No Pain, No Strain: Impact of Health on the Financial Security of Older Americans

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This study uses data from the 2002 and 2004 Health and Retirement Study to investigate the impact that new and existing health problems have on the financial strain of older Americans. Two-period models are estimated for a series of financial ratio guidelines that take into account household solvency, liquidity, and investment asset accumulation. We test our models using a subjective measure of self-reported health status and two objective measures of health that control for the severity of specific health conditions. The results show that health problems significantly increase the likelihood of financial strain for older individuals, but the effects vary by the measure of financial strain used and how health status is defined. Specifically, existing health conditions were more likely to affect solvency and investment asset accumulation than liquidity, while new health events were more likely to affect solvency. The severity of the condition did not seem to matter as much as whether the condition was chronic. These results provide insight into the future financial security of older Americans and have important implications for health policy and research.

As the U.S. population ages, there is considerable debate about whether rising health care costs and growing levels of household debt threaten the future financial security of older Americans (Copeland 2006; Johnson and Penner 2004). Currently, individuals aged 65 years or older spend, on average, 19 percent of their income on out-of-pocket health care expenditures, including health insurance premiums (Crystal et al. 2000). Out-of-pocket health care expenditures are projected to increase to at least 30 percent of after-tax income for older families by 2030 (Johnson and Penner 2004).

In addition to concerns over rising health care costs, there is growing concern that older Americans are accumulating too much debt. The average total debt held by a family with a head aged 55 years or older has risen significantly in recent years, from $29,309 in 1992 to $51,791 in 2004 (Copeland 2006).1 The average debt held by a family with a head aged 75 years or older has increased by even more, from $7,769 in 1992 to $20,234 in 2004, an increase of more than 160 percent. Debt levels have grown fastest for lower-income families. Specifically, families in the lowest income quartiles experienced the largest percentage point increases in debt, from 38.0 percent in 2001 to 47.0 percent in 2004. If current projections are accurate, health care costs and household debt levels will continue to rise, resulting in greater financial strain for older Americans (Copeland 2006; Johnson and Penner 2004).

Previous research has examined how health affects the wealth depletion of the elderly (Hurd and Kapteyn 2003; Kim and Lee 2005; Lee and Kim 2003; Smith 1999, 2003). These studies have found that poor health significantly increases wealth depletion. This research, however, does not adequately investigate the extent to which health affects the overall financial security of older Americans. To what extent do health problems result in

serious financial strain such as insolvency? Also, as wealth is depleted, how do the financial portfolios of older individuals change in response to health problems, especially to chronic health conditions? Many older Americans, especially those who are retired, do not have earnings that they can use to cover unexpected health care costs. Unlike the working population, they have to spend larger portions of their income on health care expenses as well as larger shares of their retirement wealth. For this reason, older Americans with health problems may experience changes in their portfolios, such as those related to liquidity and investment asset holdings.

Our study builds upon previous research and uses longitudinal analysis to provide a more complete picture of the effect that health status has on the financial strain of older Americans. Using data from the 2002 and 2004 Health and Retirement Study (HRS), we construct a series of financial ratio guidelines that account for a household's degree of financial strain (i.e., solvency, liquidity, and investment asset accumulation). Two-period models are estimated for a sample of the U.S. population aged 65 years or older to examine the impact that new and existing health events have on current financial strain and changes in financial strain. We test our models using both a subjective measure of self-reported health status and two objective measures of health that control for the severity of specific health conditions. The results of this study provide insight into the future financial security of older Americans and have important implications for health policy and research.

LITERATURE REVIEW

Health and Socioeconomic Status

A large body of research has examined the relationship between health and socioeconomic status (SES). Some studies have focused primarily on the impact that SES has on health status, examining whether low SES (e.g., income and wealth) leads to poor health (e.g., Drentea and Lavrakas 2000; Jacoby 2002; Meer, Miller, and Rosen 2003). These studies provide some evidence that lower SES can lead to poor health, either by the physical stress that financial strain creates or because of limited access to quality health care services. However, the effect of SES on health status typically has been found to be very small.

The majority of research related to health and SES tends to show that poor health results in lower SES (e.g., Adams et al. 2003; Kim and Lee 2005; Lee and Kim 2003; Lyons and Yilmazer 2005; Michaud and van Soest 2004; Smith 1999, 2003; Wu 2003). In fact, it is well documented in the literature that the dominant direction of causation for older Americans is not from SES to health, but from health to SES (Adams et al. 2003; Lee and Kim 2003; Michaud and van Soest 2004; Smith 1997, 1999).

The relationship between health and SES has been frequently documented using wealth because wealth captures command over economic resources, particularly consumption opportunities (Hurd 1990; Smith 1997). The link from health to wealth has been found using a variety of wealth measures. Some studies have used total wealth and found that

poor health decreases the dollar amount of wealth held by the individual (Adams et al. 2003; Smith 1999,2003; Wu 2003). Other studies have used the percentage change in wealth between two time periods (Haider et al. 2000; Hurd and Kapteyn 2003). They found that unanticipated health expenses resulted in a 10 percent decrease in savings. Kim and Lee (2005) and Lee and Kim (2003) used a binary measure to identify individuals who had experienced a depletion in wealth that was greater than 10 or 30 percent. They found that those with health problems experienced a more accelerated decline in wealth depletion than those without health problems.

