Environmental Risk Factors, Health and the Labor Market Response of Married Men and Women in the United States

by

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WP 07-08

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April 20, 2009

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[♣] I thank participants at the 2008 EAERE conference in Gothenburg, and in seminars at University of Maryland, University of Nevada, and Vrije University Amsterdam for helpful comments. I am grateful to Ray Kuntz and the Agency for Healthcare Research and Quality that gave me access to the data for my research. All remaining errors and omissions are my own.

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Abstract

Cost-benefit analyses of health and safety regulations require estimates of the benefits of reducing pollution, and hence the risks of pollution-caused illnesses. Lost work income constitutes an important component of monetized benefits. This paper examines the impact of married men and women's health conditions potentially caused or exacerbated by environmental exposures on their labor force participation, hours of work, and weekly earnings. I focus on cancer, stroke, ischemic heart disease, emphysema, chronic bronchitis, chronic obstructive pulmonary disease and asthma. The analysis is based on data from the Medical Expenditure Panel Survey for U.S. households from 1996 to 2002.

Keywords: Cost-benefit analysis; Earnings; Environmental health conditions; Labor force participation; Labor supply.

JEL Classification: D61, I10, J21, J22, J30

1. Introduction

Many studies have shown an association between environmental exposures and certain health conditions.[1] For example, exposure to fine particulate matter ($PM_{2.5}$) or carbon monoxide has been associated with an increased number of hospitalizations and doctor visits due to cardiovascular problems and respiratory diseases (U.S. Environmental Protection Agency, EPA 1996b and 2000). Exposure to indoor and outdoor pollution (e.g., dust, tobacco smoke, particulate matter) has been shown to exacerbate asthma (Institute of Medicine, 2000; U.S. EPA, 1996a and 1996b). Other examples include radon and lung cancer (U.S. EPA, 1999a) and arsenic and cancer in several organs (Morales et al., 2000). Some effects on health (e.g., eyes irritation) are short-term and reversible; other health conditions such as emphysema, stroke, ischemic heart disease and cancer are more serious and they may have permanent effects.

A goal of many government agencies is to protect the health of the citizens from environmental pollutants through the implementation of specific regulations.[2] In regulatory impact analyses of health and safety regulations it is often necessary to monetize the benefits of reducing cases of heart disease, respiratory illness and cancer in order to answer questions such as "Which health problems should be address first and what intervention should be used in order to alleviate them?" "Are the benefits of a government program worth its costs?" This occurs, for example, in U.S. EPA analyses of

[1] Studies that show an association between environmental exposure and certain health conditions include Doll and Peto (1981); Abbey et al. (1993 and 1995); Schwartz (1993); Ponka and Virtanen (1994); Dockery (2001); Peters et al. (2001); Pope et al. (2002, and 2004); Chen et al. (2005); Sullivan et al. (2005); and Miller et al. (2007).

[2] Many environmental statutes and associated regulatory programs have been established to protect human health, such as the Clean Air Act of 1970, the Safe Drinking Water Act of 1974, and the Superfund program of 1980 in the United States.

drinking water regulations, which often affect cancers (U.S. EPA, 1999b), and air pollution regulations, which reduce heart and lung diseases (U.S. EPA, 1999b and 2005).

Estimates of the labor market impacts of diseases related to environmental exposures constitute an important component of monetized benefits. More generally, policy makers are concerned about the consequences of serious illnesses and chronic conditions that may prevent people from working or reduce their earnings if they do work. Estimates of the magnitude of these effects are important in designing social programs such as the Old Age, Survivors and Disability Insurance program (OASDI) in the United States.

This study examines the effects of married men and women's health conditions potentially caused or exacerbated by environmental exposures on their (i) labor force participation, (ii) earnings, and (iii) hours of work. I focus on the impact of cancer, stroke, ischemic heart disease, emphysema, chronic bronchitis, chronic obstructive pulmonary disease (COPD) and asthma on the labor market decisions of married men and women of working age (under the age of 65). These illnesses were selected based on their possible association with environmental pollutants and on the anticipated future need of government agencies to monetize the benefits of reducing cases of heart disease, respiratory illness and cancer.

The analysis is based on recent data from the Medical Expenditure Panel Survey (MEPS) for U.S. households from 1996 to 2002. MEPS is unique for its overlapping panel design and for the detailed economic and health information it contains. Health conditions are identified by International Classification of Diseases (ICD9) codes, and for each health condition the date when the condition began is provided. This information allows me (i) to identify health conditions potentially caused or exacerbated by

environmental exposures; and (ii) to examine how the duration of an illness affects labor market decisions and performance. Cropper and Krupnick (1998) emphasize that "One might hypothesize that the longer one has had the disease the longer he has had to adjust to it; hence, labor market effects should diminish with duration. On the other hand, for progressive diseases, e.g., emphysema, the longer one has had the disease the more serious it is likely to be." Finally, I use matching techniques to control for observed differences between ill and healthy individuals.

Most of the literature that studies the effects of health on labor market decisions focuses on the effects of an individual's "health status," "work limitation" or "disability status."[3] For cost-benefit analyses of specific environmental, health or safety policies, it is necessary to focus on particular health conditions.[4] Among the studies that have examined the effects of specific diseases, most have focused on mental health problems (e.g., Bartel and Taubman, 1986; Ettner et al., 1997; Grzywacz and Ettner, 2000) and diabetes (e.g., Kahn, 1998; Bastida and Pagan, 2002; Brown et al., 2005).

The few studies that do examine the labor market impacts of potentially environmentally-related health conditions such as respiratory and circulatory diseases are based on old data on white men from the 1970s (Bartel and Taubman, 1979; Cropper and Krupnick, 1989) or they consider broad categories such as "heart disease" (Wilson, 2001; Zhang et al., 2009). In addition, the latter studies focus only on labor force participation, and they do not control for the duration of the disease.[5]

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[3] For example, Luft (1975); Parsons (1977); Chirikos and Nestel (1984 and 1985); Anderson and Burkhauser (1984); Baldwin and Johnson (1994); Baldwin et al. (1994); Haveman et al. (1994); Loprest et al. (1995); Campolieti (2002); Cai and Kalb (2006).

[4] In particular, U.S. EPA studies of the costs and benefits of the Clean Air Act (U.S. EPA, 1997 and 1999a) and the Clean Air Interstate Rule (U.S. EPA, 2005) value the benefits from reducing stroke, coronary heart disease, hypertension, congestive heart failure, ischemic heart disease, chronic obstructive pulmonary disease, pneumonia, and asthma.

[5] For completeness, it should be mentioned that there are other studies that control for specific diseases in explaining labor force participation, but it is beyond their scope to look at the effects of the specific

My results suggest that with the only exceptions of chronic bronchitis and chronic obstructive pulmonary disease, all the health conditions here examined significantly reduce the probability that a married man participates in the labor force, although the effects differ by disease and duration of the illness. Stroke and emphysema have the largest negative effects (-29% and -23%, respectively). I also find that the relationship between the duration of a married man's health condition and the probability of being in the labor force is *U*-shaped, in particular for people who have had a stroke or cancer. This might be due to the fact that for the people that survived the illness could have become chronic and they adjusted to it. All the examined health conditions also significantly affect the probability of a married woman to be part of the labor force, but the effect is comparatively small, for example -5.1% if she has had a stroke and -3.5% if she has had emphysema.

Among married men who are working, I find a reduction in earnings by 21.8% if a married man has had ischemic heart disease for less than one year, and by 48.7% if he has had emphysema for less than one year. To illustrate, having had emphysema for less than one year reduces the earnings of a man with a college degree to those of a healthy man without high school diploma. If instead I consider married women I find that the only health condition that affects their earnings is stroke (-28.7%).

Finally, only emphysema and chronic bronchitis affect the number of hours of work of a married man, and only stroke negatively affects the hours of work of a married

conditions on labor force participation. Their main purpose is to test for different measures of work disability. For example, Stern (1989) presents no discussion of the effects of specific diseases on the probability of participation in the labor market, and he considers aggregate categories such as "breathing" and "heart and circulation." This reflects the main goals of the paper that are to estimate the effect of disability on labor force participation by using specific disease variables as instruments and to test for the endogeneity of the disability status. Similarly, Kreider (1996) uses physician-diagnosed health conditions as instruments for disability. He considers fifteen conditions including cancer, heart disease, stroke, lung and asthma. However, the main purpose of the study is to assess the degrees to which various groups of nonworkers may overreport limitation, and how reporting bias may affect inferences about the effect of disability on participation decisions.

woman. If a married man has had emphysema for less than one year then he experiences a reduction by 4.6 hours of work per week. To put things in perspective, in a month this is equivalent of one less part-time workweek. If instead a married woman had a stroke less than one year ago she experiences a reduction by about 9 hours of work per week, that is about a full time week per month.

The reminder of this paper is organized as follows. Section 2 describes the data and the sample selection. Section 3 develops the empirical models. Section 4 presents the results, and Section 5 concludes.

2. Data Description

To estimate the effect of a married adult's illness on his/her labor force participation, earnings, and hours of work I use the Medical Expenditure Panel Survey for U.S. households from 1996 to 2002. MEPS began in 1996 and it is characterized by an overlapping panel design: each year a new panel of households is introduced into the survey. There are five rounds of data collection over the course of a two-year period of time. Data are collected at the individual and household levels. All data are reported in person by a single respondent for the household in the course of a personal interview.

MEPS is unique for its detailed information on employment (e.g., labor force status, weekly hours of work, hourly wages), demographic characteristics of both spouses, and on specific health conditions. Health conditions are identified by International Classification of Diseases (ICD9) codes. An individual in the sample is considered to have a condition if (i) during the interview it has been reported that he/she has the condition; (ii) if the individual's disability days (e.g., missing days of work, spending days in bed) are related to the condition; or (iii) if the individual had an event associated with the condition, such as a hospital inpatient stay, an emergency room visit,

an outpatient visit, an office-based provider visit, prescription medicine purchases, or other medical expenses. Health care providers (doctors, hospitals and home health agencies) are contacted by telephone to supplement or replace household-reported information that household respondents could not accurately provide. This information and the use of specific diseases instead of a general health measure reduce the potential measurement error.

Certain conditions are a priori coded as "priority conditions," due to their prevalence, expense, or relevance to policy, using a list provided by the sponsor agency AHRQ (Agency for Healthcare Research and Quality).[6] For each of the "priority conditions" the date when the condition began is provided. This information allows me to infer how long the individual has had the condition.

