

Health, Wealth and Gender: Do Health Shocks of Husbands and Wives Have Different Impacts on Household Wealth?

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Abstract

The extent to which men's versus women's health affects household wealth and the mechanisms through which these effects occur have important implications for the welfare of older individuals living with a spouse, and in particular for women who are likely to outlive their husbands by several years. Intermediate mechanisms through which individual health shocks may affect household wealth are discussed. Four waves of HRS data on married couples are used to estimate the direct effect of onset of various health conditions on household wealth, with these effects allowed to differ for husbands and wives. Estimates using only wave 2 health shocks (controlling for baseline health) indicate that the impact of a health shock to the wife has a larger negative impact than a health shock to the husband, which is consistent with prior work. Estimates in which health shocks from waves 2-4 are allowed for produce conflicting results. Further research is required to ascertain the reason for this apparent conflict.

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I. Introduction

The extent to which men's versus women's health affects household wealth and the mechanisms through which these effects occur have important implications for the welfare of older individuals living with a spouse, and in particular for women who are likely to outlive their husbands by several years.

That persons with lower health status tend to have lower wealth and income is an accepted stylized fact. However, the direction of causation between health and wealth has not been satisfactorily sorted out. Some recent work has made some progress in this area. This paper is part of a larger project which seeks to further untangle this relationship. The project will investigate the types and magnitudes of economic impacts of health shocks on households and on individuals within a household framework. For various reasons, we might expect health shocks experienced by husbands to result in different economic impacts than health shocks experienced by wives. In order to formulate policy which efficiently addresses the needs of households, we must understand how health shocks impact households, not only how they affect the individual.

Households may be better able to insure themselves against some health shocks than others, and whether the husband or wife experiences the health shock may be an important distinction in this regard. Households may be less able to insure against some shocks than others, and some households may be more at risk than others. By pinpointing the households at greatest risk and the types of health shocks which pose the greatest threat to the well-being of older Americans, policy can be designed to target funds where they are most crucial.

Using longitudinal data from the Health and Retirement Study, the timing of health shocks, income shocks, and deviations from a wealth accumulation trajectory can be

examined to separate the direct effect of health on wealth from the portion of the relationship attributable to spurious correlations. These data will also allow the direct effect to be ascribed to various mechanisms by which health shocks reduce eventual wealth. The current paper will not empirically address these various mechanisms, but will discuss them, as they provide important motivation for the research questions which will be presently addressed with the data.

II. Theory – How Health Shocks Affect Wealth

There are several mechanisms through which health shocks to an individual may affect the wealth of the household. A health shock may result in reduced market labor supply, decreasing current earnings and benefits, and possibly resulting in lower pension wealth than would have been achieved. Disability insurance, both public and private, may insure some persons against these losses to some degree. Households may self-insure by having the spouse increase his or her labor supply – increasing current hours and/or delaying retirement – in order to make up for some of the lost income. However, the spouse might decrease labor supply to provide care needed by the person experiencing the health shock.

Out of pocket medical expenditures associated with health shocks will clearly affect household wealth. Different households will have different levels of insurance against these expenses. Those with higher permanent incomes will be better insured on average if only private insurance is considered. However, social insurance may insure primarily those with very low incomes, resulting in a U-shaped insurance-income relationship. It is possible that women, who have had lower labor market attachment than their husbands, may be less-well

insured against medical expenses, although most private policies allow for purchase (if not employer provision) of spouse medical insurance.

Other types of expenditures may increase as well. For example, market goods and services may be substituted for the home production of the person experiencing the health shock, who may no longer be able to perform the same tasks as before, or for the home production of the spouse who increases market labor supply or increases time caring for the ill spouse. The home may require work or goods to allow mobility of a person with reduced physical functioning. The couple may move into different housing which allows easier mobility or requires less care, or may move closer to relatives, incurring transaction costs associated with buying and selling a home, as well as other moving-related expenses. In addition, the marginal utility of consumption may be a function of health, so that optimal consumption (given fixed prices and resources) rises or falls in periods of poor health. Lillard and Weiss (1997) find evidence that the marginal utility from consumption rises in periods of poor health. This suggests that individuals and households may save in anticipation of poor health, increasing consumption when that period arrives. There are some compelling theoretical arguments, however, that marginal utility from consumption may decline in periods of poor health for some individuals – those who like to travel or to consume in other physically active ways for example.

A health shock may change a household's actual or perceived time horizons and level of risk. If after a health shock, an individual expects to retire sooner than originally planned, or perceives an increase in the risk of future shocks, then precautionary saving may be increased, and existing wealth may be moved to less risky assets which bear lower average returns earlier than would have been the case. The latter will result in a slower growth rate for

household wealth. On the other hand, if the individual adjusts his or her life expectancy downward in response to a health shock, there may be an incentive to consume or distribute wealth earlier, offsetting to some degree the increased precautionary saving motive.

Because husbands are typically older than their wives, husband's health more often declines before wife's health. Therefore, husbands' health shocks may draw down resources earlier on (while there are still resources to draw down), and wives' health shocks may have lower observed impact on wealth due to credit constraints near the end of life.¹

A final possible mechanism for health shocks to affect household wealth is through a household bargaining effect. There is a growing body of empirical literature showing evidence that who controls resources in the household affects how those resources are allocated. If a husband experiences a health shock, then his wage relative to that of his wife may fall, and his share of household income may fall as well. This shift would increase the wife's relative bargaining power, and may change spending and saving patterns toward her optimum. If he requires care that she provides, this would further strengthen her bargaining position. As Lundberg and Ward-Batts (2000) propose, wives have a longer retirement period to finance than do their husbands, and so may have a preference for saving more.

