WORK IN PROGRESS – COMMENTS ARE WELCOME

The Effect of an Acute Health Shock on Work Behavior: A Comparison of Universal and Employer-based Health Insurance Systems

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Abstract

Health shocks should affect work behavior differently depending on the type of health insurance available. If health insurance is employment-contingent, individuals have an incentive to keep working in order to keep their insurance. The income effect of higher out-of-pocket medical expenditures further increases the incentive to keep working. In this paper, we compare the work response to an acute health shock of similar individuals nearing retirement in two countries with different types of health care systems: the U.S., with an employment-based health insurance system, and Denmark, with universal health care. Surprisingly, we find that older Americans are over two times more likely to stop working following an acute health shock than their Danish counterparts. Potential explanations are tested for the differential work response following an acute health shock in the two settings.

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I. Introduction

Acute health shocks may reduce desired labor supply by increasing the disutility of work and reducing the ability to work. At the same time, health shocks increase financial needs – for example, through increased medical cost – and thus may increase desired labor supply. For example, among those aged 51 to 64, medical conditions increase health spending and reduce non-health spending of individuals with low income (Butrica et al. 2009). The evidence on the net effect of an acute health shock - such as a heart attack - on labor supply is mixed. Using the first two waves of the Health and Retirement Study (HRS), McClellan (1998) finds that individuals experiencing health shocks are twice as likely to exit the labor force than individuals who do not. Dwyer and Hu (2000) find that developing a new work limitation increases the likelihood of retirement more than having a persistent limitation. Likewise, Coile (2004) finds that an unexpected health shock reduces labor supply. Controlling for unobserved effects, however, reduces the magnitude of the dynamic relationship between poor health in the previous period and current non-employment risk (Haan and Myck, 2009). Furthermore, the specific sample under analysis and the type of health shock considered seem to matter. Bradley et al. (2005) find that married women who develop breast cancer are more likely to continue working and even increase the intensity of their labor supply compared to those who do not.

The labor supply response following a health shock should depend on having access to health insurance. If access to health insurance depends on employment, workers have a greater incentive to continue working in order to keep their health insurance. This effect will be even stronger in the presence of higher out-of-pocket medical expenses because of the resulting income effect. Empirical evidence in the U.S. for the link between health insurance coverage and retirement behavior in the absence of a health shock, however, is mixed (French and Jones 2008;

Madrian 2006). Identifying and quantifying the potential effect is difficult because of potential self-selection into employment with different types of health insurance coverage and the correlation of health insurance incentives and pension-related incentives on work behavior (Madrian 2006).

Sidestepping these issues by exploiting exogenous variation in U.S. state and federal 'continuation of coverage' COBRA mandates (laws allowing individuals to purchase continuing health insurance for up to 18 months after leaving a firm), Gruber and Madrian (1995) find that access to one year of continuation benefits raises the retirement hazard by 30 percent for men aged 55-64. Other authors have dealt with these issues by estimating structural dynamic programming models of retirement decisions, modeling Social Security benefit rules and health insurance. Earlier models (Lumsdaine et al. 1994, Gustman and Steinmeier 1994) have found only small effects of health insurance on retirement behavior, but newer and more elaborate models, which account for risk aversion and uncertain medical expenditures, find bigger effects. Rust and Phelan (1997) find that "health insurance constrained" individuals (those who will lose their employer provided health insurance once they retire and have no access to actuarially fair private health insurance) are more likely to remain in employment until Medicare eligibility at age 65. Similarly, Blau and Gilleskie (2006) find that availability of employer-provided retiree health insurance has small positive effects on employment. These models lack a savings decisions, and are therefore likely to overstate the effect of health insurance since individuals are not able to self-insure against the risk of medical expenditures (French and Jones 2008). French and Jones (2008) explicitly incorporate the savings decision as well as preference heterogeneity for leisure. While they find that health insurance influences the timing of retirement, again the

effects are small: an increase in the age of Medicare eligibility increases the average age of retirement of men by less than one month.

In this paper, we explore the effect of acute health shocks of older workers on the probability of not working. We use the policy variation of two different types of health insurance – universal and employer-provided – to compare whether acute health shocks lead to different effects on work behavior. This circumvents the problem of self-selection into employment with different types of health insurance. At the same time, this enables us to study the response to actual medical events as opposed to broadly defined self-reported health changes since we are not restricted by state space considerations.[1] To our knowledge, no studies have examined this interaction between health shocks and health insurance systems.

Information on medically diagnosed health shocks and labor market participation of older individuals is drawn from two sources: sub-samples from the Danish Longitudinal Registers and matched sub-samples from the U.S. HRS. This comparison is meaningful as the two countries enjoy nearly the same level of prosperity and growth, similar levels and trends in the aging of the population and life expectancy, as well as similar rates of unused productive capacity in the age group 55-64 (Gruber and Wise 1998). Yet, institutions contrast sharply with income tax-financed universal health care and generous social protection in Denmark compared to the more liberal American economic system. The results from this study can inform policy makers in countries considering the adoption of universal health insurance schemes who are concerned with the effects of universal health insurance on retirement behavior.

[1] For example, Rust and Phelan (1997) measure health status as good, bad or dead.

The main result shows, surprisingly, that when comparing similarly defined samples and applying similar controls health shocks have *less* of an impact on paid work in Denmark than in the U.S. In fact, while older individuals aged 52-64 in Denmark are 7.2 percentage points more likely to be not working following a new acute condition, the same age group is 19.5 percentage points more likely to do so in the U.S. This increase represents 34% of the baseline probability of not working in Denmark of 21.2%, and 127% of the baseline probability of not working in the U.S. of 15.3%. We test a variety of potential explanations and find that they are able to account for a part of this country difference.

The rest of the paper is organized as follows: Section II suggests a theoretical framework, Section III describes the data, Section IV presents the estimation method, Section V the results and Section VI discusses the findings and concludes.

II. Theoretical framework

In this section, we present a simple theory of how health shocks influence the retirement decision through the budget constraint.[2] For an individual approaching retirement, the problem is to choose retirement age, *r*, by maximizing the sum of the discounted per period utilities of working from age *t* to age *r-1* and retiring at age *r* and the utilities of retiring thereafter until *T*, the highest possible age:

$$V(r) = \sum_{S=t}^{r-1} \beta^{S-t} U^W(C_S, h_S) + \sum_{S=r}^{T} \beta^{S-t} U^R(C_S(r), 0) \qquad (1)$$

[2] We thank Ronald Ehrenberg and Nicole Maestas for useful suggestions here.

The instantaneous utility of work is U^W, which depends on consumption, C_S, and hours worked (negatively), h_S, and the utility of retirement, U^R, which depends only on consumption as workers are assumed to stop working after retirement. The constraints are given by $C_S = wh_S + A_S$, where A is asset income, w the wage rate, and $C_S(r) = B_S(r) + A_S$, where $B(r)$ are retirement benefits, which depend on the age of retirement. Thus, retirement at age r is preferred over working another year and postponing retirement to $r+1$ if $V(r) > V(r+1)$. This occurs if

$$U^W(C_r, h_r) < U^R(C_r(r), 0), \tag{2}$$

i.e., the current disutility of working more than offsets the loss in consumption by retiring ($C_r(r) < C_r$), in particular if this first order effect of not deferring retirement is sufficiently large in magnitude to dominate the second order effect of foregone benefit accrual:

$$\sum_{S=r+1}^{T} \beta^{S-r} (U^R(C_S(r+1), 0) - U^R(C_S(r), 0)). \tag{3}$$

This assumption is likely to be satisfied. First of all, the second order effect would vanish in a regime where benefits do not depend on age of retirement[3]. It may be positive if working another year increases subsequent benefit levels, but it is likely to be small in magnitude. Indeed, most benefits systems are not actuarially fair, and benefit accrual - the increase in expected present discounted value of future social security benefits if retirement is postponed by a year – is typically negative (Gruber and Wise, 2004). Thus, the retirement date is taken to be the first date r satisfying (2).

