THE RELATIONSHIP BETWEEN HOUSING COST BURDEN AND HEALTH

STATUS OF OLDER ADULTS IN THE UNITED STATES

by

LESLIE ELLEN GREEN-PIMENTEL

(Under the Direction of ANNE L. SWEANEY)

ABSTRACT

Prior empirical research has demonstrated that a relationship exists between health and wealth as well as health and financial strain, but the direction of the relationship remains in question. Very little research has been conducted that specifically examines the relationship between mortgage debt and health. The number of adults entering retirement with mortgage debt is increasing and the levels of mortgage debt they are carrying is also increasing. This study used two waves (2004 and 2006) of the Health and Retirement Study to examine the dual relationship between housing cost burden and self-reported health status of mortgagees age 65 and older. Two-stage probit least squares regression was used to examine this relationship. Model One examined the relationship between the level of housing cost burden and the probability of reporting being in good health. Model Two examined the relationship between being in good health and the level of housing cost burden. The results indicated that level of housing cost burden in 2006 was not statistically significantly associated with the probability of reporting good health in 2006. However, level of education, assets, and whether or not the respondent participated in regular physical activity in 2004 were significant to the probability of

reporting being in good health in 2006. The results also indicated that being in good health in 2006 was not statistically significantly associated with the level of housing cost burden in 2006. However, race/ethnicity, marital status, employment status, and health insurance coverage in 2004 were significant predictors of level of housing cost burden in 2006. The Life Cycle Income Hypothesis was used in variable selection, hypotheses formation, and in drawing conclusions to the results. In short, the Life Cycle Income Hypothesis suggests individuals utilize their total available resources in older age in order to maintain constant consumption. However, utilizing home equity, which typically requires repayment, may in reality go against the Life Cycle Income Hypotheses as individuals are assumed to have timed final payments of loans with the decision to exit the labor force. This research is timely in as much as the population of adults age 65 and older is increasing in the United States and in light of the evidence that levels of mortgage debt held among people in this age group are also increasing.

INDEX WORDS: Housing cost burden, mortgage debt, self-reported health status, and older adults

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DEDICATION

I would like to dedicate this dissertation to my parents. They have taught me the value of hard work, helped me see the importance of receiving an education, and have encouraged me to do my best in whatever I pursue. Thank you for your confidence, love, and encouragement!

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1

Introduction

The relationship between health and wealth has been a popular topic for investigation among researchers for the last few decades. However, the direction of the relationship remains in question. Prior empirical work suggests that financial strain has a negative effect on an individual's health (American Association of Retired Persons [AARP], 2008a; Caplovitz, 1974; Drentea, & Lavrakas, 2000; Jacoby, 2002; Mills, Grasmick, Morgan, & Wenk, 1992; O'Neill, Prawitz, Sorhaindo, Kim, & Garman, 2006; O'Neill, Sorhaindo, Xiao, & Garman, 2005; Xiao, Sorhaindo, & Garman, 2006), whereas other empirical work suggests that poor health leads to financial strain and the depletion of financial wealth (Kim & Lyons, 2008; Lyons & Yilmazer, 2005; Meer, Miller, & Rosen, 2003; Smith, 1997; Smith & Kington, 1997a). However, only a few studies have singled out the relationship of mortgage debt and health status (Cairney & Boyle, 2004; Nettleton & Burrows, 1998, 2000).

Home equity is an important asset in the portfolios of older Americans (National Bureau of Economic Research [NBER], 2001) and is often their largest form of wealth (Fisher, Johnson, Marchand, Smeeding & Torrey, 2007; Joint Center for Housing Studies, 2008a; NBER; Walker, 2004). Many individuals spend much of their working lives accumulating assets that will be used to maintain a desired lifestyle once they are no longer working for pay. It is expected that these assets will be able to provide the desired lifestyle for the duration of the individuals' lives. Similar to other investment options, a

home may be sold to access its equity. However, many older adults want to remain in their homes for as long as possible (Bayer & Harper, 2000; National Association of Home Builders (NAHB), 2005). In order for homeowners to access their equity without moving, some form of loan is required, such as a second mortgage or home equity line of credit. Older adults may then face a larger mortgage payment or even two payments in addition to their other expenses. Older individuals in this situation may find it stressful especially since income is typically reduced upon retirement. They often may have a tighter budget to manage and the responsibility of an additional lien on their home.

Two schools of thought exist for older adults in the United States with mortgage debt. First, mortgage debt could contribute to poor health. Mortgagees[1], particularly those facing a decrease in income, may worry about making payments which may in turn lead to a decline in health. Prior research indicates a negative relationship between mortgage debt and health (Cairney & Boyle, 2004) and between foreclosure and health (Collins, 2006; Nettleton & Burrows, 1998, 2000). Second, mortgage debt may be the result of poor health. Prior research suggests that older homeowners may be using home equity to pay for health related costs (Kim & Lyons, 2008).

Purpose of Study

The purpose of this study is three fold. The first is to create a profile of mortgagees age 65 and older using the 2004 and 2006 waves of the Health and Retirement Study (HRS) and compare the health of homeowners without a mortgage and homeowners with a mortgage. The second is to examine the dual relationship between the ratio of mortgage debt to income and self-reported health among adults age 65 and older.

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[1] The term mortgagees refers to borrowers who are currently making payments on a mortgage loan.

Mortgage debt included amounts paid toward a first and/or second mortgage.[2] The third

purpose is to address the implications this relationship has for older mortgagees. The dual

relationship between ratio of mortgage debt to income and self-reported health status is

evaluated using instrumental variable regression.

Need for Study

The population of older adults is steadily increasing in the United States. In 2003,

individuals age 65 and older made up over 12% of the population, a total of 35.9 million

people (U.S. Census Bureau, 2005b). It is projected that by the year 2030 this number

will increase to 71.5 million, approximately 20% of the population (U.S. Census Bureau).

As the population of older adults increases so will their aggregate needs.

Typically, one may expect fixed living expenses to decrease upon retirement with

the final payment of a mortgage. However, this is not always the case; an increasing

number of older adults are entering retirement with mortgage debt. An estimated 36.4%

of homeowners age 65-74 and 18.5% of homeowners age 75 and older have a mortgage

on their property (U.S. Census Bureau, 2003a). Mortgagees over age 65 spend

approximately three times more on housing related expenses, including mortgage debt,

property taxes, insurance and utilities, than mortgage-free owners of the same age group;

a difference of almost $600 in monthly expenditures (U.S. Census Bureau). The level of

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[2] Reverse mortgage is not included as a possible mortgage loan type because information regarding reverse mortgages is not found in the HRS. Additionally, since their inception, reverse mortgages have not been used extensively among eligible homeowners, although their popularity has increased in recent years (Center for Retirement Research at Boston College, 2006).

outstanding mortgage debt being held by near retirees (ages 55-64) has also increased

(Bucks, Kennickell, & Moore, 2006; Masnick, Di, & Belsky, 2006)[3].

Negative effects could arise from carrying mortgage debt into retirement. First, older mortgagees may experience increased stress as they enter a period of life typically marked by a reduction in income and yet have little or no change in fixed expenses. Thus, there is a concern that many individuals will enter retirement financially ill prepared (Employee Benefit Research Institute, 2008). Second, failure to pay on a mortgage may result in the loss of the home. Older homeowners could access the equity in their home to satisfy their defaulted loan rather than losing the home to foreclosure. However, this would require either a loan for the amount they were in arrears, which would require repayment, or a deed in lieu of foreclosure which would require giving up the home. Neither option may be appealing for older adults who want to stay in their homes for an extended period of time. Additionally, a decline in home values, as many homeowners have experienced recently, likely reduced the largest form of wealth held by many older adults, thus leaving less equity for consumption during retirement. Such a financial stressor could result in a decline of health.

In addition to lingering or even newly aquired mortgage debt, older adults also face increasing healthcare costs. These costs will vary depending on the age, sex, health, and healthcare needs of the individual. It is estimated that among households headed by persons over age 65, healthcare is absorbing approximately 13% of their household

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[3] Masnick, Di, & Belsky (2006) examined cohorts of near retirees in 1990 and 2000. Bucks, Kennickell, & Moore (2006) reported on changes found among respondents in the Survey of Consumer Finances from 2001 to 2004. Please see the literature review for more detailed information on the topic.

income, almost double that being spent by households headed by persons age 55 to 64 (Federal Interagency Forum on Aging Related Statistics, 2008). Healthcare costs have steadily increased since the early 1990s for Medicare enrollees over age 65 and are dramatically higher for those over age 85 (Federal Interagency Forum on Aging Related Statistics). Out-of-pocket healthcare costs are expected to continue to increase with technological improvements; rising premiums, deductibles, co-payments, and other related costs (Center for Retirement Research at Boston College, 2004). As the population of older adults rapidly increases, learning more about the relationship between the ratio of mortgage debt to income and health may provide valuable insight in the financial needs of older adults.

Objectives of the Study

There are three objectives to this study. The first objective is to create a profile of older mortgagees and compare their self-reported health status with that of homeowners without a mortgage. The second is to examine the dual relationship between the ratio of mortgage debt to income and self-reported health. The third objective is to address the implications of this study for older adults in the United States. The research questions are as follows.

1- What is the demographic profile of mortgagees age 65 and older in the United States?

2- What is the housing finance profile (home value, mortgage debt, equity, and housing cost burden) of mortgagees age 65 and older in the United States?

3- Does the mean self-reported health status of individuals age 65 and older with a mortgage differ from that of those in the same age group who own their homes without a mortgage?

4- What is the relationship between the ratio of mortgage debt to income and the probability of having good health among mortgagees age 65 and older in the United States?

5- What is the relationship between good health and the ratio of mortgage debt to income among mortgagees age 65 and older in the United States?

Benefits

This study will benefit older homeowners who have mortgage debt or who are anticipating accruing mortgage debt. Upon retirement, adults enter a stage of their lives where income is decreased and it may become difficult to meet their financial needs if they still carry the responsibility of mortgage debt. Although the percent of older households with mortgage debt is small (36.4% of homeowners age 65-74 and 18.5% of homeowners age 75 and older), that percent translates into millions of households (U.S. Census Bureau, 2003a), thus this issue is not trivial. Understanding the relationship between the ratio of mortgage debt to income and health status can provide valuable insight into the financial needs of older adults. Prior research suggests that many near-retirees have a false sense about their level of financial security, believing they are financially prepared for retirement when in fact they may not be prepared (Employee Benefit Research Institute, 2008). Some may be under the impression that their equity will last longer than is realistically possible. For example, older homeowners may have had plans to consume their equity as they aged; however, with the recent decline in home values and considering the costs required to access equity through a loan, homeowners may no longer have as much equity at their disposal as originally planned.

The findings of this research will be useful to financial planners and counselors, educators, and advocates for older adults. As these professionals are made aware of the possible health implications of carrying mortgage debt into retirement, they can place increased emphasis on paying off such debt prior to retirement and thus improve the well-being of their clientele. Additionally, if such professionals are made aware of the implications that financing healthcare needs out of equity can have on older adults' retirement portfolios, then they may be able to offer more realistic suggestions regarding portfolio allocations. This may increase the likelihood of clients maintaining a desired lifestyle and meeting retirement goals, such as bequests. Policy makers can also benefit from this study as they anticipate necessary changes in public policy and as they work to protect the rights of this rapidly growing group of older adults.

The next chapter presents a review of literature and includes a discussion regarding the general relationship between health and wealth as well as the specific relationship between mortgage debt and health; the influence of the United States' housing boom and bust of the early to mid 2000s on older adults' accumulation of mortgage debt, and the implications for acquiring such debt so near retirement. Additionally, the relationship between healthcare costs and the financial security of older adults is addressed.

CHAPTER 2

Literature Review

This literature review explores the general relationship between health and finances then more specifically the relationship between mortgage debt and health. The concern regarding the duality of the relationship between health and wealth as well as health and mortgage debt is addressed. Specific information regarding older adults and mortgage debt is discussed and implications concerning the relationship between health related costs and the financial security among older adults are given.

The Relationship between Debt and Health

Prior research has demonstrated a negative relationship between debt or financial strain and individual health status. Concerns regarding the effect of financial strain on health status have existed for some time. Caplovitz (1974) surveyed individuals who had debt collection lawsuits against them. Most indicated their health had been negatively affected by debt, primarily through symptoms related to anxiety and worry. Other studies have found similar results. Large debt loads have significantly and negatively affected self-reported health (Drentea, & Lavrakas, 2000; Jacoby, 2002; O'Neill, et al., 2005; O'Neill, et al., 2006) and having lower levels of financial stress and overall debt is positively associated with better health (O'Neill, et al., 2006; Xiao, et al., 2006). Other studies have found that financial problems have a negative effect on psychological well-being (Mills, et al., 1992; Krause, 1997). Older adults have demonstrated negative health effects as a result of financial stressors and exhibited increased signs of depression

(Krause). As a result of the economic downturn of the late 2000s, adults age 45 and older report that financial stress led to health problems and influenced decisions to cut back on medical expenses (AARP, 2008a). Limitations with the above studies include the following: they primarily examine a particular type of debt or perceived poor financial management of respondents to determine if a negative health effect exists. Some used only cross sectional data (AARP; Drentea & Lavrakas; Krause; Mills, et al.; O'Neill, et al., 2005; Xiao, et al.), non-generalizable samples (Drentea, & Lavrakas; Mills, et al.), and suffer from self-selection bias (O'Neill, et al., 2005, 2006; Xiao, et al.).

Much of the literature discussed above acknowledges that the relationship between health and financial strain is dual in nature. Thus, it is possible that financial strain or debt leads to a decrease in health status; it is also equally likely that having poor health would increase financial strain. Empirical evidence from cross sectional data exists to support the idea that health status decreases socioeconomic status (Smith, 1997; Smith & Kington, 1997a). Prior research using longitudinal data has also provided evidence that health affects financial strain. Kim and Lyons (2008) used two waves of the Heath and Retirement Survey (HRS) and found that among older adults, existing health conditions significantly increased financial strain primarily through insufficient investment assets and insolvency. Those who experienced a new health condition also experienced increased financial strain, but primarily through insolvency (Kim & Lyons). Wu (2003) also used two waves of the HRS and found that among married couples, negative health shocks to the wife decreased wealth and increased expenditures. Using 10 years of HRS data the Center for Retirement Research at Boston College (2005) found that as health declines among older adults, wealth is depleted and the more severe the decline in health

the larger the decline in wealth. Additionally, Meer, et al. (2003) used the Panel Study of Income Dynamics (PSID) to examine how changes in wealth over a five year period affected changes in health. Initially they found wealth to be a significant and positive predictor of health status. However, after attempting to control for endogeneity through the use of an instrumental variable (receipt of an inheritance) the relationship was no longer significant. Lyons and Yilmazer (2005) created a pooled cross section of the Survey of Consumer Finances (SCF) to examine various measures of financial strain on self-reported health. They also used instrumental variable regression to examine this relationship. They first examined the effect of financial strain on health and used attitudes toward financial management and borrowing and whether or not the household reported having a non-health related income shock in the prior year as instruments. Second, they examined the effect of health on financial strain and used as instruments whether the householder smokes, expectation of major medical expenses, and whether or not the father of the householder was still living. They found only little evidence that financial strain affected health, but found significant evidence that poor health increased the likelihood of financial strain (Lyons & Yilmazer).

Although these studies were creative in their attempts to demonstrate that the direction of this relationship is from health to financial strain, these results should not all be taken at face value. Financial strain and health status evolve over time. Some of the data used were cross sectional (Lyons & Yilmazer, 2005; Smith & Kington 1997a; Smith, 1997), while others examined two waves of data (Kim & Lyons, 2008; Wu, 2003). An attempt at examining these changes over a longer time period was made, but the authors admitted they were still unable to accurately assess a long term and causal impact (Meer,

et al., 2003). Prior health, health behaviors, and family health history, such as biological or genetic tendencies, are important determinants of individual health status. Some of the above studies included a measure of prior health, health behaviors, or family health history (Lyons & Yilmazer; Smith & Kington), while others controlled for prior health over periods of two to five years but failed to control for the health history of the respondent's family (Kim & Lyons; Meer, et al.). Additionally, measures of financial strain were not always uniform. For example, the financial strain measure used by Lyons and Yilmazer only included being delinquent at least two months on loan payments. Meer et al. used a wealth variable based on estimates of asset values made by the respondent; such estimates are likely overestimated. Wealth measures were also incomplete through the absence of pension income (Smith; Wu). Attrition was present in some studies (Meer, et al.; Smith). Sample selection was also a concern. Some studies used only samples of older adults (Kim & Lyons; Smith; Smith & Kington).

The Relationship between Mortgage Debt and Health

In the study by Ford, Kempson, and Wilson and in Davis and Dhooge (as cited in Nettleton & Burrows, 1998)[4] mortgage debt was also shown to have a negative effect on homeowner health. When any household faces financial trouble and the ability to maintain mortgage payments is jeopardized, the household may experience great anxiety, emotional stress, or physical stress (Joint Center For Housing Studies, 2003; as cited in Nettleton & Burrows, 1998; Nettleton & Burrows, 2000). Such stress could be attributed to the fact that when households enter mortgage default they generally have two options, either cure the loan or face foreclosure and lose the security that accompanies homeownership. However, empirical research regarding the effect of mortgage debt on

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[4] The original works could not be located.

health is severely limited. Only three prior empirical studies examining this specific relationship could be found. Using five waves (1991-1996) of the British Household Panel Survey, Nettleton and Burrows (1998) examined whether or not the onset of mortgage default decreased mental health status. In the early 1990s Britain experienced an economic and housing recession that resulted in large numbers of mortgage foreclosures. The authors found that compared to those who did not experience mortgage problems, those who did experience problems were significantly more likely to have a decline in mental well-being from year one to year two, controlling for changes in physical health, employment, and income. This result was consistent for both men and women (Nettleton & Burrows, 1998). In another study of British households, families who actually experienced foreclosure during the early 1990s housing recession were interviewed and reported declines in physical and emotional health due to the process of foreclosure (Nettleton & Burrows, 2000). Some health effects reported by these households in conjunction with their foreclosure experiences included: lower immune systems, increased poor health practices such as smoking, and being emotionally shaken. Some households rated the experience as equivalent to the loss of a loved one. Households experiencing stress either long term or emotionally driven, are likely to experience direct (physical) or indirect (behavioral) health effects (Nettleton & Burrows, 2000).

Additionally, empirical work demonstrates a relationship between housing tenure (owners, mortgagees, renters) and psychological distress (Cairney & Boyle, 2004). During an economic recession and unstable housing market in Canada, respondents from the 1991 Canadian General Social Survey on Health were used to analyze whether those

who own their homes outright felt more secure in their arrangement of shelter than those still paying on their mortgage or renters who essentially have no control over the status of the property in which they live. It was found that those who owned their home with no mortgage reported having less psychological distress than mortgagees who in turn reported less distress than renters (Cairney & Boyle). The model accounted for over 33% of the relationship between mortgagees and psychological distress. These results do not indicate that homeowners without a mortgage are exempt from financial worries, or that a mortgage free home does not require financial thought, but rather that there exists a relationship between housing tenure and psychological distress. There is something to be said about the concept of owning a home mortgage free and the security that it brings to the owner; their basic needs of shelter are met (Cairney & Boyle). There is limited empirical evidence of the relationship between mortgage debt and health status and no known evidence exists to date of this relationship among individuals in the United States or specifically among older adults in the United States.

The findings of the above studies are limited. The samples were examined during a time of economic and housing uncertainty (Cairney & Boyle, 2004; Nettleton & Burrows, 1998, 2000). Due to such circumstances under which the data were collected, one may be concerned that the results were biased. For example, the stress of the economic uncertainty compounded the stress of the homeowner thus leading the respondent to report being in worse health. Also, heterogeneity among individuals' housing tenure choice was not controlled for, the lifestyle of homeowners may drive their decision to borrow, or not borrow, from available equity (Cairney & Boyle). Additionally, cross sectional data were used (Cairney & Boyle; Nettleton & Burrows,

2000) and not all the samples were generalizable to the population of the respective country (Nettleton & Burrows, 2000).