Some of the mechanisms discussed here will have larger impacts when the wife has a health shock, and some when the husband has a health shock. Clearly, whether husbands' or wives' health shocks have a larger net effect on household wealth is an empirical question. In any event, the wife is likely to bear a large portion of the burden of either spouse's health shocks because she will typically live several years beyond her husband's death and will have to stretch the household's reduced wealth to cover consumption over more years.

¹ It is unlikely that the data used will allow addressing this issue because individuals in the sample may not yet be old enough to have reached this point.

In order to design policy to mitigate the negative economic effects of health on wealth, it is important to understand not only the magnitude of the net effect, but also the relative importance of each of the mechanisms discussed above. This will not be accomplished in the present draft, but will be a priority in future work. High poverty rates of widows and of older couples where one or both spouses is in poor health may be driven in part by the impact on wealth of these health shocks. Policy recommendations may include provisions through Social Security Disability Insurance (SSDI), Medicaid, Supplemental Security Income (SSI), or other programs which could provide some assistance in certain cases without requiring that a couple draw down wealth to levels which endanger the welfare of the longer-living spouse, typically the wife.

III. Literature

Using changes in health and wealth between waves 1 and 3 of the HRS, Smith (1999) finds a fairly large negative impact of a new severe health condition on household wealth of about \$17,000, regardless of whether the household has medical insurance or not. However, Levy (2000) finds no significant effect of a new severe condition on wealth, except among single uninsured men. Levy uses changes in wealth and health between waves 1 and 2 of the HRS. It may be that there are lagged impacts on wealth of health changes between waves 1 and 2 which she does not capture. Smith estimates effects of new health events through several pathways, allowing lagged effects. While he does generally find that there are additional effects during the latter period of health events experienced in the earlier period, these lagged effects are small relative to the initial effects. This suggests that lagged effects

missed by Levy, using only data through wave 2, do not explain the large discrepancy in the results of the two studies.

Another key difference in the strategies of these studies is that Levy allows different effects of health shocks to the husband and to the wife in married couples, as well as for different effects among married-couple, single-male, and single-female headed households. Smith apparently constrains the effects of a health event to be the same, regardless of the household type (married or single head) and regardless of who in a married couple experiences the health event, essentially estimating a mean effect. However, the significant effect Levy finds for uninsured single men is not large enough, nor that portion of the sample large enough, for these effects to generate the large mean effects Smith finds for the whole sample.

Using waves 1 and 2 of the HRS, Charles (1999) investigates the effects of health shocks on spousal labor supply, allowing for distinct effects of shocks on labor supply of husbands and wives. He finds that wives increase market work, while husbands tend to reduce labor supply in response to a health shock to the spouse. He concludes that there is substitution by the husband or wife for the primary activity (market work or home production) of the spouse who experienced the health shock.

Smith allows for different effects of severe versus mild onsets (both on wealth and on intermediate variables representing pathways of effects on wealth), and finds that there are large differences. Charles finds that effects on spousal labor supply are larger when health is measured by disability rather than a self-rated measure of health status. Levy reports descriptive statistics for five conditions or diagnoses, the onset of which she defines as a

serious health event. However, she does not allow for effects of these onsets to vary across the five types.

Wu (1999) uses waves 1 and 2 of HRS data to estimate the impact on the wave 2 wealth of married couples of health shocks occurring between waves 1 and 2. He allows impacts to differ when the shock is to the husband versus the wife, and uses intermediate variables to ascribe portions of the impacts on wealth to reduction in labor supply through early retirement and to out-of-pocket medical expenditures. Wu finds that men's health shocks impact wealth solely through labor supply, but that women's health shocks impact wealth through additional mechanisms, particularly higher overall living expenses. Since wives in this cohort are likely to be the primary home producers, these increased expenses may be due to purchase of substitutes for home produced goods.

Empirical analyses in the present paper will take a similar strategy to that in Wu, but will use waves 1 through 4 of the HRS data. This will allow addressing whether effects of wave two shocks persist in the long run, or whether households are able to make up for those losses. The current draft will not decompose effects on wealth by intermediate mechanisms, such as labor supply and medical expenditures. However, a future draft will include these decompositions, as well as including Social Security, pension, and 401-k wealth in net worth estimates. Future work will also extend the panel backwards in labor supply analysis by examining Social Security and IRS W-2 earnings records for impacts on earnings of health events prior to wave 1.²

IV. Data

The Health and Retirement Study (HRS) is a national longitudinal survey of older

Americans which began in 1992, with follow-up interviews every two years. Individuals in the original HRS cohort (used here) were aged 51 to 61 in 1992, or were married to or cohabiting with a survey respondent in this age range. This paper uses a sample of married couples from the initial survey in which both spouses are living and the couple is still married at the time of the Wave 4 interview in 1998. In addition, they must have provided information on assets and debt, allowing calculation of net worth, in both waves 1 and 4.³ The resulting sample contains 3521 couples. Estimates which use log of net worth will exclude 166 of these households, or 4.7%, in which net worth is zero or negative.