[3] In Denmark, Netherlands, Canada, among others, the first pillar is a flat, non-contributory demogrant benefit.

Now, suppose the worker suffers from a health shock at age *r*. This may reduce the planning horizon *T*, thus reducing the second order effect (3) and hence reinforcing the relevance of (2) as the retirement criterion. We investigate whether the health shock makes (2) more or less likely to be satisfied. If hours do not adjust there is an income effect, that is, consumption while working is reduced to $C_S^{'} = wh_S + A_S - M_S$, where M_S are medical expenses, and consumption in retirement becomes $C_S^{'}(r) = B_S(r) + A_S - M_S$. Thus, retirement should be delayed if the reduction in utility is less if working, i.e. if

$$\frac{\partial U^W}{\partial C_r}(C_r, h_r) < \frac{\partial U^R}{\partial C_r}(C_r(r), 0). \qquad (4)$$

As $C_r(r) < C_r$, typically this would be the case.[4] Hence, it is likely that a health shock defers retirement when workers must pay out-of-pocket costs for their medical treatment. On the other hand, if health, *H*, were explicitly introduced in *U*(.) by way of the disutility of work effort, i.e., $U = U(C, h(H))$, with $h'(H) > 0$, $U_{hH} < 0$, then a health shock would raise the disutility of work, and this substitution effect would tend to accelerate retirement. In the Danish case of universal health insurance, there is only a small income effect since medical expenses are minor. Hence, only the substitution effect is present, thus making inequality (2) more likely and inducing earlier retirement following a health shock.

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[4] An example is the Gustman and Steinmeier (1994) specification, $U(C_S, h_S) = \alpha C_S^{\alpha} + f(h_S)$, where $\alpha < 1$, i.e., utility is additively separable in C_S and h_S with decreasing marginal utility. In this case, clearly (4) is satisfied for $C_r(r) < C_r$, i.e. $C_r^{\alpha-1} < C_r(r)^{\alpha-1}$ since $\alpha - 1 < 0$.

In the U.S., both income and substitution effects are present, hence the effect of an acute health shock on retirement should be less than in Denmark, assuming equal preferences for leisure in both countries. This country difference increases for the health insurance constrained individuals in the U.S. who lose their health insurance when they stop working, which would increase medical expenses (M_S) after retirement. This additional income effect ("job-lock") makes continued work more valuable and thus these individuals even more likely to keep working.[5]

III. Data and Descriptives

The data for the U.S. uses the first six waves (1992-2002) of the HRS, a national biennial panel survey of individuals born between 1931 and 1941 and their spouses.[6] Observations on HRS age-eligible individuals are selected who are between the ages of 52 and 63 in 1994, are working in all previous waves, and have not had a health shock prior to 1992. Thus, the sample consists of five two-wave periods based on 6 waves of data (wave 1-2, wave 2-3, wave 3-4, etc). After list-wise deletion of person-year observations with missing information in the previous wave, age ineligible individuals, those currently receiving Medicare or Medicaid (160), and those with missing variables (119), the final sample includes 15,709 person-wave observations.

[5] See Gruber and Madrian (2002) for a review of the literature on the effect of health insurance on job mobility.

[6] The HRS is sponsored by the National Institute of Aging and conducted by the University of Michigan. We use the public use data files produced by the RAND Center for the Study of Aging (RAND HRS Data Version H and fat files). See Juster and Suzman (1995) and the HRS website at http://hrsonline.isr.umich.edu for an overview of the data.

The Danish data consists of a 20% random sample of individuals from the population registers from the years 1991-2001 who are 52-64 years old in 1993. The data include individual information on demographics, labor market characteristics, financial aspects, transfer payments, and objective health measures. The latter are merged from the National Patient Registry and consist of the diagnoses made at hospital admissions in any given year. Following McClellan (1998), we define an individual as having had an acute health shock if he or she was hospitalized in relation with a heart attack, a stroke, or a new cancer. We select individuals who are working in the previous wave and have not had a health shock in the period 1986-1991. Since no new individuals are added the sample becomes increasingly older. Individuals are never allowed to exceed age 64 at any time during the sample period since 65 is the age of eligibility of Medicare in the U.S. To match the sampling framework of the HRS, five two-year periods are constructed out of the 11 years of data at hand (1991-1993, 1993-1995 etc.). The final sample includes 263,788 person-wave observations.

We define individuals as working if they receive pay from work.[7] Instead of focusing narrowly on labor market exit through retirement we use the widest definition of non-work as possible, including retirement, unemployment, disability, other type of benefit receipt (e.g. sickness absence) or being outside the labor market.[8] This is useful because such a definition is not affected by the institutional differences between Denmark and the U.S. that might result in

[7] We conduct a variety of robustness checks, such as including those with very low wages among those not working, but found no significant different results.

[8] While an alternative could be an hours-based measure, this information is not available in the Danish registers.

different types of transition pathways from work to retirement.[9] Thus, the outcome measure is a dichotomous variable defined as working for pay or not. Aside from the health shock measures, the estimations include controls for gender, couple status, an interaction term between gender and couple status, age dummies, race dummies (for the U.S. sample only), education categories, self-employment, and financial aspects, all measured in the previous wave except for the age dummies. We include the logs of income and wealth as financial aspects but refrain from adding replacement rates, potential retirement benefit streams or other types of compensation measures as explanatory variables because of endogeneity concerns (Bound 1989).

The construction of the two samples differs in two ways. First, the Danish sample covers the period 1991-2001 while the U.S. sample covers the period 1992-2002. The difference is less than a year in most cases since in the Danish data labor market status and demographics are measured at the earliest at the end of November, while the median end of the interviews in the HRS sample is about midyear.

Second, while the Danish health measures are medical diagnoses made at the time of hospital discharge, these measures are self-reported in the U.S. HRS. Subjective reports of health are prone to justification bias (Anderson and Burkhauser 1985), but individuals are probably less

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[9] For example, disability retirement is not as widely-used a path in the U.S., where the majority of individuals transits directly to the receipt of Social Security benefits from full-time work at the early or normal retirement ages. In the 50-54 age group, only 6% of men receive disability; at ages 55-59, this figure is 9% and at ages 60-64, 12.9% (Coile and Gruber 2004). By way of comparison, in Denmark in 2000, 11.3% of the 50-59 age group and 13.6% of the 60-64 age group retired through disability pension.

likely to misreport the presence or new diagnosis of a specific acute condition. Self-reported measures may serve as more credible proxies in this case. On the other hand, objective health measures need not be correlated with work incapacity (Bound 1991). In our analysis only serious conditions (heart attack, stroke, and new cancer) are considered which can be expected to impose work limitations.

The share of those not working is lower in the U.S. While 21.2% of the age-cohort is not working over this period in the Danish sample, the equivalent figure in the HRS is 15.3% (see Appendix Tables A.1. and A.2. for summary statistics). In the HRS, shares of those not working are highest among those with health insurance coverage in retirement (17%), followed by those without any form of health insurance (15.3%). Those with employer provided health insurance but no retiree coverage have the lowest rate (12.8%). The Danish and U.S. samples are comparable in terms of female share, marital status, age distribution, self-employment status and education, but some differences confirm the need to control for these factors. Most importantly, while 3.7% of the HRS sample experiences an acute health shock over this period, the corresponding figure in the Danish case is lower, at 1.5%. We explore different explanations for this difference and how it might influence our results in Section V.