Overall, these studies have showed that health problems can lead to declines in wealth for older Americans. However, this research has not adequately investigated the extent to which wealth depletion results in financial strain. In particular, do health problems deplete wealth to the point of insolvency? And, in turn, how do health problems affect the asset allocation of older individuals?

Financial Ratios and Portfolio Allocation

Researchers have identified several financial ratio guidelines that have been used to predict household financial strain such as liquidity problems and insolvency (e.g., Baek and DeVaney 2004; Chang, Hanna, and Fan 1997; DeVaney 1994; DeVaney and Lytton 1995; Garman and Forgue 2006; Lyons and Yilmazer 2005; Yao, Hanna, and Montalto 2003; Zeldes 1989). These financial ratio guidelines focus on assessing a household's ability to avoid excessive debt (solvency ratio), maintain adequate liquidity (liquidity ratio), and make progress toward financial goals (investment assets ratio). Since each financial ratio captures a slightly different aspect of the financial position of the household, a single ratio may not be comprehensive enough to accurately capture the degree to which households are under financial strain (Baek and DeVaney 2004; Lyons and Yilmazer 2005). For this reason, one might want to take into consideration several of these financial guidelines when examining the financial strain of older Americans.

To date, little research has examined the link between these financial ratios and health status. Using cross-sectional data from the Survey of Consumer Finances, Lyons and Yilmazer (2005) used three financial guidelines (delinquent on loan payments, total assets/total debts less than 1.0, and liquid assets/income less than 0.25) to examine the relationship between self-reported health status and financial strain for a general sample of the U.S. population. They found that for all three measures, poor health significantly increased the likelihood of financial strain. There was little evidence to show that financial strain contributed to poor health.

Two other recent studies by Rosen and Wu (2004) and Berkowitz and Qiu (2006) used data from the HRS to examine how health status affects the portfolio allocation decisions of older Americans. Rosen and Wu (2004) found that health status was a significant predictor of both the probability of owning different types of financial assets and the proportion of total financial wealth allocated to each type of asset. Specifically, they found that older households in poor health were less likely to hold risky financial assets and more likely to hold a greater share of their financial wealth in safe assets. Berkowitz

and Qiu (2006) looked at how changes in health status affected the financial asset and nonfinancial asset holdings of older Americans. They found that new health events led to larger declines in financial than nonfinancial wealth. The reduction in financial wealth further resulted in older households restructuring the composition of their financial assets.

Health Status Measures

Within the literature, health status has been defined using a variety of measures. Despite differences in the measures used, little attention has been paid to investigating the impact that both self-reported and objective measures of health have on financial strain. Some studies have used individuals' self-reported subjective perceptions of their health. Self-reported measures serve as general indicators of health; typically, individuals are asked to rate their current health status from excellent to poor. While some have questioned the reliability and validity of self-reported measures, most research has found that they provide meaningful and reliable measures of an individual's actual health status (e.g., Baker, Stabile, and Deri 2001; Hoeymans et al. 1997; Idler and Benyamini 1997; Idler and Kasl 1991, 1995; Meer, Miller, and Rosen 2003). Hurd and Kapteyn (2003) used self-reported measures from both U.S. data and data from the Netherlands to show that there was a strong positive association between health and income and health and wealth. Another recent study by Lyons and Yilmazer (2005) used a self-reported measure from the Survey of Consumer Finances to show that poor health positively, and significantly, affected financial strain.

Other studies have used more objective measures that control for the prevalence and incidence of specific health conditions such as functional impairments, medically diagnosed conditions, and chronic diseases (Adams et al. 2003; Haider et al. 2000; Kim and Lee 2005; Lee and Kim 2003; Smith 1999, 2003; Wu 2003). These studies have examined how existing health conditions and new health events affect wealth depletion. Some also have looked at how these effects differ by the severity of the condition (e.g., a mild or severe chronic condition). In general, the findings show that existing severe chronic conditions have a significant impact on the wealth depletion of older Americans, while existing mild chronic conditions do not. The results further show that both new health events and existing chronic conditions lead to significant wealth depletion.

METHODS

Theoretical Framework

The life cycle theory of consumption and savings provides a framework for explaining how older individuals spend down their financial resources as health problems arise and how the depletion of these resources can result in financial strain. In general, the life cycle model describes how individuals save before retirement and dissave after retirement to finance consumption over the remainder of their lives (Modigliani and Brumberg 1954). The simplest model assumes that individuals exhaust all of their savings by the time of their death. Variations of the model further assume that individuals set aside some savings for the purpose of leaving a bequest. Individuals may also

anticipate expenses for emergencies or long-term medical care and therefore, as a precautionary measure, set aside additional savings. Regardless, the fundamental prediction of the theory is that savings declines with age, implying that decreases in savings are planned or expected. This simple framework does not, however, take into consideration unexpected events or uncertainties that arise during the remainder of the individual's lifetime.