Finally, to fully account for all factors affecting participation in the labor force and work hours, I merge MEPS data with community socioeconomic variables measured at the county level, such as the unemployment rate in the household's county of residence, and annual average weekly wage in the household's county of residence. This information is drawn from the Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW) program and Local Area Unemployment Statistics (LAUS) program (BLS 2007a, 2007b). All dollar values are converted to 2002 dollars using the annual average Consumer Price Index (BLS, 2007c).

[6] Some of the "priority conditions" are long-term life-threatening conditions, such as cancer, diabetes, emphysema, high cholesterol, HIV/AIDS, hypertension, ischemic heart disease, and stroke. Others are chronic manageable conditions, including arthritis, emphysema, chronic bronchitis, COPD, asthma, gall bladder disease, stomach ulcers, and back problems. The list of "priority conditions" also includes mental illnesses.

2.1 Sample Selection

My analysis is based on years 1996-2002. The initial sample includes 174,126 observations.[7] I select only married couples with both husband and wife present in the household (10,674 observations deleted and sample size of 163,452). I also exclude couples (i) where both partners are disabled (1,934 observations deleted and sample size of 161,518 observations) or (ii) retired (19,284 observations deleted and sample size of 142,234 observations), (iii) at least one of the spouses is a student (1,622 observations deleted and sample size of 140,612 observations) or (iv) at least one of the spouses is less than 18 years old (166 observations deleted and sample size of 140,446 observations)[8]

I further drop the observations where education or income of at least one of the spouses is missing (10,216 observations deleted and sample size of 130,230 observations). In order to estimate the effect of an individual health condition on own labor market decisions, I build two samples. The first sample includes only men of working age (less than 65 years old) married with a woman older than 18, and it has 58,029 observations (13,355 individuals). The second sample includes only women of working age (less than 65 years old) married with a man older than 18, and it has 60,216 observations (13,873 individuals). Tables 1 and 2 present the descriptive statistics of the sample of married men in working age with a wife older than 18 and the sample of married women with a husband older than 18. Tables 1 and 2 show that the sample of ill individuals is characterized by a significant (at 1% significant level) higher proportion of

[7] Note that "observations" refers to the number of married individuals in the sample multiplied by the number of times each is interviewed. Since one of the objectives of my research is to study how specific health conditions affect the earnings of married men and women I exclude the panels with oversampling of low-income households (that is panels 2, 7, 8 and 9). Since the second part of my research studies whether being married to a person with a chronic health condition influences the labor market decisions of the spouse, single persons are excluded. The analysis regarding this second part of my research is presented in a companion paper.

[8] I define as disabled the individual who declared that the main reason why he/she is not working is because he/she is unable to work because ill or "disabled."

white and non-Hispanic individuals than the healthy sample.[9] In addition, an ill married person is significantly older and more educated (at 1% statistical level) than a healthy person.[10]

For the purpose of this study, I have selected cancer, stroke, ischemic heart disease, emphysema, chronic bronchitis, COPD, and asthma because these conditions are relevant to environmental policy (they have been linked with exposure to certain pollutants). An individual is defined as ill if he/she has at least one of these conditions, while he/she is defined as healthy if he/she does not have any of these health conditions. Table A1 in the Appendix provides a definition of each health condition. The variable "cancer" includes non-melanoma skin cancers. However, in order to examine the effect of the most serious types of cancers I create the variable "severe cancer," which excludes non-melanoma skin cancers (ICD9 codes 173 and 233).

Table 3 presents the percentage of married men and women in the two samples with each condition. The most common conditions are cancer, COPD, chronic bronchitis and asthma both for married men and married women of working age. For example, 3.32% of the sample of married men of working age have or have had cancer, 4.46% COPD, 4.09% chronic bronchitis, and 2.41% asthma. About 33% of ill married men (501 married men) and about 39% of ill married women (834 married women) have or have had more than one of the health conditions examined.

Table 4 shows the distribution of the health conditions by round of interview. For example, about 54% of the men with cancer are diagnosed to have this illness during the

[9] The z-statistics for the test of equality of proportions are -7.5101 for white and -20.2114 for non-Hispanic in the sample of married men with a wife older than 18, and -8.3887 for white and -18.3805 for non-Hispanic in the sample of married women with a husband older than 18.

[10] t-test statistics are -33.4376 for age and -7.6312 for education in the married men sample, and -26.7435 for age and -2.8168 for education in the married women sample. Ill individuals are older than the healthy ones because among the health conditions that define a married person as ill I included diseases that are more likely to affect people when they become older (e.g., emphysema and stroke).

MEPS study period. About 46% of the men with cancer report having this illness already during their first MEPS interview, 18% developed cancer between the first and the second round of interview, 15% between the second and the third round of interview, 12% between the third and the fourth round of interview, and 8% between the fourth and fifth round of interview.

2.2 Data Matching

Adapting Angrist (1998) and Angrist and Krueger (1999) to my case and using their notation, let's denote with Y_{i0} for example the earnings of an individual when he/she is healthy, and with Y_{i1} the earnings if instead he/she was ill. Then, since both outcomes, Y_{i0} and $Y_{i1,}$ cannot be observed at the same time for the same individual one option is to focus on the "average treatment effect," $E[Y_{i1} - Y_{i0}]$ (Angrist and Krueger, 1999). However, ill individuals are on average different in their personal characteristics from healthy individuals. As Angrist and Krueger (1999) emphasize, it is unlikely that I obtain a good estimate of the effect of the health condition on earnings by comparing the earnings of ill and healthy individuals. Let's consider the following equation by Angrist and Krueger (1999)

$$E[Y_{1i} \mid D_i = 1] - E[Y_{oi} \mid D_i = 0] =$$
$$E[Y_{1i} - Y_{oi} \mid D_i = 1] + \{E[Y_{oi} \mid D_i = 1] - E[Y_{oi} \mid D_i = 0]\}$$

where D_i is equal to 1 if the individual is ill and 0 if he/she is healthy. The first term in the right hand side of the equation is "the average causal effect" of the health status, $E[Y_{1i} - Y_{oi} \mid D_i = 1]$, while the second term represents the bias caused by using the earning of healthy individuals instead of what ill individuals would have earned if they had not been ill (Angrist, 1998; Angrist and Krueger, 1999).

Ideally, to examine the effect of illness on labor market outcomes one would like to randomly assign the illnesses here studied to individuals, and to compare pre- and post-illness labor market outcomes for those persons who received an illness and those who did not. It is clear that this is not possible, so I sample retrospectively from the cases (ill individuals) and controls (healthy individuals). I implement a matched case-control study by using a data matching algorithm that matches the ill individuals to the healthy individuals by age, education, race and ethnicity (Cook and Campbell, 1979; Shadish et al., 2002). The data matching algorithm consists of the following steps:

1. Define as ill every married individual in the sample with at least one of the following conditions: cancer, severe cancer, stroke, ischemic heart disease, emphysema, chronic bronchitis, COPD or asthma. Define as healthy an individual who does not have any of these conditions.
2. Sort the sub-samples of ill individuals and of healthy individuals by exogenous characteristics of the individual, specifically by age group (age 18-24, age 25-34, age 35-44, age 45-54, age 55-64, age 65 plus), education category (no high school degree, high school degree, some college, college degree), race (white, non-white) and ethnicity (Hispanic, non-Hispanic).
3. Match the ill sub-sample with the healthy sub-sample by age, education, race and ethnicity: in other words, randomly select from each stratum of the healthy sub-sample created in step 2 observations equal to the number of observations of the corresponding stratum of the ill sub-sample.

This data matching algorithm results in the same number of ill and healthy individuals for each combination of age, education, race and ethnicity. In order to study the effect of a person's health condition on own labor market decisions I build two

samples: in the first sample ill married men match healthy married men by age, education, race and ethnicity; in the second sample ill married women match healthy married women by age, education, race and ethnicity. The first sample consists of a total of 3,016 married men (1,508 ill and 1,508 healthy) and 13,347 observations. The second sample consists of a total of 4,246 married women (2,123 ill and 2,123 healthy) and 18,615 observations.

Table 5 presents the descriptive statistics for these two matched samples, and Table 6 the percentage of married men and women by each health condition. For example, 14.72% of the sample of married men have cancer, 18.10% have chronic bronchitis, 19.73% have COPD, and 10.68% have asthma. As Table 6 shows, the rates of cancer, stroke, ischemic heart disease and stroke increase sharply with age, but the rates of chronic bronchitis, COPD and asthma decrease with age[11] As expected, very few cases of stroke, ischemic heart disease and emphysema appear in men less than 35 years old.

For the estimation of the effect of a specific health condition on a married man (or woman)'s earnings and hours of work I use the matched samples just described. I drop self-employed individuals and I select married men (or married women) who participate in the labor market, have a positive number of hours worked per week and positive hourly wages.[12]

[11] The fact that the rates of chronic bronchitis and COPD decrease by age might be related to smoking cessation and asthma reduction. The Centers for Disease Control and Prevention (CDC) cites tobacco smoking and asthma as key factors in the development and progression of COPD and chronic bronchitis (CDC, 2003).

[12] Implicit in the exclusion of self-employed individuals is the assumption that self-employed individuals would be just like a regular employee if I could observe their wages.

3. Overview of the Empirical Models and Estimation Methods

3.1 Labor Force Participation

The first goal of this research is to investigate how the health conditions of married people affect their labor force participation. I estimate a random effects probit where labor force participation (*P*) is the dependent variable. I define an individual as being in the labor force if he identifies himself as currently working, unemployed or looking for a job, or temporarily laid off or on leave. All other individuals are classified as not in the labor force.

I assume that participation is driven by the latent variable *P**:

$$(1) \qquad P^*_{it} = \alpha_0 + \mathbf{C_{j,it}}\boldsymbol{\alpha_1} + \mathbf{X_{m,it}}\boldsymbol{\alpha_2} + \mathbf{X_{f,it}}\boldsymbol{\alpha_3} + \mathbf{X_{h,it}}\boldsymbol{\alpha_4} + \mathbf{Z_{it}}\boldsymbol{\alpha_5} + \mathbf{T_{it}}\boldsymbol{\alpha_6} + \varepsilon_{1,it}$$

where *t* represents the interview round (*t = 1, … ,T,* with T = 5); *m* denotes the husband and *f* the wife. P^*_{it}, which is not observed, represents the propensity of individual *i* (*i = m* if husband and *f* if wife) to participate in the labor market in round *t*. The vector $\mathbf{C_{j,it}}$ includes dummy variables equal to 1 if individual *i* has condition *j* in round *t*; 0 otherwise. Specifications that also include continuous variables for the duration of individual *i*' s health condition *j,* plus companion dummy variables equal to 1 if the duration of condition *j* is missing, 0 otherwise, and quadratic variables of the duration of the health condition *j* are also implemented.[13] The vector $\mathbf{C_{j,it}}$ also includes dummy variables for the presence of mental illness, back problems and arthritis because a significant percentage of individuals have at least one of these conditions, and because previous literature found these illnesses to be important (e.g., Ettner et al., 1997;

[13] Duration refers to the number of years that the individual has had condition *j*.

