.00985	-0.0493	0.0702	0.169***	0.0423	0.00195
	(0.0517)	(0.0550)	(0.0625)	(0.0635)	(0.0544)	(0.0608)	(0.0704)	(0.0677)
	233	233	233	233	151	151	151	151
(4) Arthritis	0.0510	0.0494	0.0461	0.0154	0.0503	0.0463	0.0623	0.0439

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Table 4 – Continued

	Full Sample				Married Only Sample			
	0 Mo	6 Mos	12 Mos	24 Mos	0 Mo	6 Mos	12 Mos	24 Mos
	(0.0334)	(0.0497)	(0.0511)	(0.0570)	(0.0386)	(0.0528)	(0.0546)	(0.0608)
	306	306	306	306	197	197	197	197
Panel B. Dependent Variable: % Change in Hours Worked, Conditional								
(1) All Diagnoses	3.138**	3.964**	4.552**	5.350**	3.271**	3.951**	4.674**	4.714**
	(1.444)	(1.732)	(1.937)	(2.090)	(1.450)	(1.726)	(1.975)	(2.044)
	1,328	1,282	1,259	1,249	861	829	821	810
(2) Hypertension	4.345**	6.221**	3.376	1.391	4.802**	6.558**	3.547	2.311
	(2.147)	(2.818)	(3.147)	(3.450)	(2.274)	(2.736)	(3.247)	(3.289)
	613	588	579	577	396	381	382	372
(3) Mental	4.134	1.754	0.884	2.273	6.180*	1.387	1.417	4.457
	(3.474)	(3.787)	(4.538)	(5.171)	(3.715)	(3.564)	(4.859)	(5.525)
	215	213	208	206	140	138	135	133
(4) Arthritis	0.384	0.166	6.754	13.38***	1.553	-1.049	3.348	11.74**
	(3.945)	(4.676)	(5.095)	(3.039)	(4.803)	(5.365)	(5.494)	(0.0369)
	282	281	277	190	182	181	180	296
Panel c. Dependent Variable: Change from Full-time to Part-time, Conditional								
All Diagnoses	-0.0454***	-0.0350**	-0.0395**	-0.0401*	-0.0444**	-0.0395**	-0.0411**	-0.0422**
	(0.0167)	(0.0155)	(0.0170)	(0.0209)	(0.0179)	(0.0165)	(0.0173)	(0.0212)
	1,328	1,282	1,259	1,249	861	829	821	810
(2) Hypertension	-0.0640**	-0.0610**	-0.0576**	-0.0224	-0.0683**	-0.0750***	-0.0632**	-0.0326
	(0.0253)	(0.0239)	(0.0257)	(0.0322)	(0.0275)	(0.0239)	(0.0274)	(0.0300)
	613	588	579	577	396	381	382	372
(3) Mental	-0.0825	-0.0462	-0.0320	-0.0141	-0.0911	-0.0733	-0.0252	-0.0492
	(0.0499)	(0.0438)	(0.0483)	(0.0640)	(0.0562)	(0.0471)	(0.0553)	(0.0683)
	215	213	208	206	140	138	135	133
(4) Arthritis	0.0125	0.0101	-0.0520	-0.0822*	0.00521	0.00228	-0.0529	-0.0772
	(0.0369)	(0.0281)	(0.0390)	(0.0432)	(0.0391)	(0.0382)	(0.0458)	(0.0512)
	296	282	281	277	190	182	181	180

Notes: For each item in each panel, the number in first row is the estimated coefficient. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The second row contains the standard errors (in parentheses) while the third row contains the number of observations. Control variables are included in the estimation.

fully employed compared to workers with coverage from spouse's employer. The results show that the coefficients estimated for "Full" and "Married Only" samples for workers with all types of diagnosis are negative. The coefficients are significant at conventional levels across all periods. Since full employment is usually required to be eligible for ESI, this supports the hypothesis that workers with ESI tend to remain fully employed to keep health insurance.