An individual's actual changes in savings may differ from planned changes due to unexpected events that positively or negatively affect overall savings. On the one hand, unanticipated financial events such as receiving unexpected gifts or inheritances can increase savings. In contrast, other unexpected events, such as those stemming from health problems or a change in marital status, can accelerate planned declines in savings and result in older individuals running out of savings earlier than expected (Haider et al. 2000; Kim and Lee 2005; Lee and Kim 2003; Smith 1999). In such cases, savings may be depleted fairly quickly placing financial strain on individuals, which in turn, can threaten their overall financial security. This accelerated depletion of savings can lead to serious financial strain such as insolvency.

This study focuses on the impact that health problems have on financial strain. However, it is important to acknowledge that there are other factors indirectly related to health status, which can contribute to, or help to mitigate, financial strain. We briefly discuss four of those key factors. First, health problems, especially new health events and chronic conditions, can result in large and unexpected increases in health care expenditures (Haider et al. 2000; Lee and Kim 2003; Smith 1999, 2003). Individuals can transfer this health risk in later years by obtaining supplemental health insurance plans from former employers or by purchasing Medigap programs to supplement Medicare. These health insurance plans can help to mitigate declines in savings that result from unexpected health care expenditures and rising health care costs (Kim and Lee 2005; Smith 1999, 2003).

Second, health problems can increase nonmedical consumption (Lillard and Weiss 1997). For example, when individuals have health problems, they may prefer to use transportation services instead of driving on their own. They also may cut back on household production such as cooking or cleaning and rely more on market goods and services. In addition, they may need to make modifications to their home to accommodate illness or disability (Kutty 1999). If older individuals have adult children, they may be able to reduce the financial burden associated with a health condition by living with their children or having some other alternative living arrangement.

Third, health problems can lead to depletions in savings by reducing an individual's ability to work, resulting in reductions in current and future earnings. Most individuals over the age of 65 are retired, so the reduction of savings through earnings is not as relevant for this group. However, health problems can have a significant impact on wealth that was accumulated from previous earnings as well as other resources. Smith (1999) found that the onset of a new severe health condition resulted in about $17,000 (or 7 percent) of wealth depletion for Americans aged 51-61 years. Also, Haider et al. (2000)

found that unanticipated health expenses led to a 10 percent dissaving for Americans aged 70 or older.

Finally, health problems can affect savings by changing individual's inter vivo and bequest behaviors (Hurd 1990; Smith 1999). Older individuals, who have health problems, may decrease or eliminate inter vivo transfers or inheritances to children to cover increases in health care expenditures. These reductions in transfers and bequests can help to slow decreases in savings that result from health problems. However, declines in savings are still likely to occur, especially for those with serious health conditions who have limited financial resources.

Overall, this theoretical framework provides insight into why older individuals, who have an existing health problem or who experience an unexpected health event, may be more likely to dissave and become financially strained (e.g., insolvent, illiquid, and asset depleted). We use this framework to provide context for our empirical analysis, which looks at how changes in health status affect financial strain across two time periods. Our analysis takes into consideration the factors described above such as health insurance, nonmedical consumption, employment, and monetary transfers.

Empirical Models

Recall from previous literature that the dominant direction of causation for older Americans is not from SES to health but from health to SES. Thus, we are interested in examining how changes in health status affect the financial strain of older Americans. To do this, we use longitudinal analysis similar to Lee and Kim (2003), Kim and Lee (2005), and Smith (2003). We first estimate the following two-period model:

According to this model, current financial strain (FS^sub t^) is determined dynamically by health in the previous period (H^sub t-1^), new health events that arise between the previous and the current periods (ΔH^sub t-1,t^), and financial strain in the previous period (FS^sub t-1^). FS^sub t^ is a discrete dependent variable that is equal to 1 if the respondent reports being financially strained in the current period and 0 otherwise. FS^sub t-1^, H^sub t-1^, and ΔH^sub t-1,t^ are also discrete choice variables. FS^sub t-1^ is equal to 1 if the respondent reports being financially strained in the previous period and H^sub t-1^ is equal to 1 if the respondent reports having a health problem in the previous period (i.e., an existing health condition). ΔH^sub t-1,t^ represents a change in health status and is equal to 1 if the respondent reports a negative change in health status between t - 1 and t (i.e., a new health event). (See the next section for complete details on the variables and how they were constructed from the data.)

We know from our theoretical discussion that FS^sub t^ is determined by a vector of other exogenous factors, X^sub t-1,t^. Included in X^sub t-1,t^ are the financial characteristics of the household such as income, assets, monetary transfers, and previous levels of financial strain. X^sub 1-1,t^ also includes demographic factors that control for a respondent's age, gender, race/ethnicity, education, marital status, living arrangements, employment status, and how well the individual is covered by health insurance.