Grzywacz and Ettner, 2000).[14] $\mathbf{X_{m,it}}$ and $\mathbf{X_{f,it}}$ denote two vectors of husband and wife's demographics, respectively, such as age, age squared and education dummies, whether the individual served in the military, ethnicity and race. $\mathbf{X_h}$ represents the household characteristics, such as number of children in age group 0-5, 6-11 or 12-17; transfer income and non-transfer income in thousands of dollars.[15,16] **Z** is a vector of local labor markets variables, such as the unemployment rate in the county and the annual average weekly wage in the county in hundreds of dollars; it also includes information on the area of residence of the respondent (i.e., if the couple lives in a rural area or small town or in a statistical metropolitan area). **T** is a vector of dummies for the year and month of interview.

As mentioned, P_{it}^* is not observed. What I do observe is whether the individual participates in the labor force. The mapping from the latent propensity to participate in the labor force, P_{it}^*, to the observable P_{it} is

$$P_{it} = \begin{cases} 1 \ if \ P_{it}^* > 0 \\ 0 \ if \ P_{it}^* \le 0 \end{cases}.$$

where P_{it} is equal to 1 if individual *i* participates in the labor market in round *t* and 0 otherwise. On assuming that the error term, $\varepsilon_{1,it}$, is normally distributed, this results in a probit equation. I further assume that the error term is comprised of two components, both of which are normally distributed:

$\varepsilon_{1,it} = \nu_1 + \eta_{1,it}$ and $\varepsilon_{1,it} \sim N(0, \mathbf{V})$.

[14] I do not control for the duration of mental illness, back problems and arthritis because they are not of primary interest in this research and because there is no particular reason to believe that they should be related to exposure to common pollutants.

[15] Transfer income includes person's Social Security Income, alimony income, child support, public assistance, Supplemental Security Income (SSI), Individual Retirement Account (IRA) income, pension income, veteran's income, and other regular cash contributions.

[16] Non-transfer income includes person's interest income, dividend income, sales income, trust/rent income, and refund income.

The term ν_1 is an individual-specific error component that remains unchanged within an individual over time and is independent across individuals; $\eta_{1,it}$ is an i.i.d. error across and within individuals. This means that $\varepsilon_{1,it}$ is a T-variate normal vector with zero means and variance-covariance matrix **V**, where $\mathbf{V}=\begin{bmatrix} 1 & \cdots & \rho \\ \vdots & \ddots & \vdots \\ \rho & \cdots & 1 \end{bmatrix}$. The time-varying and time-invariant independent variables are assumed exogenous with respect to the error term. The resulting model is a random-effects probit. The contribution to the likelihood by each individual is the probability of observing the exact sequence of labor force participation decisions reported by the individual for each of the T survey rounds. This probability is an integral of order *T* of the joint normal density of the errors.[17]

3.2 Weekly Earnings Equation

The second goal of this research is to estimate the effect of a married person's health condition on their own weekly earnings. The equation for weekly earning is defined as follows

(2) $$\ln earn_{it}^{*} = \beta_0 + \mathbf{C_{j,it}}\boldsymbol{\beta}_1 + \mathbf{X_{it}}\boldsymbol{\beta}_2 + \mathbf{X_{h,it}}\boldsymbol{\beta_3} + \beta_4 annww_{it} + \mathbf{T_t}\boldsymbol{\beta_5} + \varepsilon_{2,it}.$$

Because earnings are observed only if the individual works, I specify the following mapping to the observables:

$$\ln earn_{it} = \ln earn_{it}^{*} \; if \; P_{it} = 1, \text{ that is } P_{it}^{*} > 0.$$

[17] The individual's *i* contribution to the likelihood is

$$l_i = \Pr(P_{m1} = p_{m1}, P_{m2} = p_{m2}, ..., P_{mT} = p_{mT})$$
$$= \int_{-\infty}^{\mathbf{x}_1\boldsymbol{\beta}} \int_{-\infty}^{\mathbf{x}_2\boldsymbol{\beta}} ... \int_{-\infty}^{\mathbf{x}_T\boldsymbol{\beta}} \phi(\varepsilon_1, \varepsilon_2, ..., \varepsilon_T) d\varepsilon_T ... d\varepsilon_2 d\varepsilon_1$$

where **X** denotes all the vectors of independent variables included in the participation equation (1) at time 1, 2, … , T.

The dependent variable in equation (2) is the logarithm of the individual *i*'s weekly earnings at round *t*. I construct weekly earnings as the product of the weekly number of hours worked and the hourly wage. Among the independent variables I include the annual average weekly wages by county ($annww_t$), and the vectors $\mathbf{C_{j,it}}$, $\mathbf{X_{it}}$, $\mathbf{X_{h,it}}$, $\mathbf{T_t}$, which are the same vectors that appear in labor force participation equation (1). Experience is approximated by age and education and I do not control for occupation or industry, as these variables are endogenous.

In order to estimate consistent estimates, I account for sample selection by using Heckman's two-step estimation procedure following Wooldridge (1995, 2002 p. 583). For each period *t*, I estimate a cross-sectional probit model of labor force participation with the same explanatory variables of the model described in the previous section, and dependent variable $P_{i,t}$, which is equal to 1 if individual *i* participates in the labor market in round *t* and 0 otherwise. Then, I compute the value of the inverse Mills ratio $\hat{\lambda}_{it} = \frac{\varphi(\mathbf{R_i}\hat{\boldsymbol{\alpha}}_i)}{\Phi(\mathbf{R_i}\hat{\boldsymbol{\alpha}}_i)}$, all *i* and *t*, where $\mathbf{R_i}$ summarizes all the independent variables of equation (1) and $\hat{\boldsymbol{\alpha}}_i$ is the vector of probit coefficients.

Finally, I estimate the following equation by running a pooled OLS regression (Wooldridge, 2002, p. 583):

$$(3)\quad \ln earn_{it} = b_0 + b_1\hat{\lambda}_{i1} + \ldots + b_T\hat{\lambda}_{iT} + \mathbf{C_{j,it}b_{T+1}} + \mathbf{X_{it}b_{T+2}} + \mathbf{X_{h,it}b_{T+3}} + b_{T+4}annww_{it} + \mathbf{T_t b_{T+5}} + e_{1,it}$$

where $\hat{\lambda}_{i1}$ represents the inverse Mills ratio computed at period 1, and $\hat{\lambda}_{iT}$ at period T.

Entering the estimated inverse Mills ratios in the right-hand side of equation (3), however, introduces heteroskedasticity. Because, in addition, the error terms are correlated, I use White's heteroskedastic-consistent covariance matrix modified to obtain a cluster-correlated robust variance-covariance matrix of the coefficients. Wooldridge

(2002) warns that although in principle the first-step probit and the second-step linear regression can contain exactly the same regressors, to ensure identification it is best to include some regressors in the first-step probit that are not part of the vector of regressors in the second-step equation (3). I exclude from earnings equation (3) the metropolitan statistical area dummy, the county's unemployment rate, if the spouses have served in the military, and the demographic characteristics of the spouse of individual *i*.

3.3 Labor Supply Equation

The third goal of this research is to estimate the effect of a married person's health condition on the hours of work. Hours of work are observed only if individual *i* participates in the labor force and is employed. They are function of the hourly wage (w_{it}), of the own health condition *j* ($\mathbf{C_{j,it}}$), of the demographic and household characteristics ($\mathbf{X_i}$, $\mathbf{X_h}$). All variables are defined as in the previous sections with the exception of $\mathbf{X_i}$, which in this case does not include the education of individual *i*.

The structural equation for weekly hours of work is

$$(4) \qquad l_{it}^{*} = \delta_0 + \delta_1 w_{it} + \mathbf{C_{j,it}}\boldsymbol{\delta}_2 + \mathbf{X_{it}}\boldsymbol{\delta}_3 + \mathbf{X_{h,it}}\boldsymbol{\delta}_4 + \mathbf{T_t}\boldsymbol{\delta}_5 + \varepsilon_{3,it}$$

with $l_{it} = l_{it}^{*}\ if\ P_{it} = 1$, that is $P_{it}^{*} > 0$, i.e., I observe work hours only if individual *i* participates in the labor market and is employed. The dependent variable is individual *i*'s weekly hours of work at round *t*. The variable w_{it} represents the individual *i*'s hourly wages at round *t*, which I regard as endogenous. Once again, I assume that the error term contains individual-specific effects that are uncorrelated with the independent variables. As before, following Wooldridge (1995, 2002 p. 583), Heckman's two-step estimation procedure is deployed to account for sample selection, and I apply two-stage least squares (2SLS) to deal with the endogeneity of wages.

The first stage of the 2SLS procedure regresses log husband wages on a set of instruments and sample selection correction terms for all *i* and *t*:

(5) $w_{it} = \mu_0 + \mu_1\hat{\lambda}_{i1} + ... + \mu_T\hat{\lambda}_{iT} + \mathbf{C_{j,t}\mu_{T+1}} + \mathbf{X_{it}\mu_{T+2}} + \mathbf{X_{h,it}\mu_{T+3}} + \mu_{T+4}annww_{it} + \mathbf{T_t\mu_{T+5}} + \zeta_{1,it}$.

The estimated coefficients can be used to form a prediction, $\hat{w}_{it}$. In the second stage, I include the predicted wages ($\hat{w}_{it}$) and the inverse Mills ratios for sample selection in the hours worked equation (4). I finally run a pooled OLS regression on the equation

(6) $l_{it} = d_0 + d_1\hat{\lambda}_{i1} + ... + d_T\hat{\lambda}_{iT} + d_{T+1}\hat{w}_{it} + \mathbf{C_{j,it}d_{T+2}} + \mathbf{X_{it}d_{T+3}} + \mathbf{X_{h,it}d_{T+4}} + \mathbf{T_td_{T+5}} + e_{2,it}$

I use White's heteroskedastic-consistent covariance matrix modified to obtain cluster-correlated robust estimate of variance. For identification, I exclude from the hours of work equation (6), the metropolitan statistical area dummy, the county's unemployment rate, whether the spouses have served in the military, the education level of individual *i*, and the spouse's demographic characteristics.