IV. Empirical Model

Probability models of not working are estimated on the pooled samples, where the latent variable NW_{it}^{*} is the unobserved propensity to not work at period *t* given that the individual was working in period *t*-1, and is given by:

$$NW_{it}^{*} = \beta_0 + \beta_{AN} Acute\_new_{i[t-1,t]} + \beta_X' X_{it-1} + \beta_Z' Z_{it} + \mu_{it}, \text{ for } i = 1..N, t = 1..T \text{ , with}$$

$$NW_{it} = \begin{cases} 1 & if \quad NW_{it}^{*} > 0 \\ 0 & else \end{cases},$$

where NW_{it} is the observed not working indicator; $Acute\_new_{i[t-1,t]}$ measures the occurrence of an acute health shock between t-1 and t; X is a vector of controls measured at time t-1, which includes gender, marital status, the interaction between the two, educational categories, self-employment status, income, and wealth; and Z is a vector of age dummies measured at time t. Standard errors are adjusted for multiple observations of individuals. A parsimonious specification is chosen to avoid any endogeneity via the regressors. Specifically, we do not control for health insurance status in the U.S. sample. Individuals who are insured may have different unobserved characteristics than those uninsured with respect to tastes for work, risk-taking, discounting behavior etc., so that the inclusion of health insurance status in the estimation may bias the effect of an acute health shock on labor supply. For example, French and Jones (2008) find that those with employer-provided retiree health insurance have stronger preferences for leisure than those without such insurance. Instead, the identification strategy used in this paper consists of comparing similar individuals in a setting where insurance is universal to a setting in which some individuals may select themselves into jobs providing insurance while for others this option does not exist. By conditioning on a wide and relevant set of observables, the aim is to reduce all other types of measurable heterogeneity.

V. Results

We begin by comparing the results from a random effects model to those of a pooled probit and find that assuming random-effects does not substantially affect the results (see Table 1). Hence,

we proceed with pooled probit models. Table 2 presents the marginal effects[10] of the pooled probit model. According to the estimates from the Danish sample, a new acute health shock raises older workers' probability of not working (NW) by 7.2 percentage points. This estimate is highly statistically significant. In the equivalent U.S. sample, the corresponding estimate is also strongly statistically significant but much higher than in Denmark with 19.5 percentage points (see Table 2, columns 1 and 2).[11] In fact, comparing the marginal effects relative to baseline probabilities, Americans are nearly four times as likely to stop working following an acute health shock compared to Danes (the effect represents 127% of the baseline probability of non-work in the U.S. compared to 34% of the baseline probability of non-work in Denmark).

Comparing individuals by gender and marital status, we find that married men in the U.S. (with other characteristics of average married men) have a probability of not working of 11.5% if they had no health shock, and 32.2% if they had a health shock (for all U.S. men these probabilities are 12.0% versus 32.8%). For married Danish men, the probability of not working in the absence of a health shock is 14.9% and in the presence of a shock is 25.0% (for all Danish men these numbers are 15.4% versus 25.5%). For married women in the U.S. (with other

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[10] Throughout the paper, we report the marginal effects of continuous variables at the means and of dummy variables for a change from 0 to 1.

[11] This compares to the findings by Coile (2004) who estimates linear probability models of labor force exit on a sample of married individuals aged 50-69 from the first six waves of the HRS. She finds a marginal effect of a health shock for married men (women) of 16.1 (9.7) percentage points, with effects almost twice as big when considering severe shocks. Coile does not condition on the absence of shocks prior to first observation as we do in this paper.

characteristics of average married women), the probability of not working is 16.1% if they had no health shock and 39.3% otherwise (for all U.S. women it is 14.9% vs. 37.4%). For married women in Denmark, the same probabilities are 22.9% and 33.7% (for all Danish women, 22.5% vs. 32.9%). The impact of an acute health shock is thus much greater in the U.S. than in Denmark, and the hypothesis that individuals should retire to a greater extent in a universal health insurance system following a health shock is not supported by this evidence.

The estimated marginal effects of the other variables (shown in Table 2) conform to expectation.[12] Older workers, those not self-employed and those with lower income are more likely to stop working in both countries. Greater wealth is associated with non-work among Americans but with more work in Denmark.

Figure 1 plots the marginal effects by age. Across all ages, the marginal effect of an acute health shock on not working is greater in the U.S. than in Denmark. The marginal effects increase by age and rise sharply at the early retirement ages in both countries (age 60 in Denmark and age 62 in the U.S.). The country difference remains when we plot the marginal effects by gender and couple status (see Figures 2 and 3). The availability of retirement programs has a larger impact in the Danish sample as mentioned earlier whereas withdrawal from work increases more continuously in the U.S. case.

Although it is likely that individuals self-select into employment with health insurance both with and without retirement coverage (Levy and Meltzer, 2004), it is useful to examine the differences in the size of the effects of an acute health shock for individuals with different types

[12] Note that in non-linear models interaction terms are not easily interpretable (Ai and Norton, 2003).

of health insurance. To investigate this, we subdivide the U.S. sample by insurance status measured in period t-1, before the potential health shock has occurred. That is, we explore differences in behavior between individuals with insurance and those who are "insurance constrained" (cf. Rust and Phelan, 1997). Four subsamples are considered separately: Group 1, *health insurance unconstrained*, includes everybody whose employer health insurance coverage (either own or spousal) continues in retirement up to at least age 65 or who is covered by a federal government health insurance program. Group 2, *health insurance constrained*, are those who lose their employer provided health insurance when they stop working and are not covered by a federal government health insurance program. Group 3, *no health insurance*, includes those individuals who have neither (own or spousal) employer provided nor federal government health insurance. Group 4, *missing*, consists of 1,577 observations where we do not have sufficient information on health insurance status to place them in any of the three groups. A comparison of observed characteristics of these groups shows important differences and the selection effect into different types of occupations (see Appendix A2). Individuals with unconstrained health insurance are healthier and have more education than those who are constrained, which are in turn healthier and have more education than those without health insurance.

Table 2, columns 3-5, show that individuals without any health insurance have the strongest response following an acute health shock (with a marginal effect of 26.1 percentage points), followed by health insurance unconstrained (19.5 percentage points) and health insurance constrained individuals (15.6 percentage points). This is consistent with the finding by French and Jones (2008) that individuals with retiree health insurance have stronger preferences for leisure. Figure 4 plots marginal effects by age separately for each insurance group. In the U.S., individuals in all of these groups respond stronger to an acute health shock than Danes, despite

the fact that the job-lock effect and the income effect from increased medical expenses are not present in Denmark. Thus, the hypothesis that individuals should retire to a greater extent in a universal health insurance system compared to an employment-based insurance system seems not to be supported even after subdividing by insurance status in the U.S. We therefore test country differences in the other parameters hypothesized to affect work behavior implied by our theoretical model. In the following, we successively investigate five possibilities that might contribute to the differential work response following an acute health shock in the two settings: Differences in baseline health and the severity of the acute health shock; differences in work disutility; unobserved heterogeneity; differences in the dynamic response to an acute health shock; and institutional differences.[13] Because of data restrictions, most of these possibilities are assessed using the U.S. sample.

A. Health, Mortality and Health Care Differences (*H, T*)

The differences in the marginal effects of acute health shock on work behavior in the U.S. and Denmark could be related to differences in either the measurement of an acute health shock, in underlying health, treatment of health shock, or out-of-pocket medical expenditures. We in turn

[13] A variety of robustness checks regarding variable and sample definitions showed no significant effects. We imposed an income cut-off in Denmark (>50,000 D.Kr. annual income after tax in 2000-prices), a work hours cut-off (over 20) in the U.S., added industry dummies in the U.S., defined unemployment as working for pay, restricted the sample to couples with unchanged partner status in the two successive periods considered, to only whites (U.S.), and to only those with positive wealth (U.S.) (see Appendix Tables A.4 and A.5.)

investigate each of these four possible explanations, starting with the differences in the measurement of the health shock.