The key parameters of interest in our model are α^sub 1^ and α^sub 2^, which measure the impact that existing health conditions and new health events, respectively, have on financial strain. The probit method is used to estimate equation (1) and obtain unbiased estimates of α^sub 1^ and α^sub 2^.

We also are interested in determining whether a change in health status results in a change in financial strain between the two periods. Therefore, we use a second longitudinal approach and regress new health events (ΔH^sub t-1,t^) that arise between the previous and the current periods on changes in financial strain between the two periods (ΔFS^sub t-1,t^). That is:

To estimate this two-period model, we again use the probit method and obtain unbiased estimates of β^sub 1^ and β^sub 2^, which measure the degree to which existing health conditions and new health events result in a change in financial strain between t - 1 and t.

DATA

To estimate our models, we use data from the HRS, which is a national longitudinal study of older Americans sponsored by the National Institute on Aging. The HRS provides in-depth information on the financial position of older households including income, assets, and debts, which allows us to construct a series of financial ratio guidelines. The data also provide comprehensive information on the health status of individuals, including both subjective and objective measures of health such as self-reported health status and whether the individual has a specific health condition.

For our analysis, we use the most recent data from the 2002 and 2004 HRS. The 2002 HRS interviewed a nationally representative probability sample of 18,167 respondents who were born prior to 1948. To look at how changes in health affect the financial strain of older Americans, we restrict our sample to include respondents who were aged 65 years or older in 2002 (10,867 of 18,167 respondents) and who participated in both the 2002 and the 2004 waves of the survey (9,394 of 10,867 respondents).

It is important to note that we conduct our analysis at the individual level. The HRS collects individual-level data on some factors such as health status; however, it also collects household-level data on other factors such as financial resources. If a couple is married in the HRS, both the husband and the wife may be included as respondents regardless of whether both spouses were bom in 1948 or earlier. In these cases, we calculate financial ratios at the household level and then assign the same ratio to the husband and wife if they are both included in the data set.

Because our analysis is conducted at the individual level, we use the respondent-level weights to yield unbiased estimates of the population parameters. The value of these probability weights takes into account the marital status of the respondent and the number of age-eligible persons in the household (Heeringa and Connor 1995, pp. 37-38). Thus, the weights adjust for the fact that both the husband and the wife may be included as

respondents in the data. For the purposes of this study, all of our data have been weighted.

Also, note that the HRS sample is clustered and stratified, and unless this is taken into account, standard errors based on simple random sampling will tend to be biased downward. For our analysis, standard errors have been adjusted for sample clustering and stratification.2

Financial Strain Measures

We construct our dependent variables using three financial ratio guidelines, which serve as measures of financial strain for older Americans: a solvency ratio (total assets/total debts less than 1.0), a liquidity ratio (liquid assets/monthly income less than 2.5), and an investment assets ratio (investment assets/net worth less than 0.25)? A dummy variable is created and set equal to 1 if the respondent reported that they were financially strained according to that particular ratio. Note that each ratio captures a slightly different aspect of financial strain.

The solvency ratio (total assets/total debts less than 1.0) identifies older respondents who are highly leveraged and close to being insolvent. These households face a wide range of financial challenges since their liabilities exceed their assets and they have retired or are close to retiring. Thus, these individuals not only lack enough assets to cover their debts but also may not have a current income flow that is flexible and sufficient to pay current bills and expenses. We define total assets as the sum of financial assets (checking accounts, savings accounts, money market funds, certificates of deposit, mutual funds, stocks, bonds, and individual retirement accounts) and nonfinancial assets (primary residence and other real estate). Total debts are all debts including mortgage debt. This ratio is perhaps the most unambiguous measure of financial strain since it defines insolvency.

The liquidity ratio (liquidassets/monthly income less than 2.5) captures the extent to which older Americans have sufficient liquid assets to cover about 2.5 months of living expenses. Liquid assets include checking accounts, savings accounts, and money market funds.4 In general, financial planners recommend that individuals set aside an emergency fund with liquid savings worth about three to six months of living expenses (e.g., DeVaney 2000; Garman and Forgue 2006). Having an emergency fund ensures that individuals, especially the elderly, are adequately prepared for unexpected expenses such as those related to a negative health shock. The 2.5 month cutoff may seem arbitrary. However, having an emergency fund that is slightly smaller than that recommended by the financial experts is likely to be more appropriate for older Americans since they have larger amounts of accumulated wealth than younger individuals.5 Keep in mind, though, that older individuals, who rely almost solely on limited incomes and who have not adequately prepared for retirement, may need a larger "cushion" to protect themselves against unexpected health events. While the majority of older Americans have Medicare (98 percent), it only covers about half of all medical expenses (Ezzati-Rice, Kashihara, and Machlin 2004; Hurd and McGarry 1997). Also, a new health condition may be more

likely than an existing one to have an impact on liquidity, and a larger emergency fund may help to better mitigate the financial burdens associated with a new health event.6