One cannot ignore the fact that a dual relationship also exists between mortgage debt and health (Cairney & Boyle, 2004). The responsibility of keeping a mortgaged home rests on the ability of the owner to make consistent and timely payments. Such responsibility may lead to a decline in health especially when resources used to make those payments, such as income, are jeopardized or no longer available. By the same token, homeowners (mortgagees or outright owners) may experience poor health and utilize the equity in their home to pay for healthcare costs, or find it difficult to make mortgage payments due to healthcare costs. Prior research demonstrates that an increase in medical expenses affects moderate income households' ability to meet mortgage obligations and thus threatens their sense of housing security (Seifert, 2006). Additionally, it has been argued that because home equity is a relatively illiquid asset, households may choose to access a more liquid asset rather than their equity to meet healthcare obligations or medical expenses (Smith & Kington, 1997a). However, once U.S. credit markets became increasingly more flexible in the late 1990s and early 2000s the view point changed. It has since been argued that when individuals are faced with a sudden serious illness (like cancer or stroke) they may not have the time to access liquid investment assets and may be more likely to borrow the money to cover expenses and home equity may be the most obvious source for such a loan (Kim & Lyons, 2008). To support this argument, lower levels of self-reported health status were found to be a significant factor in the probability of holding mortgage debt but not a significant factor

in the probability of holding consumer debt for individuals age 65 and older (Lee, Lown, & Sharpe, 2007).

The Housing Bubble and Burst

U.S. home values steadily increased since the early 1990s but dramatically increased from 2000 to 2006 (Joint Center for Housing Studies, 2009; Standard & Poor's, 2009). The S&P/Case-Shiller Home Price Index measures house price appreciation every quarter for single family homes in each of the nine U.S. Census divisions. Home prices grew 89% from 2000 to 2006 then began a sharp and steady decline; in 2008 home prices had fallen to 2004 levels, a 21% decline (Standard & Poor's). During this time (2000 – 2006) it became easier and more affordable to access home equity, interest rates were low and lenders were lenient in granting credit to a variety of borrowers. As a result, home equity became more liquid and housing debt increased. The Board of Governors of the Federal Reserve System (as cited in Masnick, et al., 2006)[5] show that from 1989 to 2004 the ratio of housing debt (on a primary residence) to income increased for all age groups while the ratio of consumer debt to income remained fairly constant. This suggests that what had once been considered as a relatively illiquid asset had become relatively liquid and was being utilized at greater levels (as cited in Masnick, et al.). Home equity loans grew at an outstanding rate, an increase of $598 billion from 2000 to 2006 (Joint Center for Housing Studies, 2008b). During 2006, a total of $327 billion of home equity was refinanced, up from $31.6 billion in 2000[6] (Joint Center for Housing Studies, 2008b).

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[5] The table provided by the Board of Governors of the Federal Reserve System depicting this information in Masnick, et al. (2006) could not be located.

[6] Refinancing here refers to: mortgage refinance, cash-out refinance, and home equity loan.

With such increases in equity borrowing followed by sudden decreases in home values, homeowners today own even less of their homes than they did prior to the early 2000s market burst of activity. This could present a financial problem for homeowners as they approach retirement as this debt is likely to be carried into retirement (Center for Retirement Research at Boston College, 2008; Masnick, et al.).

Mortgage Debt and Older Adults

There are increasing numbers of adults approaching retirement with higher levels of mortgage debt than ever before and in some cases double the mortgage debt of preceding generations (Copeland, 2006; Center for Retirement Research at Boston College, 2008; Masnick, et al., 2006). Using the Survey of Consumer Finance, Masnick, et al. tracked housing debt among 10-year age cohorts in 1990 and 2000. The first cohort observed in 1990 (ages 45-54) reported a median housing debt of $25,000. The next cohort of 45-54 year olds, the oldest of the baby boomers, when observed in 2000 had $50,000 of housing debt. The authors estimate that the next cohort of 45-54 year olds, who make up the youngest of the baby boomers, will have approximately $70,000 of median mortgage debt in 2010. It was further estimated just among households with the highest levels of housing debt, that the oldest boomers (aged 55-64) would reach $100,000 of housing debt and that the youngest cohort of boomers (aged 45-54) would have in excess of $120,000 of housing debt by 2010 (Masnick, et al.). Such increases are obviously driven by home values and interest rates and in light of the current decrease in housing values these estimates will likely differ from reality in 2010. This trend was seen among those with the highest levels of housing debt as well as the lowest levels of housing debt (Masnick, et al.). Approximately 48% of 55-64 year olds in 1990 had

housing debt. This increased to 59.7% for the next cohort to reach age 55-64 in 2000. For adults age 65-74 housing debt levels also increased, from 26.5% to 36.5% respectively. Additionally, it is interesting to note that the Board of Governors of the Federal Reserve System (as cited in Masnick, et al., 2006) shows that homeowners over age 65 had nominal consumer debt payments compared to mortgage debt payments (as cited in Masnick, et al.). Such increases in housing debt may not be so alarming to the financial well-being of these households if the value of their homes increased at least proportionately. This sample demonstrated that each successively younger cohort purchased more expensive housing and saw gains in their housing between 1990 and 2000. Despite increases in home values throughout the 1990s, the levels of housing debt stunted equity growth (Masnick, et al.).

Older adults also took part in the equity borrowing that occurred during the housing boom. During the first four years of the housing boom, the probability of extracting home equity was high among households headed by 50-62 years olds. These households extracted more home equity and consumed more of that borrowed equity than households headed by younger individuals (Center for Retirement Research at Boston College, 2008). Households over age 62 extracted their home equity at much lower levels than younger households, possibly indicating that such households had very little to no current mortgage debt and were hesitant to acquire additional housing debt (Center for Retirement Research at Boston College). These results indicate that households who experienced an increase in home value during the housing boom, (most likely realized among older homeowners as they have had the time to accumulate more equity than younger households), were more likely to access that equity for consumption, paying off

debts or making home improvements, than to invest it in other markets (Center for Retirement Research at Boston College). These results are based on a relatively small sample of equity borrowers from the Survey of Consumer Finances; however, the impact of these findings may indeed be far reaching and may not be fully realized for years to come.

There is early evidence that adults nearing retirement have been affected by the recent decline in housing values. American Association of Retired Persons (2008b) used consumer data files from Experian, a credit reporting agency, to examine the delinquencies and foreclosures that occurred from July to December 2007. Approximately 28% of delinquencies and foreclosures during this time period were experienced by individuals age 50 and older and totaled over 684,000 adults. Just under 50,000 of these homeowners were in foreclosure or had lost their homes to foreclosure at the time of the study.

One may wonder why households would borrow from their equity so near retirement as it is likely to have an effect on their financial security while in retirement. Increases in housing debt could be attributed to a variety of reasons such as the increased home values, the leniency in granting equity loans, and the increase in refinancing that occurred during the 1990s and early 2000s (Center for Retirement Research at Boston College, 2008; Masnick, et al., 2006). Such borrowing left many homeowners, who may have only been a few years away from paying off their mortgage, with a new mortgage loan and higher payments or a longer repayment period. Additionally, the increased housing debt levels could be due in part to later age at first marriage, remarriages, two earner households, and the presence of children. Such circumstances could easily result in

households who enter homeownership later in life or obtain a larger mortgage because of dual income or presence of children (Masnick, et al.). It has also been speculated that mortgagees anticipating an inheritance may be more comfortable taking on greater amounts of mortgage debt that will be carried well into retirement years (Masnick, et al.). In 2007, when home values started declining, many households were faced with the harsh reality that they borrowed against gains in home equity that they may never actually realize. The false security that many households experienced when their home values increased and they proceeded to borrow against their equity has resulted in a lower net worth as they approach retirement (Center for Retirement Research at Boston College). In as much as the housing and financial markets are still struggling to recover, these households are not likely to regain their losses for some time, thus leaving them less prepared to enter and stay in retirement.

Characteristics of Older Mortgagees

A limited number of empirical studies have profiled older adults with mortgage debt. For example, Lee, et al. (2007) characterized mortgagees age 65 and older as having a larger family size (household size of two compared to one), some college or more, being Black or Hispanic, employed, having consumer debt and higher net worth. Those reporting good health or fair/poor health were less likely than those reporting excellent health to hold mortgage debt. Additionally, the probability of holding mortgage debt decreased with age. Those age 75 and older were less likely than those age 65-74 to have mortgage debt (Lee, et al.). Masnick, et al. (2006) found that married households held larger amounts of housing debt than single headed households. The U.S. Census reports that those who are most likely to have a home equity line of credit are older (median age

of 50), have higher incomes, own the home with a person of the opposite sex, are White and are previous homeowners (U.S. Census Bureau, 2007). Homeowners who have a home equity line of credit as their only mortgage are more likely to be a little older (median age of 60), have lower income, owned for a longer period of time (median of 19 years), and have a home that is of lesser value and older structure than individuals who have a home equity line of credit in addition to at least one other mortgage on their property (U.S. Census Bureau). The presence of unsustainable mortgage debt is "strongly socially patterned" (Nettleton & Burrows, 1998, p. 736) meaning that having mortgage debt that is beyond a person's control is not just a random occurrence but rather more likely to occur among certain socially and economically disadvantaged groups. For example, those who are divorced or separated, the unemployed, and households headed by individuals of minority race or ethnic background (Nettleton & Burrows).

Equity Use among Older Mortgagees

There are many reasons why homeowners obtain a refinance or second mortgage. They may want to make repairs or improvements to the home, consolidate debt, meet educational or medical expenses, invest in other markets or real estate, start a business or even pay due taxes (U.S. Census Bureau, 2007). In general, prior research has shown that the primary use of home equity among all ages of homeowners includes debt consolidation and home repair (Canner, Durkin, & Luckett, 1998; Canner, Dynan, & Passmore, 2002; Joint Center for Housing Studies, 2008a; U.S. Census Bureau) while using equity to meet medical service needs is nominal (Canner, et al., 1998, 2002; as cited in Joint Center for Housing Studies;[7] U.S. Census Bureau).

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[7] This work cited an unpublished bankruptcy report. The report could not be located.

Prior research is limited in its ability to explain why older homeowners retain housing debt or obtain a second mortgage or home equity line of credit. The current literature offers conflicting points of view. Some literature describes older adults as consumers of home equity while other literature provides evidence that older adults seldom access their equity. For example, some older homeowners access their equity for consumption, debt repayment or home improvements (Center for Retirement Research at Boston College, 2008), but compared to younger households, older households are using less of their equity for routine home improvements and as a consequence are experiencing a reduction in equity (Davidoff, 2006).

Other older homeowners retain their equity until they are faced with a negative shock, such as the death of a spouse (NBER, 1987, 2001; Walker, 2004), the placement of a spouse in a nursing home (NBER, 2001), or declining health (Walker). When negative events occur to the household's composition or health, the homeowner may choose to terminate homeownership and use the proceeds for healthcare expenses (NBER, 2001; Walker). However, termination has also been noted as an option of last resort (NBER, 2001). This suggests that there are some homeowners who do not plan to use their equity as a means of retirement income or non-housing consumption, such needs would be met through other resources such as personal savings and work retirement plans. A home is instead purchased and maintained as a place to live and enjoy older adulthood and not regarded as a means of financing various forms of consumption as one ages (NBER, 2001). Similarly, Fisher, et al., (2007) found evidence that older homeowners retain their equity for bequest purposes. However, considering the heterogeneity of older adults, mixed findings should be expected. This group of

individuals differs in their life experiences, backgrounds, goals, and values, all of which may be difficult to control for in any given study.

Health and the Effect of Healthcare Costs on Financial Security of Older Adults

The health of adults over age 65 is generally reported as being good or excellent and not until a person reaches their 80s does health really decline (Federal Interagency Forum on Aging Related Statistics, 2008). Such health status is consistent across gender and race (Federal Interagency Forum on Aging Related Statistics). Healthcare costs have steadily increased over the last decade with the highest average costs being realized by individuals over 85 years of age (Federal Interagency Forum on Aging Related Statistics). Older adults are facing increases on prescriptions (Federal Interagency Forum on Aging Related Statistics), premiums, deductibles, and co-payments (AARP, 2006; Center for Retirement Research at Boston College, 2004). In 2004, Medicare enrollees over age 65 spent an annual average of approximately $12,000 on healthcare costs and enrollees over age 85 spent just under $22,000 annually (Federal Interagency Forum on Aging Related Statistics). The cost of healthcare is taking a toll on the budgets of older adults (Center for Retirement Research at Boston College; Federal Interagency Forum on Aging Related Statistics). From 1977 to 2004 the percent of income being spent on healthcare costs doubled for those reporting fair to poor health (from 9% of their income to 18%), and increased 141.67% for low income households, from 12% to 29% of their income (Federal Interagency Forum on Aging Related Statistics).

Health insurance is available to reduce the costs of healthcare; however, it may not be adequate. Once individuals reach age 65 they are automatically enrolled in Medicare, and can benefit from Medicare Part A hospital insurance, Part B medical

insurance, and Part D prescription drug insurance. Many individuals may also choose to purchase a supplemental insurance such as Medigap which provides additional coverage for out-of-pocket expenses and even deductibles and coinsurance for Medicare. Medicaid is also available as a supplement to Medicare for low income/asset households (Dalton, 2008b). Some adults may not be able to afford such supplemental policies and may not have the advantage of retirement benefits that include some measure of additional health insurance. Despite the health insurance available for older adults, many may enter their retirement years uninsured or underinsured.

As healthcare costs increase, the overall financial security of older adults may be negatively affected (Center for Retirement Research at Boston College, 2004, 2005, 2009; Copeland, 2006; Kim & Lyons, 2008). Although individuals save to support themselves during retirement, and thus expect their savings to decrease with age, they may not have adequately accounted for the rising cost of healthcare, even if they accounted for the likelihood of medical expenses. For example, as new technologies emerge in the healthcare industry, individuals may be motivated to utilize such technologies to improve their health, even if they were not anticipating the cost of such technologies when saving for retirement (Center for Retirement Research at Boston College, 2004). Additionally, as an individual's health declines, a larger proportion of retirement savings will be required to meet the costs associated with declining health (Center for Retirement Research at Boston College, 2005, 2009; Levy, 2007).

The presence of medical debt has also placed a burden on many older households. In a recent nationally representative study conducted by the Kaiser Family Foundation, respondents indicated that over the last five years they experienced various financial

difficulties due to medical debt. Of respondents age 65 and older, 9% had trouble paying non-medical bills, 13% had to draw on most or all of their savings in order to cover the medical bills, 8% were not able to cover necessities, 5% borrowed money to meet their medical obligations (this consisted of loans or a second mortgage), and 1% filed for bankruptcy as a result of their medical bills (Kaiser Family Foundation, 2008). Additionally, when out-of-pocket healthcare costs increase among older adults, their non-healthcare expenses (excluding housing costs) are not affected. This suggests that older adults preserve their daily standard of living possibly choosing to deplete savings, borrow, or even do without some healthcare services in order to meet the increases in healthcare costs (Center for Retirement Research at Boston College, 2009).

Prior research also indicates that private health insurance is less likely to be held by households experiencing financial strain and less likely to be present among household heads in poor health compared to those in good health (Lyons & Yilmazer, 2005). Individuals experiencing financial strain are also less likely to have supplemental health insurance such as that offered through an employer or Medigap and are more likely to be a recipient of Medicaid (Kim & Lyons, 2008). Simply having some level of supplemental insurance coverage may moderate the financial strain experienced by older adults (Angel, et al., 2003; Kim & Lyons). As the costs of healthcare increase and as medical debt becomes more prevalent, older adults run the risk of having insufficient funds to cover consumption needs in retirement thus creating an untimely and difficult situation for elders in the United States.

Although the body of literature examining the relationship between health and finances is large, there is limited research that specifically examines the relationship

between mortgage debt and health (Cairney & Boyle, 2004; Nettleton & Burrows, 1998, 2000), and even less literature that examines this relationship among older homeowners (Lee, et al., 2007), let alone the duality of this relationship. This study will add to the current body of literature addressing the health-wealth nexus by singling out the relationship between mortgage debt and health and by specifically examining this relationship among older adults.

Prior research regarding the health and finances of consumers has used various measures of total assets or debts. This study will focus on the respondents' ratio of mortgage debt to income. Mortgage debt and other forms of debt, such as consumer debt, differ. Thus for the following reasons mortgage debt was chosen for use in this study. First, mortgage debt levels and the ratio of mortgage debt to income have steadily increased for consumers since the early 2000s (Bucks, et al., 2006; Center for Retirement Research at Boston College, 2008); however, the ratio of consumer debt to income has remained fairly constant (Center for Retirement Research at Boston College). This may be due in part to the fact that generally mortgage debt is less costly to the borrower than consumer debt. For example, during this time mortgage interest rates were lower than other forms of credit such as credit cards. In the early 2000s interest rates on home loans were around 5% to 7% (Joint Center for Housing Studies, 2009) while the interest rates on credit cards could be 20% and higher. Second, there is a tax incentive for carrying mortgage debt that does not come with carrying consumer debt. Homeowners can receive a tax deduction for the interest they pay on their mortgage. This provides a unique incentive for obtaining and retaining mortgage debt rather than consumer debt for homeowners who itemize their deductions.

Third, the consequences for defaulting on mortgage debt are typically more severe than the consequences for defaulting on other forms of consumer debt, particularly unsecured debt. A mortgage loan is secured by the home and if payments are late the homeowner becomes delinquent on the loan. Prolonged delinquency could result in the loss of the home through foreclosure. The consequence for defaulting on unsecured debt does not result in repossession of property. Individuals severely burdened by consumer debt can find relief in bankruptcy through debt forgiveness. Individuals delinquent on mortgage debt can only find temporary relief in bankruptcy which means stalling the foreclosure process so the homeowner can work out a repayment agreement with the lender or come up with the necessary funds to bring the loan current. Bankruptcy does not provide forgiveness of mortgage debt. Fourth, complete repayment of a mortgage loan results in financially securing the shelter of the consumer whereas complete repayment of items purchased with other forms of credit may not contribute in the same way to the security and well-being of the consumer. Fifth, the literal dollar value of the asset behind mortgage debt, the home, will in most cases exceed the dollar value of what was purchased with other forms of consumer debt. A home is commonly the largest purchase individuals make in a lifetime. Sixth, the personal value associated with a home can exceed the personal value associated with possessions purchased on consumer credit. As homeowners age, their emotional attachment to the home may increase, leading homeowners to value their home as a meaningful good rather than a monetary investment (Carstensen, 2006; Dupuis & Thorns, 1998; Fisher, et al., 2007). Seventh, mortgage debt carries risks associated with the economy. In situations where home values decline, persons who still owe on their mortgage consequently owe a greater portion of their

equity than they did prior to the decline in values. This type of situation may be expected in cases of an auto loan where the value of the automobile is automatically reduced with time. However, when one purchases a home; they expect the value to increase and equity to accumulate. Eighth, for most mortgages making payments results in building equity. Over time equity can increase net worth and act as an additional resource for consumption as the homeowner ages. In many cases, items purchased with consumer credit carry no monetary benefit into retirement.

Ninth, homeowners entering retirement may not have projected retirement expenditures to include mortgage payments; particularly if they purchased the home years ago with the expectation of paying it off in full before retirement. Homeowners may then be forced to work longer than planned, re-evaluate how much they will need to live off of in retirement, or be required to give up other necessities or wants while the mortgage debt is present. This may create undue stressors for homeowners. During 2008, a time of economic downturn, there was a 10% increase in Americans age 63 and older reporting stress as a result of housing costs (American Psychological Association, 2008).

With the above factors in mind, the importance of examining the specific relationship between health and mortgage debt, instead of other forms of consumer debt, is clear. This study will add to the current body of literature addressing the health-wealth nexus by singling out the relationship between mortgage debt and health and by specifically examining this relationship among older adults.

Theoretical Framework

Description of Theory

Modigliani and Brumberg (1954) discuss four motives for saving. The motives for saving are 1) intent to bequest; 2) even out the income stream as present and future income may not match desired consumption; 3) provide precautionary saving for possible emergencies; and 4) supply some level of down payment in order to enjoy the services of durable goods. Any asset held by an individual may satisfy one or more of the above motives for saving. For example, homeowners can use their home (an asset) for a bequest, an emergency fund, or retirement fund (Modigliani & Brumberg, 1954).