HRS data provide information on the values of various types of assets and debts, allowing calculation of the couple's net worth.⁴ These data provide information on retirement plans or reason for retirement, employment and marriage history and current status, and family and social networks. Health information in the data includes self-rated health status category, prior and current diagnoses and health events in the initial survey and new events and diagnoses in each subsequent survey for a number of common conditions, and self-rated degree of physical functioning in performing a wide array of common tasks. The race and educational attainment, including highest degree, of each individual is reported, as is the couple's geographic region of residence. Table 1 provides means of key variables used in this analysis.

² Respondents provide retrospective health information on previous events and diagnoses in the initial interview.

³ Asset and debt values are imputed for some households by HRS staff using hot deck methods and information from unfolding bracket questions which follow "don't know" responses.

⁴ The net worth measure used does not include the present value of future Social Security and pension benefits or the value of 401-K and similar accounts. These values can be calculated using restricted data from Social Security records and employer pension plan details, and will be used in future work.

V. Empirical Strategy and Results

The goal of empirical analysis in this paper is simply to ascertain whether health shocks over the eight year period between waves 1 and 4 affected the growth of household wealth over that period, and to estimate the magnitudes of those effects, allowing health shocks to husbands and wives to affect wealth differently.

Log nominal 1998 net worth is estimated as a function of log 1992 nominal net worth, husband's and wife's ages, and health shocks for both husband and wife occurring after the 1992 interview. One can think of 1992 wealth, conditional on 1992 health, as a proxy for many other variables which might affect the path of household wealth accumulation, such as permanent income, education, cost of living, and so on.⁵ The level of 1992 wealth will also affect the level of 1998 wealth (or the change in wealth over the period) even in the absence of any active saving or dis-saving through appreciation, interest, and dividends.

It is important to control for baseline health, done in these analyses by controlling for reports of previous health events and diagnoses as of the 1992 interview. Baseline health may affect wealth and growth of wealth for various reasons. For example, it is plausible that individuals with low health endowments are more likely to experience "health shocks" in all periods, so that these shocks are not as much a surprise to this group as to others. In addition, those with high discount rates may invest less both in health and in future consumption. Controlling for baseline health assures that health shock variables are measuring shocks and not time-invariant heterogeneity in health or discount rates.

⁵ While I have not controlled directly for such variables in the present paper, I plan to explore whether they may have a direct effect on the change in wealth in future work.

Table 1 presents results of an estimate of the log of 1998 wealth using log of 1992 wealth, husband's and wife's ages, and the most general set of health variables as regressors.⁶ The latter consist of binary variables measuring reports of hypertension, diabetes, cancer, lung disease, heart disease, stroke, psychological problems, arthritis, and injuries (including hip fractures). Any prior onset or diagnosis is reported at the baseline interview in 1992, and new diagnoses are reported in subsequent interviews in 1994, 1996, and 1998. Survey questions are worded so as to have doctors' diagnoses but not self-diagnoses be reported.

The wife's health shocks having a negative and significant effect on 1998 wealth include diabetes in 1998 and 1994, hypertension, heart disease, stroke, and psychological problems in 1996, and lung disease in 1994. The husband's health shocks having a negative and significant effect on 1998 wealth include hypertension in 1998 and 1994, and diabetes and psychological problems in 1996. The positive significant coefficients for wife's stroke and psychological problems in 1998 and husband's injury in 1994 are puzzling. It is plausible that households may be over-insured for these events, particularly in the case of injury, but this is unlikely an adequate explanation. Other possibilities are that sequential or simultaneous co-morbidity results in high colinearity between these and some other health shock variables, causing these strange results, or that extreme outliers are driving the results. Both possibilities will be addressed in future work. There are also some positive and statistically significant coefficients for 1992 health variables, but these should not be interpreted as health shocks. These variables merely control for health in the baseline survey, and we have no *a priori* hypothesis about the sign of their coefficients in this model.

⁶ Using log of wealth necessitates dropping 4.7% of the sample with zero or negative net worth in one or both years. Sensitivity of results to omitting these households will be discussed later.

Tables 2 and 3 present models similar to that in Table 1, except that health variables have been aggregated to some degree. A similar strategy has been used in most previous work discussed earlier in this paper. Smith (1999) distinguishes between major (severe) and minor onsets, with the former consisting of cancer, heart condition, stroke, and lung disease, and the latter consisting of all other onsets reported in the HRS. By contrast, Wu includes diabetes in the severe category, and excludes onsets not defined as severe from most estimates. Gatti defines cancer, stroke, and heart attack as major illnesses and diabetes, congestive heart failure, hypertension, and lung diseases as chronic illnesses. Other conditions, such as arthritis, are omitted from her analysis. I follow an approach most similar to Smith, defining cancer, stroke, and heart or lung disease as major illnesses and diabetes, hypertension, arthritis, or psychological problems as mild. Note that some chronic diseases fall into each of these categories. Aggregated binary variables capture a new onset of any of the conditions in that category in that period. Injury is maintained as a separate category, as it may be less likely in general to signal declining overall health.

In Table 2, aggregated health variables which have statistically significant negative impacts on 1998 wealth are the wife's major and mild onsets recorded in the 1996 interview. Again, there is a puzzling positive result for a husband's 1994 injury, as well as for his mild condition onset in 1998.