4. Results

In each of the following tables I analyze two models. Model 1 includes dummy variables denoting the presence or absence of each of the health conditions examined in this paper. Model 2 includes all of the abovementioned dummy variables, plus the health condition's duration, which is the number of years each condition was experienced for, and a quadratic term of the duration of the health condition. Marginal effects are calculated for a married man or woman 47 years old, white, non-Hispanic, and with a high school degree.

A. Labor Force Participation

Table 7 presents the results of the random-effects probit of a married man and a married woman's labor force participation for the health conditions examined and their duration.[18]

Model 1 of Table 7 shows that all the examined health conditions, (cancer, stroke, ischemic heart disease, emphysema, and asthma) reduce a married man's participation in the labor force, with the exception of chronic bronchitis and COPD. As expected, the most severe cancer category (i.e., the category that among the skin cancers considers only melanomas) has a greater negative effect than the cancer category that includes the non-melanoma types of skin-cancers - the effect is a 15 percentage points reduction versus 4.6. Stroke and emphysema have the largest negative effects. Having had a stroke reduces the probability of participating in the labor force by an average of 29 percentage points, while emphysema by an average of 23 percentage points. Smaller effects are associated with asthma (-6.9%) and ischemic heart disease (-9.8%).

Model 2 of Table 7 suggests that the longer a married man has had the health condition the stronger is the negative effect on his labor force participation. However, Model 2 also indicates that the relationship between the duration of a health condition and the probability of being in the labor force is *U*-shaped, in particular for stroke and the the cancer category that includes the non-melanoma types of skin-cancers. This might be due to the fact that for the people that survived the illness could have become chronic and they adjusted to it.

[18] The coefficients of the other control variables are presented in Table A3 in the Appendix. Generally, demographic and household's characteristics affect married men and women's labor force participation in the expected directions. Unlike the existing studies on the effect of own health on individual's labor market decisions, I also control for the spouse's characteristics, such as age, education, race and ethnicity. For example, I find that the wife's race and ethnicity do not affect her husband's labor force participation while her husband race and ethnicity significantly affect her wife's decision to work or not to work, all else the same.

In contrast with the results for married men, all the health conditions examined significantly affect the probability of a married woman to be part of the labor force, but the effect is comparatively small (Table 7). If a married woman has had a severe cancer then the likelihood that she is in the labor force is reduced by 1.6 percentage points, while if she had ischemic heart disease, a stroke or emphysema the percentage reductions are 5.8, 5.1 and 3.5, respectively. In addition, in contrast with the results for married men, the duration of the health condition does not affect her labor force participation (Table 7, Model 2).

The negative effects tied to labor force participation of stroke, ischemic heart disease, and emphysema are consistent with the results of Cropper and Krupnick (1989). However, Bartel and Taubman (1979) do not find any significant effects of heart disease on labor force participation of veteran white men. Wilson (2001) finds that while emphysema and asthma do not affect men's and women's labor force participation heart disease negatively impacts the labor force participation of men and women in New Jersey. In contrast with Wilson (2001) I find a significant effect of asthma and cancer on married men and women's labor force participation. This could be a consequence of the fact that I am also the first to have a relative large percentage of asthmatics and people with cancer in the sample.[19]

B. Labor Productivity

Do health conditions linked with environmental exposures affect the productivity of married people? If so, how large is this effect? I answer these questions by estimating

[19] In my sample about 11% of married men and about 14% of married women have asthma, and about 15% of married men and about 16% of married women have cancer.

weekly earnings equation (3) as described in Section 3.2[20] Table 8 presents the marginal effects of each health condition and of the health condition's duration on a married man's and married woman's earnings.[21]

Model 1 of Table 8 indicates that if I do not control for the duration of the health conditions, none of the examined conditions affect married men's earnings. In contrast, if I control for how long a married man has had the health condition (Model 2), I find a 21.8% reduction in earnings if a married man has had ischemic heart disease for less than one year, and a 48.7% reduction in earnings if he has had emphysema for less than one year. To illustrate, having had emphysema for less than one year is enough to bring the earnings of a man with college degree down to those of a healthy man without high school diploma.

In addition, I find that while in the short term (i.e., less than one year) chronic bronchitis and COPD do not affect a married man's earnings, after one year of illness his earnings decrease. This means, for example, that experiencing chronic bronchitis for two years (i.e., the median duration) reduces earnings by 14.51% and experiences COPD for two years reduces earnings by 9.82%. For comparison, Bartel and Taubman (1979) find significant negative effects on men's earnings for heart disease and the combined category "bronchitis, emphysema and asthma" while Cropper and Krupnick (1989) find that only emphysema and heart attack significantly reduce men's earnings.

If instead I consider married women, as Model 1 of Table 8 shows, I find that all the health conditions examined do not affect their earnings with the exception of stroke, which is slightly significant at the 10% level. A married woman that had a stroke

[20] The coefficients of the non-health variables are shown in Table A4 in the Appendix. For example, among the other regressors, non-whites and Hispanic men tend to earn less (-16% if non-white; -20% if Hispanic); and as expected, the more highly educated a married man is, the higher his earnings.
[21] Tables A5 in the Appendix shows the coefficient estimates.

experiences a 28.7% reduction in her earnings. In addition, as Model 2 of Table 8 shows, for how long a married woman has experienced the illness does not significantly affect her earnings.

C. Labor Supply

As shown by Model 1 in Table 8, the conditions studied here do not affect the number of hours a married man or married woman work. This result may well be driven by the fact that married workers' with the most severe conditions have already dropped out from the labor force. If I control for the duration of the health condition (Model 2) only emphysema and chronic bronchitis affect the number of hours of work of a married man, and only stroke negatively affects the hours of work of a married woman.[22]

If a married man has had emphysema for less than one year then he experiences a reduction by 4.6 hours of work per week. To put things in perspective, in a month this is equivalent of one less part-time workweek. If for example, he has had chronic bronchitis for two years (i.e., the median duration) then he loses two hours per week, that is 100 hours per year. If instead a married woman had a stroke less than one year ago she experiences a reduction by about 9 hours of work per week, that is about a full time week per month. For comparison, Barten and Taubman (1979) find that only the aggregated category "bronchitis, emphysema and asthma" has a negative significant effect on men's weekly hours of work while heart disease has a negative but insignificant effect.

[22] Emphysema seems to increase the number of hours of work of a married woman (about 9 hours per week), however, the number of married women with emphysema is very small (32). These results may drive also the positive effect of COPD on married women's hours of work.

5. Conclusions

Cost-benefit analyses of health and safety regulations require estimates of the benefits of reducing pollution, and hence the risks of pollution-caused illnesses. Lost work income constitutes an important component of monetized benefits.

This paper has explored the impact of specific health conditions previously linked with exposure to environmental pollutants on labor force participation, hours of work, and weekly earnings of married men and women in the United States by using recent data from the Medical Expenditure Panel Survey for U.S. households.

I have found that all the health conditions examined (cancer, stroke, ischemic heart disease, emphysema, and asthma), with the exception of chronic bronchitis and COPD, significantly reduce the probability that a married man participates in the labor force, although the effects differ by disease and duration of the illness. Among the health conditions studied, stroke and emphysema have the largest negative effects. I have also found that in particular for people that have had a stroke or for people with cancer, the relationship between health conditions' duration and married men's labor force participation is a *U*-shaped. The labor force participation decreases until a minimum and then, it starts increasing. Bartel and Taubman (1979) hypothesize that "the diminution of effects may occur because individuals are cured, or have adapted their behavior."

In contrast to married men, the effect of a married woman's health condition on her labor force participation, even if statistically significant, is very small, and the duration of the health condition does not affect her labor force participation. Furthermore, among married men and women who are working, having had one of the health conditions examined does not have a strong effect on own earnings or hours of work, with the exception of ischemic heart disease and emphysema for men, and stroke for

women. This might be due to the fact that married people with the most severe conditions have already decided not to participate in the labor force.

These findings are of importance in informing national health policies, for which it is often necessary to examine the effects of reducing cases of heart disease, respiratory illness and cancer; and more generally, in designing social programs.

In addition, one advantage of this study is that the potential measurement error in the health variables has been limited by using specific health conditions instead of a general health measure. Furthermore, I used a large longitudinal dataset that allowed me to implement a matched-case control study to control for observed differences between ill and healthy individuals.

However, this study has treated the health conditions as exogenous, while there could be potential endogeneity bias due to reverse causality of labor market outcomes on health conditions, and unobserved individual characteristics such as risk preference. “The implicit assumption is that exogenous shocks to health are the dominant factor creating variation in health status, at least in developed countries. This may not be an unreasonable assumption given that current health depends on past decisions and on habits that may be very difficult to break (e.g., smoking, or a preference for a high fat diet), and the fact that individuals often have highly imperfect information about the health production function at the time these decisions are made” (Currie and Madrian, 1999, p. 3313). The implementation of the matched case-control study and the inclusion of individual and family characteristics in the estimated equations may have limited the endogeneity bias. However, the potential of endogeneity bias is noteworthy and should be addressed in future work.