The life cycle income hypotheses (LCH) developed by Modigliani and Brumberg (1954) states that over a lifetime individuals will save during times of higher income and borrow during times of lower income in order to maintain a constant standard of consumption. Individuals allocate their current and future resources for consumption in such a way as to maximize their utility, or satisfaction. Future oriented individuals consume less of their current resources in order to save for future consumption. Present oriented individuals consume more of their current resources (even to the point of dissaving) in anticipation of higher future income.

The LCH assumes that individuals maximize utility at any age through consistent consumption given their total (current and expected) resources. Thus, it is also assumed that individuals are rational consumers and plan consumption based on their total resources, with the expectation that income will vary over their lives. Consumers expect their income stream to vary as they receive promotions, experience job changes and career changes. Thus, consumers attempt to even out the income stream by saving and

dissaving in order to experience constant consumption over the life cycle. Consumption is thought to be constant because the theory assumes that prices and interest rates remain constant over time. Additionally, some forms of consumption are necessities such as food, shelter and clothing. In as much as individuals need at least a minimum level of these goods in order to survive, constant consumption on such items is expected over the life cycle. Thus, during the early years individuals borrow to meet consumption needs and during retirement they rely on total accumulated resources.

Total accumulated resources consist of saved income from employment, net worth (assets minus liabilities) or wealth, and expected future income. Total resources are also referred to as stock of wealth and are shown in the following two period equations (Ando & Modigliani, 1963; Bryant & Zick, 2006):

$$R_1 = A_1 + Y_1 + Y_2 / (1+r) \qquad\qquad (1)$$

where R_1 represents total resources, A_1 refers to net worth (assets minus liabilities), Y_1 is the individual's current income and $Y_2 / (1+r)$ represents the present value of the individual's future income. It is expected that the individual's total resources will be sufficient to provide for consumption through life expectancy when the resources will then be completely depleted.

Younger individuals may borrow funds to pay for education or job training. They may also borrow funds to get settled, for example, getting a loan for an automobile to get to work or a home to live in and provide shelter for the household. Individuals who are more settled in their careers may experience an increase in income, pay off past debts,

and begin saving for the future. Thus consumers' marginal propensity to save, or percent of income to save, increases when income increases and their marginal propensity to consume, or percent of income designated for consumption, cannot increase more than any increase in income. This implies that individuals can only consume a portion of their income during their working life in order to accumulate enough resources to even out their income stream and provide for constant consumption in the future. A simplified version of the consumption function for the LCH is as follows (Dwivedi, 2004):

$$C = aWr + cY_L \hspace{4cm} (2)$$

where C is consumption that is financed out of lifetime income and wealth; a represents the marginal propensity to consume from wealth (W_r), and c represents the marginal propensity to consume from labor income (Y_L). Despite the LCH claim that consumers plan for constant consumption over the life cycle, prior research, such as Borsch-Supan and Stahl (1991) has demonstrated that as adults age their consumption patterns actually decrease instead of remain constant.

Additionally, the LCH makes the following assumptions. First, individuals are certain as to their employment, longevity and health, thus they can plan to accumulate sufficient resources to meet their consumption needs as they age. The purpose of saving for the future is to provide for consumption when paid employment has ceased. Once individuals are no longer employed, they can rely on these resources to maintain a constant level of consumption. Second, individuals do not face liquidity constraints, meaning they have free access to the credit market. However, in reality individuals do

face constraints in obtaining a loan, such as available down payment, ability to repay, and the value of the collateral, or asset, being purchased. Third, individuals do not expect to give or receive an inheritance, any accumulated resources are due to personal saving efforts. However, in reality many individuals may intend to make bequests.

Use of the Life Cycle Hypothesis in Prior Literature

The LCH is particularly useful in explaining savings and consumption behavior and has been used to explain the relationship between wealth and health (Attanasio & Hoynes, 2000; Center for Retirement Research at Boston College, 2005; Kim & Lyons, 2008; Shea, Miles, & Hayward, 1996). It is difficult to accurately determine if poor health has led to wealth depletion and financial strain or if wealth depletion and financial strain has led to difficulties in maintaining proper health and increasing stress levels. One should consider the health and financial status of individuals across the life cycle. The term 'cumulative disadvantage' (Crystal & Shea, 1990) describes the concept that a person who is disadvantaged in their younger years with poor health or inadequate financial means may retain such status their entire lives; it becomes a perpetuating cycle. For example, a person who is sickly in their youth may never have the opportunity to secure stable and consistent employment. Income may be devoted to medical expenditures thus limiting the ability to save for the future and build wealth for future consumption (Shea, et al.). Therefore, using the LCH to understand the relationship between health and wealth provides the proper framework for considering individuals' lifetime experiences with health and wealth.

The theory has also been used to address mortgage debt decisions among older homeowners (Center for Retirement Research at Boston College, 2008; Davidoff, 2006;

Joint Center for Housing Studies, 2008a; Masnick, et al., 2006). Borrowing from equity can place a strain on the accumulated retirement wealth of homeowners, especially when home values decline, but it can also act to smooth out consumption in later years (Joint Center for Housing Studies). However, research regarding equity use among older adults does not always coincide with theory. The LCH considers total assets and does not distinguish the assets by type or composition. The Joint Center for Housing Studies discusses how equity differs from other types of assets, such as stocks, and these differences may help explain why equity use among older adults has not always been found to follow the LCH. First, housing wealth is typically less volatile and more permanent than wealth held in the financial market. The financial market can change noticeably from day to day whereas changes in the housing market usually move slower and remain as such for longer periods of time. Second, the valuation of housing is more expensive and less definite than the valuation of other investments. For example, stocks are traded daily and their value is constantly monitored whereas any particular home is not traded daily and its value is assessed less frequently. A homeowner must pay to have their home valued. The value of a home is determined by an appraiser and may differ depending on the appraiser, location, and appraised value of similar homes in the surrounding area.

Third, the selling of financial investments typically requires lower transaction costs than does the sale of a home. Costs for selling or trading investments typically include a commission to an investments broker where as costs for selling a home include but are not limited to Realtor® fees, appraisal, and title search. Fourth, because financial investments, such as stocks, can be easily valued and have lower transaction costs, this

generally makes them a more liquid investment than accessing equity through a sale, home loan, or downsizing. Fifth, spending housing equity requires obtaining a loan where as spending from other investments requires selling that investment for its current dollar value. The consumption of equity may then be viewed as going against the LCH, as the theory suggests that individuals entering retirement borrow from savings in order to finance their lifestyles, but the theory does not appear to suggest that retirees borrow from savings with the expectation of repayment in order to finance their lifestyles.

Such differences in housing wealth versus other financial investments may aid in explaining why prior empirical research has found that many older homeowners retain their equity for bequest purposes (Fisher, et al., 2007), health related issues (NBER, 2001; Walker, 2004), or because of personal meaning (Dupuis & Thorns, 1998) rather than liquidating it to support a constant level of consumption. It should be noted that while a bequest motive does not specifically follow the LCH, variations of the theory such as the Permanent Income Hypothesis by Friedman (1957) do include the bequest motive.

Although the LCH is useful in understanding the relationship between health and wealth, prior studies known to date that have used the LCH in this context have only done so limitedly. Outlined below are some examples of the limited use of the LCH in the known literature regarding health and wealth. It is fully acknowledged that the goal of these papers appears not to have been to explain phenomena with theory, but rather to contribute to the empirical evidence of the health and wealth relationship. However, it is a well known concept that research questions should be driven by theory. At the very least, researchers should be acknowledging the role of theory in their work, and many do

this (Attanasio & Hoynes, 2000; Center for Retirement Research at Boston College, 2005; Kim & Lyons, 2008; Meer, et al., 2003; Shea, et al., 1996). However, most fail to inform the reader how the theory has driven their choice of key independent variables and instead focuses on how prior empirical work motivates their variables of choice (Attanasio & Hoynes; Center for Retirement Research, 2005; Meer, et al.).

This issue of acknowledging the theory but not explaining how the theory drives the key independent variables is also common in the literature that examines mortgage debt decisions and equity use among older adults (Center for Retirement Research at Boston College, 2008; Davidoff, 2006; Fisher, et al., 2007; Lee, et al., 2007; Masnick, et al., 2006). Much of this work was written in such a way that elements of the LCH are believed to be implied as the authors set up their model (Attanasio & Hoynes; Center for Retirement Research at Boston College, 2005, 2008; Fisher, et al., 2007; Masnick, et al.), but such implications may only be recognized by one very familiar with the theory and reading with the LCH specifically in mind. In addition, many authors do not relate their results back to the LCH through their conclusions and implications (Attanasio & Hoynes; Center for Retirement Research at Boston College, 2005). Others make only a few attempts or inferences back to the LCH, but never make solid ties between the theory and their results, regardless of whether or not the results are in line with the theory (Center for Retirement Research at Boston College, 2008; Kim & Lyons; Lee, et al.; Masnick, et al.).

This paper expands the prior use of the LCH by clearly outlining the theoretical motives behind the use of the primary independent variables (as seen in the following chapter) and specifically makes connections between the LCH and the results and conclusions. Additionally, the use of panel data more easily allows the life cycle effect to

be apparent in the analyses than if only a cross section of data were used. While the results of prior literature regarding health and wealth can be linked back to the theory (whether for or against the theory) authors rarely make such connections in their writing. This could be due to limited space in the journals that accepted their work or simply running out of time and energy to make the additional inferences. The results may not have conformed to the theory and explaining such differences can be difficult. Also, authors may have had a personal motivation to make the implications that they were passionate about rather than identifying how theory did or did not influence the outcomes of their research. If prior research had included such analyses, then the sum of this prior work may have specifically contributed to further clarifications of the LCH or the adoption of a new sister theory that may even more concisely explain the savings and consumption behavior of forthcoming generations.

Demand for Mortgage Debt and Health

The demand for mortgage debt is driven by equity, interest rate, the income of the buyer and the consumption preferences of the buyer. Many individuals purchase a home in order to have a place to call their own, to enjoy the security and satisfaction of homeownership and build equity, which is a form of savings. Homeownership easily falls under any of the four motives for saving discussed by Modigliani and Brumberg (1954). Once homeowners accumulate equity, they may choose to retain a mortgage instead of paying it off for a variety of reasons. One reason may be to continue taking advantage of the mortgage interest deduction. Another reason may be to finance consumption, such as higher education for a child, home improvements, or debt repayment. Such equity use can be accomplished through a refinance, second mortgage, or home equity line of credit. For

the purposes of this paper, the demand for mortgage debt is illustrated with the following

demand function:

$$\text{Mortgage Debt} = F(E_i, M, Y_i, C_i, X) \quad i = 1, \dots, N \tag{3}$$

where E represents the equity of the home and thus the owner's ability to take on

additional mortgage debt. The market characteristics that aid in determining the choice to

obtain a mortgage such as interest rates are represented by M. Recall the LCH holds

prices and interest rates constant but in reality, housing prices and interest rates for

mortgage loans fluctuate with the economy and play a large role in the demand for

obtaining mortgage debt. The income of the homeowner is denoted by Y and the

consumption preferences for obtaining the mortgage are represented by C. Exogenous

demographic characteristics are indicated by X.

The demand for good health is driven by: health behaviors such as regular visits

to a doctor, healthy eating habits, regular exercise, the financial resources to maintain and

improve health status such as income, and the individual's biological and genetic

background. Risk tolerance may also contribute to the demand for health; those who

exhibit higher risk levels may be more likely to engage in risky health behaviors such as

smoking or drinking which may lead to poor health (Smith & Kington, 1997b).

Additionally, maintaining low levels of stress contribute to the demand for good health in

as much as high levels of stress can lead to increased blood pressure, headaches, and

insomnia (American Psychological Association, 2008). For the purposes of this paper, the

demand for good health is illustrated with the following demand function:

$$\text{Good Health} = F(B_i, G_i, S_i, Y_i, R_i, X) \quad i = 1, \ldots, N \qquad (4)$$

where individual health behaviors are represented by B, the genetic and biological background of the individual is denoted by G, the stress level experienced by the individual is represented by S, and the financial resources used to maintain and improve health are noted by Y. Risk tolerance that leads to health behaviors is noted by R and X encompasses exogenous demographic characteristics.

In summary, there exists much literature regarding the relationship between health and wealth; however, there is little research that specifically examines the relationship between health and mortgage debt. The LCH has been used previously to help explain such relationships and is appropriate for use in the context of this study. While other theories such as Grossman's (1972) economic model of health may also be appropriate for understanding the relationship between health and mortgage debt, the LCH will be used because of the understanding it provides for older persons' consumption needs and economic resources in later life.

CHAPTER 3

Methodology

The purpose of this study is to add to the current body of health and wealth

literature by examining the dual relationship of health and the ratio of mortgage debt to

income among individuals age 65 and older. Specifically, the relationship between the

ratio of mortgage debt to income and the probability of having good health. This was

done using the 2004 and 2006 waves of the Health and Retirement Study (HRS) and a

two-stage probit least squares model. This chapter provides a description of the data and

sample, defines the dependent and independent variables, outlines the research questions

and hypotheses, describes the models in detail both theoretically and empirically, and

explains the statistical procedures that were used to answer the research questions.

Data and Sample

The Health and Retirement Study (HRS) was used for this study. The HRS

consists of a complex sample of adults age 50 and older across the United States. The

study has been conducted every two years since 1992 and contains detailed information

on over 22,000 respondents' physical and mental health, healthcare costs, and financial

status, including assets, insurance, and retirement planning. There are also a host of

demographic and family system variables available in the data set. The HRS assists in the

efforts of many disciplines to conduct research regarding the health and economic well-

being of the aging population. Funding for the HRS comes from the National Institute on

Aging and the Social Security Administration. The HRS is overseen by the University of

Michigan and is available to the public (Health and Retirement Study, n.d.). The data

were accessed through the RAND® Corporation which provides a clean and user-friendly

version of the HRS data. This study used data from the 2004 and 2006 waves of the HRS.

The sample used to answer research questions 1, 2, 4, and 5 totaled 1,197 individuals and

consisted only of homeowners age 65 and older reporting a mortgage payment in the

baseline year, 2004. The sample used to answer research question 3 totaled 6,728

individuals and consisted only of homeowners age 65 and older with or without a

mortgage who also provide a self-reported health status. In this study, these individuals

are referred to as respondents. The HRS is ideal for this study because of its large sample

size and comprehensive data on both financial status and health status. The HRS is the

only national data set known to date to provide detailed information regarding the health

and housing finance of respondents.

Table 1

Sample Obtained for Study

Levels of data at baseline [a]	Non-weighted sample size	Weighted sample size
Total sample (homeowners and renters/living with friend age 65 and older)	7,971	26,670,822
Homeowners age 65 and older	6,732	22,523,644
Homeowners age 65 and older who report having mortgage debt	2,082	6,646,109
Homeowners age 65 and older who report a specific house payment	1,588	5,021,640

Levels of data at baseline [a]	Non weighted sample size	Weighted sample size
Homeowners age 65 and older who report a specific house payment (final regression model)	1,179	3,815,742

[a] Baseline refers to HRS data from the year 2004.

The HRS has a clustered and stratified sample design (often referred to as a complex sample design) that over-represents Blacks, Hispanics, and residents of Florida (Health and Retirement Study, 2008). Sample weights were used to make adjustments in the analyses for unequal probability of selection and thus allow the results to be viewed as nationally representative of the population age 65 and older. Sample weights, while they do not solely account for the complex design, allow more accurate point estimates to be produced than if weights were not used. There are two types of sample weights in the HRS, household level weights and individual level weights. Individual level data were used thus individual level weights were applied. The value of the individual level weight is determined by the number of age-eligible respondents in the household, marital status, race/ethnicity, sex, and age group (Health and Retirement Study). The individual level weights account for the fact that both a husband and wife could be respondents, a characteristic known as clustering.

The statistical software packages used to analyze these data (SAS[®] 9.1 and STATA[®] 11.0) produce calculations based on the assumption that the data were collected as a simple random sample. Consequently, resulting standard errors would likely be small relative to standard errors that appropriately account for the complex sample design. This increases the likelihood of a Type I error where the null hypothesis is rejected when in

fact it is true (Nielsen, Davern, Jones, & Boies, 2009). The HRS provides sampling error codes (STRATUM and SECU) that allow more accurate standard errors to be produced (Health and Retirement Study, 2008). The sampling error codes are designed to use either the Taylor Series method or Balanced Repeated Replication (BRR) method (for a comprehensive description of the theory and practice of these and other complex sample variance estimation procedures see Wolter, 2007). The Taylor Series method is used in this study.[8] If the sampling error codes are not used, then the variance estimations will be underestimated and the resulting confidence intervals will likely be too narrow.

Households eligible for participation in the HRS must have at least one member qualify as age eligible, meaning they were born between 1931 and 1941. Additionally, the age eligible respondent could be single, married to a spouse who is also age eligible, or married to a spouse who is not age eligible (Heeringa & Connor, 1995). Therefore respondents could be either male or female, and married or single.

In as much as this study examined individual level data, one may be concerned that husband and wife respondents reported household finances differently. For example, the spouse that manages the household finances would know the exact amount of the mortgage payment whereas the spouse that is less involved with the household finances might not know the exact amount of the mortgage payment. The HRS collects data regarding the finances of the household from only one member of the household, the one most familiar with the finances. When individual level data are examined, the financial

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[8] Research question 3 was analyzed using SAS® 9.1 and the Taylor Series method was used. Research questions 4 and 5 were analyzed using a two-stage command in STATA® 11.0. This two-stage command was not weighted as no weight command exists for this particular analysis which is described near the end of this chapter.

information is matched up with the respective husband or wife such that their reported

financial information is the same.[9]

Variables

The dependent variables used in this study were self-reported health status and the

ratio of mortgage debt to income, otherwise known as housing cost burden. Self-reported

health is a common measure used in a variety of studies that examine the relationship

between health and wealth (Angel, et al., 2003; Drentea, & Lavrakas, 2000; Lyons &

Yilmazer, 2005; Meer, et al., 2003; O'Neill, et al., 2005; Wu, 2003)[10]. This way of

measuring health, by self-reports, has been found to be consistent with physician

assessments and is a strong predictor of disease and mortality (Adams, Hurd, McFadden,

Merrill, & Ribeiro, 2003; Baker, Stabile, & Deri, 2004; Idler & Benyamini, 1997; Idler &

Kasl, 1991; McGee, Liao, Cao, & Cooper, 1999). However, it should be noted that self-

reports are prone to response error (Baker et al.). The HRS asks respondents to rate their

health as excellent, very good, good, fair, or poor. This variable was dichotomized to

equal "1" if health was reported as excellent, very good, or good, and to equal "0" if

health was reported as fair or poor. Prior studies have also dichotomized similar health

status variables (Angel, et al.; Baker, et al.; Kim & Lyons, 2008; McGee, et al.; Meer, et

al.). The ratio of mortgage debt to income, or housing cost burden, was created using two

variables: monthly mortgage payment and monthly income. The monthly mortgage

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[9] Note: some secondary data surveys collecting financial information ask the respondent if they used any

documentation, such as pay stubs or bill statements, to calculate their responses or if they did not use any

such documentation. The HRS does not ask respondents if documentation was used to generate answers for

financially related survey questions.

[10] Of the named authors, Wu, 2003 is the only one that used the HRS.

payment was reported by the respondent at the time of interview in 2006 and includes

debt from at least one of the following: first mortgage, second mortgage, or other home

loan (not including a loan on a home equity line of credit or refinance).[11] Monthly income

was derived by dividing yearly income by 12. Income consists of respondent and spouse

earnings, pensions and annuities, Supplemental Security Income (SSI) and Social

Security Disability, Social Security Retirement, unemployment and workers

compensation, other government transfers, household capital income, and other income.

Income reported in the 2006 interview was for the prior calendar year (2005) and was

inflated in this study to represent 2006 dollars. Housing cost burden is a continuous

variable and ranges from 0 to 1. The monthly ratio of mortgage debt to income, or

housing cost burden, is examined in order to put the monthly level of mortgage debt into

context with respondent's monthly income. The greater the monthly proportion of income

spent to secure housing, the lower the monthly proportion of income available for other

consumption. This ratio is referred to in the rest of this study as housing cost burden.