Health shocks are further aggregated in Table 3 for the purpose of comparing the effect of any health shock to the husband versus to the wife. One variable for each spouse indicates any new onset of any condition included in these analyses recorded in 1994, 1996, or 1998, including injuries. Both have negative signs, but only the husband's variable is statistically significant. Comparing the point estimates, a husband's shock appears to have a

greater impact than a wife's health shock. This is not consistent with results found by Wu, which use only waves one and two of these data. This also does not appear to be consistent with the statistically significant results in Table 2, perhaps suggesting that the additional aggregation generates (further) mis-specification.

The adjusted R-squares in Tables 1-3 indicate that using less aggregated health shock variables does add useful information, suggesting that different types of conditions may affect wealth growth differently, and perhaps that the timing of these shocks is also important, as we might expect. Therefore, it may be useful to take a different approach to that in Table 3 in future work to compare magnitudes of effects of health shocks of husbands and wives, such as choosing a few typical or common scenarios, or running simulations.

As suggested above, it is possible that there is high correlation between sequential new onsets. If a health shock in one period reveals information to the household about the higher probability of future onsets, then those subsequent onsets may be to some extent anticipated by the household and are not true shocks. This suggests we might be interested in examining effects of early shocks while excluding later shocks. A simple, albeit not complete, way of doing so would be to examine effects of only 1994 onsets, excluding information about onsets in 1996 and 1998, as is done in Table 4. Another advantage to this specification is that it may tell us something about long-run effects of 1994 shocks, and how they compare to the shorter-run effects on 1994 wealth estimated by Wu.

Table 4 includes two models. The first uses the most general set of health variables, in which each condition enters separately. Model 2 uses more aggregated health variables, like those in Table 2. We might expect chronic diseases to have greater long-run impacts on household wealth, and this does appear to be the case in Model 1. Wives' diabetes, lung

disease and heart conditions and husbands' hypertension have significant negative effects on wealth. Other 1994 onsets do not have statistically significant effects in this model, with the exception of the recurring positive "effect" of husband's injury. Some chronic conditions are classed as mild and some as major. Model 2 uses aggregated health variables for mild, major, and injury reports. Wives' major 1994 onsets (which would include lung and heart disease) have significant effects. Again, husband's 1994 injuries appear to affect wealth positively. These results do appear to be consistent with the Wu findings that wives' health shocks have a greater negative economic impact than husbands' health shocks.

In other results not shown here, the change in level of wealth was used as the dependent variable, with the level of 1992 wealth as a regressor. Although this is not an attractive specification for a variable such as wealth, unlike the log wealth specification, it allows inclusion of households with zero or negative wealth. First, note that none of the individual conditions have statistically significant effects in that model. Second, and more importantly, note that results do appear to differ when households with negative or zero wealth in at least one period are included in versus excluded from the sample. This suggests that exploration of other approaches, such as quantile regression, which allow inclusion of households with zero or negative wealth, may be warranted.

We might expect that households with different levels of resources could be affected differently by health shocks in ways that the models presented here cannot capture. For example, it might be that households with fewer assets have access to social programs, such as Medicaid, that more well-off households do not. Therefore, a given health shock may have a larger impact on the resources of wealthier households. On the other hand, there may be an incentive for households in a particular range of net worth to spend down assets in order to

qualify for social assistance. This might be done simply by transferring assets to children or other relatives. Finally, those with better jobs and higher incomes may also have better medical and disability benefits, which would suggest just the opposite.

Preliminary results (not shown) indicate that there may be significant differentials in the impacts of health shocks between groups along the wealth distribution. Dividing households into quintiles of 1992 wealth, a set of quintile dummy variables is interacted with aggregated 1994-1998 husband and wife health shock dummies. These results indicate that impacts on households at the bottom of the wealth distribution are more negative than those on households further up in the distribution. Further work is required to determine whether the households with the largest impacts are prone to the spend-down incentive, and whether these differences persist when more general health onset variables are used.

Some preliminary testing of both model specification and effects of exclusion of outliers shows that results for some health shocks are robust, while others are not. For example, the consistently positive and significant coefficient on husband's 1994 injury in the results presented here disappears when one outlier is excluded. Some wife's health shocks become insignificant when either change in log net worth or percent change in net worth is used as the dependent variable.⁷ These functional form and outliers issues will continue to be investigated.

VI. Conclusions

This paper has detailed various theoretical mechanisms through which individual wealth may affect household wealth. It has suggested corresponding reasons why we might

⁷ The latter allows inclusion of households with zero or negative net worth in one or both periods, resulting in a sample size of 3341.

expect economic impacts on households of individual's health shocks to differ for husbands and wives. It asserts that efficient policy design depends on having a better understanding of the intermediate mechanisms by which health shocks to husbands and wives affect wealth.

Some simple estimates show that onset of various conditions does appear to significantly affect household wealth, and that these direct effects – effectively net effects of the various mechanisms – are not generally symmetric for husbands and wives. This finding is consistent with that of Wu (1999), as are estimates of the effects of 1994 health onsets, indicating that health shocks to wives appear to have greater negative impacts on wealth than health shocks to husbands.

Some apparent inconsistencies of the long-run 1994 estimates (which are consistent with Wu's results) with results using health shocks from three waves of the data (1994, 1996, 1998) require further research to reconcile. Some positive "effects" of health shocks suggest possible specification errors. Clearly, more sensitivity testing to model specification is warranted.