As mentioned earlier, the prevalence of acute health shocks is much lower in the Danish sample with 1.5% compared to 3.7% in the U.S. sample. This is similar to the findings by Banks et al. (2007) that rates of heart attacks, strokes, and cancer were much higher in the U. S. than in England. This lends support to the idea that the differences in measured acute health shocks are real rather than the result of differences in measurement. Nevertheless, there are two differences in the measurement of health shocks. In the Danish sample, acute health shocks are doctor-diagnosed and contingent on a related hospital stay. In the U.S. sample, the health shock is self-reported (as diagnosed by a physician) and independent of a hospital stay. One might expect that acute health shocks that were not diagnosed in a hospital to be less severe. This would bias the estimate of the marginal effect in the case of the U.S. downward, and can, therefore, not explain the stronger effect we find in the U.S. There is not enough information available in the HRS to connect each health shock with a hospital stay, but if we define individuals as having had a health shock only if they reported a hospital stay (possibly unrelated to the health shock) during the previous two-year period, marginal effects indeed increase (to 0.253 in the baseline case).

The second difference in the measurement of health shocks is the use of medical diagnoses in Danish sample and of self-reports in the U.S. sample. We are constrained to making a register-survey comparison because no panel survey of the elderly exists in Denmark that is comparable to the HRS in terms of size and richness. [14] This difference between self-reports and

[14] The Survey of Health, Ageing and Retirement in Europe (SHARE) is currently only available for two waves, and the sample we could use to compare our results to is too small.

diagnoses could only explain our findings, however, if the shocks reported in the HRS are more severe than those defined by the diagnoses, which is likely not the case.

One way of addressing this is to test whether any cross-sectional survey-register differences are present in the Danish case. Thus, we make use of a large Danish cross-sectional survey, the National Health Interview Survey (SUSY) 2000 of about 22,000 individuals aged 16 or more, which is the third general health and morbidity survey carried out by the National Institute of Public Health. This survey has been merged to register data on labor market variables and diagnoses for the years 1998-2000. Limiting the sample to 50-62 year olds in 1998 who were working according to the register employment measure, we run probit regressions of NWFP in 2000 on the same controls as before, i.e. gender, marital status (and their interaction), educational categories, self-employment status, income, wealth and age-dummies, all measured in 2000. Two measures of acute health shocks are tried on this single cross-sectional survey sample – the previously defined register measure based on diagnoses at hospitalization, and the corresponding survey measure based on individuals' self-reports on the presence of (current) chronic conditions such as heart attack/angina pectoris, hypertension/high blood pressure or cancer. The results show that the marginal effect of an acute health shock on NWFP is 0.179 (standard error 0.061) using the register-based measure and 0.098 (0.061) using the survey-based measure, and that the difference between the two is not statistically significant, $\chi^2(1) = 1.16$ Prob>$\chi^2(1) = 0.2813$ [15].

Another potential explanation for our findings are health differences in the two samples. As mentioned above, older Americans appear to be in worse physical health than similar Danes.

[15] These results are available on request.

Such differences might affect the results of our comparison both in terms of health, *H*, and mortality, *T*. Poor underlying health and poorer physical functioning also make it more difficult to recover and return to work after an acute health shock.

To assess the potential role of differences in baseline health, we added information on self-reported health in *t*-1 to the model (Table 4, column 2). Though this reduces the impact of an acute shock on NW, the effect is small and the marginal effect of an acute health shock on NW remains 2-3 times larger in the U.S. than in Denmark. We also added dummy variables for having some difficulty with any instrumental activity of daily living (IADL) and for the numbers of activities of daily living (ADL) with which the respondent has reported having some difficulty at time t, that is, after the health shock has occurred.[16] Assuming that more severe health shocks are affecting these activities more, controlling for those should give a lower bound on the effect of an acute health shock. When including these dummies (all of which are highly statistically significant), the marginal effect of an acute health shock in the U.S. decreases from 19.4 to 16.4 percentage points, still well above the effect in Denmark (results not shown).

Country differences in health may also reflect a different racial and socioeconomic composition, as much previous work confirms the existence of a strong socioeconomic gradient in health as well as important health disparities in outcomes and access to health care across racial groups (Banks et al. 2007, Marmot 1999). It could be that the gradient is different in the two countries, affecting the estimate of an acute health shock. Table 3 shows the marginal effects

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[16] The IADLs included are using the phone, managing money, taking medications, shopping for groceries, and preparing meals. The ADLs included are bathing, dressing, eating, getting in/ out of bed, and walking across a room.

of an acute health shock on NW in the two countries for the samples split by educational level. As expected, there is a strong effect of education: in both countries, the higher the level of education the smaller the effects of a health shock, but the country differences remain. Recent studies, which compare health of U.S. and British heads of household using biological markers for diseases, find that Americans are in much worse health than their English counterparts at all points in the socioeconomic distribution (Banks et al. 2006 and 2007). All our models for the U.S. include controls for race. In a robustness check, redoing the U.S. analysis on whites only and those with positive wealth made no difference to our results (see Appendix Table A.4.).

Another reason for the difference in marginal effects of an acute health shock in the two countries could be that the composition of health shocks is different. For example, if the share of individuals with an acute health shock who had cancer is higher in Denmark, and cancer has a smaller impact on the ability to work then heart attacks and strokes, then this could explain the smaller effect of an acute health shock on work behavior found in the Danish sample.[17] To assess whether this might be the case, we first split the dummy for an acute health shock by type of condition and compare the relative shares of the different types of health shocks in the two countries. The shares for the U.S. sample are 48% (cancer), 30% (heart attack), and 22% (stroke) compared to 65% (cancer), and 35% (heart attack/stroke) in Denmark (it is not possible to distinguish between heart attack and stroke in the Danish sample). That is, compared to the U.S. sample, Danes are more likely to have had cancer and less likely to have had a heart attack or a stroke suggesting that the composition of the types of health shocks indeed is different. Second, we replace the dummy for an acute health shock with dummies for the different types of

[17] Thanks to Jared Rubin for pointing this out.

health shocks in the estimations. We find that the marginal effects of heart attack, stroke and new cancer on non-work are, respectively, 24.5, 26.0 and 12.5 percentage points for the U.S. compared to 9.8 and 5.9 percentage points for heart attack/stroke and new cancer respectively for Denmark (all highly statistically significant; results not shown). Thus, irrespective of the type of health shock the marginal effect of an acute shock is higher in the U.S. than in Denmark, supporting the idea that, although the composition of health shocks differs in the two countries, the divergence in marginal effects cannot be explained by this difference.

It is also possible that differential mortality could explain the findings. Self-reported health may not capture the full extent of the severity of the condition if Americans - because of poorer physical functioning and obesity - tend to be hit with more severe, life-threatening health shocks that affect their planning horizon, T, and this could explain their greater non-work. However, life expectancy at age 60 is lower in Denmark than in the U.S. by about 1/3 of a year for men and 1 year for women (Barbi 2008). In fact, the trend in life expectancy in the 35-74 age group in Denmark has been unfavourable over the last few decades in comparison to countries with similar income levels (Juel et al. 2000). When splitting by cause, this study finds that mainly heart diseases but also liver cirrhosis and lung cancer (women) contribute to the excess Danish mortality. Considering these levels and trends in mortality differences between Denmark and other developed countries, Danes should be retiring earlier.