The independent variables used to address the research questions include:

race/ethnicity, marital status, employment status, education, gender, age, assets, level of

consumer debt, home modifications for accessibility, and health insurance. Assets consist

of all assets less any liabilities. Assets include primary residence, other real estate (does

not include a second home),[12] business assets, IRAs, Stocks, Bonds, and Checking and

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[11] Payment information was not provided for balances on home equity lines of credit or refinances.

Payment includes principal and interest but may also include property tax and/or insurance.

[12] Respondents who reported owning a second home were also asked to provide an asset level (or net worth

level) that included the value and or liabilities associated with that second home. This study only examines

Savings account totals (see Table 2). Consumer debt consists of respondent and spouse

credit card and medical debt, loans on any life insurance policies, and loans from

relatives (loans for any mode of transportation are not included).[13]

Table 2

Variables Used in the Multivariate Analyses

Variable	Variable description
Dependent variables[a]	
Self-reported health (in 2006)	Coded as 1 if health was reported as excellent, very good, or good. Coded as 0 if health was reported as fair or poor.
Housing cost burden (in 2006)	Monthly level of mortgage debt divided by monthly income, all in 2006 dollars[b]. A continuous variable ranging from 0 to 1.
Independent variables measured at baseline[c]	
Race/Ethnicity	White non-Hispanic, Black non-Hispanic, Hispanic, or Other each coded as a dummy variable with White as the reference group.
Marital status	Married, separated or divorced, or widowed each coded as a dummy variable with married as the reference group[d].
Employment status	Coded as 1 if employed. Coded as 0 if not employed[e].

the asset level where only the primary home is included and does not consider the asset level where a

second home may be reported.

[13] The HRS computes imputations for missing values in the following variables: income, assets, consumer

debt.

Variable	Variable Description
Education	Less than high school, high school graduate, college (includes some college and college graduate or higher) each coded as a dummy variable with less than high school as the reference group[f].
Gender	Coded as 1 if female. Coded as 0 if male.
Age	A continuous variable including only those age 65 and older.
Log level of assets	Level of assets, a continuous variable in 2006 dollars.
Log level of consumer debt	Level of consumer debt, a continuous variable measured in 2006 dollars.
Home modifications (for accessibility)	Coded as 1 if the respondent's home was already accessible or if they made the home accessible in the last two years. Coded as 0 if home was not accessible.
Medicare	Coded as 1 if the respondent reported having any Medicare health insurance. Coded as 0 if the respondent reported having no Medicare health insurance[g].
Medicaid	Coded as 1 if the respondent reported having any Medicaid health insurance. Coded as 0 if the respondent reported having no Medicaid health insurance.
Champus/VA	Coded as 1 if the respondent reported having any Champus/VA health insurance. Coded as 0 if the respondent reported having no Champus/VA health insurance.

Variable	Variable Description
Private	Coded as 1 if the respondent reported having any form of privately sponsored health insurance, such as through an employer. Coded as 0 if the respondent reported having no form of privately sponsored health insurance.

[a] The dependent and independent variables are all characteristics of the respondents.

[b] *Monthly level of mortgage debt* consists of all first mortgage debt, second mortgage debt, and other mortgage debt (not including home equity line of credit balance or refinances) a continuous variable in 2006 dollars. *Monthly income* is derived from total household income divided by 12 and is a continuous variable in 2006 dollars.

[c] Baseline refers to HRS data collected in the year 2004.

[d] Some respondents reported never having been *married*. However this category of respondents did not provide enough variation to be included in the final regression model. Respondents who were *never married* (n= 19) were dropped from the sample.

[e] As defined by the Bureau of Labor Statistics, employed persons include those working for pay and those absent from work for sick or other leave. Persons not employed includes those who are unemployed and looking for work, temporarily laid off, disabled, retired, and homemaker (Bureau of Labor Statistics, 2008).

[f] The categories *some college* and *college grad or higher* were combined into one category, *college*, because of high correlation between *some college* and *college grad or higher*. These two variables, some college and college grad or higher produced a Variance Inflation Factor (VIF) of 10 and 11 respectively.

[g] *Medicare* is a form of health insurance available for adults over age 65. In this sample there are a small percent of older adults (4.59%) who report not having any *Medicare* health insurance.

This is consistent with U.S. Census data indicating only 95% of adults over age 65 have any

Medicare health insurance (U.S. Census Bureau, 2005a). Additionally, it is worth noting some

respondents report having no health insurance of any form. However, there was not enough

variation in this variable to include it in the final regression model. Thus respondents who

indicated they had no health insurance (n=10) were dropped from the sample.

It should be noted that the age variable may be better suited for this research as a

series of dummy variables instead of the continuous variable indicated. However, based

on the final sample size, a continuous construction was the most appropriate. For

example, it may be important to differentiate the effects of age among the sample, such as

examining the sample in three age categories: young (65-74), middle (75-84), and old

(85+). However, the vast majority of respondents (80.28%) were age 65-74 and only

1.67% were age 85+, thus examining age as a continuous variable was most appropriate.

Two models are required to examine the dual relationship between health and

housing cost burden. Model One examined the relationship between housing cost burden

and the probability of respondents reporting good health and Model Two examined the

relationship between respondents having good health and their housing cost burden. To

control for the endogenous relationship between health and housing cost burden, an

independent variable was included in Model One that was specific to housing cost burden

and was not included in Model Two. This variable was lump sum dollar amount received

over the last two years (primarily in the form of inheritance but may also include lump

sums from insurance or pensions). Similarly, there was an independent variable included

in Model Two, specific to the health status of the respondents that was not included in

Model One. This variable was frequency with which the respondent is engaged in physical activity (see Table 3).

Table 3

Instrumental Variables

Variable	Variable Description
Model One	
Log dollar amount received between 2004 and 2006	Lump sum amount received between 2004 and 2006 as reported in 2006. Lump sums may come from inheritance, insurance, or pensions. A continuous variable in 2006 dollars.
Model Two	
Regular physical activity In 2004	Coded as 1 if engage in moderate activity at all during the month Coded as 0 if hardly ever or never engage in moderate activity during the month.[a]

[a] Moderate activity is defined as taking part in sports, gardening, cleaning the car, walking at a moderate pace, dancing, or participating in floor or stretching exercises.

Additional variables were used to create a housing finance profile of respondents, see Table 4. Those variables were obtained from interview year 2004 (baseline) and include the present value of the home, the net value of the home,[14] level of mortgage debt, and housing cost burden. Housing cost burden at baseline was created from two variables, monthly mortgage payment and monthly income. The monthly mortgage payment was reported by the respondent at baseline, interview year 2004, and includes debt from at least one of the following, first mortgage, second mortgage, or other home

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[14] The HRS computes imputations for missing values on net value of the home.

loan (not including a loan on a home equity line of credit or refinance).[15] Monthly

mortgage payment, a continuous variable, was inflated to 2006 dollars. Monthly income

was derived by dividing yearly income by 12. Income consists of respondent and spouse

earnings, pensions and annuities, Supplemental Security Income (SSI) and Social

Security Disability, Social Security Retirement, unemployment and workers

compensation, other government transfers, household capital income, and other income.

Income reported in the 2004 interview was for the prior calendar year (2003) and was

inflated in this study to represent 2006 dollars. Housing cost burden is a continuous

variable and ranges from 0 to 1

Table 4

Additional Variables used to create the Housing Finance Profile of Respondents

Variable	Variable Description
Present value of the home at baseline[a] (2004)	The price the home would bring if sold in the market. Continuous variable measured in 2006 dollars.
Net value of the home at baseline (2004)	The value of the home minus any amount owed for a first or second mortgage, home equity loan, or balance on a home equity line of credit (also referred to as equity). A continuous variable measured in 2006 dollars.
Level of mortgage debt at baseline (2004)	Total sum of mortgage debt owed. Includes first and second mortgage, home equity loan, and balance on home equity line of credit. Measured in 2006 dollars.

[15] Payment information was not provided for balances on home equity lines of credit or refinances.

Variable	Variable Description
Monthly mortgage payment at baseline (2004)	Consists of all first mortgage debt, second mortgage debt, and other mortgage debt (not including home equity line of credit balance or refinances). A continuous variable measured in 2006 dollars.
Log income at baseline (2004)	Total household income is reported for the prior calendar year (2003) and includes: earnings of the respondent and spouse; pensions and annuities; Supplemental Security Income and Social Security Disability; Social Security Retirement; unemployment and workers compensation; other government transfers; household capital income; other income. A continuous variable measured in 2006 dollars.
Housing cost burden at baseline (2004)	Monthly level of mortgage debt reported at baseline divided by monthly income at baseline[b]. A continuous variable measured in 2006 dollars.

[a] Baseline refers to HRS data collected in the year 2004.

[b] Monthly income is derived by dividing yearly income by 12.

Theoretical Model

The independent variables used in this study to predict health status and housing cost burden were chosen based on both the Life Cycle Income Hypothesis (LCH) and prior empirical work. The ways in which prior empirical work drove the choice of independent variables are discussed below. The LCH states that consumers make their consumption and savings decisions based on their stage in the life cycle and their total available resources. Younger consumers utilize their available resources to dissave (typically borrowing in the credit market) in order to establish their lives and careers.

Middle aged consumers typically experience periods of higher levels of income, use their available resources to save for retirement, and pay down debts. Older consumers use their accumulated resources to dissave (typically exhausting personal assets or savings) for the remainder of their lives. Thus, consumers are presumed to be rational in their decision-making, so they have the resources sufficient to meet their consumption expectations in retirement.

In this study, the variables that were available to measure an individual's total resources consisted of income and assets; however, only assets were used. Income was not included because it was directly used to create the variable housing cost burden. This study examined the relationship between housing cost burden and self-reported health among individuals age 65 and older. In the context of the LCH, one may believe that households entering retirement would have no (or very little) debt because their middle age years were focused not on dissaving, but on paying down debt and saving in preparation for retirement. Thus older adults would be prepared and ready to draw down their investments (including equity) for consumption as they age. However, for those who carry mortgage debt into retirement, this may place undue strain on their retirement spending plans which may lead to lower self-reported health as the individual feels the effect of this financial stressor.

This study also examined the relationship between self-reported health status and the housing cost burden of persons age 65 and older. Considering the LCH, one may believe that as individuals age and their health begins to decline, they will access their total available resources to pay for healthcare. In light of the relaxed credit market in the early 2000s, increases in home values, and equity borrowing, it is plausible that older

homeowners chose to borrow from their equity to finance health consumption instead of choosing to use other savings or credit options.

Independent variables that were used to predict the outcomes of health status and housing cost burden in the context of LCH were age, employment status, level of consumer debt, marital status, and health insurance. Regarding age, mortgagees at the beginning of their retirement life expectancy would be expected to have more mortgage debt and be in better health than mortgagees nearing the end of their retirement life expectancy. Mortgage debt may be lower for mortgagees near the end of retirement life expectancy because they have had more time to pay off the debt and may be holding onto their accumulated equity for bequest purposes. The LCH portrays older individuals as living off their accumulated resources, thus borrowing from personal savings and not living off employment income. Older individuals with high levels of consumer debt may represent those who borrowed too much during their younger years and consequently may be forced to be employed for a longer period of time than they had wished in order to meet such debt obligations. Thus, the LCH suggests that older individuals may very well be retired and no longer working for income or to pay down debts.

Marital status is also important for predicting housing cost burden and health status. In terms of the LCH, married individuals may have more total resources at their disposal to cover healthcare expenditures as well as a larger mortgage. Their mortgage may be larger due to the need for larger housing when compared to widows (widowers) and divorcees. A change in marital status such as becoming divorced or widowed could create a situation whereby resources are reduced more quickly as expenditures arise from such a change. Health insurance can act as a moderating factor for overall declines in

total available resources. Individuals with sufficient health insurance can rely on the insurance to cover most of their healthcare costs and will not need to deplete their total resources to simply maintain good health or offer assistance with declining health. The remaining variables, race, education, gender, and home modifications for accessibility were used simply as control variables.

The LCH creates a clear and simple framework with which to build the empirical model. However, due to the heterogeneous nature of the older population with their various social, economic, and cultural backgrounds, it was expected that the results may not entirely follow the LCH. The sample for this study consisted of adults born prior to the baby boom generation (1946-1964), as oldest baby boomers will not reach age 65 until 2011. This sample may have some lingering influences of their parents and family who were children of the Depression era, which may influence their life cycle savings and consumption decisions.

Empirical Model

Two waves of the HRS were used to examine the relationship between health status and housing cost burden among respondents age 65 and older. A two-period model was implemented to examine the relationship between health status and housing cost burden, and instrumental variable regression was used to examine the direction of the relationship between health status and housing cost burden. In effect, the model helps to determine whether housing cost burden affects changes in health status or whether changes in health status affect housing cost burden.

Model One

$$\Pr[HS_{t1} = 1] = F(\beta_1 HCB_{t1} + \beta_2 X_{t0} + \beta_3 D_{t0} + u_{t1}) \tag{5}$$

The dependent variable for Model One is represented by HS_{t1} which is the self-reported health of the individual in Time One. The primary independent variable is represented by HCB_{t1} which is the housing cost burden of the household in Time One. Other independent variables of importance are represented by X_{t0} and include level of assets and level of consumer debt. Variables at baseline that are hypothesized to be important to the relationship of health and housing cost burden are represented by D_{t0} and include the respondent's race/ethnicity, marital and employment status, education, gender, age, whether or not home modifications were made for accessibility between Time Zero and Time One and health insurance. Unmeasured determinants of HS are represented by u_{t1}.

Model Two

$$HCB_{t1} = \alpha_0 + \alpha_1 HS_{t1} + \alpha_2 X_{t0} + \alpha_3 D_{t0} + \varepsilon_{t1} \tag{6}$$

The dependent variable for Model Two is represented by HCB_{t1} which is the housing cost burden of the individual in Time One. The primary independent variable is represented by HS_{t1} which is the self-reported health status in Time One. Other independent variables of importance are represented by $X_{t0,}$ and include level of assets and level of consumer debt. Variables at baseline that are hypothesized to be important to the relationship of health and housing cost burden are represented by $D_{t0,}$ and include race/ethnicity, marital and employment status, education, gender, age, whether or not

home modifications were made for accessibility between Time Zero and Time One and health insurance. Unmeasured determinants of housing cost burden are represented by ε_{t1}.

Research Questions and Hypotheses

The research questions are as follows:

1- What is the demographic profile of mortgagees age 65 and older in the United States?

2- What is the housing finance profile (home value, mortgage debt, equity, and housing cost burden) of mortgagees age 65 and older in the United States?

3- Does the mean self-reported health status of individuals age 65 and older with a mortgage differ from that of those in the same age group who own their homes without a mortgage?

4- What is the relationship between the ratio of mortgage debt to income and the probability of having good health among mortgagees age 65 and older in the United States?

5- What is the relationship between good health and the ratio of mortgage debt to income among mortgagees age 65 and older in the United States?

Hypothesis for Research Question 3

Based on prior literature supporting a negative relationship between health and mortgage debt (Cairney & Boyle, 2004; Nettleton & Burrows, 1998; 2000), it was expected that homeowners with no mortgage would have a higher probability of reporting good health than homeowners with a mortgage.

H_{o1}: There is no difference in the mean self-reported health status of homeowners without a mortgage and homeowners with a mortgage at baseline.

H_{a1}: The mean self-reported health status of homeowners with a mortgage at baseline is lower than the health of homeowners without a mortgage at baseline.

Hypothesis for Model One

Primary independent variable.

Recall the sample for Model One consists of only homeowners age 65 and older with a mortgage. Due to existing evidence suggesting that mortgage debt is negatively associated with physical and emotional health (Cairney & Boyle, 2004; Nettleton & Burrows, 1998; 2000), it was expected that the housing cost burden in Time One among individuals age 65 and older in the HRS would be negatively related to the probability of having good health in Time One. The higher the housing cost burden an individual reports, the lower the probability of the individual having good health.

H_{o2}: The housing cost burden of the respondent in Time One has no relationship with the probability of the respondent having good health in Time One *ceteris paribus*.

H_{a2}: The housing cost burden of the respondent in Time One has a negative relationship with the probability of the respondent having good health in Time One *ceteris paribus*.

Demographic variables.

According to the LCH, individuals' total resources are used for maintaining a constant level of consumption over the life span. Married individuals often have more total resources at their disposal and thus more resources to maintain their health.

Additionally, it has been found that married individuals are more likely to be healthy than single individuals (Center for Retirement Research at Boston College, 2005; Meer, et al., 2003). This could be attributed to a number of things such as a greater likelihood of having affordable health insurance, if both were employed with benefits, simply the motivation to stay healthy for the sake of one's spouse and the joint retirement goals that may exist, or due to mate selection process where healthier partners are preferred to unhealthier partners. Thus, it was expected that individuals who are divorced, separated or widowed would have a lower probability of reporting good health than individuals who are married, possibly the result of fewer total available resources compared to the resources of married individuals.

Older adults belonging to racial and ethnic minority groups, such as Blacks and Hispanics, have been found to have shorter life expectancies and poorer health than White older adults (Blesch & Furner, 1993; Centers for Disease Control and Prevention, 2007; Furner, 1993; U.S. Census Bureau, 2005b). For example, a higher percentage of older Whites report excellent or good health compared to older Blacks and Hispanics (Centers for Disease Control and Prevention; McGee, et al., 1999), and older Blacks report higher rates of diagnosed health conditions such as hypertension, diabetes, and arthritis than older Whites (Blesch & Funer; Furner). Thus, compared to Whites, it was expected that minorities in this study would have a lower probability of reporting being in good health. Many of the minority individuals in this study would have been born in the 1940s or earlier and may not have had the resources for or the access to adequate healthcare or health education. Additionally, more of these individuals may have been raised in lower income households than their White counterparts and not had the financial

resources to maintain good health. Also, compared to older Whites, older Black or Hispanic persons may not have had jobs that provided sufficient health benefits, thus contributing to an inability to maintain good health. In terms of the LCH, individuals belonging to racial and ethnic minority groups, such as Hispanics and Black non-Hispanics, experience a constant level of consumption over their lives; however, their total available resources may be lower than Whites. As a result, the constant consumption that minorities enjoy is likely to be at a lower level compared to Whites. This does not imply that the level of consumption is inadequate, but simply that it is at a lower level.

Health status among older adults differs by gender. Men are more likely than women to be diagnosed with chronic diseases that take their lives at younger ages while women are more likely to be diagnosed with chronic diseases that are not life threatening (Rieker & Bird, 2005). Such diseases allow them to live longer but with the consequence of a lower quality of life (Rieker & Bird). Women are also more likely than men to report their health as fair or poor (McGee, et al., 1999), and physically active men are more likely than physically active women to engage in high levels of activity (U.S. Census Bureau, 2005b). In this study, it was expected that women would have a lower probability of reporting being in good health than men. This matches the LCH as women are likely to accumulate less total resources than men over their lifetimes and thus have fewer resources at their disposal to afford to maintain a constant level of good health. Additionally, an individual's health declines more with age and appears to decline the most after age 85 (Federal Interagency Forum on Aging Related Statistics, 2008). Thus, it was expected that older respondents would have a lower probability of reporting being in good health than younger respondents.

The LCH would suggest that individuals make their employment decisions based on their accumulated resources. If they have enough resources to cease market work, they will choose to retire. If their resources are not large enough to maintain constant consumption as they age, they will stay employed and continue to contribute to their total available resources. However, prior research suggests that the decision to cease market work and enter retirement may be made by older adults as a direct result of their health (Dalton, 2008a; RAND® Labor and Population Program, 2001; Shultz & Wang, 2007; Smith & Kington, 1997b) and some may feel forced to enter retirement because of declining health (Dalton). If an individual becomes involuntarily unemployed, this may lead to higher rates of distress and depression (Pearlin, Menaghan, Morton, & Mullan, 1981). Thus, it was expected that older adults in this study who were employed at baseline (2004) may have a higher probability of reporting good health in Time One (2006) compared to those who were not employed at baseline.

Having a lower education has been associated with poor self-rated health (Angel, et al., 2003; McGee, et al., 1999) and psychological distress (Cairney & Boyle, 2004), while higher education among older working adults as compared to non-working adults has been associated with very good and excellent self-reported health (National Academy on an Aging Society, 2000). The more education a person receives the more likely they are to obtain employment with benefits that may not come with the type of employment that someone with less education obtains, thus helping them maintain their health. Such individuals have the knowledge necessary to seek out information regarding good health and may have better access to good healthcare. Therefore, it was expected that the more

education the older adults in this study achieved, the higher the probability of their reporting good health in Time One.

