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The Effects of Mortgage Debt on Assets and Total Resources Among Near-Retirement Households

Lance Palmer
Utah State University

THE EFFECTS OF MORTGAGE DEBT ON ASSETS AND TOTAL RESOURCES AMONG NEAR-RETIREMENT HOUSEHOLDS

by

Lance Palmer

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ABSTRACT

The Effects of Mortgage Debt on Assets and Total Resources Among Near-Retirement Households

by

Lance Palmer, Doctor of Philosophy

Utah State University, 2004

Major Professor: Dr. Jean M. Lown
Department: Family, Consumer, and Human Development

The purpose of this study was to investigate the long-term relation between household leverage through the use of mortgages, and changes in household wealth using the theoretical framework of the life cycle income hypothesis. The results of this study are relevant to current positions regarding household leverage via mortgages. This study used the 1992 through 2002 waves of the Health and Retirement Study. The characteristics of leveraged and unleveraged households were compared in 1992 and 2002 as were changes during that period. The relation between household leverage and changes in assets and total resources over the period was modeled using robust regression analysis.

Based on the results of independent *t* tests and chi-square tests, there were statistically significant differences between leveraged and unleveraged households.

The general difference between the two groups was that greater proportions of leveraged households were working in 1992 and 2002 than unleveraged households. This observation was supported by differences in household income, work status trends, age of household head, total resources, and changes in total resources. Unleveraged households had statistically significantly higher assets than leveraged households; however, there was no statistically significant difference in the change in assets between the two groups.

Retained or incurred mortgage debt during the study period, relative to not having mortgage debt, had a consistent negative effect on changes in assets and total resources. The initial leverage ratio and square of the initial leverage ratio were not statistically significant in either of the estimated regression models. The effect of eliminating mortgage debt, relative to not having mortgage debt, on changes in assets and total resources was not statistically different from zero.

From the standpoint of maximizing resources, maintaining mortgage debt did not appear to be the best alternative for most households. However, for high-income and more risk-tolerant households, mortgage debt was beneficial and enhanced increases in assets and total resources. While the use of mortgage debt for investment capital had the potential to increase total resources, households may have derived greater satisfaction from using the mortgage proceeds for consumption, given their preferences and expectations. Implications for consumers, financial professionals, educators, and tax policymakers were drawn from the results of the study.

(168 pages)

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CHAPTER 1

INTRODUCTION

Background of the Study

Consumers looking for financial advice regarding mortgage debt and household leverage find contradicting opinions in both the popular and professional press. Many in the financial community argue that mortgage debt, with its low cost and favorable tax treatment, provides excellent capital for investing. Others counter, arguing that debt is debt and the interest rate charged on mortgage debt is a high hurdle for the average risk-averse investor to overcome (Goff & Cox, 1998; Orman, n.d.; Storms, 2000; Tomlinson, 2002).

The lack of a consensus among financial writers and planners has left consumers without a clear understanding of whether mortgage debt, aside from the purchase of a home, can be beneficial in a household's financial portfolio. This question has been approached from a theoretical perspective using Monte Carlo simulations and other bootstrap statistical models (Palmer, 2002; Tomlinson, 2002), and also from a practitioner's perspective with the use of case studies and hypothetical scenarios (Goff & Cox, 1998; Storms, 1996, 2000). Both methods inadequately address the long-term consequences of household leverage through mortgage use, since neither method addresses actual household behavior, nor provides a means for a retrospective analysis of the decision.

An actual examination of leveraged and unleveraged households is necessary to understand their behavior and whether either circumstance yields positive

economic benefits to the household. There is an absence of empirical studies examining which types of households choose to maintain mortgage debt and which choose to pay it off and whether there are long-term implications associated with the decision. These contradictions and missing aspects of the current literature regarding household leverage via mortgage debt highlight the importance of empirical analysis of the household leverage decision.

This study examines the characteristics of leveraged and unleveraged households and estimates the long-term financial consequences of maintaining or eliminating mortgage debt. Based on the findings of this research, general recommendations to consumers may be made based on the experiences of consumers in general, rather than derived from specific or hypothetical scenarios or case studies in which the variability of the situation and outcome are controlled. The findings of this study may also have implications regarding the appropriateness of the current tax code which provides households with an incentive to hold mortgages over other forms of debt, and makes limited distinction between mortgages used to purchase or improve a home and mortgages used to leverage a financial portfolio or increase current consumption.