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Table 1 – Descriptive Statistics: Sample of Men 18-64 with a Wife older than 18

	Total Sample		Healthy Married Men		ill Married Men	
Variables	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Dependent Variables						
Husband participating	0.931	0.254	0.936	0.244	0.818	0.386
Husband's Weekly Earnings	861.575	593.531	860.589	595.660	885.141	539.694
Husband's Weekly Hours of Work	44.419	9.895	44.447	9.884	43.754	10.153
Husband's Characteristics						
Age	43.232	10.631	43.003	10.574	47.956	10.726
Age 25-34	0.214	0.410	0.218	0.413	0.127	0.333
Age 35-44	0.313	0.464	0.317	0.465	0.223	0.416
Age 45-54	0.271	0.444	0.269	0.444	0.303	0.460
Age 55-64	0.177	0.382	0.170	0.376	0.334	0.472
Years of education	12.779	3.187	12.763	3.196	13.104	2.985
High-school degree	0.334	0.472	0.334	0.472	0.328	0.469
Some college	0.198	0.398	0.198	0.398	0.199	0.399
College	0.268	0.443	0.266	0.442	0.302	0.459
Non-white	0.138	0.345	0.139	0.346	0.104	0.305
Hispanic	0.220	0.414	0.225	0.418	0.111	0.314
Served in the military	0.208	0.406	0.203	0.402	0.299	0.458
Wife's Characteristics						
Age	41.082	10.494	40.879	10.446	45.278	10.600
Age 25-34	0.245	0.430	0.249	0.432	0.163	0.370
Age 35-44	0.327	0.469	0.331	0.470	0.258	0.438
Age 45-54	0.260	0.439	0.256	0.436	0.337	0.473
Age 55-64	0.112	0.315	0.107	0.309	0.205	0.404
Age 65+	0.006	0.080	0.006	0.078	0.013	0.114
Years of education	12.745	3.043	12.736	3.058	12.933	2.687
High-school degree	0.339	0.473	0.337	0.473	0.362	0.481
Some college	0.231	0.422	0.230	0.421	0.250	0.433
College	0.242	0.428	0.242	0.428	0.231	0.421
Non-white	0.137	0.344	0.139	0.346	0.103	0.304
Hispanic	0.222	0.416	0.227	0.419	0.119	0.323
Served in the military	0.011	0.104	0.011	0.104	0.012	0.109
Household's Characteristics						
Number of children age05	0.399	0.701	0.405	0.705	0.283	0.614
Number of children age611	0.430	0.729	0.435	0.731	0.339	0.664
Number of children age1217	0.401	0.712	0.406	0.716	0.310	0.620
Transfer income/1000	1.190	4.525	1.134	4.417	2.339	6.261
Non-transfer income/1000	1.296	4.763	1.283	4.746	1.562	5.108
Area Characteristics						
Non-MSA	0.224	0.417	0.223	0.416	0.257	0.437
Unemployment rate by county	5.106	2.825	5.113	2.840	4.962	2.487
Average weekly wage by county/100	6.056	1.587	6.061	1.590	5.939	1.519
Total Observations	58,029		52,680		5,349	

Notes: The sample refers to the 1996-2002 MEPS data where I exclude: (i) couples where both partners are disabled or (ii) retired or (iii) where at least one of the spouses is a student or (iv) where at least one of the spouses is less than 18 years old; and (v) married men older than 64. A married man is defined as ill if he has at least one of the following conditions: cancer, stroke, ischemic heart disease, asthma, chronic bronchitis or COPD. A married man is healthy if he does not have any of these health conditions. Tables A1 and A2 in the Appendix respectively present the definition of each condition and of the variables.

Table 2 – Descriptive Statistics: Sample of Women 18-64 with a Husband older than 18

	Total Sample		Healthy Married Women		ill Married Women	
Variables	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Dependent Variables						
Wife participating	0.743	0.437	0.745	0.436	0.723	0.447
Wife's Weekly Earnings	577.016	406.399	575.779	405.634	596.138	417.634
Wife's Weekly Hours of Work	37.850	11.015	37.852	11.009	37.809	11.106
Husband's Characteristics						
Age	44.207	11.583	44.002	11.565	47.341	11.413
Age 25-34	0.206	0.404	0.211	0.408	0.133	0.339
Age 35-44	0.302	0.459	0.304	0.460	0.265	0.441
Age 45-54	0.260	0.439	0.258	0.437	0.300	0.458
Age 55-64	0.166	0.372	0.161	0.368	0.232	0.422
Age 65+	0.043	0.202	0.041	0.199	0.060	0.237
Years of education	12.739	3.224	12.734	3.234	12.812	3.073
High-school degree	0.332	0.471	0.331	0.471	0.351	0.477
Some college	0.195	0.396	0.195	0.396	0.197	0.398
College	0.267	0.442	0.267	0.442	0.263	0.440
Non-white	0.139	0.346	0.142	0.349	0.106	0.307
Hispanic	0.217	0.412	0.222	0.415	0.138	0.345
Served in the military	0.223	0.416	0.219	0.414	0.282	0.450
Wife's Characteristics						
Age	41.671	10.763	41.459	10.742	44.901	10.561
Age 25-34	0.236	0.425	0.241	0.428	0.163	0.370
Age 35-44	0.316	0.465	0.318	0.466	0.289	0.453
Age 45-54	0.256	0.437	0.253	0.435	0.308	0.462
Age 55-64	0.143	0.350	0.138	0.345	0.216	0.412
Years of education	12.714	3.060	12.708	3.072	12.811	2.866
High-school degree	0.339	0.473	0.339	0.473	0.341	0.474
Some college	0.229	0.420	0.229	0.420	0.241	0.428
College	0.239	0.426	0.240	0.427	0.232	0.422
Non-white	0.138	0.345	0.140	0.348	0.107	0.309
Hispanic	0.219	0.413	0.224	0.417	0.136	0.343
Served in the military	0.011	0.102	0.010	0.102	0.012	0.107
Household's Characteristics						
Number of children age05	0.386	0.693	0.393	0.698	0.265	0.593
Number of children age611	0.416	0.720	0.421	0.722	0.337	0.683
Number of children age1217	0.390	0.704	0.392	0.705	0.355	0.684
Transfer income/1000	1.484	5.118	1.443	5.051	2.108	6.020
Non-transfer income/1000	1.343	4.854	1.334	4.825	1.472	5.273
Area Characteristics						
Non-MSA	0.225	0.418	0.224	0.417	0.238	0.426
Unemployment rate by county	5.104	2.807	5.112	2.829	4.982	2.446
Average weekly wage by county/100	6.056	1.593	6.060	1.597	5.995	1.528
Total observations	60,216		52,809		7,408	

Notes: The sample refers to the 1996-2002 MEPS data where I exclude: (i) couples where both partners are disabled or (ii) retired or (iii) where at least one of the spouses is a student or (iv) where at least one of the spouses is less than 18 years old; and (v) married women older than 64. A married woman is defined as ill if she has at least one of the following conditions: cancer, stroke, ischemic heart disease, asthma, chronic bronchitis or COPD. A married woman is healthy if she does not have any of these health conditions. Tables A1 and A2 in the Appendix respectively present the definition of each condition and of the variables.

Table 3 – Married Men and Women's Health Conditions

	Sample of Married Men 18-64 with a Wife Older than 18						Sample of Married Women 18-64 with a Husband Older than 18					
	Total		Health Condition's Duration				Total		Health Condition's Duration			
	Freq.	%	Mean	Median	Min	Max	Freq.	%	Mean	Median	Min	Max
Cancer	444	3.32	3.03	1	0	41	657	4.74	3.24	2	0	24
Sever cancer	326	2.44	2.94	1	0	22	558	4.02	3.22	2	0	23
Stroke	88	0.66	2.76	1	0	23	62	0.45	2.25	1	0	29
Ischemic Heart Disease	225	1.68	4.00	2	0	30	95	0.68	3.15	1	0	21
Emphysema	58	0.43	6.49	4	0	29	32	0.23	3.87	3	0	12
Chronic Bronchitis	546	4.09	4.28	2	0	42	964	6.95	4.24	1	0	55
COPD	595	4.46	5.05	2	0	42	981	7.07	4.22	1	0	55
Asthma	322	2.41	16.98	14	0	63	589	4.25	14.49	9	0	63
Total number of individuals	13,355						13,873					

Notes: The two samples refer to the 1996-2002 MEPS data where I exclude: (i) couples where both partners are disabled or (ii) retired or (iii) where at least one of the spouses is a student or (iv) where at least one of the spouses is less than 18 years old. The first sample also excludes married men older than 64, while the second sample excludes married women older than 64. Health condition's duration refers to the number of years that the individual has had a health condition. Table A1 in the Appendix presents the definition of each health condition.

Table 4 – Married Men and Women's Health Conditions by Round of Interview

Sample of Married Men 18-64 with a Wife Older than 18

	Round of Interview										
Health Condition	**1**		**2**		**3**		**4**		**5**		
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	**Total**
Cancer	205	46.22	79	17.85	68	15.33	54	12.13	38	8.47	444
Severe Cancer	149	45.77	59	18.18	51	15.67	37	11.29	30	9.09	326
Stroke	40	45.98	17	19.54	14	16.09	11	12.64	5	5.75	88
Ischemic Heart Disease	145	64.25	15	6.79	21	9.50	25	11.31	18	8.14	225
Emphysema	44	76.67	7	11.67	2	3.33	2	3.33	3	5.00	58
Chronic Bronchitis	185	33.96	100	18.30	145	26.60	66	12.08	49	9.06	546
COPD	227	38.21	105	17.73	143	24.10	68	11.36	51	8.61	595
Asthma	246	76.27	24	7.46	25	7.80	16	5.08	11	3.39	322

Sample of Married Women 18-64 with a Husband Older than 18

	Round of Interview										
Health Condition	**1**		**2**		**3**		**4**		**5**		
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	**Total**
Cancer	310	47.14	102	15.55	95	14.40	98	14.89	53	8.02	657
Severe Cancer	268	48.08	85	15.19	85	15.19	76	13.65	44	7.88	558
Stroke	28	45.76	14	22.03	7	11.86	9	15.25	3	5.08	62
Ischemic Heart Disease	57	59.55	15	15.73	16	16.85	5	5.62	2	2.25	95
Emphysema	23	71.88	3	9.38	0	0.00	3	9.38	3	9.38	32
Chronic Bronchitis	325	33.66	169	17.55	244	25.28	116	12.03	111	11.48	964
COPD	343	34.96	170	17.32	241	24.57	117	11.90	110	11.26	981
Asthma	464	78.82	44	7.55	42	7.18	21	3.50	17	2.95	589

See notes of Table 3.