Finance related variables.

Assets contribute to the health of the individual. Persons with larger amounts of resources (assets) are able to invest in their health more so than persons with fewer resources. In terms of the LCH, persons with larger total resources are able to engage in constant consumption over the life course; therefore, those with larger assets may be more likely to afford regular doctor visits, have an adequate diet, and meet the increasing costs of healthcare. Individuals with fewer resources may suffer from not being able to afford to maintain their health. There is empirical evidence that assets are positively related to health (Smith & Kington, 1997b), but it is acknowledged that prior health as well as family background also drives one's ability to accumulate income and assets. Thus, it was expected that level of assets at baseline would be positively related to the probability of the respondent reporting good health in Time One. Based on the literature that reports an inverse relationship between financial strain and health status (Drentea, & Lavrakas, 2000; Jacoby, 2002; Krause, 1997; Mills, et al., 1992; O'Neill, et al., 2005; O'Neill, et al., 2006; Xiao, et al., 2006), it was expected that the level of consumer debt held by the older adults examined in this study would be inversely related to their self-reported health status. Individuals with high consumer debt may jeopardize their ability to maximize their health by spending too much time in the work place in order to repay the debt and not enough time practicing good health behaviors (Jacoby). When income is devoted to making debt payments, less income is available to afford healthy foods, needed medications, and regular doctor visits. This also follows the LCH; when

individuals use their resources for debt repayment they have fewer resources to then be used toward maintaining a constant level of consumption. If debt repayment levels are extremely high, this will impact the constant level of consumption for an even longer period of time.

Many older adults want to remain in their homes as they age (Bayer & Harper, 2000; NAHB, 2005). Home modifications designed to increase functionality in the home can allow an older homeowner to age in place for a longer period of time. Many older adults who make home modifications believe that they will be able to remain in their homes as they age and that living there will be easier because of the modifications (Bayer & Harper). Such modifications can allow older adults to feel more in control of their living conditions. Perceived control of an older adult's actions or behaviors is a key indicator of psychological functioning (Oswald, Wahl, Schilling, & Iwarsson, 2007). Therefore, one may assume that older adults living in homes that have been modified for accessibility may report overall better health because of the increase control they feel over their living environment, even if their actual health has not improved. Thus it was expected that a respondent whose home has been modified for accessibility may be more likely to report being in good health.

Health related variables.

Individuals with health insurance are more likely to be in good health than those without health insurance. In as much as healthcare costs can be high, those benefitting from any health insurance may not have the same worries about meeting their healthcare expenses as individuals without health insurance. In terms of the LCH, health insurance can act as a moderating factor for declines in total resources, thus better enabling the

individual to maintain a constant level of consumption, whether for consumption in general or health consumption specifically. Those with coverage may visit the doctor more regularly and more easily afford the procedures and medications that are needed to maintain their health. The more comprehensive the health insurance coverage, the more healthcare services will be used (Hurd & McGarry, 1997). The majority of older individuals benefit from Medicare and have many healthcare costs covered. However, individuals who need additional care and consequently experience healthcare costs in excess of the costs or type of costs that will be covered under Medicare must seek out additional supplemental health insurance if they can afford the additional premiums and deductibles. This supplemental health insurance can be found through government or private providers. Therefore, it was expected that individuals who report having any of the following forms of health insurance: Medicare, Medicaid, Champ/VA, or insurance offered through a private health insurance provider at baseline would have a higher probability of reporting good health in Time One compared to those who report not having any Medicare, Medicaid, Champ/VA, or insurance offered through a private provider.

Hypotheses for Model Two

    Primary independent variable.

Recall that the sample for Model Two consists of only homeowners age 65 and older with a mortgage. Empirical evidence supports the notion that health is positively related to socioeconomic status (SES) and wealth (Center for Retirement Research at Boston College, 2005; Smith, 1997; Smith & Kington, 1997a; Wu, 2003) and is negatively related to financial strain (Kim & Lyons, 2008; Lyons & Yilmazer, 2005).

Therefore, it was expected that health status in Time One would be negatively related to the housing cost burden in Time One, such that those reporting excellent, very good, or good health in Time One would have a lower housing cost burden in Time One than those reporting fair or poor health.

H_{o3}: Being in excellent, very good, or good health has no relationship with the mortgagees' housing cost burden in Time One *ceteris paribus*.

H_{a3}: Being in excellent, very good, or good health has a negative relationship with the mortgagees' housing cost burden in Time One *ceteris paribus*.

Demographic variables.

Keith (1986) found it is often the case that married-couple households are in a better financial position than households headed by single persons; however, with divorce, separation, or the death of a spouse, the risk for financial hardship increases (Keith, 1986). Married-couple households have been found to hold larger amounts of mortgage debt than households headed by single persons (Masnick, et al., 2006). Generally, married persons have more resources at their disposal, such as dual income, and may thus choose to have a larger mortgage than persons who are not married. Additionally, married couples may have chosen a larger home (and thus larger mortgage) than single persons in order to raise a family. According to the LCH, households, regardless of marital status, would be expected to have paid off their mortgage upon retirement knowing that income from employment would cease and that consumption would become dependent on total accumulated resources. While empirical evidence

shows that this may not always be the case as households are in fact entering retirement with mortgage debt (Copeland, 2006; Center for Retirement Research at Boston College, 2008; Masnick, et al.), the expectation that retiring households should at least have higher levels of accumulated equity than younger households still stands. As a result, households entering retirement should have more equity at their disposal to use for consumption as needed. Therefore, individuals who are divorced, separated, or widowed may have chosen to utilize accumulated equity to pay for expenses in conjunction with the loss of their spouse. For example, in the case of a death, final medical or funeral expenses could be financed from home equity. In the case of a divorce, a wife who is left with the house may decide to borrow the equity for a variety of reasons such as paying for a child's education, better transportation, or needed home repair she cannot do herself. Therefore, individuals who are divorced, separated, or widowed may have a larger housing cost burden than married individuals. This could be due to the loss of income from the spouse they are no longer with or due to increased mortgage debt used to meet expenses associated with no longer having a spouse. Thus, it was expected that respondents who were divorced, separated, or widowed would have a higher housing cost burden than married respondents.

Obtaining a mortgage loan requires the use of banking or mortgage lending services. Individuals from some social and historical backgrounds may be opposed to using banking services and acquiring debt while others may be in favor of borrowing. Racial and ethnic minority groups may experience difficulty obtaining a loan with good terms due to discrimination or may simply avoid seeking a loan because they are adverse to banking or lending services. Thus, race and ethnicity may affect the housing cost

burden of the respondent (Center for Retirement Research at Boston College, 2008; Lee, et al., 2007). Minority households may be forced to take loans that cost more than White households may obtain and thus warrant a higher housing cost burden. It is also argued that minority households may have large amounts of housing debt as they are greater targets for subprime mortgages which are commonly known for extending loan to value ratios. Thus, minority households may end up with a higher housing cost burden than White households (Immergluck, 2008). Because older minority adults may have been disadvantaged for much of their lives with regard to employment and income, the LCH would suggest that their total resources would be lower and thus their consumption level also lower. A lower consumption level would suggest a smaller level of mortgage debt compared to White households who may have experienced an advantage in their employment and income. However, given the reality of attitudes toward borrowing, discrimination in the mortgage loan market, and the nature of subprime mortgage loans, one may expect older adults of minority races (Black non-Hispanic and Hispanic) to be less likely to extract their equity and therefore have overall lower levels of mortgage debt, but a higher housing cost burden than Whites. Thus, it was expected that minorities (Black non-Hispanic, Hispanics, and other) would have a higher housing cost burden compared to White non-Hispanics.

Women are more likely than men to experience financial strain (Angel, et al., 2003; Lyons & Yilmazer, 2005) and women are also more likely than men to experience poverty in their old age. Women have longer life expectancies than men (Federal Interagency Forum on Aging Related Statistics, 2008) and thus will likely outlive their spouse and lose the financial resources that accompanied their spouse. The majority of

women experiencing poverty in their old age were not poor before the death of their

spouse (Cruikshank, 2003). In general, single older women have fewer assets and

retirement benefits than men in as much as they likely had sporadic work histories and

consequently a lack of accumulated retirement benefits (Morgan & Kunkel, 2007). This

lack of total accumulated resources may encourage women to delay paying off an

existing mortgage or to obtain a loan on their equity in order to meet other expenses.

Thus, it was expected that female respondents would report having higher levels of

mortgage debt than male respondents.[16]

According to the LCH, younger individuals are more likely to borrow funds to

meet expenses, middle aged individuals to save for retirement, and older individuals to

use accumulated savings. Following a similar idea, one may expect mortgagees entering

retirement to have more mortgage debt than adults who are approaching life expectancy.

Homeowners age 75 and older are less likely to have mortgage debt than homeowners

age 65-74 (Lee, et al., 2007; U.S. Census Bureau, 2003a). These adults (75 years and

older) would have had additional time to pay off their mortgage and are possibly

intending to bequest the home. So, it is reasonable to expect that age is inversely related

to mortgage debt, thus the older individuals are the less mortgage debt they will have and

consequently the lower their housing cost burden.

Having some kind of paid employment (or income source) is vital to obtaining a

mortgage loan and maintaining payments. Individuals nearing retirement may delay

retirement because of financial responsibilities. Older adults with lower levels of wealth

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[16] Recall that HRS respondents could be male or female and could be married, separated / divorced, or
widowed.

have been found to seek employment in order to supplement their income (Lee, Lown, & Hong, 2002). Older adults working part or full time are more likely to report having mortgage debt (Lee, et al., 2002) and have also been found to be more likely to experience financial strain (Kim & Lyons, 2008). Retirees may also have to make the decision to re-enter the labor force to continue to successfully make mortgage payments (Masnick, et al., 2006). The LCH would suggest that individuals transitioning from employed to not employed would have synchronized that transition with the final payments of their mortgage and thus no longer need employment income to satisfy a house payment. Thus, it was expected that respondents who reported being employed at baseline may have a larger housing cost burden in Time One than respondents who were not employed at baseline. Employment would then be considered as necessary for maintaining monthly mortgage obligations. Those who are not employed do not need the additional income to meet the demands of a house payment.

Older individuals with higher levels of education may have had higher paying jobs and thus are more likely to afford a larger mortgage than individuals with less education. In general, individuals with 13 years or more of education are reported as having favorable attitudes toward credit (Chien & DeVaney, 2001). However, one may argue that higher educated individuals may be more likely to use their higher income to meet needs instead of borrowing (Center for Retirement Research at Boston College, 2008). In the case of obtaining a mortgage, which is largely dependent on income for repayment, one may more so believe that having a higher income may entice individuals to seek out a loan because they have the resources to pay for it over time, allowing them to benefit from the proceeds of the loan now instead of in the future. It has been found

that having a college education is significant in determining the likelihood of holding mortgage debt among older homeowners (Lee, et al., 2007). Additionally, older individuals with less education are more likely to have fewer assets to the point of being insufficient for their needs (Kim & Lyons, 2008). However, more educated individuals are likely to be allocating a smaller portion of their income to their mortgage payment than less educated individuals. Therefore, respondents with higher levels of education and thus likely higher income, may have higher levels of mortgage debt than respondents with lower levels of education, and thus likely lower income. Thus, it was expected that the housing cost burden of those with a high school diploma or college education would be lower than those who did not graduate from high school. Recall that housing cost burden in this study consists of the ratio of monthly level of mortgage debt[17] to monthly income.

Finance related variables.

Assets are also important in determining homeowners' housing cost burden. If homeowners are obtaining a second mortgage loan they must have sufficient equity accumulated in order to do so and thus have a higher level of assets (or net worth). Thus, according to the LCH, homeowners are engaging in dissaving from their accumulated resources. However, after obtaining such a loan, the homeowners' net worth would likely decrease simply because of how net worth is calculated (assets minus liabilities). Therefore, homeowners must first have sufficient equity accumulated, thus contributing to an overall higher initial level of net worth, in order to obtain a loan from their equity.

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[17] Monthly level of mortgage debt consists of all first mortgage debt, second mortgage debt, and other mortgage debt (not including home equity line of credit balance or refinances).

Once a loan is obtained, the homeowner no longer owns that equity and consequently their net worth reflects the shift of that equity from an asset to a liability, resulting in a lowering of total net worth. This is of course contingent on the homeowners other assets and liabilities remaining constant. Thus, it was expected that the higher the assets reported in Time Zero the lower the level of mortgage debt in Time One and thus the lower the housing cost burden in Time One.

Level of non-housing debt is another important factor in being granted a mortgage. If the level of non-housing debt or consumer debt is too high, the mortgage loan may not be granted because the homeowner's ability to pay is compromised by the obligation of prior debts. However, in the relaxed credit markets of the early 2000s debt to income ratios were in many cases expanded. Having consumer debt in the year 2000 was found to be a positive and significant factor in the likelihood of having mortgage debt among adults age 65 and older (Lee, et al., 2007). Borrowing from home equity has often been used as a means of consolidating consumer debts (Canner, et al., 1998; Canner, et al., 2002; Joint Center for Housing Studies, 2008a; U.S. Census Bureau, 2007) and one could argue that if individuals have a favorable attitude toward borrowing, they may very well have both mortgage and consumer debt. Thus, it was expected that as the level of consumer debt increased so would the level of mortgage debt and consequently the housing cost burden. According to the LCH, as individuals approach retirement, their savings should increase and dissaving decrease. Therefore, carrying consumer debt after retirement is contrary to the LCH. Individuals are expected to have ceased borrowing from the credit market early enough to pay off their debts and sufficiently build their total resources for consumption in retirement. However, choosing to borrow from equity after

retirement may be considered in line with the LCH because as individuals progress through old age they are expected to dissave from their total accumulated resources. However, borrowing from equity results in necessary repayment which is considered as going against the LCH with regard to older adults.

Many individuals who borrow from their home equity choose to make home improvements with the loan proceeds (Canner, et al., 1998, 2002; Joint Center for Housing Studies, 2008a; U.S. Census Bureau, 2007). This is often considered a wise investment choice – to take equity proceeds and use it for something that will aid in the rebuilding of future home equity. Some home improvements are motivated by the physical needs of residents. Considering the needs of older adults, it is common to make home improvements to aid in the accessibility of the home for aging individuals (Bayer & Harper, 2000). Such improvements may include installing lever door handles, grab bars, and no slip flooring. Assuming such improvements are made with home equity, thus requiring repayment, it would be expected that respondents who report living in an accessible home may have a higher housing cost burden than those who do not live in an accessible home.

Health related variables.

Older individuals experiencing financial strain are more likely to be Medicaid recipients and less likely to have additional health insurance coverage (Kim & Lyons, 2008). Thus, persons who own their homes and have health insurance coverage may be less likely to need to access their equity to pay for healthcare needs as their insurance is capable of covering much of their healthcare costs, thus there is no need to utilize assets such as equity. In such cases, the health insurance coverage is protecting the total

accumulated resources of the individual and thus allowing those resources to be used for maintaining constant consumption. Thus, it was expected that mortgagees with any health insurance, specifically those who report having any Medicare, Medicaid, Champus/VA, and insurance offered through a private health insurance provider, would have lower levels of mortgage debt and thus a lower level of housing cost burden than individuals reporting not having any of those forms of insurance. Expected directions for Models One and Two are based on the LCH and on prior empirical studies, see Table 5.

Table 5

Expected Directions for Models One and Two

Independent Variables	Model One	Model Two
	Dependent Variable	Dependent Variable
	Probability of having good health in Time One	Housing Cost Burden in Time One
Self-reported health (good) in time one (2006)	N/A	-
Housing cost burden in time one (2006)	-	N/A
Race/Ethnicity (White non-Hispanic)		
Black non-Hispanic	-	+
Hispanic	-	+
Other	-	+
Marital status (married) at baseline[a]		
Separated / divorced	-	+
Widowed	-	+

Independent Variables	Model One	Model Two
	Dependent Variable	Dependent Variable
	Probability of having good	Housing Cost Burden
	health in Time One	in Time One
Employment status (not employed) at baseline		
Employed	+	+
Education (less than high school) at Baseline		
High school graduate	+	-
College education	+	-
Gender (male) at baseline		
Female	-	+
Age at baseline	-	-
Log assets at baseline	+	-
Log level of consumer debt at baseline	-	+
Home modifications (not modified) at baseline	+	+
Medicare at baseline	+	-
Medicaid at baseline	+	-
Champus/VA at baseline	+	-
Private at baseline	+	-

Note: Reference groups are in parenthesis

[a] Baseline refers to HRS data collected in 2004

Statistical Analysis

Descriptive statistics were used to answer research questions 1 and 2 and thus create a demographic profile and housing finance profile (home value, mortgage debt, equity, and housing cost burden) of mortgagees age 65 and older at baseline. A t-test for two independent samples was used to answer research question 3. To investigate the relationship between mortgage debt and health (research questions 4 and 5) a two-stage, or simultaneous equation model, was used that allows the endogeneity of health status and housing cost burden to be controlled. The statistical software package, SAS® 9.1 was used to answer research question 3 and the statistical software package, STATA® 11.0 was used to answer research questions 4 and 5. The unweighted two-stage command used in STATA (CDSIMEQ did not account for the complex sample design) as no sample design commands exist for this particular analysis. This analysis is described below.

In this study, housing cost burden and health status are both endogenous variables. The level of mortgage debt obtained in relation to income is a choice made by the consumer. Health status is in part determined within the individual by factors such as genetics and biology but is also determined by choices made by the individual, such as lifestyle and healthy behaviors. As a result of this endogeneity, both variables are correlated with the error term. Specifically regarding Model One, housing cost burden is an endogenous right hand side variable and may be correlated with unmeasured determinants of the dependent variable, health status. Regarding Model Two, health status is the endogenous right hand side variable and it may be correlated with unmeasured determinants of the dependent variable, housing cost burden. These unmeasured determinants may include unmeasured self esteem, ability, or motivation.

Recall Models One and Two:

$$\Pr[HS_{t1} = 1] = F(\beta_1 HCB_{t1} + \beta_2 X_{t0} + \beta_3 D_{t0} + u_{t1})$$ (5)

$$HCB_{t1} = \alpha_0 + \alpha_1 HS_{t1} + \alpha_2 X_{t0} + \alpha_3 D_{t0} + \varepsilon_{t1}$$ (6)

The error terms, u_i and ε_i, represent any omitted or unmeasured factors related to the dependent variables housing cost burden (HCB) and self-reported health status (HS). If, for either model, the primary independent variable is correlated with the error term, then the estimators of the primary independent variables will be inconsistent, meaning that the estimators will not be representative of the true regression coefficient values. This inconsistency could be directly due to an omitted variable, measurement error present in the independent variables, or simultaneous causality where the direction of causation is unknown and could run from the independent variable to the dependent variable or visa versa (Stock & Watson, 2007).

Instrumental variable regression[18] is a tool that can be used to produce consistent estimates of the coefficients. First developed by Wright (1928), this technique uses an instrumental variable to isolate the part of the independent variable that is not correlated with the error term. In terms of instrumental variable regression, an independent variable

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[18] Instrumental variable regression has the following assumptions. 1) The exogenous independent variables are not correlated with unmeasured determinants of the dependent variable. $E(u_i \mid X_{1i}, \ldots X_{ri}) = 0$; 2) The dependent variable, independent variables (both endogenous and exogenous), and the instrumental variables are independently and identically distributed; 3) Large outliers are unlikely; 4) The instrument meets the two conditions, instrument relevance and instrument exogeneity (Stock & Watson, 2007).

that is correlated with the error term is known as an endogenous variable and is determined from within the system, a choice variable. If the independent variable is not correlated with the error term then it is known as an exogenous variable and is determined from outside the system. In this study, self-reported health status and housing cost burden are both endogenous independent variables and both are correlated with the error terms ε_i and u_i respectively. Because both health status and housing cost burden are endogenous variables, the direction of their relationship is in question. The presence of mortgage debt may contribute to poor health through the added stress of holding secured debt during retirement, and it is just as likely that the existence of poor health status is positively affecting the probability of carrying mortgage debt, perhaps to finance healthcare.