Trends in Mortgage Debt

For many Americans, home ownership is considered a fundamental part of the American Dream. The Census Bureau reported that 66.2% of U.S. households, or approximately 69.8 million households, owned their home in 2000 (United States

Census Bureau, n.d.). Home ownership rates have generally been climbing over the past two decades, and the current home ownership rate follows that same trend.

Efficient credit markets are advantageous to consumers, allowing them to shift resources between periods by borrowing in order to smooth their consumption over time. Modern mortgage finance in the United States, which allows individuals to borrow large amounts of money and repay it over several decades, is a result of utilizing the efficiency of secondary financial markets through the sale of mortgage-backed securities. For the average household, these market efficiencies make home ownership possible. At the close of 2001, total mortgage debt in the United States was approximately $5.4 trillion and total consumer debt was $1.7 trillion. To give some perspective to these amounts, total corporate debt in the United States at the end of 2001 was $4.8 trillion (Board of Governors of the Federal Reserve System, 2003).

As the number of home owners has increased, aggregate mortgage debt, or money borrowed against the value of an individual's residence, has also increased. Not only has aggregate mortgage debt increased, but the proportion of households with mortgage debt has also increased. In 1992, only 39.1% of households had any mortgage debt. By 2001 this number had risen to 44.6%, an increase of 14.1%. Mortgage debt during the same period, measured in 2001 dollars, increased from $3.57 trillion in 1992 to $5.39 trillion in 2001, or 50.9% (Board of Governors of the Federal Reserve System, 2003). Home ownership over the same time period increased only 6.0%, which is less than half the rate of growth in households with mortgage debt, suggesting that a greater proportion of households were borrowing via

mortgage debt (Aizcorbe, Kennickell, & Moore, 2003). Velde (2002) noted that the increase in household debt has been accompanied by an increase in household assets, suggesting that households may be purchasing assets with a portion of their borrowings, or household assets are rising independent of household debt as a result of the strong economy during the 1990s.

Borrower Incentives

During the late 1990s and early years of the 2000s, mortgage interest rates were at or near historical lows. These low interest rates provided consumers with ample incentives to refinance existing mortgage loans or take on new mortgages. Home owners not only benefitted from low interest rates during the 1990s, they also benefitted from significant appreciation of home values which resulted in large increases in home equity. The combination of low interest rates and rapid appreciation of home values led many home owners to cash out some of their equity through refinancing, additional mortgages, or home equity lines of credit. By refinancing, home owners could potentially cash-out some of their accumulated equity and simultaneously lower their monthly payment (Coy & Keenan, 2003).

As Velde (2002) suggested, some of the money obtained through refinancing and lower monthly payments was likely used to purchase assets. Another asset likely invested in, but not accounted for directly, is human capital resulting from education, relocation, and additional job training. In addition to accumulating assets, much of the cashed-out equity was consumed. Economic observers noted that the recent economic

downturn was mitigated by strong consumer spending, as a result of liquidating home equity. In 2002, approximately $200 billion was generated from cash-out refinancing, $350 billion (net of mortgage repayment) from equity conversion through home sales, and $130 billion from home equity lines of credit (Greenspan, 2003). Greenspan reported that approximately half of the $200 billion obtained from cash-out refinancing was invested in the borrower's residence or other investments.

In addition to the incentive of low interest rates, the tax system in the United States allows households that itemize their deductions to include mortgage interest in their income tax deduction calculation. Mortgage interest is deductible when the household has itemized deductions in excess of the standard deduction. According to the United States Department of the Treasury (1996), 30% of households itemized their deductions in 1996 and potentially received a tax benefit from mortgage interest deductions. For those who itemize, this deduction reduces the after-tax cost of mortgage debt by the amount of excess deduction resulting from the mortgage interest multiplied by the borrower's marginal tax rate. This has the potential of creating an artificially low cost of debt for some households. This favorable tax treatment of mortgage interest encourages households to hold more mortgage debt than they otherwise would. Consequently, many households have reallocated their debt portfolios to increase their mortgage debt and reduce other forms of debt (Dunsky & Follain, 2000; Stango, 1999). However, the trading of unsecured for secured debt may make households more vulnerable to changes in income and consequently the risk of foreclosure and possibly bankruptcy (Sullivan, Warren, & Westbrook, 2000).