Table 5 – Descriptive Statistics of the Matched Samples

	Married Men		Married Women	
Variables	Mean	Std. Dev.	Mean	Std. Dev.
Dependent Variables				
Individual participating	0.881	0.324	0.746	0.435
Weekly Earnings	921.797	699.389	574.527	391.109
Weekly Hours of Work	44.119	10.123	37.503	10.972
Husband's Characteristics				
Age	47.312	10.494	46.798	11.389
Age 25-34	0.132	0.338	0.143	0.350
Age 35-44	0.234	0.423	0.278	0.448
Age 45-54	0.311	0.463	0.290	0.454
Age 55-64	0.311	0.463	0.222	0.416
Age 65+	-	-	0.054	0.226
Years of education	13.123	3.063	12.866	3.089
High-school degree	0.327	0.469	0.343	0.475
Some college	0.203	0.402	0.201	0.401
College	0.304	0.460	0.270	0.444
Non-white	0.099	0.299	0.109	0.311
Hispanic	0.112	0.316	0.141	0.348
Served in the military	0.287	0.452	0.265	0.441
Wife's Characteristics				
Age	44.749	10.486	44.372	10.462
Age 25-34	0.165	0.371	0.171	0.377
Age 35-44	0.272	0.445	0.298	0.457
Age 45-54	0.338	0.473	0.303	0.460
Age 55-64	0.187	0.390	0.203	0.402
Age 65+	0.011	0.103	-	-
Years of education	12.960	2.847	12.830	2.874
High-school degree	0.345	0.475	0.347	0.476
Some college	0.250	0.433	0.242	0.429
College	0.247	0.431	0.231	0.421
Non-white	0.101	0.301	0.105	0.306
Hispanic	0.131	0.337	0.138	0.345
Served in the military	0.011	0.106	0.009	0.096
Household's Characteristics				
Number of children age05	0.294	0.629	0.288	0.618
Number of children age611	0.334	0.667	0.362	0.693
Number of children age1217	0.322	0.647	0.366	0.680
Transfer income/1000	1.753	5.333	1.833	5.596
Non-transfer income/1000	1.543	5.045	1.498	5.253
Area Characteristics				
Non-MSA	0.250	0.433	0.253	0.435
Unemployment rate by county	4.892	2.406	4.986	2.478
Average weekly wage by county/100	5.988	1.545	5.968	1.532
Total observations	13,347		18,615	

Notes: The matched samples are the result of the application of the data matching algorithm described in Section 2 to the original sample. The original sample refers to the 1996-2002 MEPS data where I exclude: (i) couples where both partners are disabled or (ii) retired or (iii) where at least one of the spouses is a student or (iv) where at least one of the spouses is less than 18 years old. The sample of married men also excludes married men older than 64, while the sample of married women excludes married women older than 64. Table A2 in the Appendix presents the definition of the variables.

Table 6 – Married Men and Women by Health Condition and Age Group

Matched Sample of Married Men 18-64 with a Wife Older than 18												
	Age 18-24		**Age 25-34**		**Age 35-44**		**Age 45-54**		**Age 55-64**		**Total**	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Cancer	2	5.56	21	5.74	60	8.96	148	16.44	213	20.40	444	14.72
Severe Cancer	2	5.56	20	5.46	44	6.57	103	11.44	157	15.04	326	10.81
Stroke	0	0.00	1	0.27	6	0.90	24	2.67	57	5.46	88	2.92
Ischemic Heart Disease	0	0.00	6	1.64	28	4.18	78	8.67	113	10.82	225	7.46
Emphysema	0	0.00	1	0.27	4	0.60	13	1.44	40	3.83	58	1.92
Chronic Bronchitis	12	33.33	103	28.14	167	24.93	137	15.22	127	12.16	546	18.10
COPD	12	33.33	104	28.42	170	25.37	147	16.33	162	15.52	595	19.73
Asthma	7	19.44	58	15.85	90	13.43	105	11.67	62	5.94	322	10.68
Number of married men	36		366		670		900		1,044		3,016	
Matched Sample of Married Women 18-64 with a Husband Older than 18												
	Age 18-24		**Age 25-34**		**Age 35-44**		**Age 45-54**		**Age 55-64**		**Total**	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Cancer	10	10.42	85	12.65	166	13.62	217	17.09	179	18.10	657	15.47
Severe Cancer	10	10.42	83	12.35	152	12.47	173	13.62	140	14.16	558	13.14
Stroke	0	0.00	1	0.15	7	0.57	24	1.89	30	3.03	62	1.46
Ischemic Heart Disease	0	0.00	3	0.45	11	0.90	35	2.76	46	4.65	95	2.24
Emphysema	0	0.00	0	0.00	4	0.33	9	0.71	19	1.92	32	0.75
Chronic Bronchitis	26	27.08	179	26.64	324	26.58	248	19.53	187	18.91	964	22.70
COPD	26	27.08	179	26.64	327	26.83	250	19.69	199	20.12	981	23.10
Asthma	15	15.63	104	15.48	163	13.37	187	14.72	120	12.13	589	13.87
Number of married women	96		672		1,219		1,270		989		4,246	

See notes of Table 5. Table A1 in the Appendix presents the definition of each health condition.

Table 7 –Effects of a Married Man and Woman's Health Condition on Their Own Labor Force Participation

Health Condition	Married Men				Married Women			
	Model 1		Model 2		Model 1		Model 2	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Cancer	-0.7947***	-0.0457	-0.6641	-0.0326	-0.1456	-0.0024	-0.2076	-0.0046
	(0.2527)		(0.4240)		(0.1321)		(0.1468)	
Duration			-0.3679***	-0.0183			-0.0931	-0.0013
			(0.0987)				(0.0857)	
Duration^2			0.0103***				0.0062	
			(0.0038)				(0.0049)	
Severe Cancer	-0.8791***	-0.1520	-0.6132***	-0.1038	-0.1932*	-0.0156	-0.2231*	-0.0198
	(0.1488)		(0.2332)		(0.1004)		(0.1327)	
Duration			-0.1662	-0.0263			0.0844	0.0053
			(0.1125)				(0.0918)	
Duration^2			0.0044				-0.0032	
			(0.0075)				(0.0057)	
Stroke	-4.2336***	-0.2888	-3.2431**	-0.1910	-2.1340**	-0.0510	-1.9639**	-0.0599
	(0.6883)		(1.2993)		(0.9136)		(0.8708)	
Duration			-1.4877***	-0.0819			-0.6644*	-0.0350
			(0.3471)				(0.4029)	
Duration^2			0.0606***				0.0123	
			(0.0171)				(0.0210)	
Ischemic Heart Disease	-1.6172***	-0.0981	-1.3956	-0.0726	-2.3446***	-0.0583	-1.7574***	-0.0518
	(0.4069)		(1.3752)		(0.5143)		(0.6727)	
Duration			-0.3817**	-0.0241			-0.0785	-0.0069
			(0.1855)				(0.3648)	
Duration^2			0.0031				-0.0133	
			(0.0127)				(0.0301)	
Emphysema	-3.4529***	-0.2295	-1.6568	-0.0880	-1.6035**	-0.0347	11.4713	0.0459
	(1.0994)		(2.2814)		(0.7947)		(685.4792)	
Duration			-0.3571	-0.0213			0.7588	0.000004
			(0.3257)				(0.4614)	
Duration^2			0.0047				-0.0579	
			(0.0123)				(0.0402)	
Chronic Bronchitis	0.1675	0.0089	0.2603	0.0118	0.1902*	0.0029	0.2173**	0.0045
	(0.2451)		(0.2769)		(0.1083)		(0.1002)	
Duration			0.0460	0.0005			0.0297	0.0003
			(0.2211)				(0.0635)	
Duration^2			-0.0039				-0.0016	
			(0.0060)				(0.0017)	
COPD	-0.0726	-0.0018	0.1957	0.0088	0.1566*	0.0032	0.2085**	0.0043
	(0.1974)		(0.2689)		(0.0921)		(0.1003)	
Duration			-0.4088***	-0.0200			0.0172	0.0001
			(0.1491)				(0.0566)	
Duration^2			0.0079				-0.0012	
			(0.0048)				(0.0016)	
Asthma	-1.1672***	-0.0688	-1.5388*	-0.0830	-0.3048**	-0.0051	-0.1840	-0.0041
	(0.4360)		(0.8791)		(0.1526)		(0.2120)	
Duration			0.0824	0.0029			0.0325	0.0003
			(0.0851)				(0.0282)	
Duration^2			-0.0007				-0.0007	
			(0.0018)				(0.0006)	

Notes: Marginal effects for the health conditions are for a discrete change of the dummy variable from 0 to 1. They have been calculated for the average married individual in the sample (i.e., 47 years old, white, non-Hispanic, and with a high school degree). Model 1 does not control for the duration of the health condition (i.e., the number of years that the individual has had a health condition); Model 2 controls for the duration of the health condition and it includes a quadratic term of the duration of the health condition (Duration^2). Other covariates include husband's and wife's characteristics, household and area characteristics, dummy variables for the year and month of interview as listed in Table A3 in the Appendix. The samples are the matched sample of married men/women aged 18-64 with wives/husbands older than 18 as described in Section 2. Standard errors clustered on the married individual are in parentheses. * Significant at 10% level; ** Significant at 5% level; *** Significant at 1% level.

Table 8 – Marginal Effects of a Married Man and Woman's Health Condition on Earnings and Hours of Work

Health Condition	Married Men				Married Women			
	Log Weekly Earnings[a]		Weekly Hours of Work[b]		Log Weekly Earnings[a]		Weekly Hours of Work[b]	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Cancer	-0.0541	-0.0454	-0.2413	0.1700	0.0026	0.0272	-0.5402	-0.2877
	(0.0380)	(0.0560)	(0.6490)	(0.9628)	(0.0403)	(0.0465)	(0.6173)	(0.7563)
Duration		0.0021		0.0716		0.0156		-0.1748
		(0.0164)		(0.2591)		(0.0238)		(0.3587)
Severe Cancer	-0.0110	0.0252	0.2503	0.3890	0.0308	0.0270	-0.1745	0.0173
	(0.0456)	(0.0587)	(0.7808)	(1.0170)	(0.0393)	(0.0476)	(0.6527)	(0.7935)
Duration		0.0077		0.2039		0.0002		-0.4932
		(0.0282)		(0.4743)		(0.0247)		(0.3818)
Stroke	-0.0914	-0.0204	-1.4481	-2.2729	-0.3383*	-0.6747	-0.1896	-9.1870*
	(0.1359)	(0.1680)	(1.7155)	(2.2820)	(0.1941)	(0.4549)	(2.6017)	(4.8966)
Duration		-0.0575		-1.0286		0.1097		0.5975
		(0.0698)		(1.3439)		(0.1356)		(2.5870)
Ischemic Heart Disease	-0.0260	-0.2460**	-0.6318	-0.9530	-0.1026	0.0159	-1.6329	-3.5429
	(0.0583)	(0.1254)	(0.8784)	(1.1980)	(0.0942)	(0.1042)	(1.9406)	(2.8815)
Duration		0.0098		-0.3673		-0.0173		0.9171
		(0.0232)		(0.3476)		(0.0661)		(1.1560)
Emphysema	0.0184	-0.6685***	2.0363	-4.6529**	-0.0326	-0.2184	1.9439	9.3434***
	(0.0967)	(0.2370)	(2.6094)	(2.3234)	(0.1717)	(0.1975)	(4.9032)	(3.0384)
Duration		-0.0264		0.5618		-0.0116		-1.3254
		(0.0303)		(0.8370)		(0.0902)		(3.0266)
Chronic Bronchitis	-0.0055	0.0092	0.0171	-0.2370	0.0331	0.0478	0.5854	0.9457*
	(0.0296)	(0.0309)	(0.5323)	(0.5256)	(0.0305)	(0.0328)	(0.5018)	(0.5200)
Duration		-0.0696***		-0.7727**		0.0036		0.0209
		(0.0181)		(0.3077)		(0.0156)		(0.3217)
COPD	0.0020	0.0083	0.1972	-0.2340	0.0342	0.0491	0.4066	1.0324**
	(0.0284)	(0.0310)	(0.5327)	(0.5252)	(0.0304)	(0.0327)	(0.4928)	(0.5166)
Duration		-0.0466***		-0.0808		-0.0034		0.0082
		(0.0166)		(0.4039)		(0.0152)		(0.2939)
Asthma	-0.0453	-0.0302	0.0460	1.1573	-0.0172	0.0679	0.2707	0.2630
	(0.0380)	(0.0645)	(0.7485)	(1.3653)	(0.0388)	(0.0573)	(0.6218)	(1.0741)
Duration		-0.0006		0.0393		0.0025		0.0440
		(0.0032)		(0.0597)		(0.0042)		(0.0700)