Differences in the health care production technology could also be a driving factor. It is claimed that the U.S. medical system is more thorough and state-of-the-art when it comes to treating acute conditions, see, for example, Cutler and Mas (2006) who compare non-fatal health outcomes across the U.S., Canada, U.K., and Spain and find that while the U.S. medical system does worse in treating some chronic diseases, such as diabetes, compared to the other countries,

it provides better acute care, particularly for heart diseases. On the other hand, Skinner, Staiger and Fisher (2006) find in recent years that those regions in the U.S. that had the greatest health care spending related to acute myocardial infarction were not those that achieved the highest improvements in survival. In contrast, nationalized health care systems tend to use dated technology and, typically, hospitals are short-staffed, waiting times are long and stays are relatively short even for acute care cases. If patients in the U.S. are admitted faster to the hospital, are subject to more rigorous examinations and receive more aggressive treatment for acute conditions, this may explain the greater propensity to be away from work in the U.S. following a health shock.

The model predicts that medical expenses operating through the budget constraint should induce individuals to keep working. Reverting back to the baseline, we test whether controlling for baseline health care usage affects the rate at which individuals experiencing health shocks stop working. In Table 4, column 3, we add the number of physician visits and log of out-of-pocket medical expenditures for the period preceding the possible health shock. We use previous period measures because current out-of-pocket expenditures and number of doctor visits are likely correlated with the severity of the health shock. The inclusion of these two variables barely changes the marginal effect of acute health shock in the U.S. When including current period measures the marginal effect of an acute health shock decreases to 15.2 though only the number of doctor visits is statistically significant.

To further control for severity, expected mortality, and a health care production technology that more frequently diagnoses conditions, we add the previous diagnosis of a severe condition that reduces life expectancy (high-blood pressure and diabetes), health care usage, and self-reported health in Table 4, column 4. The effects of previous diagnoses on non-work are

only minor and not statistically significant. To summarize, we do not find compelling evidence that differences in the measurement of acute health shocks, treatment protocols, medical expenses or even underlying health can explain the counterintuitive finding that a health shock has a much stronger effect on NW in the U.S. than in Denmark.

B. Work Disutility (U_{hH})

The theoretical model indicated that a health shock could raise the disutility of work and thereby accelerate retirement. It is possible thatthis effect is weaker in Denmark. Danish workplaces have been found to be among the most accommodating in Europe, especially since the twin pillars of corporate social responsibility and activation of marginalized groups were embraced beginning in the mid-1990s (Bengtsson 2007). Larsen (2006) reports that almost half of the private and public workplaces in Denmark with at least ten employees and with a least one employee above the age of 50 make an effort to retain older workers. Municipalities pay for necessary workplace adaptations, provide employers with wage subsidies and give sick-listed workers a form of social support that facilitates continued work without risk of benefit loss**.** These schemes came into being in the mid to late 1990's during the latter part of the sample period. Still, if American workplaces are considerably less accommodating of workers with health problems, this may explain some of the difference in the findings. While there is no direct information at hand on workplace accommodation, workers in the HRS are asked whether their job is stressful and whether or not the job is physically demanding. Plausibly, workers with health conditions that are not accommodated find working more stressful and demanding. Including these indicators, however, barely changes the coefficient of an acute health shock (results not shown). Likewise, adding industry dummies to the baseline model did not change the marginal effect of an acute health shock (results not shown).

As the country difference remains largely unexplained, we investigate the importance of differential sample selection and different institutional settings.

C. Differential Attrition and Unobserved Heterogeneity

Differential attrition and unobserved heterogeneity could explain the stronger effect in the U.S. if the Danish sample strongly positively selects over time, that is, if the individuals in the Danish sample become successively relatively healthier and valuing leisure less than the U.S. sample. Survey nonresponse in the HRS is unlikely to yield this outcome since attrition in the HRS is not selective in health when controlling for observables (Kapteyn et al. 2006). Nevertheless, it is possible that health and other factors lead to differential selectivity over time in the two settings. Since at any time we condition on having worked in the previous wave, any worker who stops working will disappear from the sample. If relatively healthy workers drop out from the U.S. sample, say high-income individuals with adequate private pension savings, this could explain the relatively stronger effect of health shocks on not working in the remaining sample in the U.S. All available evidence in this area, however, suggests the opposite – that those with high discount rates, low assets and poor health retire at 62 (Gustman and Steinmeier 2004).

At the same time, we expect that the existence of a multitude of early exit options and a generous and somewhat more easily accessible disability pension in the Danish welfare state would tend to siphon out low wage/low SES workers from the labor market early, a group for whom the replacement rate from early retirement pensions is high (see, for example, Bingley et al. 2004). Thus, individuals in Denmark who continue to work at older ages are probably predominantly high SES, white-collar workers with stronger tastes for work and in relatively better health and therefore more prone to return to work following a health shock. Pre-existing co-morbidities (such as cardiac disease), which are more prevalent among low SES groups

(Marmot 2001), reduce the number of work hours and increase labor market exit (Saeki et al. 1995). If the Danish sample were more selected with respect to health than comparable Americans, the effect of a health shock would be weaker.[18]

To test the importance of differential selection over time, we conducted three robustness checks. First, we repeated the analysis for the first two-year span (1992-1994). In the baseline regression on the HRS, the marginal effect increases from 0.195 to 0.314 when we restrict the sample. In the Danish register sample, the marginal effect from the first wave only is 0.064 (see Appendix Tables A3 and A4, column 5). Thus, an even bigger country gap is present in the first wave only. Second, we split the samples by educational level (Table 3). As mentioned earlier, we find a gradient in both countries but wide differences in the size of the marginal effect. Third, we split the sample by wealth quartile (results not shown). Here, we again find a negative gradient in the U.S. (with marginal effects of 0.292, 0.195, 0.177, and 0.115), but this time not in Demark. The country difference remains.[19] We conclude that differential sample selection does

[18] In prior work, we corrected for potential sample selection due to disability exit in the Danish case with a Heckman two-step procedure using the regional disability rate by age group as an instrument for the disability take-up decision. Although the Mills ratio was significant in the retirement model, health shock effects on retirement remained unchanged when it was included as a regressor (Datta Gupta and Larsen, 2007).

[19] This is supported by Kaplan-Meier estimates (not shown), which show that in both countries the probability of continuing to work is lower for those with an acute health shock at all ages and that the difference between those with and without an acute health shock increases

not appear to be the reason behind the observed country differences. We turn therefore to differences in short and long run behavior of Danes and Americans.

D. Dynamic Response: Re-entry via partial employment

Older workers in the U.S. may more easily leave their jobs following a health shock than in Denmark because re-entry to a bridge job or to partial employment at a lower wage and reduced hours is easier to obtain than in a high-wage, high-benefit labor market such as Denmark. Maestas (2007) found that in the HRS almost 50% of retirees either partially retire or re-enter the workforce at a later point in time. On the other hand, retirement continues to be an absorbing state in Denmark (Bingley et al. 2004) so that conditionally on working at that age, workers may be more reluctant to give up their career jobs in the event of an acute health shock.

To assess whether short-term discontinuations of work can explain some of the differences between Denmark and the U.S., we re-estimate the final models by comparing the effect of an acute health shock occurring between t-1 and t on not working at period t+1. The results shown in Table 5 confirm our supposition above. The marginal effect rises from 7.2 percentage points in period t (Table 2) to 11.8 percentage points in period t+1 in the Danish register data. For the U.S., the marginal effects diminish with time, decreasing to a 17.0 percentage point probability of NW two periods later following an acute health shock. In terms of baseline probabilities, in Denmark the effect is 56% of baseline probability, and in the U.S. 111% of baseline probability, implying roughly half the size of the gap found before. If we also

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with age. This difference, however, increases much more in the U.S. – at age 64, it is almost three times as big in the U.S. as in Denmark.

include self-reported health, the difference in the marginal effects decreases from 5.2 to 4.1 percentage points, but the difference in baseline probabilities is still about 100% (see Table 5).