Nonetheless, some financial planners argue that households should strongly consider carrying a mortgage and invest any additional money–that would otherwise be paid towards early retirement of the loan–in investments that yield a higher after-tax rate of return than the interest rate paid on the mortgage after taxes (Edelman, 2001; Johnston, 2000; Storms, 2000). This would enhance the financial wealth of individuals and in turn may increase their overall life time consumption. This strategy is not without risk, since investment returns are uncertain while mortgage payments are certain. Furthermore, mortgages are generally secured by the individual's primary residence, making the choice to carry a mortgage for investment purposes a potentially emotional decision.

Recommendations by Financial Professionals

Financial planners appear to be divided regarding the use of mortgages to leverage households. Many feel that households should not carry mortgages into retirement while others persuasively argue that even households in retirement would be well-served by utilizing mortgages to tap into their home equity and obtain low-cost investment capital to diversify their assets (Edelman, 2001; Johnston, 2000; Storms, 1996, 2000; Tomlinson, 2002). Financial authors readily acknowledge that the household's decision to carry mortgage debt is also affected by the household's attitude towards risk and debt.

Household debt and access to credit create a choice for consumers regarding how resources are saved for future periods such as retirement. For households that

currently carry a mortgage, unleveraging themselves, or paying off mortgage debt ahead of scheduled payments, is an effective method of saving for consumption in future periods. The rate of return earned on the money used to prepay the debt equals the interest rate charged on the borrowed funds. Many households choose to become, or remain, unleveraged, or debt-free. According to the 2001 Survey of Consumer Finances (The Federal Reserve Board, 2003), 21% of households with fixed rate mortgages are ahead of their mortgage amortization schedule (author's calculations).

On the other hand, households may choose to carry mortgage debt, or leverage themselves, so that they can have greater investment capital or a more diversified portfolio. These households choose not to prepay mortgages, but rather make minimum payments on the loan or increase their current mortgage, to take advantage of low-cost investment capital and to potentially increase their portfolio's diversification. These households use tax-advantaged mortgage debt to leverage and diversify their assets in the hopes of realizing greater financial returns.

When evaluating the choice to leverage or unleverage an individual's assets with a mortgage, a common and popular comparison used is the historical return on equity investments versus the investor's current interest rate on their mortgage. While this is a convenient comparison, most investors experience rates of return below historical market rates of return, nullifying the appropriateness of this comparison (Dalbar, Inc., 2001).

According to a recent study by Dalbar, Inc. (as cited in Clements, 2004), the average annual return on equity mutual funds for the 19 years ending December 2002

was 11.8%. However, over that same period the average annual return realized by equity mutual fund investors was only 2.6%. The reason cited for this large disparity was mutual fund owners' relatively short holding period of the mutual funds, approximately 2.6 years. Dalbar, Inc. (2001) suggested that mutual fund investors appeared to be switching between funds frequently, rather than employing a long-term buy-and-hold strategy. However, Dalbar's findings may be subject to debate. Clements pointed out a bias in Dalbar's methodology which, when corrected, increased annual investor returns to 8.2% and reduced the gap between actual investor returns and the markets performance to 3.4 percentage points. Under the revised methodology, individual investors appeared to perform better, yet still lagged behind the overall market.

Comparisons using the historical rate of return in the equity market to current mortgage rates are also inappropriate because the average investor does not allocate 100% of their portfolio to stocks. Waggle and Johnson (2003) examined optimal portfolio allocations using a mean variance analysis and expected utility model and found that the optimal portfolio allocation for moderately risk-averse households with significant mortgage debt does not include a substantial allocation to stocks. For households with a high loan to value ratio and relatively modest financial asset holdings, optimal portfolios included as little as 12% equity allocation.

Historical rates of return on equities, such as those published by Ibbotson Associates (2002), are calculated using broad market indices based on a buy-and-hold strategy. Given the major difference between mutual fund investors' behavior and the

method for calculating historical rates of return, it does not seem appropriate for individual investors to use historical rates of return on equities to compare mortgage prepayment versus investing—unless the investor has consistently used a buy-and-hold strategy and invested the majority of his or her assets in a market representative portfolio of equities.

Significance of the Study

Consumers looking for financial advice regarding mortgage debt and household leverage find contradicting opinions on how and when it should be used. Financial writers' and planners' clashing opinions have left consumers with no clear consensus on the appropriate course of action. Financial writers and planners have explored this topic with a variety of analyses and perspectives, including bootstrap modeling, case studies, and hypothetical scenarios (Goff & Cox, 1998; Palmer, 2002; Storms, 1996, 2000; Tomlinson, 2002). However, these approaches fail to address the long-term consequences of using mortgages on primary residences for leverage because they ignore actual household behavior. These methods also fail to provide a means for retrospective analysis of the decision.