Notes: Model 1 does not control for the duration of the health condition. Model 2 controls for the duration of the health condition and it includes a quadratic term of the duration of the health condition (Duration^2). Each model accounts for sample selection by including inverse Mills ratio for each round of interview *t*. Each model also includes dummy variables for the year and month of interview. The samples are the matched sample of married men/women aged 18-64 with wives/husbands older than 18 as described in Section 2. Marginal effects have been calculated by using the estimated coefficients presented in Table A5 in the Appendix. Standard errors are in parentheses and obtained using Delta method.
* Significant at 10% level; ** Significant at 5% level; *** Significant at 1% level.
[a] Other covariates include individual and household characteristics; average weekly wages by county as listed in Table A4 in the Appendix.
[b] Other covariates include individual and household characteristics and predicted hourly wages as listed in Table A4 in the Appendix.

Appendix
Table A1 – Definition of Health Conditions

Chronic condition	ICD-9 Code	Definition
Arthritis	711	arthropathy associated with infections
	730	osteomyelitis, periostitis, and other bone infections
Asthma	493	asthma
Back problems	720-724; 847	dorsopathies; sprains and strains of other parts of back
Cancer	140-149; 160; 230	cancer of head and neck
	150-151; 230	cancer of esophagus; of stomach
	153-154; 159	cancer of colon; of rectum and anus
	155	cancer of liver and intrahepatic bile duct
	157	cancer of pancreas
	152; 156; 158-159; 162	cancer of other GI organs, peritoneum
	162; 231	cancer of bronchus, lung
	162-163; 165	cancer, other respiratory and intrathoracic organs
	170-171	cancer of bone and connective tissue
	172	melanomas of skin
	173; 232	other non-epithelial cancer of skin
	174-175; 233	cancer of breast
	179-180; 182; 233; 795	cancer of uterus; of cervix
	027	cancer of ovary
	181; 183-184	cancer of other female genital organ
	185-186; 233	cancer of prostate; of testis
	188-189	cancer of bladder; of kidney and renal pelvis
	191-192	cancer of brain and nervous system
	193	cancer of thyroid
	201	Hodgkin's disease
	200; 202	non-Hodgkin's lymphoma
	202-208	leukemia
	203	multiple myeloma
	164;190;194-195;234;795;	cancer, other and unspecified primary
	196-198	secondary malignancies
	199	malignant neoplasm without specification of site
	235-239	neoplasm of unspecified nature or uncertain behavior
COPD	491	chronic bronchitis
	492	emphysema
Chronic bronchitis	491	chronic bronchitis
Emphysema	492	emphysema
Ischemic heart disease	410	acute myocardial infarct
	411-413	Other forms of ischemic heart disease; angina pectoris
	414	other forms of chronic ischemic heart disease
Mental illness	319	mental retardation
	291; 303; 305	alcohol-related mental disorders
	292; 304; 305	substance-related mental disorders
	290; 293-294; 310; 331	senility and organic mental disorders
	296; 300; 301	affective psychoses; neurotic disorders; personality disorders
	295; 297-299	schizophrenia and related disorders; other psychoses
	300; 301; 307; 308; 312	anxiety; somatoform; dissociative; personality disorders
	300;302;306;307;309;311;313;315-316	other mental conditions
	308; 312	acute reaction to stress; disturbance of conduct
	290; 293-294	dementias; transient organic psychotic conditions
	300; 309	neurotic disorders; Adjustment reaction
	310	specific nonpsychotic mental disorders following brain damage
	331	other cerebral degenerations
	797	senility without mention of psychosis
Stroke	430	subarachnoid hemorrhage
	432	other and unspecified intracranial haemorrhage
	433-435	precerebral occlusion; transient cerebral ischemia
	436	acute but ill-defined cerebrovascular disease
	437	other and ill-defined cerebrovascular disease
	438	late effects of cerebrovascular disease

Table A2 – Variables Definition

Variable name	Definition
Individual i's Health Conditions	
Health condition *j*	Dummy =1 if individual *i* has or has had health condition *j*; 0 otherwise (*j* = cancer, severe cancer, stroke, ischemic heart disease, emphysema, chronic bronchitis, COPD, asthma)
Duration_health condition	Number of years that the individual has had the health condition
Duration^2_health condition	Duration of the health condition squared
Missing duration health condition	Dummy =1 if duration of the health condition is missing; 0 otherwise
Arthritis	Dummy =1 if individual *i* has arthritis; 0 otherwise
Back	Dummy =1 if individual *i* has back problems; 0 otherwise
Mental	Dummy =1 if individual *i* has mental illness; 0 otherwise
Individual i's Characteristics	
Age	Age of the individual *i*
Age^2	Age of the individual *i* squared
Age 18-24	Dummy = 1 if individual *i* is in the age group 18-24; 0 otherwise
Age 25-34	Dummy = 1 if individual *i* is in the age group 25-34; 0 otherwise
Age 35-44	Dummy = 1 if individual *i* is in the age group 35-44; 0 otherwise
Age 45-54	Dummy = 1 if individual *i* is in the age group 45-54; 0 otherwise
Age 55-64	Dummy = 1 if individual *i* is in the age group 55-64; 0 otherwise
Age 65+	Dummy = 1 if individual *i* older than 64; 0 otherwise
High-school	Dummy = 1 if individual *i* has a high-school degree; 0 otherwise
Some college	Dummy = 1 if individual *i* has some college; 0 otherwise
College	Dummy = 1 if individual *i* has a college degree; 0 otherwise
Non-white	Dummy = 1 if individual *i* is non-white; 0 otherwise
Hispanic	Dummy = 1 if individual *i* is Hispanic; 0 otherwise
Served in the military (*didserved*)	Dummy = 1 if individual *i* served in the military; 0 otherwise
Household Characteristics	
Numage05	Number of children in age group 0-5
Numage611	Number of children in age group 6-11
Numage1217	Number of children in age group 12-17
Transfincome	Transfer income / 1000
NonTransfincome	Non-transfer income / 1000
Area Characteristics	
Non-MSA	Non metropolitan statistical area
Unemployment rate by county	Unemployment rate by county as percentage of the labor force
Wage by county	Average weekly wage by county/100

Table A3 – Coefficients of Non-Health Variables in Labor Force Participation Equations

Independent Variables	**Married Men**		**Married Women**	
	Model 1	Model 2	Model 1	Model 2
Age_f	0.3127	0.1842	4.4676***	4.2970***
	(1.4480)	(1.7763)	(0.6983)	(0.4407)
Age2_f	0.0169	0.0248	-0.6005***	-0.5694***
	(0.1472)	(0.1772)	(0.0788)	(0.0482)
Highschool_f	0.3279	0.3065	1.5883***	1.3839***
	(0.3866)	(0.4079)	(0.2734)	(0.1227)
Somecollege_f	1.6732***	1.7397***	2.2167***	2.0587***
	(0.4508)	(0.4701)	(0.2953)	(0.1403)
College_f	1.8164***	2.0085***	2.9814***	2.8713***
	(0.5097)	(0.5397)	(0.3199)	(0.1647)
Non-white_f	-0.2666	-0.2627	-0.4059	-0.5143**
	(0.5238)	(0.5274)	(0.2924)	(0.2136)
Hispanic_f	0.2482	0.1645	-0.3816	-0.2355
	(0.7058)	(0.6399)	(0.3295)	(0.2116)
Age_m	2.8883	3.2364	-0.1824	-0.3873
	(1.8119)	(2.0735)	(0.5676)	(0.3699)
Age2_m	-0.5642***	-0.5869***	0.0067	0.0296
	(0.1862)	(0.2087)	(0.0568)	(0.0363)
Highschool_m	1.5605***	1.6780***	0.2065	0.2408*
	(0.4164)	(0.4535)	(0.1948)	(0.1241)
Somecollege_m	1.4397***	1.5347***	-0.1280	-0.0581
	(0.4798)	(0.5245)	(0.2198)	(0.1460)
College_m	2.7407***	2.7387***	-0.5861**	-0.5897***
	(0.4838)	(0.5313)	(0.2320)	(0.1555)
Non-white_m	-1.3419**	-1.4427**	0.4920*	0.5935***
	(0.5797)	(0.5980)	(0.2967)	(0.2161)
Hispanic_m	-0.4443	-0.3547	-0.6552**	-0.5071**
	(0.7232)	(0.6846)	(0.3304)	(0.2114)
Numage05	0.4548*	0.5168**	-0.6139***	-0.6530***
	(0.2321)	(0.2289)	(0.0869)	(0.0608)
Numage611	0.3432*	0.3524*	-0.6381***	-0.6460***
	(0.1887)	(0.1973)	(0.0788)	(0.0554)
Numage1217	0.1307	0.1247	-0.3133***	-0.2867***
	(0.1832)	(0.1798)	(0.0758)	(0.0596)
Transfincome	-0.1128***	-0.1129***	-0.0342***	-0.0321***
	(0.0135)	(0.0136)	(0.0077)	(0.0060)
NonTransfincome	0.0346*	0.0334*	-0.0039	-0.0040
	(0.0187)	(0.0180)	(0.0071)	(0.0062)
Didserved_f	-0.0368	-0.1321	0.8942	0.9972**
	(1.0500)	(1.0774)	(0.6432)	(0.4842)
Didserved_m	0.1342	0.2293	0.1861	0.1018
	(0.2889)	(0.3001)	(0.1443)	(0.1017)
Nonmsa	0.1502	0.1962	0.0783	0.1382
	(0.2890)	(0.3082)	(0.1432)	(0.1060)
Unemployment_rate	-0.1435***	-0.1409***	-0.0933***	-0.0900***
	(0.0470)	(0.0464)	(0.0253)	(0.0166)
Wage by county	0.0524	0.0630	0.0318	0.0102
	(0.0883)	(0.0966)	(0.0411)	(0.0304)
Constant	3.6473	3.5321	-2.7513***	-1.9533
	(3.2958)	(5.0460)	(0.7228)	(1.5720)