An instrument must meet two conditions in order to be valid and thus produce an unbiased estimate of β_1 and α_1. The two conditions are instrument relevance and instrument exogeneity. Instrument relevance means that the instrument (Z) is correlated with the endogenous right hand side variable (X) such that $corr(Z,X) \neq 0$. Instrument exogeneity means that the instrument (Z) is uncorrelated with unmeasured determinants of the dependent variable (u) such that $corr(Z, u) = 0$ (Stock & Watson, 2007). The instrument chosen for Model One is not included in Model Two, and it is lump sum dollar amount received over the last two years.[19] The instrument chosen for Model Two is not included in Model One, and it is whether or not the respondent participates in regular physical activity. It is possible to test for instrument relevance by using the F-

[19] Receipt of a lump sum dollar amount has been previously used as an instrument in empirical research (Meer, et al., 2003; RAND® Labor and Population Program, 2004)

statistic and the Likelihood Ratio test. However, it is not possible to test instrument exogeneity in this study. Instrument exogeneity can be tested using the J-statistic, also known as the test of overidentifying restrictions, if the models included more than one instrumental variable. If this was the case the models would be considered overidentified and it would be possible to test for instrument exogeneity (Stock & Watson).

The strength of using an instrumental variable to control for endogenous right hand side variables is the instruments' ability to isolate the part of the independent variable that is not correlated with the error term. This is only truly possible if the instruments adequately meet the conditions of instrument relevance and instrument exogeneity. Identifying an instrument that is believably correlated with the endogenous right hand side variable but not with unmeasured determinants of the left hand side variable is difficult. Thus the analysis of research questions 4 and 5 is only as good as the instruments. Provided these conditions are met a cause/effect relationship will be produced.

Because the dependent variable for Model One is dichotomous and the dependent variable for Model Two is continuous, a two-stage probit least squares model (2SPLS) was used. The 2SPLS process is described below as outlined by Keshk (2003) and demonstrates how research questions 4 and 5 were answered.

$$Y_1 = \gamma_1 Y^*_2 + \beta'_1 X_1 + \varepsilon_1 \qquad (7)$$

$$Y^*_2 = \gamma_2 Y_1 + \beta'_2 X_2 + \varepsilon_2 \qquad (8)$$

where the dependent variable Y_1 is a continuous endogenous measure, the dependent

variable Y_2 is a dichotomous endogenous measure, and β'_1 and β'_2 represent the vector of

coefficients for the matrices of exogenous independent variables, X_1 and X_2. The error

terms are noted by ε_1 and ε_2. The first stage estimations of both equations 7 and 8 will be

used to produce predicted values of Y_1 and Y_2 which will then be used in the second stage

in place of the endogenous right hand side variables to produce consistent estimates. This

is demonstrated in equations 9 and 10

$$Y_1 = \gamma_1 \hat{Y}^{**}_2 + \beta'_1 X_1 + \varepsilon_1 \tag{9}$$

$$Y^{**}_2 = \gamma_2 \hat{Y}_1 + \beta'_2 X_2 + \varepsilon_2 \tag{10}$$

In the case of this study, equation 11 estimates the housing cost burden of the respondent

in Time One and equation 12 estimates the probability of the respondent having good

health in Time One.

$$HCB_1 = \gamma_1 HS^*_2 + \beta'_1 X_1 + \varepsilon_1 \tag{11}$$

$$HS^*_2 = \gamma_2 HCB_1 + \beta'_2 X_2 + \varepsilon_2 \tag{12}$$

where HCB_1 represents the housing cost burden of the respondent in Time One (a

continuous variable) and HS^*_2 represents the self-reported health status of the respondent

in Time One (a dichotomous variable). Equations 13 and 14 are constructed just as

equations 9 and 10 above.

$$\text{HCB}_1 = \gamma_1 HS\hat{}^{**}_2 + \beta'_1 X_1 + \varepsilon_1 \tag{13}$$

$$HS^*_2 = \gamma_2 HCB\hat{}_1 + \beta'_2 X_2 + \varepsilon_2 \tag{14}$$

where HS and HCB (endogenous variables) are replaced with the predicted values $HS\hat{}^{**}_2$

and $HCB\hat{}_1$.

The next chapter presents the results of the analysis. Detailed answers to each

research question are also presented.

CHAPTER 4

Results

This chapter contains results from the data analysis. Descriptive statistics were used to create a demographic and housing finance profile of respondents to answer research questions 1 and 2. A t-test was used to answer research question 3. The remainder of this chapter outlines the results of a two-stage probit least squares model (2SPLS) used to answer research questions 4 and 5. Research questions 1, 2, 4 and 5 are answered based on the final regression model which had a sample size of 1,197 representing 3,815,742 mortgagees over age 65 in the United States. The sample used to answer research question 3 totaled 6,728 individuals and consisted of homeowners in the United States age 65 and older with or without a mortgage who also provide a self-reported health status.

Prior to running the analyses to answer the research questions, diagnostics tests were run. Cook's distance was run to examine influential outliers and Variance Inflation Factor (VIF) and Spearman and Pearson Correlation Coefficients were run to examine multicolinearity. Cook's distance is used to determine if outlier data are influential. If the results indicate the presence of influential outliers, then those specific observations can be removed from the analysis. A total of 58 observations were determined to contain influential outliers and were removed from the final regression model. Variance Inflation Factor is a test for multicollinearity which occurs when two or more of the independent variables are correlated on a moderate to high level. In such cases, the directions of the

parameter estimates may be misleading and the standard errors of the estimates may be

inflated (Mendenhall & Sincich, 2003). The results of the VIF and careful inspections of

both Spearman and Pearson Correlation Coefficients indicate the final regression model

does not have any problems with collinearity.[20]

Research Questions

Research Question 1

What is the demographic profile of mortgagees age 65 and older in the United

States? As shown in Table 6, this sample of mortgagees had an average age of 70 years

old. Nationally, of all homeowners age 65 and older, there are more mortgagees age 65-

74 than mortgagees age 75 and older, 36.4% and 18.5% respectively (U.S. Census

Bureau 2003a). The majority of respondents, 50.79% were male, while the U.S. Census

reports that only 41.20% of persons age 65 and older are male[21] (U.S. Census Bureau,

2005b). This sample was primarily White, 73.77%, a little lower than the U.S. Census

report that 83% of adults age 65 and older are White (U.S. Census Bureau, 2005b). Most

respondents, 48.79%, reported an education of some college or higher, this is more than

the 35.40% reported nationally (U.S. Census Bureau, 2005b). Married individuals

consisted of 72.43% of this sample, similar to the national report of 71.2% (U.S. Census

Bureau, 2005b). The percent of respondents reporting a martial status of

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[20] The results of the Spearman Correlation Coefficients revealed that the dummy variables *high school graduate* and *college* were relatively highly correlated (0.65). Such a correlation is to be expected given these variables, *high school graduate* and *college*, were created from the variable *education* which ranged from 0 to 17. The variables, *high school graduate* and *college*, were therefore left in dummy form instead of being collapsed into one variable, *education*.

[21] Note: In the 2004 wave of the HRS the majority of respondents, 58.51%, were female.

separated/divorce or widowed were 9.19% and 16.79% respectively, slightly higher than

the national report of 7% and 14.3% respectively (U.S. Census Bureau, 2005b). The

majority of respondents, 72.85%, were not employed and 59.65% of those not employed

were retired. Nationally, 86.55% of adults age 65 and older are not employed (U.S.

Census Bureau, 2005b).

Table 6

Descriptive Statistics for Sample of Mortgagees n=1,197 (3,815,742 weighted)

Variable description	Mean (Median)	S.E.[a]	Min	Max	Percent
Race/Ethnicity					
White non-Hispanic	0.8170	0.0112	0	1	73.77
Black non-Hispanic	0.0932	0.0084	0	1	15.04
Hispanic	0.0494	0.0063	0	1	8.02
Other	0.0403	0.0057	0	1	3.17
Marital status at baseline[b, c]					
Married	0.7193	0.0130	0	1	72.43
Separated / divorced	0.0917	0.0083	0	1	9.19
Widowed	0.1708	0.0109	0	1	16.79
Employment status at baseline					
Employed	0.2808	0.0130	0	1	27.15
Not employed	0.7192	0.0130	0	1	72.85
Education at baseline					
Less than high school	0.1750	0.0109	0	1	20.55
High school graduate	0.3109	0.0134	0	1	30.66

Variable description	Mean (Median)	S.E.[a]	Min	Max	Percent
Education at baseline cont.					
College education	0.5139	0.0145	0	1	48.79
Gender at baseline					
Female	0.4962	0.0145	0	1	49.21
Male	0.5038	0.0145	0	1	50.79
Age at baseline	70.76 (69.00)	0.1534	65.00	94.00	
Home modifications at baseline					
Modified for accessibility	0.1212	0.0094	0	1	11.95
Medicare at baseline					
Any Medicare	0.9534	0.0061	0	1	95.41
Medicaid at baseline					
Any Medicaid	0.0348	0.0053	0	1	4.09
Champus/VA at baseline					
Any Champus/VA	0.1007	0.0087	0	1	10.36
Private at baseline					
Any private	0.4218	0.0142	0	1	42.02

[a] Standard errors were estimated via Taylor Series method.

[b] Baseline refers to HRS data collected in 2004.

[c] All values presented in this table are based on weighted data.

Additionally, mortgagees in this study reported a median income of $49,374 and $214,514 median assets (see Table 7). The Census reports median income of all individuals over age 65 at $23,787 (U.S. Census Bureau, 2005b). The sample in this study holds median assets, including home value, of $214,514 whereas nationally the value of median assets, including home value, held by individuals over age 65 is $108,885 (U.S. Census Bureau, 2005b).

Table 7

Financial Profile of Mortgagees n=1,197 (3,815,742 weighted)

Description	Min	Max	Mean (Median)	S.E.[a]
Yearly income at Baseline[b] (in 2006 dollars)	4,207.30	651,957.00	73,252.00 (49,374.47)	2,304.15
Assets at baseline[c] (in 2006 dollars)	-243,702.28	26,606,077.29	580,707.66 (214,513.50)	45,263.67
Level of consumer debt at Baseline[d] (in 2006 dollars)	0.00	106,723.00	3,463.01 (0)	304.98

[a] Standard errors were estimated via Taylor Series method.

[b] All values presented in this table are based on weighted data.

[c] In the final regression model assets at baseline was coded such that all negative and zero values were equal to 0.01 thus allowing assets to be logged.

[d] In the final regression model level of consumer debt at baseline was coded such that all zero values were equal to 0.01 thus allowing level of consumer debts to be logged.

Research Question 2

What is the housing finance profile (home value, mortgage debt, equity, and housing cost burden) of mortgagees age 65 and older in the United States? As shown in Table 8, this study found that the median home value of respondents was $186,765, higher than the $108,300 reported nationally[22] (U.S. Census Bureau, 2003b). Total mortgage debt for the sample in this study ranges from $427 to $1,067,231 and includes first and second mortgage and balance on home equity loan. The majority of the sample, 94.99%, reported debt amounts for a first and/or second mortgage, 17.46% report having a home equity loan, and 12.45% of respondents report having both a first and/or second mortgage and a home equity loan. The median housing cost burden reported for this sample at baseline was 15.78%; the Census reports the majority of adults age 65 and older, 59.8%, have a housing cost burden under 30% (U.S. Census Bureau, 2005b).

Table 8

Housing Finance Profile of Mortgagees age 65 and older n=1,197 (3,815,742 weighted)

Description	Min	Max	Mean (Median)	S.E.
Value of home at baseline ($) [b, c, d]	693.70	26,680,783.48	315,774.74 (186,765.48)	33,684.67
Net value of the home (equity) at baseline ($)	-376,038.96	25,613,552.14	222,757.82 (107,790.37)	32,324.14
Level of mortgage debt at baseline ($)	426.89	1,067,231.34	93,016.93 (69,370.04)	2,742.02

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[22] The figure reported here is in 2000 dollars, if inflated to represent 2006 dollars it totals $126,790.

Description	Min	Max	Mean (Median)	S.E. [a]
Balance of home equity loan debt at baseline ($)	0.00	170,757.01	5,466.79 (0.00)	513.98
Housing cost burden at baseline[e] (%)	0.85	539.77	21.17 (15.78)	0.67
Housing cost burden in Time One (%)	0.34	95.11	21.25 (17.14)	0.44

[a] Standard errors were estimated via Taylor Series method.

[b] All values in this table are based on weighted data.

[c] All values reported are inflated to represent 2006 dollars

[d] Baseline refers to Time Zero or 2004.

[e] Income values used to calculate housing cost burden at baseline (year 2004) were inflated to 2006 dollars.

Research Question 3

Does the mean self-reported health status of individuals age 65 and older with a mortgage differ from that of those in the same age group who own their homes without a mortgage? This question was answered using the full sample of homeowners, 6,728 and represents 22,506,640 homeowners over age 65 in the United States. The hypotheses were as follows:

H_{o1}: There is no difference in the mean self-reported health status of homeowners without a mortgage and homeowners with a mortgage at baseline.

H_{a1}: The mean self-reported health status of homeowners with a mortgage at baseline is lower than the health of homeowners without a mortgage at baseline.

To answer this research question, a weighted t-test for two independent samples was conducted and the pooled method was used. This test was run using the entire sample of homeowners. An ordered health variable: excellent, very good, good, fair, and poor was used thus allowing specific examination of each level of health rather than collapsing them into a dichotomous variable coded "1" for excellent/very good/good and coded "0" for fair/poor as was used in answering research questions 4 and 5. The pooled method produced a p-value less than 0.0001 and thus calls for a rejection of the null hypothesis. The mean difference in self-reported health status among mortgagees (2.6845) and outright owners (2.845) was -0.161, indicating that the mean health of mortgagees is lower than the mean health of outright owners.

Research Question 4

What is the relationship between the ratio of mortgage debt to income and the probability of having good health among mortgagees age 65 and older in the United States? The hypotheses were as follows:

H_{o2}: The housing cost burden of the respondent in Time One has no relationship with the probability of the respondent having good health in Time One *ceteris paribus*.

H_{a2}: The housing cost burden of the respondent in Time One has a negative

relationship with the probability of the respondent having good health in Time

One *ceteris paribus.*

The results for the second stage of the two-stage probit least squares (2SPLS)

regression as indicated in Table 9 show that housing cost burden in Time One is not

statistically significantly associated with the probability of reporting good health in Time

One. Since the p-value is greater than $\alpha = 0.05$ the null hypothesis stated above is

accepted and it is concluded that the housing cost burden of respondents in Time One had

no relationship with the probability of the respondent having good health in Time One

ceteris paribus. However, the results do show that education, assets, and whether or not

the respondent participated in regular physical activity are significantly positively related

(at a p-value less than $\alpha = 0.05$) to the probability of reporting being in good health.

Specifically, those who had a college education had a higher probability of reporting

being in good health in Time One than those who received less than a high school

education. Also, level of assets reported at baseline is positively associated with the

probability of reporting being in good health in Time One. Respondents who reported

regularly participating in physical activity had a higher probability of reporting being in

good health than those who reported hardly ever or never participating in physical

activity. Additionally, the results show those reporting their homes had ever been

modified for accessibility had a statistically significantly lower probability of reporting

being in good health compared to those who reported their homes had never been

modified for accessibility. Each of the statistically significant regressors had the expected

directions as hypothesized except home modification (see Table 5, Chapter 3).

Table 9

Second Stage Regression Coefficients for Model One: Housing Cost Burden Regressed

on Self-Reported Health Status (Probit model) n=1,197

Independent Variable	Self-Reported Health Status in Time One			
	Coef.	S.E.	Z	P > |z|
I_housing cost burden in Time One	3.5216	6.2151	0.57	0.571
Race/Ethnicity (White non-Hispanic)				
Black non-Hispanic	-0.3636	0.4423	-0.82	0.411
Hispanic	-0.6162	0.6969	-0.88	0.377
Other	0.1075	0.5717	0.19	0.851
Marital status (married) at baseline[a]				
Separated or divorced	-0.3705	0.2818	-1.31	0.189
Widowed	-0.3009	0.3887	-0.77	0.439
Employment status (not employed) at baseline				
Employed	0.7926	0.4793	1.65	0.098
Education (less than high school) at baseline				
High school graduate	0.2273	0.1247	1.82	0.068
College education	0.5801	0.1671	3.47	0.001
Gender (male)				
Female	0.1629	0.1267	1.29	0.198
Age at baseline	-0.0056	0.1145	-0.49	0.662
Log assets at baseline	0.0466	0.0187	2.50	0.013
Log level of consumer debt at baseline	-0.0034	0.0072	-0.47	0.640

Independent Variable	Self-Reported Health Status in Time One			
	Coef.	S.E.	Z	P > | z |
Home modifications for accessibility (not modified) at baseline	-0.3361	0.1370	-2.45	0.014
Any Medicare at baseline (no Medicare)	-0.3093	0.2462	-1.26	0.209
Any Medicaid at baseline (no Medicaid)	-0.2972	0.2251	-1.32	0.187
Any Champus/VA at baseline (no Champus/VA)	0.3388	0.3033	1.12	0.264
Any private at baseline (no private)	0.0986	0.2033	0.49	0.628
Regular physical activity at baseline (hardly ever or never)	0.5140	0.1185	4.34	0.000
Constant	-0.8288	2.1562	-0.38	0.701
Test of Model Fit LR chi-square (19) =157.57				
Prob. > Chi-square = 0.0000				
Pseudo R^2 = 0.1144				

Note: Reference groups are in parenthesis.

[a] Baseline refers to Time Zero or 2004.

Research Question 5

What is the relationship between good health and the ratio of mortgage debt to income among mortgagees age 65 and older in the United States? The hypotheses were as follows:

H_{o3}: Being in excellent, very good, or good health has no relationship with the mortgagees' housing cost burden in Time One *ceteris paribus*.

H_{a3}: Being in excellent, very good, or good health has a negative relationship with the mortgagees' housing cost burden in Time One *ceteris paribus*.

The results for the 2SPLS regression indicate there was no statistically significant relationship between self-reported health status in Time One and housing cost burden in Time One (see Table 10). Since the p-value is greater than $\alpha = 0.05$ the null hypothesis stated above is accepted and it is concluded that being in good health in Time One had no relationship with the mortgagees' housing cost burden in Time One *ceteris paribus*. However, the results do indicate that a statistically significant negative relationship exists at a p-value less than $\alpha = 0.05$ for those who report being employed and having any health insurance in the categories of Champus/VA and private sector. With regard to employment status, compared to those who were not employed, being employed was associated with a 0.067 (or 6.7 percentage point) decrease in housing cost burden. Health insurance, specifically being covered by any benefits through Champus/VA or a private health insurance provider, was associated with a 0.04 (or 4 percentage point) or 0.029 (or 2.9 percentage point) decrease in housing cost burden respectively.

The results also indicate that a statistically significant positive relationship exists at a p-value less than $\alpha = 0.05$ for those who report being of a minority race or ethnicity and those who report being separated or divorced and widowed. Specifically, respondents who reported being Black non-Hispanic or Hispanic were statistically significantly associated with a 0.065 (or 6.5 percentage point) and 0.104 (or 10.4 percentage point) increase respectively in housing cost burden in Time One. Also, those who reported belonging to the other race or ethnicity category were statistically significantly associated

with a 0.083 (or 8.3 percentage point) increase in housing cost burden in Time One.

Regarding marital status, the results show a significant positive association between

housing cost burden and being separated or divorced and widowed. Specifically,

compared to being married, being separated or divorced is significantly associated with a

0.034 (or 3.4 percentage point) increase in housing cost burden in Time One. Being

widowed was statistically significantly associated with a 0.056 (or 5.6 percentage point)

increase in housing cost burden in Time One compared to those who were married. Each

of the statistically significant regressors had the expected directions as hypothesized

except employment status (see Table 5, Chapter 3).