Finally, the investment assets ratio (investment assets/net worth less than 0.25) identifies older individuals who have less than 25 percent of their net worth in investment assets. According to Baek and DeVaney (2004), individuals in the earlier stages of the life cycle often have an investment assets ratio of less than 20 percent. However, as individuals advance through the life cycle, it is recommended that they maintain an investment assets ratio of at least 25 percent (DeVaney 2000; Lytton, Garman, and Porter 1991). This includes those who are aged 65 years or older. The investment assets ratio is a good indicator of how well an older individual has met their retirement savings goals. It also provides a good indication of the extent to which health problems might push accumulated investment assets below a critical threshold. For the purpose of this study, investment assets include stocks, bonds, certificates of deposit, individual retirement accounts, real estate, and business or farm equity but not the primary residence or vehicles. This definition follows that used by Baek and DeVaney (2004). Net worth is defined as total assets minus total debts.

To measure a change in financial strain, we construct a dummy variable that is equal to 1 for each financial ratio guideline if the respondent went from not being financially strained in 2002 to being financially strained in 2004. To account for the impact that previous financial strain has on current financial strain, we construct a dummy variable for each ratio to control for whether the respondent reported that the household was financially strained in 2002.7

Health Status Measures

We measure health status using the following three variables-self-reported health status, mild chronic health conditions, and severe chronic health conditions. Self-reported health is used to control for respondents' subjective perceptions of their health status, while chronic conditions are used to more objectively capture health status by controlling for specific health conditions (Wallace and Herzog 1995). Respondents are classified as being in poor health using the self-reported health measure if they reported being in either "poor" or "fair" health. They are classified as not being in poor health if they responded that they were in "good," "very good," or "excellent" health. A dummy variable was created to control for this measure of self-reported health. A large body of literature has found that this dichotomous measure of self-reported health status is reliable (e.g., Baker, Stabile, and Deri 2001; Meer, Miller, and Rosen 2003).8

The HRS also includes information on eight types of chronic health conditions that commonly occur in later life. They include diabetes, cancer, lung disease, heart condition, stroke, high blood pressure, psychiatric problems (including emotional or nervous conditions), and arthritis. These eight conditions can be divided into two groups based on their severity and the associated financial burden (Smith 1999; Wallace and Herzog 1995)-the first five are severe conditions and the rest are mild conditions. To measure the impact of severe or mild chronic conditions on financial strain, we create binary variables

to control for whether the respondent has, or does not have, a severe or mild chronic condition.9

For our two-period analysis, existing health conditions are defined using binary variables for whether the respondent reports being in poor health or has a severe or mild chronic condition in 2002. New health events are defined as follows. For the self-reported health measure, a change in health status represents whether the respondent reported that their health status worsened between 2002 and 2004.10 For severe and mild chronic conditions, a change in health status represents whether the respondent reported that they developed a new severe or mild chronic condition between 2002 and 2004. The specification of these variables is consistent with the literature that has used HRS data to define new health events (e.g., Berkowitz and Qiu 2006; Lee and Kim 2003; Wu 2003).

Other Variables

The following demographic characteristics are included as controls in our models and are consistent with the literature: age, gender, race/ethnicity, education, homeownership, and employment status. In addition, we include two controls for marital status-whether the respondent was married in 2002 and whether the respondent went from being married in 2002 to unmarried in 2004. Married couples are able to pool resources. Thus, if individuals go from being married to unmarried, they are likely to experience a shock to their financial situation. The direction of that shock will depend on the distribution of wealth following the marriage. We also control for whether the respondent is living with one of their adult children. Living with an adult child may reduce the amount that elderly parents need to spend on formal care (e.g., nursing home) and may help to reduce wealth depletion and thus financial strain.11

Controls for income, liquid assets, and monetary transfers are also included in our models. Household income and liquid assets are reported using the logarithm of these values in 2004 dollars. Income is measured using a self-reported measure of annual gross income for the household, and liquid assets are defined to be the sum of checking accounts, savings accounts, and money market funds. A binary variable is also included to account for whether the respondent received a lump sum transfer between 2002 and 2004, thus experiencing a positive shock to their financial situation. This variable identifies individuals who received money or property in the form of an inheritance, a trust fund, an insurance settlement, or any other large lump sum payment. Another binary variable is included to control for whether the respondent gave a financial transfer to their children between 2002 and 2004. This variable controls for a respondent's bequest motive as well as a reduction in resources between the two time periods.

In addition to these variables, we include a series of categorical variables that control for whether the respondent has supplemental health insurance coverage in addition to Medicare A and B. The first insurance variable controls for having Medicare plus an employer-sponsored insurance plan. The second variable controls for having Medicare plus Medigap, a private insurance plan that fills gaps in coverage by Medicare. The next variable controls for whether the individual is on Medicaid, which is a low-cost version

of Medigap provided by the federal government to the poor. The final variable is used to account for whether the respondent has a Medicare HMO plan.