Thus, looking ahead one period in Figure 5, the basic pattern of the age-profile remains the same as in Figure 1, but the country differential narrows substantially. Over time, therefore, the work response following a negative health episode in the two settings converges as the Danes tend to retire more and Americans retire less two periods after a health shock. In the U.S., this is most likely due to re-entry via bridge jobs or partial employment. In Denmark, there is the possibility that some of the individuals previously classified as working were in fact on short-term government-financed sickness benefits[20]. This may explain the rise in non-work two periods later when benefits are exhausted and these workers fully withdraw from the labor market. We are not able to distinguish in the data between those on salaries and those receiving these benefits.

It is also possible that Danes reduce the number of hours worked in response to an acute health shock while Americans stop working altogether. We do not have a measure of hours worked in Denmark, but a tobit regression on hours worked in the U.S. shows that individuals reduce work hours in response to an acute health shock, but when we exclude those who stopped working, an acute health shock has no effect on the number of hours worked (results not shown).

E. Job change, involuntary job loss and voluntary work discontinuation

There are three other potential explanations for the differences in the effects of an acute health shock on work behavior in Denmark and the U.S. related to the specifics of the American labor

[20] Mainly within salaried workers.

market and its institutions: Job switching to gain health insurance; involuntary job loss; and voluntary work discontinuation because of a disability application.

First, individuals may change jobs after suffering a health shock to gain health insurance coverage. There is no statistical difference, however, between the probabilities of switching employers for those who had a health shock and for those who did not. Likewise, the probability of having health insurance for those who did not have insurance in the previous period is not statistically different for those with and without a health shock. The previous argument only considers those who keep working. It is also possible that employers dismiss employees with high health costs to keep costs down.[21] To investigate this, we compare the means of being fired for individuals with health insurance that have or have not had a health shock. The means are borderline statistically different: those with a health shock are slightly more likely to have been fired (3.75% versus 2.32%). But further study reveals that if we consider only individuals who suffered from a health shock, there is no difference of being fired between those with and without health insurance.

We also considered the potential effect of the institutional design of disability pensions in the U.S., which place a cap on earnings in order for workers to qualify for disability benefits (the substantial gainful activity limit). In addition, the probability of being awarded disability increases if applicants appear ill (Benítez-Silva et al., 1999) and, therefore, Americans might withdraw from work after experiencing a health shock in order to increase their chances of being awarded disability benefits. To check this, we added a dummy whether the individual is a current disability applicant to the specification (3), Table 4. Its marginal effect is strong and highly

[21] Thanks to Steven Tadelis for pointing this out.

statistically significant at 42.2, but the marginal effect of an acute health shock decreased only slightly to 19.2 despite the likely positive correlation between the severity of the health shock and the application for disability.

VI. Discussion and Conclusions

This paper compares the effect of acute health shocks on the probability of not working among a sample of elderly workers from the Danish Longitudinal Registers and a comparison sample from the U.S. HRS. Though the job lock effect of employer-based health insurance and the income effect of increased medical expenditures only exist in the U.S., health shocks reduce work to a much greater extent in the U.S. than in Denmark, despite its general tax-financed health-care system with universal access to health care. Our results show that older Americans are nearly two times as likely to stop working following an acute health shock than similar Danes. We consider a variety of possible explanations for this, including country differences in base line health, differences in work disutility, unobserved heterogeneity, dynamic response to a health shock, and job changes in the U.S. We find that worse health and the fact that some Americans re-enter the labor force after dropping out after suffering from an acute health shock can explain some of the gap in response. We speculate that this convergence may be due to re-entry via bridge jobs or partial employment in the U.S. and labor force exit after exhaustion of sickness benefits in Denmark. Institutional differences thus account for a portion of the gap in work responses one period after the shock. Still, even if we focus on behavior two periods after the shock, relative to baseline, U.S. elderly hit by a health shock stop working at almost twice the rate of Danish elderly even after controlling for previous health status. A possible though untested explanation for the findings could be the importance of cultural norms – perhaps their stronger work ethic lead Danes to remain on the labor market even when hit by serious disease?

Yet, on average, Danes work significantly fewer hours and are considerably more often absent from work due to illness than Americans.

One caveat remains: self-reported health measures in the HRS may not be easily compared to register-based diagnostic measures of health even for narrowly specified acute conditions. We are not able to address that question in this paper except to claim that hospital-diagnosed acute conditions are likely to be more severe and therefore associated with more non-work. On the basis of our analyses, however, there appears to be little evidence to suggest that a universally insured health care system like the Danish one is associated with considerably more retirement/non-work than an employment-contingent system because workers buffered by the safety net of social insurance in the former tend to drop out at the first sign of a health problem. This result may be useful for countries that are considering adopting universal insurance systems and are concerned that labor market withdrawal following health deterioration may occur earlier in such regimes, thus resulting in a loss of output.

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Tables

Table 1: Pooled Probit vs Random Effects Probit, Coefficients on Not Working, U.S. and Denmark

	Denmark		U.S.	
	Pooled Probit	**RE Probit**	**Pooled Probit**	**RE Probit**
New acute condition	0.246***	0.254***	0.666***	0.709***
	(0.022)	(0.025)	(0.057)	(0.063)
Log Likelihood	-120619.8	-120424.97	-6285.20	-6282.87
# of Individuals	89,248	---	5,455	---
# of Observations	263,788	263,788	15,709	15,709
Rho	-	0.188	-	0.112
Sigma	-	0.482	-	0.355

Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01. Additional controls include: female, couple status, female*couple, educational categories, self-employment status$_{t-1}$, log of wealth$_{t-1}$, log of income$_{t-1}$, race (U.S. only) and age dummies.

Table 2: Pooled Probit, Marginal Effects of Health Shocks on Not Working

	Denmark	U.S.				
	(1)	(2)	(3)	(4)	(5)	(6)
	Baseline	Baseline	Health Insurance Status in t-1			
			Un-constrained	Constrained	No health insurance	Missing
New acute	0.072***	0.195***	0.195***	0.156***	0.261***	0.149***
Condition	(0.007)	(0.020)	(0.029)	(0.045)	(0.046)	(0.053)
Female	0.008**	-0.048***	-0.051**	-0.027	-0.048*	-0.025
	(0.004)	(0.013)	(0.020)	(0.027)	(0.026)	(0.028)
Couple in t-1	-0.037***	-0.049***	-0.054***	-0.018	-0.087***	-0.040
	(0.003)	(0.013)	(0.020)	(0.027)	(0.028)	(0.030)
Female*couple	0.064***	0.092***	0.087***	0.041	0.162***	0.045
	(0.004)	(0.017)	(0.024)	(0.035)	(0.042)	(0.042)
Age = 53	0.004	0.025	0.109*	-0.057	-0.023	-0.060
	(0.007)	(0.035)	(0.063)	(0.039)	(0.060)	(0.054)
Age = 54	0.015**	0.053	0.134**	-0.059*	-0.013	0.119
	(0.006)	(0.036)	(0.063)	(0.035)	(0.060)	(0.138)
Age = 55	0.027***	0.057	0.111*	-0.068**	0.058	0.115
	(0.006)	(0.035)	(0.060)	(0.031)	(0.075)	(0.135)
Age = 56	0.022***	0.047	0.150**	-0.086***	-0.019	0.092
	(0.006)	(0.034)	(0.063)	(0.025)	(0.056)	(0.125)
Age = 57	0.034***	0.049	0.130**	-0.082***	0.031	0.081
	(0.006)	(0.034)	(0.061)	(0.027)	(0.067)	(0.118)
Age = 58	0.028***	0.027	0.100*	-0.071**	-0.013	0.054
	(0.006)	(0.031)	(0.058)	(0.032)	(0.058)	(0.109)
Age = 59	0.051***	0.084**	0.186***	-0.050	-0.021	0.162
	(0.006)	(0.036)	(0.064)	(0.038)	(0.055)	(0.140)
Age = 60	0.260***	0.102***	0.185***	-0.017	0.019	0.156
	(0.007)	(0.037)	(0.064)	(0.047)	(0.064)	(0.138)
Age = 61	0.379***	0.132***	0.249***	-0.041	0.036	0.201
	(0.007)	(0.039)	(0.067)	(0.041)	(0.067)	(0.146)
Age = 62	0.342***	0.266***	0.401***	0.050	0.121	0.318*
	(0.008)	(0.045)	(0.069)	(0.065)	(0.082)	(0.164)
Age = 63	0.367***	0.284***	0.425***	0.061	0.118	0.323*
	(0.008)	(0.047)	(0.070)	(0.068)	(0.084)	(0.170)
Age = 64	0.394***	0.237***	0.366***	0.009	0.122	0.365**
	(0.008)	(0.047)	(0.074)	(0.057)	(0.086)	(0.178)
Controls [1]	yes	yes	yes	yes	yes	yes
Log Likelih.	-120619.8	-6,285.20	-3658.49	-950.27	-1067.50	-525.88
# of Individ.	89,248	5,455	3,853	1,591	1,456	1,182
# of Observ.	263,788	15,709	8,690	2,736	2,706	1,575