Conditional on remaining employed, the effects of ESI for workers with hypertension diagnosis on the probability of becoming part-time workers are relatively larger than the pooled sample and are significant at the 5% level of significance 0, 6 and 12 months after diagnosis but declines after that (see Panel C (2)). The effects on workers with mental disorders are also

negative but insignificant (see Panel C (3)). For workers with arthritis, β is positive 0 and 6 months after diagnosis. The ESI effects surface 12 and 14 months although only significant for the "Full" sample and not in the "Married Only" sample. (see Panel C (4)).

5.2.4 Controlling for Limitation

Table 5 presents the estimates for Equation 3 using all workers with all types of diagnoses. It shows the main effects of ESI on the three labor supply indicators, the main effect of having limitation and the interactive effect of having a limitation and ESI.

Using the "Full" and "Married Only", the main effect of having ESI on remaining employed seems to be very similar to the estimates when the limitation is not controlled for (compare Tables 5 Panel A (1) and 4 Panel A (1)). One difference is that the main effect does not decline 24 months after diagnosis while this coefficient is lower if the limitation is not controlled for. This implies that having a limitation may play a role in the muted effect of ESI on remaining employed 24 months after diagnosis. As expected, the main effect of having a limitation on the probability of remaining employed is negative and significant in most periods (Table 5 Panel A (2)). The coefficient also increases with time which implies that workers with limitation face increasing threat of being physiologically not able to work as time passes.

Looking at the interactive effects of ESI and limitation in the "Full" sample, the sign is mostly negative which means that workers with ESI and limitation, the "limitation effect" is stronger than the ESI "hour lock" effect (Table 5 Panel A (3)). As in the main effect of "limitation", the coefficient of the interaction of ESI and limitation is also increasing with time and is significant 12 and 24 months after diagnosis. The results for the "Married Only" sample are similar to the "Full" sample although some coefficients are no longer significant in this sample.

Table 5: Estimated Coefficient of ESI With Work Limitation Control

	Full Sample				Married Only Sample			
	0 Mo	6 Mos	12 Mos	24 Mos	0 Mo	6 Mos	12 Mos	24 Mos
Panel A. Dependent Variable: Employment								
(1) ESI	0.0211	0.0456**	0.0327	0.0405*	0.0180	0.0351	0.0208	0.0325
	(0.0165)	(0.0208)	(0.0235)	(0.0245)	(0.0161)	(0.0222)	(0.0236)	(0.0257)
(2) Limitation	-0.341***	-0.218***	-0.0872	-0.0962**	-0.0962**	-0.361***	-0.240***	-0.0829
	(0.0566)	(0.0639)	(0.0667)	(0.0433)	(0.0433)	(0.0599)	(0.0638)	(0.0694)
(3) ESI*Limitation	-0.00991	0.00898	-0.130*	-0.251***	0.0627	0.115	-0.0249	-0.204**