If one hopes to uncover true behavioral responses, it is important to discern anticipated from unanticipated changes in health. Strategies to do so will include using information on health related behaviors, such as smoking, to estimate the probability of developing cancer. We can also use changes between surveys in responses to questions about retirement plans, to questions about reason for retirement if retired, observed retirements which are inconsistent with earlier stated plans, and changes in self-assessed survival probabilities as to provide evidence of whether health shocks were unanticipated.

Directions for Further Research

Further work will look more closely at timing of shocks and at the path of wealth accumulation by using wealth information from all four waves. As discussed above, it will also decompose the direct effect of health onsets on wealth into the various intermediate mechanisms discussed herein. In addition, anticipated health events will be distinguished from true health shocks using various measures of life expectancy available in the data. The sensitivity of end results to using imputed wealth data will be addressed.

In further work on this ongoing project, co-morbidity and sequential health shocks should be examined in some detail. It may be that a person with one condition is also more likely to have a second condition, either simultaneously or later, and that high correlations between these health onsets may obscure the impact on wealth of particular onsets in statistical models. It is also important to address how health conditions affect physical functioning and ability to perform common tasks. The HRS survey includes questions on how much difficulty the respondent has with certain “activities of daily living” (ADLs) and “instrumental activities of daily living” (IADLs). Functioning is yet another layer of intermediate variables which may give us a better understanding of the processes by which health can affect earnings, wealth, and other economic outcomes.

Some additional issues further work may address include inter-household transfers to or from the households in this sample. For instance, couples may make voluntary transfers to their children, or may be assisting their own aging parents financially. Controlling for this may allow a tighter estimate of wealth and wealth changes. Examining *inter vivos* transfers is also essential in looking for spend-down for the purpose of qualifying for social assistance.

Ideally, we would like to know the magnitude and nature of impacts on the well-being of eventual widows of their husbands' and their own health shocks. The sample of those widowed over the 8 year period in this data is too small for statistical analyses, but the Ahead cohort data might be used to address this issue.

The project of which the present paper is a part will fill in some gaps and attempt to reconcile some of the apparent conflicts in the existing literature. A longer panel will be used than in any of the previous work discussed. Which types of health events have the greatest impacts, and which measures of health are the most reliable and informative for the purpose of estimating impacts on wealth, as well as on intermediate variables, will be ascertained by incorporating multiple measures of health and functioning using a factor model. Using linked data from Social Security records, this project will go further than existing literature by estimating a longer-run impact on the welfare of the longer-living spouse (taking Social Security and private pensions into account), and by incorporating 401-K values, and the value of estimated future Social Security and pension benefits in household wealth. Social Security and pension wealth is arguably an important part of the wealth portfolio of many of these households.

The project will use four waves of HRS data, and will essentially extend the panel backwards in time by using retrospective health information and administrative earnings records.⁸ This strategy will allow for estimation of the impacts on earnings of changes in health over a longer panel. Given that the couple was married at the time of a given health event or diagnosis, we can also examine any effects it may have had on the spouse's earnings profile. In addition, earnings records will provide a measure of permanent income, which is an important determinant of wealth and perhaps wealth growth.

The estimated value of future Social Security and pension benefits can be included in wealth calculations. Most previous work on the impacts of health on wealth has not taken this source of wealth into account. However, wealth in this form is a significant proportion of total wealth for many households in the HRS sample, and is likely to constitute a particularly large share of household wealth in households where widows will spend several years in or near poverty.

⁸ Linked restricted-use data on earnings were not available to the author while this draft was being prepared.

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Table 1
Estimate of 1998 Log (Net Worth)

Log (1992 Net Worth)	0.600***	(0.012)
Husband's Age	-0.005	(0.004)
Wife's Age	-0.003	(0.003)
Wife – Hypertension 1998	0.062	(0.079)
Wife – Diabetes 1998	-0.308**	(0.128)
Wife – Cancer 1998	0.000	(0.128)
Wife – Lung disease 1998	-0.142	(0.101)
Wife – Heart disease 1998	-0.027	(0.090)
Wife – Stroke 1998	0.413**	(0.165)
Wife – Psychological problems 1998	0.166**	(0.080)
Wife – Arthritis 1998	0.030	(0.056)
Wife – Injury 1998	0.038	(0.140)
Husband – Hypertension 1998	-0.146*	(0.083)
Husband – Diabetes 1998	-0.004	(0.101)
Husband – Cancer 1998	0.008	(0.090)
Husband – Lung disease 1998	-0.079	(0.102)
Husband – Heart disease 1998	-0.009	(0.071)
Husband – Stroke 1998	-0.139	(0.140)
Husband – Psychological problems 1998	0.099	(0.089)
Husband – Arthritis 1998	0.067	(0.055)
Husband – Injury 1998	-0.075	(0.116)
Wife – Hypertension 1996	-0.179*	(0.092)
Wife – Diabetes 1996	-0.160	(0.139)
Wife – Cancer 1996	-0.067	(0.158)
Wife – Lung disease 1996	0.176	(0.128)
Wife – Heart disease 1996	-0.210*	(0.114)
Wife – Stroke 1996	-0.703***	(0.213)
Wife – Psychological problems 1996	-0.203**	(0.084)
Wife – Arthritis 1996	-0.083	(0.066)
Wife – Injury 1996	0.473	(0.531)
Husband – Hypertension 1996	-0.082	(0.088)
Husband – Diabetes 1996	-0.190*	(0.103)
Husband – Cancer 1996	0.007	(0.132)
Husband – Lung disease 1996	-0.082	(0.124)
Husband – Heart disease 1996	-0.052	(0.096)
Husband – Stroke 1996	-0.045	(0.172)
Husband – Psychological problems 1996	-0.164*	(0.098)
Husband – Arthritis 1996	-0.005	(0.063)
Husband – Injury 1996	-0.056	(0.206)