Table 10

Second Stage Regression Coefficients for Model Two: Self-Reported Health Status

Regressed on Housing Cost Burden (Ordinary Least Squares Model) n=1,197

Independent Variable	Housing Cost Burden in Time One			
	Coef.	S. E.	t	$P > |t|$
I_self-reported health status in Time One	-0.0142	0.0227	-0.62	0.533
Race/Ethnicity (White non-Hispanic)				
Black non-Hispanic	0.0659	0.0127	5.18	0.000
Hispanic	0.1041	0.0172	6.06	0.000
Other	0.0835	0.0256	3.26	0.001
Marital status at baseline (married)				
Separated or divorced	0.0343	0.0157	2.19	0.029
Widowed	0.0558	0.0127	4.39	0.000
Employment status at baseline (not employed)				
Employed	-0.0679	0.0155	-4.38	0.000

Independent Variable	Housing Cost Burden in Time One			
	Coef.	S. E.	t	P > | t |
Education at baseline (less than high school)				
High school graduate	0.0038	0.0136	0.28	0.778
College education	-0.0101	0.0174	-0.58	0.563
Gender (male)				
Female	0.0162	0.0099	1.64	0.101
Age at baseline	-0.0013	0.0009	-1.48	0.140
Log assets at baseline	-0.0004	0.0019	-0.18	0.854
Log level of consumer debt at baseline	0.0002	0.0007	0.25	0.805
Home modifications for accessibility at baseline (not modified)	0.0022	0.0153	0.15	0.884
Any Medicare at baseline (no Medicare)	-0.0089	0.0215	-0.41	0.679
Any Medicaid at baseline (no Medicaid)	0.0072	0.0228	0.32	0.749
Any Champus/VA at baseline (no Champus/VA)	-0.0401	0.0146	-2.75	0.006
Any private at baseline (no private)	-0.0290	0.0087	-3.33	0.001
Log other income at baseline	-0.0019	0.0011	-1.80	0.073
Constant	0.3246	0.0695	4.67	0.000

Test of Model Fit $F (19, 1177) = 14.51$

                             Prob. > F = 0.0000

                             Adj. $R^2 = 0.1766$

Note: Reference groups are in parenthesis.

[a] Baseline refers to Time Zero or 2004.

Testing Instrument Relevance and Exogeneity

The instruments used in each model can be tested for instrument relevance in Stage One of the two-stage probit least squares regression through the use of the F-statistic for Model One Stage One, and it can be tested through the use of the Likelihood Ratio test for Model Two Stage One (Stock & Watson, 2007). The F-statistic and the Likelihood Ratio are testing the hypothesis that the coefficient on the instrument in the first stage is equal to zero (Stock & Watson, 2007). Regarding Model One Stage One, the F-statistic was 14.51 and is significant (P-value = 0.0000), thus the null hypothesis is rejected; the coefficient on the instrument in the first stage is not equal to zero. Regarding Model Two Stage One, the Likelihood Ratio test was 157.57 and is significant (p-value = 0.0000), thus the null hypothesis is rejected; the coefficient on the instrument in the first stage is not equal to zero. The results indicate that the condition of instrument relevance has been met. Because the models were not overidentified, meaning they did not include multiple instruments, it was not statistically possible to test the condition of instrument exogeneity. First stage regressions are not reported in this chapter as the primary concern is with the second stage results. First stage results for Model One are found in Appendix A and first stage results for Model Two are found in Appendix B.

Summary

To sum, the results indicate that among mortgagees age 65 and older in the Health and Retirement Study, there was no statistically significant relationship between self-reported health status and housing cost burden. There was however, significant evidence that education, level of assets, and regularly engaging in physical activity increases the probability of reporting being in good health, while ever having had a home modified for

accessibility decreases the probability of reporting being in good health. There is also significant evidence that being of a minority race/ethnicity, being separated/divorced or widowed is positively related to housing cost burden and being employed, having any Champus/VA health insurance or any privately sponsored health insurance is negatively related to housing cost burden

CHAPTER 5

Discussion

This chapter begins by discussing the primary results found in this study and relating those results to theory and prior empirical work. Limitations to the study are discussed and in light of the findings of this study, implications are drawn regarding older mortgagees in the United States and their health status. Lastly, suggestions for future research are presented. The objectives of the study were to first create a profile of older mortgagees and compare their self-reported health status with that of homeowners without a mortgage, second examine the dual relationship between the ratio of mortgage debt to income and self-reported health and third address the implications for older adults.

Profile of Older Mortgagees

Demographic Profile

One objective of this study was to create a demographic profile of older mortgagees. In brief, the representative characteristics of the mortgagees in this study were 70 years old, male, White, had some college education, were married, and were not employed at baseline (year 2004). Existing empirical research regarding the demographic characteristics of mortgagees over age 65 is limited. Of the research that is known to date, the results of this study are only somewhat consistent with prior findings. Prior literature characterizes older mortgagees as having some college or more, being employed (Lee, Lown, & Sharpe, 2007) and being married (Masnick, et al., 2006).

The Life Cycle Hypothesis (LCH) portrays older individuals as living off their accumulated resources, thus borrowing from personal savings and not living off employment income. The LCH would also suggest that individuals would time the transition out of employment with the final payments of a mortgage. At this transition, consumers would no longer need to rely on employment income to meet mortgage obligations. Therefore one might expect older mortgagees to be employed. However, this study found that the vast majority of mortgagees over age 65 were not employed. This is unexpected in light of what the LCH would suggest. However, it is unknown how close those not employed were to paying off their mortgage. Perhaps they made the decision to exit employment prior to 2006 because they were close to paying off their mortgage.

Mortgagees in this study had a median income of $49,374, median assets of $214,514, and median consumer debt of $3,464. Prior research characterizes mortgagees age 65 and older as having incomes under $35,000, assets under $200,000, and consumer debt of under $2,000 (Lee, Lown, & Sharpe, 2007).[23] The LCH suggests that older individuals use accumulated resources to maintain constant consumption through the end of life expectancy. In terms of the LCH older adults who no longer benefit from employment income must rely on accumulated resources to maintain their standard of living. Considering that the median assets of this sample were just over $200,000 may be cause for concern. Assets were defined in this study as including primary residence, other real estate (not including a second home), business assets, IRAs, Stocks, Bonds, and Checking and Savings account totals. It is possible that respondents in this study have

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[23] Lee, Lown, and Sharpe (2007) used the 2000 wave of the HRS and examined the likelihood of having debt (consumer and mortgage) among individuals age 65 and older.

additional assets for their consumption use that did not fit the given definition of assets. However, for a 70 year old only being able to rely on assets totaling $200,000 is concerning. While some of these assets may appreciate in value, the cost of living and the costs associated with growing older are sure to increase; retirement income may not be expected to increase. The average mortgagee may face some trying financial times ahead.

These data were collected before the housing down turn in 2007, thus it is possible that these same mortgagees have suffered a loss in their asset values recently, particularly their home values, potentially leaving them with much less than $200,000 to rely on for consumption through life expectancy – an estimated 5 years away given the life expectancy for men is 75.2 years and an estimated 10 years away given the life expectancy for women is 80.4 years (Federal Interagency Forum on Aging Related Statistics, 2008).

Additionally, the median debt level held by this sample of mortgagees is not in line with the LCH. The LCH would suggest that individuals approaching their retirement years would seek to pay off debts and prepare to finance consumption from their total accumulated resources. This sample of mortgagees does not appear to be following the LCH. Therefore the LCH may not be helpful in explaining the consumer behavior of these mortgagees.

Housing Finance Profile

Under the first objective of this study a housing finance profile of older mortgagees was also created. It was found that the mortgagees had a median home value of $186,765 and median equity of $107,790. Thus, indicating the average respondent may indeed be close to paying off their mortgage. It was also found that mortgagees in this

sample had a median mortgage debt level of $69,370 in 2004. These findings are much lower than findings of prior empirical work. Masnick, et al. (2006) projected that mortgage debt levels may rise to $100,000 by 2010 for the oldest of the baby boomers reporting high levels of housing debt and Lee, Lown, and Sharpe (2007) found among their sample of individuals over age 65 that most held mortgage debt under $100,000 with the majority holding mortgage debt levels of under $25,000.

In 2004 the median housing cost burden for this sample of mortgagees was 15.78%, a reasonable amount considering the fact that a housing cost burden in excess of 30% is considered a financial burden (U.S. Census Bureau, 2003b). However, the median housing cost burden increased for this sample in 2006 to 17.14%. This increase may simply be due to a decrease in income for reasons such as the decision to retire or due to pensions that are not adjusted for increases in cost of living. However, this could also be an indication of an increase in equity borrowing prior to the 2007 down turn in the housing market. Prior research found that householders over age 62 do extract their home equity, but at much lower levels than younger householders, possibly indicating that persons of this age group are more hesitant to extract their equity for consumption use (Center for Retirement Research at Boston College, 2008). The results from this study support this notion in as much as the median housing cost burden increased 1.4 percentage points from 2004 to 2006 (approximately a 8.6% increase)[24] and in as much as a very small percent of respondents, 17.46%, reported having a home equity loan.

The housing finance profile for these respondents was not supported by the LCH. The LCH suggests that individuals decrease their debt prior to retirement and then finance constant consumption with their accumulated resources. The simple fact that this

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[24] Percent Change in housing cost burden from 2004 to 2006 = ((17.14 – 15.78) / 15.78) x 100 = 8.61%

sample consisted of mortgagees over age 65 is somewhat contradictory to the LCH. In as much as the respondents in this study are primarily not employed, they are not benefitting from employment income and according to the LCH they should be relying on accumulated resources for consumption. One may argue that the choice to obtain mortgage debt is a form of using total accumulated assets; however, the LCH suggests that individuals would time final debt payments with the decision to cease employment, thus not carrying debt in any form with them into retirement. The act of consuming equity through a loan may be a form of using assets, but it is also a debt that requires repayment.

Health of Homeowners with and without a Mortgage

This study also sought to compare the health of homeowners with a mortgage and homeowners without a mortgage. The analysis show that the self-reported health of outright homeowners and mortgagees was statistically significantly different, specifically, that the self-reported health status of mortgagees was worse than the health of homeowners without a mortgage. Although the research regarding the differences in health among homeowners with a mortgage and homeowners without a mortgage is sparse and does not use a measure of self-reported health, it does support the finding of this study. Cairney and Boyle (2004) examined psychological distress among homeowners and renters and found that those who owned their home with no mortgage reported having less psychological distress than mortgagees who in turn reported less distress than renters. The possible explanation being that owning a home mortgage free brings security to the owner; their basic needs of shelter are met (Cairney & Boyle).

Additionally, Nettleton and Burrows (1998, 2000) show that mortgage debt resulted in lower physical and emotional health of homeowners.

According to the LCH, homeowners plan their finances in such a way as to be debt free upon retirement, thus allowing total resources to be used for maintaining a standard of living through the end of life expectancy instead of being used to repay debt. Homeowners entering retirement without mortgage debt may therefore have more total resources than those who enter retirement with mortgage debt. The greater the total resources, the more likely it is for individuals to afford necessary consumption such as healthcare, thus increasing the likelihood of reporting good health.

Relationship between Health and Housing Cost Burden

The second objective of this study was to examine the dual relationship between the ratio of mortgage debt to income and self-reported health. The results of this study indicate there is no statistically significant relationship between self-reported health and housing cost burden even when attempting to control for the dual relationship that exists between the two variables through the use of instrumental variables.

The Relationship between Housing Cost Burden and Health

Model One examined the relationship between housing cost burden in 2006 and the probability of reporting good health in the same year. As stated above no statistically significant relationship was found. This finding is supported by prior empirical research. The following two studies did not specifically examine the relationship between housing debt and health, but the findings complement the findings of this study. Angel, et al. (2003) found no significant relationship between financial strain and poor self-reported health. Similarly, Meer, et al. (2003) found no significant relationship between wealth

and health status after controlling for the dual relationship between wealth and health with an instrumental variable. The finding of this study is however contrary to previous empirical work specifically examining housing debt which found that housing debt had a significant and negative relationship with health status (Cairney & Boyle, 2004; Nettleton & Burrows, 1998, 2000). The findings of this study do indicate that education, assets, and regular physical activity are significantly and positively related to the probability of reporting being in good health. The directions of these relationships were as expected and the findings are supported by prior literature.

Individuals who had a college education had a significantly higher probability of reporting being in good health compared to those who did not complete high school. This finding is supported by prior research. The National Academy on an Aging Society (2000) reports higher education among older working adults as compared to non-working adults is associated with very good and excellent self-reported health. The findings of this study are further complemented by prior literature which states the lower the educational attainment the more likely poor health will be reported (Angel, et al., 2003; McGee, et al., 1999) and psychological distress experienced (Cairney & Boyle, 2004). The finding of this study makes sense because the more education a person receives the more likely they are to obtain good employment with favorable benefits thus helping them maintain their health. Additionally, more educated individuals have the knowledge necessary to seek out information regarding good health and may have better access to good healthcare.

Dollar value of total assets owned in 2004 was found to have a significant and positive relationship with the probability of reporting being in good health in 2006. Smith

(1997) demonstrated that reports of excellent health are associated with higher levels of wealth than reports of poor health. The idea being that wealth contributes to having good health. Additionally, Smith and Kington (1997b) found that level of assets was positively related to health. More wealthy households can afford better healthcare, preventative care, and even a better diet which aids in having good health. The finding of this study is consistent with the LCH which suggests that persons with larger total resources can more easily engage in constant consumption through life expectancy. Therefore, it is reasonable to assume that individuals with greater levels of assets in a given year are more likely to afford constant consumption with regard to their health, such as having regular doctor visits and an adequate diet and therefore increase the probability of reporting being in good health at a later date.

Regularly engaging in physical activity in 2004 was found to increase the probability of reporting being in good health in 2006. Prior research complements this finding. An association has been found between poor self-reported health and older adults who have difficulties with activities of daily living, such as personal care and household management (Adams et al, 2003). Therefore, it makes sense that individuals participating in regular physical activity may be less likely to have difficulties with activities of daily living and more likely to report being in good health.

The findings of this study also indicate that individuals who have homes that have ever or recently (between 2004 and 2006) been modified for accessibility have a lower probability of reporting being in good health in 2006. The direction of this relationship was not as expected and does not follow prior literature. The results of prior literature suggest that modifications to a home for accessibility can allow older adults to feel more

in control of their living conditions. Perceived control of an older adult's actions or behaviors is a key indicator of psychological functioning (Oswald, et al., 2007). Thus it was expected that a modified home would help an individual feel more in control of their living environment and possibly lead to reporting better overall health. However, this concept did not hold true for the respondents in this study. It does make sense that an individual who reports living in a home that has been recently modified for accessibility is likely already in poor health and this initial poor health may be manifesting itself in this relationship.

The Relationship between Good Health and Housing Cost Burden

Model Two examined the relationship between good health in 2006 and housing cost burden in the same year. No statistically significant relationship was found. This finding is contrary to prior empirical work which suggests that self-reported health is significantly associated with financial status. Specifically that poor health leads to financial strain and the depletion of wealth (Center for Retirement Research at Boston College, 2005; Kim & Lyons, 2008; Lyons & Yilmazer, 2005; Meer, et al., 2003; Smith, 1997; Smith & Kington, 1997a). It is acknowledged that these studies refer specifically to poor health status and financial strain or wealth where as this study examined good health status and housing cost burden. The findings of this study do indicate that being of a minority race or ethnicity and marital status are significant positive predictors of housing cost burden. Additionally, being employed and having health insurance through the ChampusVA program or private providers were significant negative predictors of housing cost burden. The direction of these relationships was as expected, except for employment. The findings are supported by prior research.

Respondents who were of minority races or ethnicities (Black non-Hispanic, Hispanic, and Other) had a higher housing cost burden than White non-Hispanics. It was expected that respondents of minority races or ethnicities would have a higher housing cost burden than White non-Hispanics in as much as minorities are more likely to have a history of being disadvantaged with regard to income, employment, and fair treatment in the mortgage market. This expectation and finding complement prior research which shows a significant and positive relationship between racial and ethnic minorities and financial strain (Kim & Lyons, 2008). In terms of the LCH, total accumulated resources are used once employment income ceases in order to maintain a constant level of consumption through life expectancy. In light of the LCH, the finding of this research makes sense. Respondents of minority races or ethnicities may have been more economically disadvantaged throughout their lives with regard to income, employment, and assets, beyond what was captured by the control variables included in the model, thus leading to a lesser accumulation of total resources than White non-Hispanics. This in turn may contribute to minority respondents having a higher housing cost burden than White non-Hispanic respondents.

This study also finds that being separated or divorced and widowed as opposed to being married is significantly and positively related to housing cost burden. This relationship was as expected and is supported by prior research. Keith (1986) found that compared to married individuals, separated or divorced and widowed individuals experience an increase in financial hardship due to the costs of losing a spouse whether to divorce or death. The LCH would suggest that regardless of marital status, an individual would not cease employment until debts were satisfied. However, in reality, this may not

always occur. Generally, married households have more resources at their disposal, such as dual income, thus when a divorce or death occurs, the individual may need to access those resources, even equity, to pay for expenses related to the loss of the spouse. This explains that individuals who are divorced or widowed may lead to experiencing a higher housing cost burden when other variables are kept equal. However, examining the point of divorce or widowhood and housing cost burden before and after such an event is beyond the scope of this paper.

Compared to those who were not employed, those who were employed in 2004 had a lower housing cost burden in 2006. The direction of this relationship was not as expected. It was assumed that employed persons would have a higher housing cost burden two years later than those who were not employed. Prior research has indicated that older adults stay employed or reenter the labor force in order to meet financial obligations (Lee, et al., 2002; Masnick, et al., 2006). The LCH would suggest that older individuals with a mortgage would remain employed until the mortgage was paid off; suggesting that persons who are not employed may have a lower housing cost burden than persons who are employed. However, this pattern of thought is not consistent with the findings of this study. The negative relationship found in this study may be attributable to the possibility that respondents who were not employed may have chosen to exit employment because of poor health. Thus, they are left allocating a higher portion of their retirement income, or other income, to meet monthly mortgage obligations. Also, respondents who were still employed in 2004 were likely to be earning peak or near peak salaries (relative to their careers and time in their careers) and consequently earning more than when they had initially purchased the home. If this is the case, then it would make

sense that they would be allocating a smaller portion of their income to mortgage payments.

Having had health insurance, specifically the receipt of any Champus/VA or private insurance in 2004, was associated with a lower housing cost burden in 2006. This relationship was as expected. Health insurance acts as a protection for total accumulated resources thus allowing total accumulated resources to be used for maintaining constant consumption through life expectancy. Thus individuals can rely on health insurance to cover health related costs more so than their personal savings or equity. Having any private health insurance coverage in 2004 was associated with a decrease in housing cost burden in 2006. This is supported by prior literature which found a negative relationship between having any private health insurance and experiencing financial strain (Angel, et al., 2003; Lyons & Yilmazer, 2005).[25] Older individuals paying the premiums for private insurance are assumed to have higher incomes in as much as private health insurance for those over age 65 is more expensive than Medicare. Therefore it was expected that those reporting having any private health insurance coverage in 2004 may have a lower housing cost burden in 2006 than those who did not report having any private health insurance coverage in 2004. The possibility that the respondents who had private health insurance coverage also had a higher income lends to the notion of spending a lower proportion of income on their mortgage than persons with lower incomes.

Respondents reporting having any Champus or VA health insurance in 2004 had a lower housing cost burden in 2006 than those who did not report having any Champus or

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[25] Angel, et al. (2003) used a two period model with health insurance measured in period one (baseline) and financial strain measured in period two. Lyons & Yilmazer (2005) used a pooled cross section.

VA health insurance. Champus/VA is administered by the Department of Veterans

Affairs and provides benefits for qualifying veterans and their beneficiaries.[26] Veterans

may indeed have a lower housing cost burden because it is likely they also took

advantage of VA loan products which provide many benefits, such as no or low down

payment, low interest rate, or limited closing costs when purchasing their home. Such

benefits may make homeownership more affordable for the veteran, which may in turn

pave the way for a lower housing cost burden. In terms of the LCH, health insurance can

be seen as a moderating factor for overall declines in total resources. Individuals with

sufficient health insurance can rely on the insurance to cover most of their healthcare

costs and will not need to deplete total resources to meet costs associated with declining

health. Therefore the findings of this study with regard to health insurance are

complemented by the LCH.