DESCRIPTIVE STATISTICS

Table 1 presents sample statistics related to our two key variables-financial strain and health status. For the entire sample, 5.1 percent of respondents reported being insolvent in 2004, 50.1 reported being illiquid, and 52.2 percent reported having insufficient investment assets. With regard to health status, 26.4 percent reported having poor health in 2002, 83.9 percent reported having a mild chronic condition, and 55.8 percent reported having a severe chronic condition. The percentage of respondents who reported that their health status had worsened between 2002 and 2004 was 30.7 percent. However, fewer respondents reported developing a new mild or severe chronic condition-only 3.9 and 6.6 percent, respectively.

Table 1 also shows the relationship between the various health and the financial strain measures. Specifically, it compares the health status of respondents who were financially strained to respondents who were unstrained in 2004.12 Standard chi-square tests were used to identify differences in means that were significant between strained and unstrained respondents. In general, we found that older respondents who reported being in poor health in 2002 or reported that their health worsened between 2002 and 2004 were more likely to be financially strained. We also found that those who were financially strained in 2004 according to one financial ratio were more likely to be financially strained according to the other ratios. For instance, those who were illiquid in 2004 were more likely than those who were liquid to be insolvent (8.6 compared to 1.5 percent) and to have insufficient investment assets (61.8 compared to 42.5 percent).

The descriptive statistics for respondents who reported being financially strained in 2004 are presented in Table 2. The following are key points to note. First, respondents who were financially strained in 2004 were more likely to report lower levels of income, liquid assets, and net worth than those who were not strained. They were also less likely to have received a lump sum of money and to have made a financial transfer to their child. Demographically, respondents who were financially strained were more likely to be black or Hispanic and living with one of their children. They had less education and were less likely to be married and to be a homeowner. With respect to insurance, financially strained respondents were more likely to be a Medicaid beneficiary and less likely to have additional health insurance coverage such as Medigap or employer-sponsored private insurance. We now examine the extent to which the regression results support these descriptive statistics.

RESULTS

Probit Analysis

Table 3 presents the results from the first model (see equation (1)), which shows how existing health problems and new health events affect the probability of being financially

strained. In this table, health status was defined using self-reported health status in 2002 and changes in self-reported health status between 2002 and 2004. The results show that having poor health in 2002 increased the likelihood that older individuals experienced financial strain in 2004. This finding was significant for the liquidity and investment assets ratios ($p < .05$) but insignificant for the solvency ratio. In addition, those who reported that their health had worsened between 2002 and 2004 were also more likely to be financially strained, but this finding was only significant for the solvency ratio.

The impact of demographic variables on financial strain was similar across the three measures, with a few small differences. Being black or Hispanic and living with a child increased the probability of being financially strained under all three measures. However, additional years of education significantly decreased the probability of being illiquid and having insufficient investment assets, while working (part-time or full-time) increased the probability of strain under these two measures. Being a homeowner significantly decreased the probability of being insolvent and illiquid. It also decreased the probability of having insufficient investment assets, but this finding was not statistically significant. Receiving a lump sum transfer or giving a financial transfer to a child between 2002 and 2004 also decreased the probability of financial strain for all three measures. However, receiving a lump sum transfer only had a significant effect on the liquidity ratio, while giving a financial transfer had a slightly significant effect on both the solvency and the investment asset ratios.

With respect to the insurance variables, we found that having supplemental health insurance in 2002 from an employer-sponsored insurance plan or Medigap significantly decreased the probability of financial strain. However, being a beneficiary of Medicaid in 2002 significantly decreased the probability of being insolvent, while it increased the probability of being illiquid and having insufficient investment assets. This is likely a function of the eligibility requirements for Medicaid, which targets the poor and is based on a household's income and asset holdings. Finally, those who were financially strained in 2002 were also significantly more likely to be financially strained in 2004.

Table 4 presents the results from the models, where health status was defined by whether an individual had a severe chronic condition. In general, the results showed that having a severe chronic condition increased the probability of financial strain. However, the significance of the results varied according to the measure of financial strain. Specifically, poor health in 2002 (e.g., having a severe chronic condition) significantly increased the likelihood of being insolvent and having insufficient investment assets in 2004. Yet, it did not significantly affect the liquidity ratio. The probability of financial strain also increased for those who reported that they developed a new severe chronic health condition between 2002 and 2004. However, this finding was only significant for the solvency ratio ($p < .05$). With respect to the demographic variables, the results were fairly consistent with those presented in Table 3.

We also estimated the models for whether an individual had a mild chronic condition. The results showed that having a mild chronic condition in 2002 significantly increased the probability of being financially strained in 2004 for the solvency and investment

assets ratios, which is consistent with the results that were found for having a severe chronic condition. However, those who reported that they had developed a new mild chronic condition between 2002 and 2004 were significantly more likely to have insufficient investment assets. There was little evidence to suggest that a new mild chronic condition affected solvency or liquidity. The regression results for these models are available from the authors upon request.