See notes of Table 7. *_f* denotes the wife and *_m* the husband. Table A1 in the Appendix presents the definition of the variables. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table A4 – Coefficients of Non-Health Variables in Earnings and Hours of Work Equations

Independent Variables	**Married Men**				**Married Women**			
	Log Weekly Earnings		**Weekly Hours of Work**		**Log Weekly Earnings**		**Weekly Hours of Work[b]**	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Invmill1	-0.1403	-0.1481	-0.5126	-0.6897	0.0411	0.0238	2.3082	1.8231
	(0.1084)	(0.1082)	(2.0163)	(2.0243)	(0.1163)	(0.1122)	(1.6255)	(1.5934)
Invmill2	-0.1449	-0.1656	-1.4218	-1.5780	0.0157	0.0097	1.6741	1.5211
	(0.1207)	(0.1211)	(2.1661)	(2.1457)	(0.1323)	(0.1266)	(1.8913)	(1.8326)
Invmill3	-0.0952	-0.0925	-0.3008	-0.3451	0.0652	0.0542	2.1905	2.0914
	(0.1231)	(0.1215)	(2.1127)	(2.0936)	(0.1260)	(0.1233)	(1.8209)	(1.7914)
Invmill4	-0.2549*	-0.2379*	-3.6703	-3.8233*	0.1634	0.1557	2.2854	2.1323
	(0.1403)	(0.1376)	(2.3359)	(2.2882)	(0.1315)	(0.1279)	(1.8441)	(1.8148)
Invmill5	-0.2162	-0.1742	-3.4878	-3.6049	0.2034	0.1842	2.6757	2.3894
	(0.1420)	(0.1421)	(2.3165)	(2.3237)	(0.1347)	(0.1304)	(1.9172)	(1.8710)
Age	1.0640***	1.0617***	5.9500***	1.4481	0.6731***	0.6721***	3.5769*	3.5616*
	(0.1110)	(0.1108)	(2.1182)	(0.9849)	(0.1237)	(0.1228)	(1.9513)	(1.9461)
Age2	-0.1130***	-0.1128***	-0.7181***	5.8615***	-0.0785***	-0.0778***	-0.5951**	-0.5839**
	(0.0129)	(0.0129)	(0.2384)	(2.1281)	(0.0153)	(0.0151)	(0.2360)	(0.2350)
High-school	0.2106***	0.2053***	-	-	0.1654***	0.1604***	-	-
	(0.0423)	(0.0426)	-	-	(0.0440)	(0.0439)	-	-
Somecollege	0.3182***	0.3147***	-	-	0.3789***	0.3757***	-	-
	(0.0484)	(0.0488)	-	-	(0.0508)	(0.0501)	-	-
College	0.6120***	0.6114***	-	-	0.7489***	0.7447***	-	-
	(0.0486)	(0.0486)	-	-	(0.0568)	(0.0557)	-	-
Non-white	-0.1555***	-0.1573***	-0.6509	-0.6045	0.0212	0.0231	1.8412***	1.8153***
	(0.0404)	(0.0409)	(0.7959)	(0.7994)	(0.0356)	(0.0358)	(0.5828)	(0.5814)
Hispanic	-0.1963***	-0.1983***	-1.5718**	-1.5687**	-0.0824**	-0.0803**	-0.6015	-0.5119
	(0.0397)	(0.0398)	(0.6401)	(0.6351)	(0.0393)	(0.0389)	(0.6602)	(0.6581)
Numage05	0.0286	0.0279	0.1075	0.0934	-0.0748**	-0.0737**	-2.2457***	-2.2578***
	(0.0201)	(0.0202)	(0.3622)	(0.3607)	(0.0296)	(0.0295)	(0.4537)	(0.4520)
Numage611	-0.0099	-0.0091	0.0437	0.0460	-0.1215***	-0.1204***	-2.3037***	-2.2984***
	(0.0163)	(0.0165)	(0.3128)	(0.3126)	(0.0259)	(0.0259)	(0.3662)	(0.3656)
Numage1217	-0.0347**	-0.0322*	-0.2128	-0.2343	-0.0984***	-0.1004***	-0.9341***	-0.9245***
	(0.0176)	(0.0175)	(0.3178)	(0.3173)	(0.0189)	(0.0190)	(0.3160)	(0.3183)
Transfincome	-0.0107**	-0.0102**	-0.1558**	-0.1468**	-0.0026	-0.0024	-0.0508	-0.0515
	(0.0048)	(0.0047)	(0.0740)	(0.0739)	(0.0028)	(0.0028)	(0.0352)	(0.0349)
NonTransfincome	0.0066***	0.0063***	0.0351	0.0359	0.0002	0.0005	-0.1037**	-0.1000**
	(0.0017)	(0.0017)	(0.0306)	(0.0307)	(0.0029)	(0.0029)	(0.0459)	(0.0462)
Wage by county	0.0753***	0.0751***	-	-	0.0605***	0.0610***	-	-
	(0.0086)	(0.0086)	-	-	(0.0088)	(0.0088)	-	-
Log wage_hat_m	-	-	1.4250	1.4481	-	-	1.8687**	1.8674**
	-	-	(0.9883)	(0.9849)	-	-	(0.8863)	(0.8792)
Constant	3.4847***	4.5408***	27.6617***	37.3842***	4.0690***	4.0522***	29.4536***	32.4345**
	(0.2429)	(0.5012)	(4.2050)	(7.4905)	(0.2748)	(0.7931)	(4.4906)	(15.6593)

See notes of Table 8. Robust clustered standard errors are in parentheses. Table A1 presents the definition of the variables. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table A5 – Coefficients Estimates of the Effects of a Health Condition on Earnings and Hours of Work

Health Condition	Married Men				Married Women			
	Log Weekly Earnings		Weekly Hours of Work		Log Weekly Earnings		Weekly Hours of Work	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Cancer	-0.0541	-0.0454	-0.2413	0.1700	0.0026	0.0272	-0.5402	-0.2877
	(0.0380)	(0.0560)	(0.6490)	(0.9628)	(0.0403)	(0.0465)	(0.6173)	(0.7563)
Duration		-0.0009		0.0952		0.0326		-0.1844
		(0.0196)		(0.3067)		(0.0354)		(0.5453)
Duration^2		0.0005		-0.0035		-0.0024		0.0013
		(0.0005)		(0.0072)		(0.0018)		(0.0299)
Severe Cancer	-0.0110	0.0252	0.2503	0.3890	0.0308	0.0270	-0.1745	0.0173
	(0.0456)	(0.0587)	(0.7808)	(1.0170)	(0.0393)	(0.0476)	(0.6527)	(0.7935)
Duration		0.0064		0.1130		0.0026		-0.8036
		(0.0481)		(0.8995)		(0.0398)		(0.5903)
Duration^2		0.0002		0.0142		-0.0004		0.0416
		(0.0035)		(0.0754)		(0.0022)		(0.0319)
Stroke	-0.0914	-0.0204	-1.4481	-2.2729	-0.3383*	-0.6747	-0.1896	-9.1870*
	(0.1359)	(0.1680)	(1.7155)	(2.2820)	(0.1941)	(0.4549)	(2.6017)	(4.8966)
Duration		-0.0807		-1.0819		0.2412		0.9296
		(0.0880)		(1.7426)		(0.2302)		(4.3981)
Duration^2		0.0069		0.0158		-0.0322		-0.0813
		(0.0055)		(0.1188)		(0.0247)		(0.4644)
Ischemic Heart Disease	-0.0260	-0.2460**	-0.6318	-0.9530	-0.1026	0.0159	-1.6329	-3.5429
	(0.0583)	(0.1254)	(0.8784)	(1.1980)	(0.0942)	(0.1042)	(1.9406)	(2.8815)
Duration		0.0057		-0.3211		-0.0457		0.6543
		(0.0384)		(0.5439)		(0.0933)		(1.6476)
Duration^2		-0.0023		-0.0068		0.0059		0.0550
		(0.0025)		(0.0324)		(0.0057)		(0.1038)
Emphysema	0.0184	-0.6685***	2.0363	-4.6529**	-0.0326	-0.2184	1.9439	9.3434***
	(0.0967)	(0.2370)	(2.6094)	(2.3234)	(0.1717)	(0.1975)	(4.9032)	(3.0384)
Duration		-0.0359		0.4942		0.0217		-2.2124
		(0.0436)		(1.2371)		(0.1754)		(5.7337)
Duration^2		0.0010		0.0075		-0.0052		0.1391
		(0.0015)		(0.0451)		(0.0136)		(0.4298)
Chronic Bronchitis	-0.0055	0.0092	0.0171	-0.2370	0.0331	0.0478	0.5854	0.9457*
	(0.0296)	(0.0309)	(0.5323)	(0.5256)	(0.0305)	(0.0328)	(0.5018)	(0.5200)
Duration		-0.0874***		-0.9392**		0.0034		0.0116
		(0.0223)		(0.3780)		(0.0209)		(0.4334)
Duration^2		0.0022***		0.0206**		0.0000		0.0011
		(0.0005)		(0.0088)		(0.0006)		(0.0135)
COPD	0.0020	0.0083	0.1972	-0.2340	0.0342	0.0491	0.4066	1.0324**
	(0.0284)	(0.0310)	(0.5327)	(0.5252)	(0.0304)	(0.0327)	(0.4928)	(0.5166)
Duration		-0.0587***		-0.0923		-0.0057		0.0073
		(0.0205)		(0.4969)		(0.0201)		(0.3903)
Duration^2		0.0015***		0.0014		0.0003		0.0001
		(0.0005)		(0.0115)		(0.0006)		(0.0122)
Asthma	-0.0453	-0.0302	0.0460	1.1573	-0.0172	0.0679	0.2707	0.2630
	(0.0380)	(0.0645)	(0.7485)	(1.3653)	(0.0388)	(0.0573)	(0.6218)	(1.0741)
Duration		-0.0008		0.1681		0.0143		0.1957
		(0.0080)		(0.1605)		(0.0107)		(0.1594)
Duration^2		0.0000		-0.0037		-0.0004		-0.0051
		(0.0002)		(0.0034)		(0.0002)		(0.0034)

See notes of Table 8. * Significant at 10% level; ** Significant at 5% level; *** Significant at 1% level.