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Table 5 – Continued

	All				Married			
	0 Mo	6 Mos	12 Mos	24 Mos	0 Mo	6 Mos	12 Mos	24 Mos
	(0.0500)	(0.0631)	(0.0712)	(0.0744)	(0.0520)	(0.0719)	(0.0766)	(0.0834)
N	1,272	1,272	1,272	1,272	815	815	815	815
Panel B. Dependent Variable: % Change in Hours Worked, Conditional								
(1) ESI	3.217**	3.242*	4.238**	4.799**	3.469**	3.592**	4.358**	4.299**
	(1.525)	(1.823)	(2.019)	(2.167)	(1.531)	(1.809)	(2.066)	(2.147)
(2) Limitation	-8.119**	-5.939	-1.897	-10.03*	-5.847	-2.766	-0.0842	-9.894*
	(3.730)	(5.004)	(5.267)	(5.300)	(3.691)	(4.910)	(5.347)	(5.199)
(3) ESI*Limitation	4.712	1.648	-3.717	2.415	1.719	-6.111	-4.669	3.522
	(4.167)	(5.603)	(6.019)	(6.134)	(4.437)	(5.870)	(6.529)	(6.528)
N	1,295	1,250	1,229	1,222	836	805	799	790
Panel A. Dependent Variable: Change from Full-time to Part-time Employment, Conditional								
(1) ESI	-0.0293*	-0.0176	-0.0255	-0.0245	-0.0346*	-0.0308*	-0.0325*	-0.0299
	(0.0175)	(0.0160)	(0.0177)	(0.0219)	(0.0189)	(0.0169)	(0.0180)	(0.0222)
(2) Limitation	0.208***	0.153***	0.175***	0.256***	0.161***	0.0929**	0.129***	0.225***
	(0.0429)	(0.0440)	(0.0463)	(0.0535)	(0.0456)	(0.0458)	(0.0466)	(0.0538)
(3) ESI*Limitation	-0.172***	-0.0973**	-0.152***	-0.224***	-0.105*	0.0363	-0.0998*	-0.203***
	(0.0480)	(0.0493)	(0.0529)	(0.0619)	(0.0548)	(0.0548)	(0.0570)	(0.0675)
N	1,295	1,250	1,229	1,222	836	805	799	790

Notes: For each item in each panel, the number in first row is the estimated coefficient of ESI. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The second row contains the standard errors (in parentheses). Control variables are included in the estimation.

For those workers who remained employed after the diagnosis, workers with ESI and no limitation still tend to exhibit less reduction in labor hours worked even controlling for limitation (Table 5 Panel B (1)). While limitation significantly and negatively affects labor hours, there is no clear pattern for the effects of ESI on the change in labor hours for workers who do have a limitation (Table 5 Panel B (2) and (3)). The main effect of ESI on the likelihood of becoming partially-employed are all negative, implying that workers with ESI tend to become partially employed during and after diagnosis (Table 5 Panel C (1)). This is significant 0, 6 and 12 months after diagnosis for the "Married only" sample and is only significant 0 months after diagnosis for the "Full" sample. Again, the main effects of having limitation are opposite the effect of ESI and strongly significant at all periods in both samples. For workers who have remained employed and have a limitation, having ESI seems to constrain them from becoming partially employed since the interactive effects of ESI and limitation are negative and all significant in the "Full" sample and mostly significant in the "Married Only" sample.

5.2.5 Controlling for Intensity of Dependence on ESI

Table 6 also shows the estimates for Equation 4 which tests whether newly diagnosed workers whose employers also cover insurance of their spouse and/or child are more locked in their jobs than workers who have ESI but no dependents. The estimated coefficients of ESI for those with or without dependents are all positive if the dependent variables are the probability of remaining employed and change in mean work hours while the estimated coefficients are mostly negative if the dependent variable is the probability of becoming part-time workers.

The signs of the coefficients in Table 6 supports the findings discussed earlier that having ESI incentivizes workers – with or without dependents to remain employed to keep health insurance. Using an F-test, I test the null hypothesis that there is no statistical difference between the estimated coefficient for workers with no dependents and the estimated coefficient for workers with dependents. The p-values for almost all of the F-tests in Table 6 is greater than 10%. Thus, I do not not reject the null hypothesis. This means that there is no difference in "job/hour lock" effects of ESI between ill workers with dependents and ill workers with no dependents.