Finally, we re-estimated all of our models to investigate whether an existing health condition or a new health event resulted in a change in financial strain between 2002 and 2004 (see equation (2)). Only a few variables were found to be significant, and those variables almost solely pertained to the solvency ratio. Specifically, we found that those whose health had worsened between 2002 and 2004 were significantly more likely to report that they had gone from being solvent in 2002 to insolvent in 2004. In addition, the results showed that having either a mild or a severe chronic condition in 2002 significantly increased the probability of going from solvency to insolvency while developing a new mild or severe chronic condition did not. We also found that those who had a severe chronic condition in 2002 were less likely to have gone from being liquid in 2002 to illiquid in 2004, but this result was only slightly significant ($p < .10$). The results from these regressions also are available upon request.

Marginal Effects for Changes in Health Status

Table 5 presents the results from all the models previously discussed. Specifically, marginal effects are presented for the three measures of health status according to financial strain in 2004 and changes in financial strain between 2002 and 2004. The predicted probabilities for being in poor health also are reported. These were the baseline probabilities that were used to calculate the marginal effects. All marginal effects were calculated at the weighted sample means.

In comparing the significance and magnitudes of the various marginal effects, several findings are worth noting. First, existing health conditions (self-reported, severe, and mild) resulted in significant increases in financial strain as measured by the investment assets ratio. Existing mild and severe chronic conditions also increased the probability of financial strain as measured by the solvency ratio. Using the predicted probabilities, we found that having an existing mild or severe health condition resulted in an 8.0 percent (0.048/0.597) or 6.5 percent (0.039/ 0.597) increase, respectively, in the fraction of older individuals who had insufficient investment assets. However, an existing mild or severe health condition resulted in a 48.4 percent (0.015/0.031) or 25.8 percent (0.008/0.031) increase in the fraction of older individuals who were insolvent. Observe that the percentage increases were substantially larger for the solvency ratio than for the investment assets ratio. Further, these results showed that the magnitude of the marginal effects was larger for existing mild chronic conditions than for existing severe chronic conditions.

Another key finding was that health conditions (new or existing, mild or severe) did not appear to significantly increase financial strain through liquidity. In fact, the effect of

health conditions on liquidity was only significant for existing self-reported poor health, which increased the probability of being illiquid by 8.0 percent (0.043/0.537).

We also found that new health events significantly affected financial strain but mainly through solvency. Being in worse health resulted in a 38.7 percent increase (0.012/0.031) on average in the fraction of older individuals who were insolvent. A new severe chronic condition resulted in a 48.4 percent increase (0.015/0.031). We found little evidence to suggest that new mild chronic conditions significantly affected solvency; however, they did appear to significantly affect the investment assets ratio. The likelihood of having insufficient investment assets in 2004 increased by 19.9 percent (0.119/0.597) for those who reported developing a new mild chronic condition between 2002 and 2004.

Finally, we looked at the impact that health had on changes in financial strain between 2002 and 2004. The marginal effects were mostly insignificant, except for the solvency ratio. Specifically, a decline in health status between 2002 and 2004 resulted in a 40.9 percent (0.009/0.022) increase in individuals going from being solvent in 2002 to insolvent in 2004. Existing severe or mild chronic conditions in 2002 resulted in an increase of 22.7 percent (0.005/0.022) and 52.4 percent (0.011/0.021), respectively, in going from solvency to insolvency.

DISCUSSION

What Have We Learned?

Recall that some studies have examined how different types of health problems can lead to wealth depletion for older Americans (e.g., Adams et al. 2003; Haider et al. 2000; Hurd 1990; Hurd and Kapteyn 2003; Kim and Lee 2005; Lee and Kim 2003; Smith 1997, 1999, 2003; Wu 2003). A few other studies have focused very generally on the health status of older Americans and its impact on broad categories of asset holdings (e.g., Berkowitz and Qiu 2006; Rosen and Wu 2004). To investigate the effect that health problems have on the financial strain of older Americans, we took a more comprehensive approach. Specifically, our study used data from the 2002 and 2004 HRS to construct three financial ratio guidelines related to a household's level of solvency, liquidity, and investment asset accumulation. We then estimated a series of two-period models to examine the impact that new and existing health events have on current financial strain and changes in financial strain. We tested our models using both a subjective measure of self-reported health status and two objective measures of health that controlled for the severity of specific health conditions. We found, in general, that health status significantly affected the financial strain of older Americans, which is consistent with the findings from previous research. However, we also found that the effects varied by both the measures of financial strain used and how health status was defined.