(Table 1 continues on next page)

Table 1 (continued)
Estimate of 1998 Log (Net Worth)

Wife – Hypertension 1994	0.048	(0.077)
Wife – Diabetes 1994	-0.287**	(0.127)
Wife – Cancer 1994	0.095	(0.161)
Wife – Lung disease 1994	-0.335**	(0.157)
Wife – Heart disease 1994	0.021	(0.129)
Wife – Stroke 1994	0.141	(0.280)
Wife – Psychological problems 1994	0.086	(0.093)
Wife – Arthritis 1994	-0.030	(0.071)
Wife – Injury 1994	0.005	(0.071)
Husband – Hypertension 1994	-0.195**	(0.087)
Husband – Diabetes 1994	-0.102	(0.103)
Husband – Cancer 1994	-0.156	(0.156)
Husband – Lung disease 1994	-0.069	(0.137)
Husband – Heart disease 1994	0.158	(0.114)
Husband – Stroke 1994	-0.074	(0.196)
Husband – Psychological problems 1994	-0.052	(0.119)
Husband – Arthritis 1994	-0.026	(0.071)
Husband – Injury 1994	0.188**	(0.084)
Wife – Hypertension 1992	-0.066	(0.037)
Wife – Diabetes 1992	-0.059	(0.061)
Wife – Cancer 1992	0.195*	(0.109)
Wife – Lung disease 1992	-0.121	(0.106)
Wife – Heart disease 1992	0.170*	(0.094)
Wife – Stroke 1992	0.098	(0.191)
Wife – Psychological problems 1992	-0.092	(0.056)
Wife – Arthritis 1992	0.004	(0.054)
Wife – Injury 1992	0.005	(0.050)
Husband – Hypertension 1992	-0.063*	(0.035)
Husband – Diabetes 1992	-0.106**	(0.054)
Husband – Cancer 1992	-0.032	(0.123)
Husband – Lung disease 1992	-0.021	(0.099)
Husband – Heart disease 1992	0.101	(0.080)
Husband – Stroke 1992	-0.031	(0.143)
Husband – Psychological problems 1992	0.042	(0.077)
Husband – Arthritis 1992	-0.044	(0.053)
Husband – Injury 1992	-0.054	(0.046)
Constant	2.984***	(0.197)
Adj. R ²	0.4909	

Standard errors in parentheses.

*, **, *** p<0.01, 0.05, 0.10 respectively

Table 2
Estimate of 1998 Log (Net Worth) using Aggregated Health Shocks by Wave

Log (1992 Net Worth)	0.618	(0.011)
Husband's Age	-0.007	(0.004)
Wife's Age	-0.004	(0.003)
Wife – Major 1998	-0.051	(0.068)
Wife – Mild 1998	0.064	(0.050)
Wife – Injury 1998	-0.039	(0.140)
Husband – Major 1998	-0.022	(0.057)
Husband – Mild 1998	0.076*	(0.044)
Husband – Injury 1998	-0.085	(0.116)
Wife – Major 1996	-0.141*	(0.082)
Wife – Mild 1996	-0.174***	(0.050)
Wife – Injury 1996	0.684	(0.527)
Husband – Major 1996	0.054	(0.072)
Husband – Mild 1996	-0.068	(0.045)
Husband – Injury 1996	-0.083	(0.204)
Wife – Major 1994	-0.082	(0.082)
Wife – Mild 1994	0.006	(0.045)
Wife – Injury 1994	-0.011	(0.071)
Husband – Major 1994	-0.084	(0.073)
Husband – Mild 1994	-0.060	(0.046)
Husband – Injury 1994	0.188**	(0.084)
Wife – Major 1992	0.150**	(0.063)
Wife – Mild 1992	0.001	(0.038)
Wife – Injury 1992	-0.017	(0.050)
Husband – Major 1992	-0.063	(0.058)
Husband – Mild 1992	-0.029	(0.035)
Husband – Injury 1992	-0.057	(0.046)
Constant	3.003	(0.194)
Adj R ²	0.4832	

Table 3
Estimate of 1998 Log (Net Worth)
using Aggregated Health Shocks – Any 1994-98

Log (1992 Net Worth)	0.621***	(0.011)
Husband's Age	-0.008**	(0.004)
Wife's Age	-0.005	(0.003)
Wife – Mild or major or injury, 1994-98	-0.055	(0.040)
Husband – Mild or major or injury, 1994-98	-0.071*	(0.038)
Wife – Mild or major, 1992	-0.014	(0.036)
Wife – Injury, 1992	-0.017	(0.050)
Husband – Mild or major, 1992	-0.024	(0.036)
Husband – Injury, 1992	-0.041	(0.046)
Constant	3.109	(0.189)
Adj R ²	0.4791	

Table 4
Estimate of 1998 Log (Net Worth)
using Only 1994 Reports of Health Shocks