Contributions to the Literature

There is a substantial body of literature that examined the relationship between

health and wealth or financial strain (Angel, et al., 2003; Caplovitz, 1974; Center for

Retirement Research at Boston College, 2005; Drentea & Lavrakas, 2000; Kim & Lyons,

2008; Lyons & Yilmazer, 2005; Meer, et al., 2003; Mills, et al., 1992; O'Neill, et al.,

2005; O'Neill, et al., 2006; Smith & Kington, 1997a). However, there is only a small

body of literature that examined the relationship between housing debt and health

(Cairney & Boyle, 2004; Nettleton and Burrows, 1998, 2000). This study contributes to

the literature as the first known study to examine the dual relationship between housing

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[26] For more information regarding ChampVA health insurance please visit:

http://www4.va.gov/hac/forbeneficiaries/forbeneficiaries.asp

cost burden and health status, among a nationally representative sample in the United States of adults age 65 and older.

The results of prior literature regarding the relationship between health and wealth or financial strain are unclear as to the direction of the relationship. Some report that financial strain has a negative effect on an individual's health (AARP, 2008a; Caplovitz 1974; Drentea, & Lavrakas, 2000; Jacoby, 2002; Mills, et al., 1992; O'Neill, et al., 2006; O'Neill, et al., 2005; Xiao, et al., 2006) while others report that poor health leads to financial strain and the depletion of wealth (Kim & Lyons, 2008; Lyons & Yilmazer, 2005; Meer, et al., 2003; Smith, 1997; Smith & Kington, 1997a). A few attempted to control for the dual relationship of health and financial strain (Lyons & Yilmazer, 2005) or wealth (Meer, et al., 2003) through the use of two-stage methods or instrumental variables but found no significant evidence to support the notion that financial strain or wealth has an effect on health (Lyons & Yilmazer, 2005; Meer, et al., 2003). This study contributes to the current literature by addressing the duality of the relationship between housing debt and health status through the use of a two-stage probit least squares regression. Similar to prior research, no significant evidence was found that housing cost burden has an effect on health status. Additionally, when taking into account the dual relationship between health and financial strain, significant evidence has been found to support the notion that health status is negatively related to financial strain (Lyons & Yilmazer, 2005). However, this study found no significant relationship to indicate that health has a negative effect on housing cost burden. Results from studies using financial strain measures or wealth measures cannot be equally compared to this study as it only considers housing debt. However, taking into consideration the conflicting results of prior

literature and the results of this study, it appears as though the quest to discover the true relationship between these variables continues.

This study also contributes to the current body of literature surrounding the topic of health status and financial strain or wealth by controlling for health insurance status. Having some forms of health insurance, Champus/VA or private in 2004, as opposed to not having any form of Champus/VA or private, was significantly related to housing cost burden in 2006. Prior studies have not always included a measure of health insurance (Drentea, & Lavrakas, 2000; Mills, et al., 1992; O'Neill, et al., 2005, 2006; Meer, et al., 2003; Smith & Kington, 1997a). However, studies that did include a measure of health insurance found having health insurance to be a significant predictor of financial strain (Angel, et al., 2003; Kim & Lyons, 2008; Lyons & Yilmazer, 2005). These studies controlled for having private health insurance (Angel, et al., 2003, Lyons & Yilmazer, 2005) and Medicare supplemented by private or government policies (Kim & Lyons, 2008). This study contributes to the existing literature by examining the relationship between having any of the following in 2004: Medicare, Medicaid, Champus/VA, or privately sponsored health insurance, compared to not having any Medicare, Medicaid, Champus/VA, or privately sponsored health insurance, on the variation in housing cost burden in 2006. No study known to date examining the relationship between health and wealth controlled for health insurance in this way.

Limitations and Strengths

This study assessed the relationship between housing cost burden and health status of individuals age 65 and older. There are many challenges in examining such a

dual relationship, some of which act as limitations to this study. Seven limitations are discussed.

First, the instruments used in this study, level of lump sum received over the past two years (as recorded in the 2004 interview) and whether or not a respondent had engaged in regular physical activity could be argued as not meeting the condition of instrument exogeneity. One could argue that level of lump sum received over the past two years (as recorded in the 2004 interview) is correlated with unmeasured determinants of health in 2006 and that participating in regular physical activity in 2004 is correlated with unmeasured determinants of housing cost burden in 2006

Second, left censoring is an issue. Left censoring is when a respondent has already had exposure to a given event prior to being observed (Population Studies Center, 1997). This study examined health over two time periods, 2004 and 2006; however, this presents an inadequate evaluation of the individuals' health over time. A more comprehensive history of respondent health would provide further insight into present health status. For example, it is possible that respondents who reported being in good health in 2004 may have been in poor health for a number of years prior to 2004, but due to some event, health related or otherwise, reported being in relatively good health at the 2004 interview. Therefore, a relative and subjective condition of the individuals' health was presented. Similarly, housing cost burden is a measure that is influenced over time and can change through the financial circumstances and decisions of respondents such as using equity to consolidate consumer debt, regularly borrowing from accumulated equity for consumption, or experiencing fluctuations in income. For example, respondents with a high housing cost burden may have historically had a low housing cost burden, but due

to financial decisions made prior to the waves used in this study experienced a temporary increase in housing cost burden. This study does not capture such a history and therefore may present an inadequate evaluation of the individuals' level of housing cost burden. Comprehensive use of panel data can assist with the problem of left censoring by incorporating a history of the individuals' health or housing cost burden. Therefore, one could justify using more waves of data; however, left censoring would still be an issue unless respondents entered the study at birth or just prior to obtaining their first mortgage.

Third, financial variables may have been inaccurately reported by individuals. There is evidence from prior research that individuals may not report accurate estimates of their home value and wealth. Prior literature presents conflicting views as to whether homeowners over estimate the value of their homes (Goodman & Ittner 1992; Kiel & Zabel, 1999; Venti & Wise, 2002). Additionally, wealthy individuals have been found to underestimate their wealth (Davies & Shorrocks, 2000). Thus, there is a cause for concern that the self-reported financial variables used in this study may be inaccurate.

Fourth, the only measures of financial strain this study considered were housing cost burden and the level of outstanding consumer debt. Other financial factors, such as the adequacy of retirement savings, were not considered. Perhaps those entering retirement with mortgage debt had plans to use retirement savings to make payments or were intending to sell their home and downsize in the future, thus eliminating the burden of a house payment as they age. Although the study controlled for the value of total household assets, which could have been later used for repayment of mortgage debt or to cover healthcare costs, this study did not fully examine the adequacy of retirement savings of the respondents.

Fifth, the data suffer from attrition. The most common reason for attrition in the Health and Retirement Study is death of the respondents. Some respondents, however, chose not to continue participating in the Health and Retirement Study either by request or for other reasons unspecified. Sixth, some variables could not be included regardless of how important they were to the theory of the relationship between health and housing cost burden. For example, where a person lives may dictate the type of healthcare they have access to and the price of their home, which in turn contributes to housing cost burden. However, the Health and Retirement Study does not provide sufficient information to determine if a respondent resides in a rural or urban location, for instance. Also, familial health may contribute to a respondent's health status; however, the variables contained in the Health and Retirement Study that could be used to measure familial health did not contain enough variation to be used in this sample. Seventh, this study only applies to adults over the age of 65. There could very well be different results in a younger sample or a sample of homeowners at any age who are experiencing difficulty making their house payments.

Strengths to the Research

Despite the limitations, there are some valued strengths to this research. First, the research question is incredibly timely, considering the fact that the number of older adults in the United States is increasing at an increasing rate and levels of mortgage debt among this group are also on the rise (Bucks, et al., 2006; Masnick, et al., 2006). Second, this study uses a national data set, the Health and Retirement Study (HRS), which allows the results to be generalized to all older mortgagees in the United States. Third, this study contributes to the current literature in that it provides information not formerly known

about mortgagees age 65 and older such as their demographic profile, housing finance profile, and revealed that outright homeowners had in 2006 statistically significantly better health than mortgagees. Fourth, theory was used throughout the paper to motivate not only the variable choice and hypotheses but also to help explain results and provide discussion, something that is not commonly seen in other empirical works that use the LCH, as many authors do not go beyond using theory to drive the variable choice and hypotheses. Lastly, this study used the most appropriate data set known to date that includes both detailed information on health and housing debt variables for individuals age 65 and older.

Implications and Conclusions

There are some important implications that come as a result of this study, even though a significant relationship was not established between housing cost burden and health status. The sample consisted of 1,197 mortgagees and 6,728 homeowners with and without a mortgage age 65 and older. When weighted the former totals some 3.8 million mortgagees and the latter some 22.5 million homeowners with and without a mortgage in the United States. The fact that so many older adults are carrying mortgage debt with them into their golden years is concerning and certainly not trivial. Consumption decisions are often made based on consumer tastes and preferences. Some consumers have a taste and preference for financing consumption today and paying for it tomorrow. The LCH supports this notion for younger households, but not necessarily older households in as much as it suggests that debt levels be reduced and savings increased as one ages in preparation to meet consumption needs after employment income has ceased. Overall, the median level of mortgage debt among this sample was $69,370 at the time of

interview in 2004 while median income, as reported at the time of interview in 2004 for the prior year, was only $49,374, thus implying that older homeowners owed more on their home than they received in income for prior year. This is surprising as one may expect, because based on the LCH, owed levels of debt would be much lower at this age in preparation for leaving paid employment. The majority of respondents, 64%, reported having no consumer debt, yet they had mortgage debt. What has led older consumers to retain mortgage debt? The idea exists that older individuals may be adverse to credit use based on growing up during the great depression or being raised by parents who survived the great depression. However, the purchase of a home is usually financially large enough that it cannot be paid for in cash, and a mortgage loan is required.[27] Yet it is unknown why some older individuals have such high levels of mortgage debt. Older adults are often the target of financial fraud schemes which may rob the individual of life savings. Thus older mortgagees could have been victims of less than desirable mortgage terms which have left them making payments longer than anticipated. However, it is more realistic to suggest that this group of mortgagees simply found themselves in a life situation that required borrowing from their equity to get by and, consequently, leaving them paying on a mortgage for longer than anticipated. Regardless, adults of all ages need to be well informed of the consequences of carrying such large amounts of debt into old age.

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[27] This could be true among individuals age 65 and older if they have experienced losses in equity due to declining values or through borrowing home equity. In such cases the individual may not have enough equity to fully purchase a new house, should they choose to sell, without obtaining a mortgage.

Professionals who work with the aging population such as financial planners and counselors, educators, and advocates for older adults can benefit from the findings of this research. Such professionals need to be aware that there is a group of older adults still carrying mortgage debt. If, as this research suggests, there is really no health consequence of having mortgage debt for persons over age 65, it surely will have consequences with regard to their financial well being. For example, accumulation and withdrawal rates on retirement accounts need to be examined carefully so that the older mortgagee has enough to finance both consumption needs and mortgage debt for a period of time. If plans for wealth accumulation do not include the possibility of continuing mortgage payments, individuals may find themselves severely underfunded at retirement. In as much as carrying mortgage debt into retirement appears to be the trend (Bucks, et al., 2006; Masnick, et al., 2006), younger generations also need to be made aware that they could slip into this trend as well. It could very well be that future generations will no longer fit the adage of house rich, cash poor, but may rather be house poor *and* cash poor. Considering the relaxed credit markets of the early 2000s and the evidence that near retirees took part in equity borrowing during that time (Center for Retirement Research at Boston College, 2008), there is concern that as the baby boomers enter retirement this issue of retired mortgagees could indeed escalate.

The results of this study suggest that an older adult's self-reported health status may be driven by educational attainment, level of assets, and physical activity. Although determinants of health status go beyond these three items to include factors such as family background, genetics, and the natural process of aging, these results do give us some indication that socioeconomic status (being measured here by education and assets)

correlates with health status. Therefore, further attention should be given to health initiatives for individuals with lower socioeconomic status. It is natural for one to believe that having any form of health insurance, such as Medicare, Medicaid, Champus/VA, or private as opposed to not having any of those forms of health insurance, would have a positive effect on health status; however, the results of this study show no significant relationship between having any Medicare, Medicaid, Champus/VA or private health insurance and one's self-reported health status. While reforming healthcare policy is important, it may prove beneficial to place an increased focus on educational initiatives for maintaining and improving health and focus on programs that give additional support to the socioeconomically disadvantaged.

The LCH is helpful in explaining how a rational consumer should act with regard to accumulating debt to become established in the early years and paying off that debt and accumulating savings to provide for constant consumption through life expectancy. However, the LCH does not offer adequate understanding for the consumers who choose to acquire mortgage debt that follows them into their late 60s, 70s, and older. Homeownership is indeed a means of building wealth and contributing to total accumulated resources. However, accessing equity through a mortgage that requires repayment during a time of life where income is or will soon be reduced as a consequence of leaving paid employment seems counterintuitive to the LCH. Perhaps there needs to be a larger focus on accumulating assets that can be more easily accessed upon retirement and that do not required repayment.

Suggestions for Future Research

Although the findings of this study showed no significant relationship between housing cost burden and health status, the rising level of housing debt among older individuals (Bucks, et al., 2006; Masnick, et al., 2006) and the potential such debt has on the physical, mental, and psychological health of the homeowner (Cairney & Boyle, 2004; Nettleton & Burrows, 1998, 2000) deserves further attention. Suggestions for future research are as follows.

First, this study focused on the relationship between self-reported health and housing cost burden, yet, housing cost burden may have a stronger influence on psychological or emotional health as shown by prior empirical work (Cairney & Boyle, 2004; Nettleton & Burrows, 1998, 2000). It would be worthwhile to investigate the specific relationship between housing cost burden and psychological and/or emotional health. Second, this study found that the self-reported health condition of older homeowners who have no mortgage is statistically significantly different from homeowners who have mortgages on their homes. Therefore, a similar study should be conducted to examine the relationship between housing tenure and health. Housing tenure could include not only outright owners and mortgagees but also renters, as differences in health may exist that are related to feeling secure in one's own shelter arrangement. A similar study was conducted by Cairney and Boyle (2004) using data on Canadians, and significant differences were found.

Third, there is evidence that homeowners in mortgage default or foreclosure experience a decline in health, particularly emotional and psychological health (Nettleton & Burrows, 1998, 2000; Joint Center for Housing Studies, 2003). This study examined

older adults with mortgage debt who typically have experienced or soon will experience a decrease in total income as a result of stopping or decreasing employment income. Decreases in total income naturally increase housing cost burden as housing cost burden is a function of house payment and income. The sample in this study is not fully comparable to a sample of homeowners who are actually facing default or foreclosure; therefore, if this study were taken a step further to examine adults who were actually behind on their mortgage payments or even in the process of foreclosure, different results may be produced.

Fourth, it would be useful to carefully examine what older adult mortgagees are consuming when they borrow from their equity. Prior research on home equity use among individuals of any age shows that borrowing from equity to meet medical service needs is nominal (Canner, et al., 1998, 2002; as cited in Joint Center for Housing Studies[28]; U.S. Census Bureau, 2007). Perhaps the level of equity borrowed is simply an indication of meeting housing needs such as size, location, or amenities. It could also be an indication that necessary consumption is not being met through income and savings. Fifth, it has been established that mortgage debt is increasing among older adults in the United States; however, no known research has been conducted regarding how close the mortgagees are to paying off their home loans. Some may be a few short months away, others may be years away. If interest rate information were available this issue could be addressed. Such information would be useful in determining how large retirement funds should be if mortgage debt repayment is going to continue as an expense for a prolonged period of time.

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[28] This work cited an unpublished bankruptcy report. The report could not be located.

Sixth, since the downturn in the housing and financial markets that began in late 2006 early 2007, following this study's observation periods of 2004 and 2006, many older adults have lost equity as their homes have decreased in value. Many have also experienced declines in their retirement savings. It would be valuable to re-conduct a similar study when the 2008 wave of data becomes available and compare the health of older homeowners before and after the housing and financial market decline. Large declines in home values may have forced many older homeowners to reevaluate their plans for using their home equity and created additional health stressors as the financial security they had intended on (both equity and retirement accounts) has likely changed for the worse and will not likely recover very quickly given their short time horizon.

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APPENDIX A

First Stage Regression Coefficients for Model One n=1,197

Independent Variable	Housing Cost Burden in Time One			
	Coef.	S. E.	t	P > | t |
Race/Ethnicity (White non-Hispanic)				
Black non-Hispanic	0.0677	0.0123	5.52	0.000
Hispanic	0.1075	0.0161	6.67	0.000
Other	0.0780	0.0237	3.30	0.001
Marital status at baseline[a] (married)				
Separated or divorced	0.0377	0.0146	2.58	0.010
Widowed	0.0572	0.0123	4.64	0.000
Employment status at baseline (not employed)				
Employed	-0.0754	0.0097	-7.75	0.000
Education at baseline (less than high school)				
High school graduate	0.0006	0.0123	0.05	0.962
College education	-0.1742	0.0119	-1.47	0.142
Gender (male)				
Female	0.0133	0.0087	1.51	0.131
Age at baseline	-0.0012	0.0008	-1.40	0.160
Log assets at baseline	-0.0009	0.0017	-0.58	0.559
Log level of consumer debt at baseline	0.0002	0.0006	0.31	0.759
Home modifications for accessibility at baseline (not modified)	0.0067	0.0128	0.52	0.604

Independent Variable	Housing Cost Burden in Time One			
	Coef.	S. E.	t	P > |t|
Any Medicare at baseline (no Medicare)	-0.0043	0.0201	-0.21	0.831
Any Medicaid at baseline (no Medicaid)	0.0109	0.0216	0.51	0.613
Any Champus/VA at baseline (no Champus/VA)	-0.0428	0.0139	-3.08	0.002
Any private at baseline (no private)	-0.0289	0.0086	-3.34	0.001
Log other income at baseline	-0.0018	0.0010	-1.75	0.081
Regular physical activity at baseline (hardly ever or never)	-0.0069	0.0111	-0.63	0.531
Constant	0.3203	0.0675	4.75	0.000
Test of Model Fit $F(19, 1177) = 14.51$				
Prob. $> F = 0.0000$				
Adj. $R^2 = 0.1766$				

Note: Reference groups are in parenthesis.

[a] Baseline refers to time zero or 2004.

APPENDIX B

First Stage Regression Coefficients for Model Two n=1,197

Independent Variable	Self-Reported Health Status in Time One			
	Coef.	S.E.	z	P > | z |
Race/Ethnicity (White non-Hispanic)				
Black non-Hispanic	-0.1251	0.1166	-1.07	0.283
Hispanic	-0.2377	0.1504	-1.58	0.114
Other	0.3823	0.2654	1.44	0.150
Marital status at baseline[a] (married) at baseline				
Separated or divorced	-0.2377	0.1421	-1.67	0.094
Widowed	-0.0995	0.1219	-0.82	0.415
Employment status (not employed) at baseline				
Employed	0.5270	0.1052	5.01	0.000
Education (less than high school) at baseline				
High school graduate	0.2294	0.1155	1.98	0.047
College education	0.5187	0.1137	4.56	0.000
Gender (male)				
Female	0.2096	0.0891	2.35	0.019
Age at baseline	-0.0097	0.0081	-1.21	0.227
Log assets at baseline	0.0431	0.0161	2.68	0.007
Log level of consumer debt at baseline	-0.0026	0.0067	-0.39	0.694
Home modifications for accessibility (not modified) at baseline	-0.3126	0.1225	-2.55	0.011

Independent Variable	Self-Reported Health Status in Time One			
	Coef.	S.E.	z	P > | z |
Any Medicare at baseline (no Medicare)	-0.3245	0.2329	-1.39	0.164
Any Medicaid at baseline (no Medicaid)	-0.2587	0.1951	-1.33	0.185
Any Champus/VA at baseline (no Champus/VA)	0.1881	0.1427	1.32	0.188
Any private at baseline (no private)	-0.0034	0.0874	-0.04	0.969
Log other income at baseline	-0.0064	0.0106	-0.61	0.545
Regular physical activity at baseline (hardly ever or never)	0.4895	0.1037	4.72	0.000
Constant	0.2995	0.6624	0.45	0.651

Test of Model Fit   LR chi-square (19) =157.57

Prob. > Chi-square = 0.0000

Pseudo R^2 = 0.1144

Note: Reference groups are in parenthesis.

[a] Baseline refers to time zero or 2004.