Table 6: Estimated Coefficient of Indicators of ESI Dependency Level

	All				Married			
	0 Mo	6 Mos	12 Mos	24 Mos	0 Mo	6 Mos	12 Mos	24 Mos
A. Dependent Variable: Employment								
(1) Only Worker Depends ESI	0.0144	0.0336	0.0359	0.00947	0.00842	0.0317	0.0376	0.0185
	(0.0198)	(0.0258)	(0.0285)	(0.0294)	(0.0201)	(0.0284)	(0.0300)	(0.0326)
(2) Spouse/Child also depend on ESI	0.0221	0.0456**	0.0338	0.0163	0.0253	0.0474**	0.0336	0.0143
	(0.0172)	(0.0224)	(0.0247)	(0.0255)	(0.0163)	(0.0230)	(0.0243)	(0.0265)
N	1,384	1,384	1,384	1,384	890	890	890	890
Ho: (1) = (2)								
F-test p-value	0.6046	0.5352	0.9213	0.7553	0.3351	0.5261	0.8807	0.8839
B. Dependent Variable: % Change in Hours Worked, Conditional								
(1) Only Worker Depends ESI	3.122*	4.638**	2.593	3.691	1.907	3.193	1.522	1.957
	(1.744)	(2.101)	(2.340)	(2.513)	(1.889)	(2.267)	(2.566)	(2.655)
(2) Spouse/Child also depend on ESI	2.877*	3.110*	4.742**	4.775**	3.490**	3.595**	5.236**	4.268**
	(1.508)	(1.808)	(2.021)	(2.183)	(1.527)	(1.817)	(2.078)	(2.154)
N	1,328	1,282	1,259	1,249	861	829	821	810
Ho: (1) = (2)								
F-test p-value	0.8501	0.3239	0.2124	0.5621	0.3340	0.8371	0.0928	0.3186
C. Dependent Variable: Change from Full-time to Part-time, Conditional								
(1) Only Worker Depends ESI	-0.0429**	-0.0338*	-0.0312	-0.00140	-0.0374	-0.0428**	-0.0280	0.00169
	(1.744)	(2.101)	(2.340)	(2.513)	(1.889)	(2.267)	(2.566)	(2.655)
(2) Spouse/Child also depend on ESI	-0.0442**	-0.0305*	-0.0407**	-0.0292	-0.0436**	-0.0310*	-0.0417**	-0.0299
	(1.508)	(1.808)	(2.021)	(2.183)	(1.527)	(1.817)	(2.078)	(2.154)
N	1,328	1,282	1,259	1,249	861	829	821	810

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Table 6 – Continued

	All				Married			
	0 Mo	6 Mos	12 Mos	24 Mos	0 Mo	6 Mos	12 Mos	24 Mos
Ho: (1) = (2)								
F-test p-value	0.9295	0.8110	0.5309	0.1365	0.7601	0.5273	0.4804	0.1873

Notes: For each item in each panel, the number in first row is the estimated coefficient of ESI. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The second row contains the standard errors (in parentheses). Other control variables are included in the estimation.

6 Conclusion

This paper finds evidence that the current system wherein most of the workers (and their family members) are dependent on their employers for their health coverage creates incentives for ill workers to remain fully employed and to reduce their hours by less. This is the case even if the sample used in this paper covers mostly mild illnesses (unlike in past research that focuses on severe illnesses) and may imply that severe cases tend to have even more severe consequences. Having ESI leads to employment and hour lock despite the existence of legislative measures that were intended to protect workers from the dangers of losing ESI.

The main advantage of this study over previous work is that it is not confined to a single state and single illness which does not limit generalizability. However, there are also limitations to this study. Since the source of health insurance is not randomly assigned, dissimilarities between workers with ESI and coverage from spouse's employer may still occur, and I cannot completely rule out the possibility of having biased estimates.

As the debate on the US health insurance system continues to be on center stage, research on the effects of ESI can timely shed light on the advantages and disadvantages of the current system. "Job lock" and/or "hours lock" may be disadvantageous if it prevents employees from doing the necessary adjustments in response to their health conditions. In the long run, workers who became locked up may be less productive relative to workers who were not locked up. This potential loss in productivity may be more costly from the perspective of the employer and for society, as a whole.

Areas for future study include verifying the long-run existence of job lock as well as long-run effects of job lock on the health of workers. Since the ACA prohibits premium rating based on pre-existing conditions in the individual markets, it is also worth investigating how the ACA changes the effect of ESI on sick workers' willingness to remain employed sufficiently.

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