	Model 1		Model 2	
Log (1992 Net Worth)	0.604***	(0.012)	0.619***	(0.011)
Husband's Age	-0.006*	(0.004)	-0.008**	(0.004)
Wife's Age	-0.003	(0.003)	-0.004	(0.003)
Wife – Major 1994			-0.194***	(0.073)
Wife – Mild 1994			-0.036	(0.043)
Wife – Hypertension 1994	0.049	(0.076)		
Wife – Diabetes 1994	-0.272**	(0.127)		
Wife – Cancer 1994	0.07	(0.139)		
Wife – Lung disease 1994	-0.281**	(0.135)		
Wife – Heart disease 1994	-0.181*	(0.109)		
Wife – Stroke 1994	-0.164	(0.237)		
Wife – Psychological problems 1994	0.027	(0.087)		
Wife – Arthritis 1994	-0.073	(0.06)		
Wife – Injury 1994	-0.007	(0.071)	-0.012	(0.071)
Husband – Major 1994			-0.058	(0.064)
Husband – Mild 1994			-0.073	(0.045)
Husband – Hypertension 1994	-0.172**	(0.087)		
Husband – Diabetes 1994	-0.077	(0.102)		
Husband – Cancer 1994	-0.077	(0.138)		
Husband – Lung disease 1994	-0.178	(0.119)		
Husband – Heart disease 1994	0.076	(0.093)		
Husband – Stroke 1994	-0.254	(0.164)		
Husband – Psychological problems 1994	-0.11	(0.11)		
Husband – Arthritis 1994	0.004	(0.061)		
Husband – Injury 1994	0.184**	(0.084)	0.180**	(0.084)
Wife – Major 1992			-0.003	(0.040)
Wife – Mild 1992			-0.058*	(0.033)
Wife – Hypertension 1992	-0.073**	(0.036)		
Wife – Diabetes 1992	-0.085	(0.06)		
Wife – Cancer 1992	0.129**	(0.063)		
Wife – Lung disease 1992	-0.097	(0.066)		
Wife – Heart disease 1992	-0.02	(0.058)		
Wife – Stroke 1992	-0.17	(0.119)		
Wife – Psychological problems 1992	-0.115**	(0.052)		
Wife – Arthritis 1992	-0.047	(0.035)		
Wife – Injury 1992	-0.001	(0.05)	-0.021	(0.050)
Husband – Major 1992			-0.040	(0.038)
Husband – Mild 1992			-0.037	(0.033)
Husband – Hypertension 1992	-0.052	(0.033)		
Husband – Diabetes 1992	-0.104*	(0.053)		
Husband – Cancer 1992	-0.007	(0.092)		
Husband – Lung disease 1992	-0.143**	(0.065)		
Husband – Heart disease 1992	0.042	(0.046)		
Husband – Stroke 1992	-0.18*	(0.092)		
Husband – Psychological problems 1992	0.017	(0.072)		
Husband – Arthritis 1992	0.001	(0.035)		
Husband – Injury 1992	-0.053	(0.046)	-0.056	(0.046)
Constant	3.033***	(0.191)	3.045***	(0.190)
Adj R ²	0.4861		0.4803	

Appendix Table A: Some Binary Variable Definitions

Variable	Defined
Wife –cancer 1998 (similar 1994, '96, '98 variables similarly defined)	Wife – new cancer report 1998, diagnosis after 1996 interview and before 1998 interview
Wife –cancer 1992 (similar 1992 variables similarly defined)	Wife – any cancer report in 1992 interview, diagnosis at any time pre-interview
Husband – Psychological 1998	Husband – new report of psychological problems 1998, diagnosis after 1996 interview and before 1998 interview
Wife –Major 1998 (similar 1994, '96, '98 variables similarly defined)	Wife – any new report of cancer, stroke, lung or heart disease, 1998 (diagnosis after 1996 and before 1998 interview)
Wife –Major 1992 (similar 1992 variables similarly defined)	Wife – any report of cancer, stroke, lung or heart disease, 1992 (diagnosis before 1992 interview)
Wife –Mild 1998 (similar 1994, '96, '98 variables similarly defined)	Wife – any new report of diabetes, hypertension, arthritis, or psychological problems, 1998 (diagnosis after 1996 and before 1998 interview)
Wife – Mild 1992 (similar 1992 variables similarly defined)	Wife – any report of diabetes, hypertension, arthritis, or psychological problems, 1992 (diagnosis before 1992 interview)

Appendix Table B: Means of Key Variables

Variable	Mean	(Std Dev)
1998 Net Worth (nominal, in thousands)	461.100	(2124.400)
Log 1998 Net Worth	5.266	(1.256)
1992 Net Worth (nominal, in thousands)	291.692	(569.647)
Log 1992 Net Worth	4.822	(1.404)
Change in Net Worth (1998 – 1992 Net Worth)	169.409	(1960.171)
Husband's age	57.055	(5.213)
Wife's age	53.096	(5.580)
The following are binary variables		
Wife – Cancer 1998	0.098	(0.298)
Wife – Lung disease 1998	0.078	(0.268)
Wife – Heart disease 1998	0.128	(0.334)
Wife – Stroke 1998	0.028	(0.164)
Wife – Hypertension 1998	0.045	(0.207)
Wife – Diabetes 1998	0.017	(0.129)
Wife – Psychological 1998	0.153	(0.360)
Wife – Arthritis 1998	0.532	(0.499)
Wife – Injury 1998	0.013	(0.113)
Wife – Cancer 1996	0.084	(0.278)
Wife – Lung disease 1996	0.073	(0.259)
Wife – Heart disease 1996	0.111	(0.315)
Wife – Stroke 1996	0.025	(0.155)
Wife – Hypertension 1996	0.033	(0.179)
Wife – Diabetes 1996	0.015	(0.123)
Wife – Psychological 1996	0.145	(0.352)
Wife – Arthritis 1996	0.481	(0.500)
Wife – Injury 1996	0.001	(0.030)