Marginal effects; Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

[1] Includes education dummies, race dummies (U.S. only), log of wealth in t-1, log of income in t-1, and dummy for self-employment in t-1.

Table 3: Probit, Selected Marginal effects on Not Working, U.S. (top panel) and Denmark (lower panel), By Highest Education Completed

U.S.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
	All	**Less than HS**	**HS/GED**	**Some College**	**College**
New acute	0.195***	0.320***	0.189***	0.172***	0.128***
Condition	(0.020)	(0.055)	(0.032)	(0.043)	(0.040)
Log Likelihood	-6,285.20	-1,272.81	-2,414.11	-1,285.99	-1,255.03
# of individuals	5,455	1,116	2,067	1,129	1,143
# of Observ.	15,709	2,956	5,844	3,374	3,535
Denmark	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
	All	**Basic**	**Vocational**	**Short or medium**	**Long**
New acute	0.072***	0.080***	0.072***	0.063***	0.026
Condition	(0.007)	(0.011)	(0.012)	(0.017)	(0.024)
Log Likelihood	-120619.8	-56681.267	-44515.58	-15710.43	-3374.344
# of Individuals	89,248	37,226	31,856	12,423	3,824
# of Obs.	263,788	114,297	95,448	41,023	13,020

Standard errors in parentheses.* p<0.10, ** p<0.05, *** p<0.01. Additional controls include: female, couple status, female*couple, educational categories, self-employment status$_{t-1}$, log wealth$_{t-1}$, log income$_{t-1}$, race (U.S. only) and age dummies.

Table 4: Pooled Probit, Selected Marginal Effects of Health Shocks on Not Working, U.S. - Checks for Explanations

	(1)	**(2)**	**(3)**	**(4)**
	Baseline	**Health**	**Health Care Usage**	**Health - all**
New acute condition	0.195***	0.183***	0.193***	0.183***
	(0.020)	(0.020)	(0.020)	(0.020)
Health fair/ poor in t-1		0.093***		0.085***
		(0.011)		(0.011)
# of doctor visits			0.002***	0.001***
between t-1 and t			(0.000)	(0.000)
Log of out-of-pocket			-0.001	-0.002*
medical expenses t-1			(0.001)	(0.001)
High blood pressure t-1				0.004
				(0.006)
Diabetes t-1				0.013
				(0.012)
Log Likelihood	-6,285.20	-6,239.35	-6,271.79	-6,231.54

Standard errors in parentheses.* p<0.10, ** p<0.05, *** p<0.01. Additional controls include: female, couple status, female*couple, educational categories, self-employment status$_{t-1}$, log wealth$_{t-1}$, log income$_{t-1}$, race and age dummies. N= 15,709 and # of individuals = 5,455.

Table 5: Pooled Probit, Marginal Effects of Health Shocks on Not Working, U.S. and Denmark, at time t+1

	Denmark	U.S.	
Specification	**Baseline**	**Baseline**	**Health - all**
New acute condition	0.118***	0.170***	0.159***
	(0.010)	(0.025)	(0.025)
Log Likelihood	-142739.99	-7,096.10	-7,051.48
# of Individuals	87,912	5,018	5,018
# of Observations	253,435	13,453	13,453

Standard errors in parentheses.* p<0.10, ** p<0.05, *** p<0.01. See Tables 2 and 4 for additional covariates included.

Appendices

Table A.1. Summary Statistics, Danish Sample: Means

Not working	0.212
New acute condition	0.015
Woman	0.428
Couple in t-1	0.813
Age	58.480
	(3.202)
Education	
Basic education	0.433
Vocational education	0.362
Short or medium education	0.156
Long education and above	0.049
Self-employed in t-1	0.171
Log of wealth in t-1/5, D.kr. [1]	5.752
	(8.548)
Log of income in t-1/5, D.kr.[1]	10.752
	(1.098)
Sample size (estimation)	263,788

Working sample. Means are taken over all persons-year observations.
Standard deviations shown in parentheses (except for dummy variables).
[1] In 2000 prices. Please note: Before taking logs, wealth and income was divided by 5 to approximate the dollar -Danish kroner exchange rate, and log(x) is defined as log(x+1) if $0<|x|<1$ and as $-\log(-x)$ if $x<0$.

Table A.2. Summary Statistics, U.S.

	All	By Health Insurance Status in t-1			
		Unconstrained	Constrained	No health insurance	Missing
Not working	0.153	0.168	0.122	0.153	0.122
New acute condition	0.037	0.035	0.037	0.040	0.045
Age at time t	58.840	58.696	59.128	58.910	59.020
	(3.151)	(3.184)	(2.956)	(3.196)	(3.171)
Woman	0.458	0.461	0.483	0.453	0.405
Couple in t-1	0.775	0.832	0.706	0.697	0.718
Education					
Less than HS	0.188	0.142	0.188	0.344	0.172
HS / GED	0.372	0.385	0.374	0.337	0.357
Some College	0.215	0.223	0.211	0.183	0.232
College +	0.225	0.250	0.227	0.136	0.239
Black	0.149	0.148	0.140	0.176	0.129
Race – other	0.033	0.025	0.039	0.050	0.038
Self-employed in t-1	0.187	0.120	0.043	0.450	0.353
Log of wealth in t-1 [1]	10.637	11.016	10.331	9.696	10.694
	(3.905)	(3.223)	(4.250)	(5.039)	(4.161)
Log of income in t-1 [1]	9.998	10.091	10.198	9.410	10.144
	(1.376)	(1.240)	(1.095)	(1.839)	(1.335)
Applied for but not currently receiving disability, t-1	0.002	0.002	0.002	0.004	0.001
# of doctor visits between t-2 and t-1	4.765	4.874	5.420	3.631	4.072
	(8.172)	(8.517)	(8.899)	(6.063)	(7.881)
Log of medical out-of pocket expenses between t-2 and t-1	5.496	5.554	5.624	5.092	5.647
	(2.578)	(2.499)	(2.510)	(2.919)	(2.428)
Fair or poor self-reported health in t-1	0.110	0.088	0.124	0.166	0.112
High blood pressure in t-1	0.280	0.273	0.268	0.285	0.334
Diabetes in t-1	0.068	0.065	0.067	0.072	0.081
Sample size	15,709	8.690	2,736	2,706	1,577

Working sample. Means are taken over all persons-year observations. Standard deviation in parenthesis except for dummy variables.

[1] Income and wealth are in 2000 prices, and for the individual in order to facilitate the comparison with the Danish data. In the case of a couple, joint values are divided by two. Please note: log(x) is defined as log(x+1) if $0<|x|<1$ and as –log(-x) if $x<0$.