One of our key results was that existing health conditions (self-reported, severe, and mild) were more likely to affect investment asset accumulation and solvency than liquidity. Lower levels of investment assets suggest that households are trading expected future return for consumption certainty and liquidity. When an individual becomes ill, it

is often not an instantaneous and unexpected event. If an individual is in declining health, a rational response would be to convert illiquid assets into more liquid assets. Thus, one would expect individuals dealing with a negative health event to experience larger drops in investment assets than in liquid assets. If individuals have adequately planned for health care expenditures during retirement, these expenses are not likely to have an immediate affect on solvency unless they develop a long-term health condition. Individuals who have chronic health problems that linger for long periods of time initially liquidate assets to pay for health expenses. Individuals who continue to draw down on their assets and/or borrow to cover their health expenses eventually reach a point where the depletion of wealth leads to insolvency.

Another key finding was that new health events affect financial strain but mainly through insolvency. In particular, those with new severe chronic conditions were significantly more likely to be insolvent than those with new mild chronic conditions. A new severe condition may be more likely to bring about insolvency than a new mild condition, simply because of the higher financial burdens associated with more severe conditions. Also, a sudden onset of serious illness (i.e., a severe chronic condition such as cancer, lung disease, a heart condition, stroke, or diabetes) can result in an individual having less time to prepare financially. Individuals may have less time to liquidate investment assets and shift their portfolios to more liquid assets. If they are unable to quickly liquidate their investment assets, they may have to borrow, perhaps against their home, which can significantly affect their solvency.

With respect to the solvency ratio, we also found that the percentage increases in financial strain were substantially larger for existing mild chronic conditions than for existing severe chronic conditions. We need to be somewhat cautious though in how we interpret this finding because the baseline probability used to calculate the percentage increases for the solvency ratio was very small (0.031). Thus, small percentage point increases (e.g., 0.008 or 0.015 increase from 0.031) result in substantially large percentage increases. The results based on the percentage point increases suggest that the severity of the health condition (i.e., mild or severe) may not matter as much as whether the condition is chronic (i.e., new or existing).

In addition to these results, we found that having some type of supplemental health insurance coverage significantly mitigated financial strain for older individuals. This result reflects how critical it is for older Americans to maintain adequate health insurance coverage, especially to pay for health care expenses that are not covered by Medicare. Also, recall that beneficiaries of Medicaid were more likely to be illiquid and to have insufficient investment assets but less likely to be insolvent. Since Medicaid is a meanstested program (i.e., only individuals with very low income and asset holdings qualify), this finding may simply reflect low financial resources rather than lower levels of financial strain.

Implications for Researchers and Consumers

Overall, the findings from this study have important implications for research related to the health and financial security of older Americans. Previous studies have focused on using primarily income and wealth to measure the financial burden of health problems for older populations. Yet, these measures do not adequately capture the extent to which poor health results in financial strain and how different types of negative health events affect financial portfolios. We have shown that financial ratio guidelines (e.g., solvency, liquidity, and investment asset accumulation ratios) can provide a more comprehensive look at how poor health affects the overall financial security of the household. In addition, we have shown how different measures of health (e.g., new or existing conditions, mild or severe) can be useful in identifying those individuals who are likely to experience different types of financial strain as a result of health problems.

Our results also have important implications for aging consumers. As the U.S. population continues to age and health care costs continue to rise, individuals are likely to see larger shares of their retirement savings going toward health care expenditures. The end result is that more individuals are likely to experience financial strain. For older individuals who have not adequately saved for retirement, a negative health event (especially a sudden and severe onset of illness) can result in more rapid wealth depletion, which in turn, can result in more serious financial strain such as insolvency.

Educational Opportunities

Financial education can help future retirees better prepare for rising health care costs and avoid unnecessary financial burden in later life. In particular, financial professionals and educators may want to provide individuals with a better understanding of how negative health events can affect their financial portfolios and how to shift their assets to hedge against serious financial strain. Also, it would be useful for individuals to have more guidance on how to build future health care expenditures into their existing savings and retirement plans, so that they are setting aside an adequate amount in a "health care fund. " In addition, consumers would likely benefit from more information about supplemental health insurance plans and the critical role they play in reducing financial strain that results from health problems. Given the scope of this article, we were unable to address issues related to long-term care planning. However, financial professionals and educators may also want to provide more information about the range of medical, personal, and social services available to those who are unable to provide for their own needs for an extended period of time. Finally, for those working with particularly vulnerable subgroups of older Americans (e.g., low-income individuals who have little or no retirement savings), there may be opportunities to provide education about low-cost medical services and insurance plans as well as government support programs such as Medicaid. All of these educational measures could help older Americans cope with the potentially debilitating effects that health problems could have on their overall financial security.

Blurb: Health/US/Healthy Living/ Report/Spring 2008
US: No Pain, No Strain: Impact of Health on the Financial Security of Older Americans

Health and Retirement Study has conducted a study on the impact of health is on the financial stability of a household. In households with at least one person above the age of 75, the amount they are indebt has risen 160 percent, from $7,769 in 1992 to $20,234 in 2004. They have found that the older the person in the household is, the more likely the debt is to be greater. This, they have hypothesized, is because of the rising dependency on health care services and its cost. By 2030, they projected that elders above the age of 65 are expected to spend 30% of their income on health care.