(Table continues on next page)

Appendix Table B: Means of Key Variables (Continued)

Wife – Cancer 1994	0.013	(0.113)
Wife – Lung disease 1994	0.014	(0.117)
Wife – Heart disease 1994	0.022	(0.146)
Wife – Stroke 1994	0.004	(0.066)
Wife – Hypertension 1994	0.045	(0.208)
Wife – Diabetes 1994	0.016	(0.124)
Wife – Psychological 1994	0.034	(0.181)
Wife – Arthritis 1994	0.078	(0.268)
Wife – Injury 1994	0.052	(0.221)
Wife – Cancer 1992	0.067	(0.249)
Wife – Lung disease 1992	0.063	(0.243)
Wife – Heart disease 1992	0.084	(0.277)
Wife – Stroke 1992	0.018	(0.133)
Wife – Hypertension 1992	0.309	(0.462)
Wife – Diabetes 1992	0.078	(0.267)
Wife – Psychological 1992	0.101	(0.301)
Wife – Arthritis 1992	0.378	(0.485)
Wife – Injury 1992	0.115	(0.319)
Wife – Major, 1998	0.263	(0.441)
Wife – Mild, 1998	0.609	(0.488)
Wife – Major, 1996	0.236	(0.425)
Wife – Mild, 1996	0.552	(0.497)
Wife – Major, 1994	0.049	(0.215)
Wife – Mild, 1994	0.156	(0.363)
Wife – Major, 1992	0.195	(0.396)
Wife – Mild, 1992	0.586	(0.493)
Wife – Major, 1994-98	0.285	(0.451)
Wife – Mild, 1994-98	0.667	(0.471)
Wife – Injury, 1994-98	0.063	(0.244)
Wife – Mild or major, 1992	0.638	(0.481)
Wife – Mild or major, 1994-98	0.742	(0.438)
Husband – Cancer 1998	0.083	(0.276)
Husband – Lung disease 1998	0.079	(0.270)
Husband – Heart disease 1998	0.216	(0.412)
Husband – Stroke 1998	0.050	(0.218)
Husband – Hypertension 1998	0.039	(0.193)
Husband – Diabetes 1998	0.025	(0.155)
Husband – Psychological 1998	0.078	(0.268)
Husband – Arthritis 1998	0.465	(0.499)
Husband – Injury 1998	0.019	(0.138)
Husband – Cancer 1996	0.051	(0.220)
Husband – Lung disease 1996	0.075	(0.263)
Husband – Heart disease 1996	0.187	(0.390)
Husband – Stroke 1996	0.041	(0.198)
Husband – Hypertension 1996	0.034	(0.181)
Husband – Diabetes 1996	0.024	(0.153)
Husband – Psychological 1996	0.072	(0.258)
Husband – Arthritis 1996	0.406	(0.491)
Husband – Injury 1996	0.006	(0.078)

(Table continues on next page)

Appendix Table B: Means of Key Variables (Continued)

Husband – Cancer 1994	0.013	(0.114)
Husband – Lung disease 1994	0.018	(0.132)
Husband – Heart disease 1994	0.029	(0.168)
Husband – Stroke 1994	0.009	(0.095)
Husband – Hypertension 1994	0.034	(0.182)
Husband – Diabetes 1994	0.024	(0.155)
Husband – Psychological 1994	0.021	(0.143)
Husband – Arthritis 1994	0.073	(0.261)
Husband – Injury 1994	0.037	(0.190)
Husband – Cancer 1992	0.029	(0.169)
Husband – Lung disease 1992	0.065	(0.246)
Husband – Heart disease 1992	0.145	(0.352)
Husband – Stroke 1992	0.031	(0.173)
Husband – Hypertension 1992	0.391	(0.488)
Husband – Diabetes 1992	0.101	(0.301)
Husband – Psychological 1992	0.051	(0.221)
Husband – Arthritis 1992	0.314	(0.464)
Husband – Injury 1992	0.136	(0.343)
Husband – Major, 1998	0.349	(0.477)
Husband – Mild, 1998	0.526	(0.499)
Husband – Major, 1996	0.293	(0.455)
Husband – Mild, 1996	0.470	(0.499)
Husband – Major, 1994	0.065	(0.246)
Husband – Mild, 1994	0.140	(0.347)
Husband – Major, 1992	0.229	(0.420)
Husband – Mild, 1992	0.594	(0.491)
Husband – Major, 1994-98	0.370	(0.483)
Husband – Mild, 1994-98	0.609	(0.488)
Husband – Injury, 1994-98	0.059	(0.236)
Husband – Mild or major, 1992	0.733	(0.442)
Husband – Mild or major, 1994-98	0.660	(0.474)

N = 3393¹

¹ This sample excludes 166 households with zero or negative net worth in 1992 or 1998.