Table A.3. Probit, Marginal effects of a Health Shock on Not Working, Robustness Checks, U.S.

	(1) Baseline	(2) Whites only	(3) Positive wealth only	(4) Unchanged couple status between t-1 and t	(5) Unempl'd. counted as working	(6) First wave only
New acute condition	0.195*** (0.020)	0.179*** (0.022)	0.188*** (0.021)	0.188*** (0.021)	0.192*** (0.020)	0.314*** (0.042)
Log Likelihood	-6,285.20	-5,061.20	-5,991.33	-6,046.34	-5,903.00	-2,024.57
# of individuals	5,455	4,404	5,343	5,386	5,455	---
# of Obs.	15,709	12,845	15,029	15,187	15,709	5,435

Standard errors in parentheses.* p<0.10, ** p<0.05, *** p<0.01. Additional controls include: female, couple status, female*couple, educational categories, self-employment status$_{t-1}$, log wealth$_{t-1}$, log income$_{t-1}$, race (U.S. only) and age dummies.
[1] Reduced sample size because of missing hours of work.

Table A.4. Probit, Marginal Effects of a Health Shock on Not Working, Robustness Checks, Denmark

	(1) Baseline	(2) Income > 50,000 D.Kr.	(3) Same couple status in t-1 and t	(4) Unempl'd counted as working	(5) First wave only
New acute condition	0.072*** (0.007)	0.073*** (0.007)	0.072*** (0.007)	0.071*** (0.007)	0.064*** (0.012)
Log Likelihood	-120619.8	-118044.2	-115255.09	-93543.66	-38894.599
# of Individuals	89,248	87,577	85,451	89,248	---
# of Obs.	263,788	259,379	253,425	263,788	89,248

Standard errors in parentheses.* p<0.10, ** p<0.05, *** p<0.01. Additional controls include: female, couple status, female*couple, educational categories, self-employment status$_{t-1}$, log wealth$_{t-1}$, log income$_{t-1}$, and age dummies.

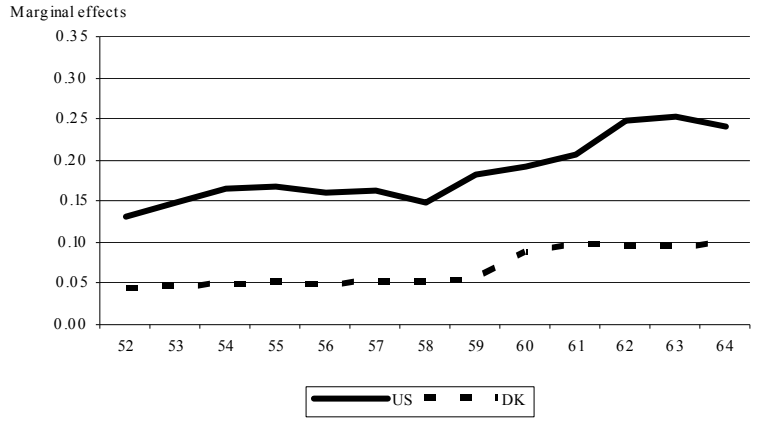

Figure 1: Comparison of Effect of New Acute Condition in Denmark and the U.S.

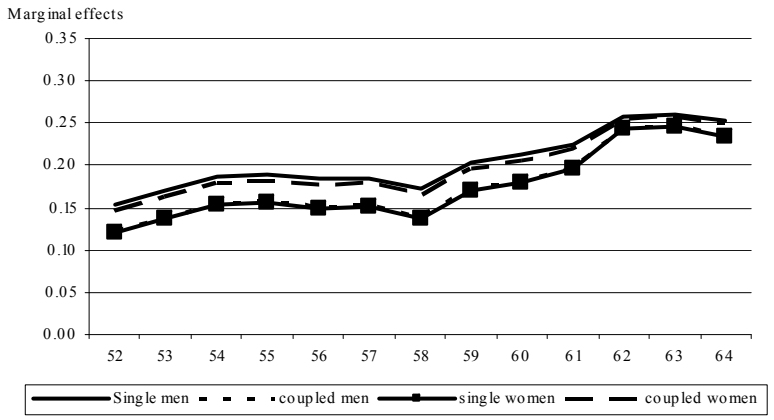

Figure 2: Marginal Effects of an Acute Health Condition by Gender and Couple Status (U.S.)

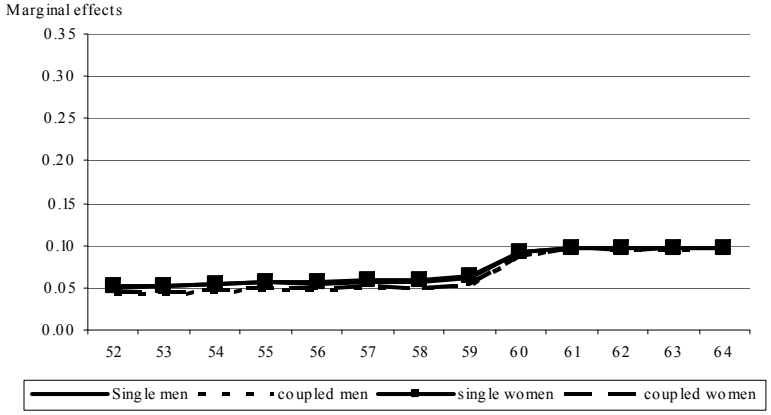

Figure 3: Marginal Effects of an Acute Health Condition by Gender and Couple Status (Denmark)

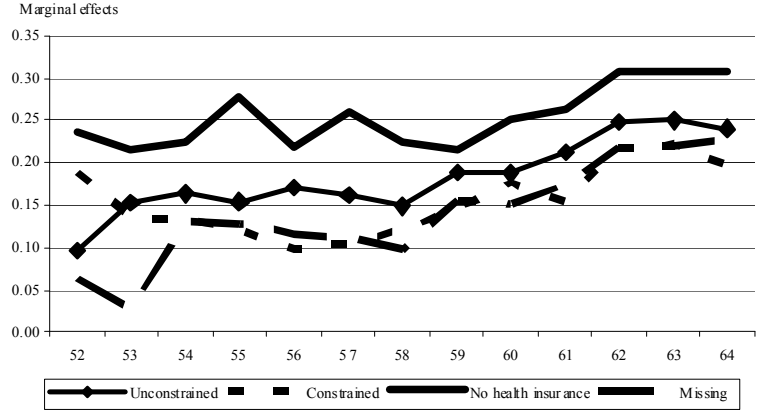

Figure 4: Comparison of Effect of New Acute Condition by Health Insurance Status (U.S.)

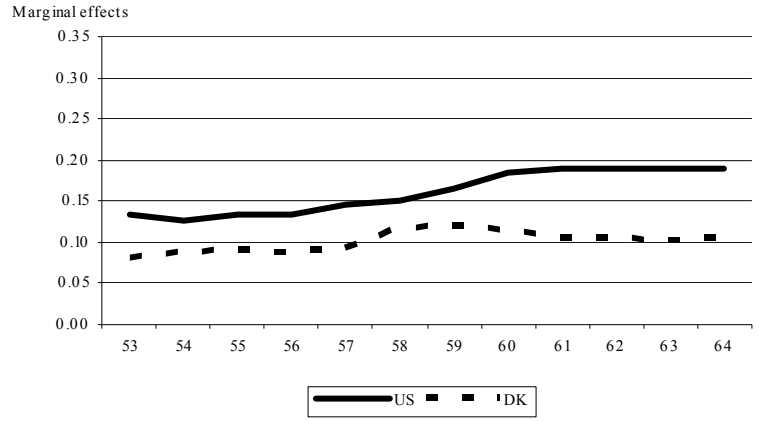

Figure 5: Marginal Effects of New Acute Health Condition on NW at time t+1 in Denmark and the U.S.