Empirical studies are necessary to examine how households behave with regard to household leverage, and which alternatives provide the household with the greatest economic well-being. There is an absence of empirical studies examining which types of households leverage themselves and how effective these households are in achieving greater financial returns. Furthermore, general recommendations to

consumers may best be made based on the experiences of consumers in general, and not derived from specific hypothetical scenarios and case studies, which limit the variability of the individual's environment. These shortcomings in the current literature regarding household leverage through mortgage debt underscore the need for empirical analysis of the household leverage decision.

Statement of Purpose

The purpose of this study is to investigate the long-term relation between household leverage, through the use of mortgages, and changes in household wealth. The results of this study will support or refute current positions regarding household leverage via mortgages. The findings will also have implications for the current tax code which provides households an incentive to hold mortgages over other forms of debt and makes limited distinction between mortgages used to purchase or improve a home, to leverage a financial portfolio, or increase current consumption.

The specific objectives of this study are:

1. To compare and contrast the characteristics (i.e., debt, assets, income, portfolio allocation, and demographics) of leveraged households (households with mortgage debt) and unleveraged households (households without mortgage debt) in 1992 and 2002,
2. To identify factors contributing to the change in the household's assets and total resources during the period from 1992 to 2002, and

3. To discuss the general implications of mortgage debt for consumers, financial professionals, educators, and tax policymakers.

A review of literature was conducted and appropriate theories and findings are identified and discussed in Chapter 2. Chapter 3 develops a theoretical and conceptual model for the analysis and also identifies the empirical model used for data analysis. The data for this study was the 1992 through 2002 data sets of the Health and Retirement Study. Chapter 4 discusses the results of the empirical analysis and Chapter 5 discusses the results and implications that can be drawn from them.

CHAPTER 2

REVIEW OF LITERATURE

Theoretical Research

The review of literature is divided into two main sections. The first section includes theoretical research addressing why people save and accumulate resources and the concept of financial leverage. The second section discusses empirical research findings regarding the accumulation of and changes in wealth, household borrowing behavior, and household response to tax incentives. The theoretical and empirical findings will lead into hypotheses regarding whether households effectively use tax-advantaged mortgage debt in order to achieve greater resources available for consumption.

Life Cycle Income Hypothesis

How and why households save has long been a central point of interest among economists because individual savings yield aggregate savings which forms the supply of capital, and hence contributes vitally to an economy's productivity (Modigliani, 1986). Current theories on savings behavior begin with Keynes (1965) who originally hypothesized:

> The fundamental psychological law... is that men are disposed, as a rule and on average, to increase their consumption as their income increases, but not as much as the increase in their income (p. 96).

According to Modigliani (1986), the prevailing motive to save a portion of income under Keynes' theory was to enable the individual to bequeath an estate to his or her heirs. Keynes' theory, formalized as the Consumption Function, does well in explaining the differences between the savings rate of similar families with different incomes. However, as Bryant (1990) pointed out, it fails to explain the consistency of the national savings rate during periods of substantial real income growth.

As a result of the Consumption Function's shortcomings, new theories were introduced. In 1949, Duesenberry introduced what came to be known as the Relative Income Hypothesis. Duesenberry hypothesized that consumption is determined largely by the behavior of one's social class and that as real incomes increase, individual social class also increases, resulting in greater expenditures to match one's peers in the newly-attained social circle. Later, Friedman (1957) introduced the Permanent Income Hypothesis, while at the same time, Modigliani and Brumberg (1954) introduced the foundation of the life cycle income hypothesis. The Permanent Income Hypothesis and the life cycle income hypothesis are very similar regarding savings and consumption. The key difference between the two is that Friedman based his model on income in perpetuity, or an indefinite life span, with the corpus going to the individual's heirs, while Modigliani and Brumberg's life cycle income hypothesis is based upon the assumption that consumption and saving behavior are based on the resources available during the life span and therefore the income available for consumption flowing from those resources is finite and exhausted over the life span (Modigliani, 1986).

According to the life cycle income hypothesis (Ando & Modigliani, 1963) individuals seek to smooth their consumption over their life by borrowing and saving at different stages of the life cycle, thus affecting the household's current portfolio of assets, debts, and net worth. The fundamental idea of the life cycle income hypothesis is that individuals base their consumption on total life resources and not on current income. Total resources include current net worth, current income, and the present value of future earned income. From these resources, a permanent income flow is estimated and the individual's consumption, a proxy for utility or satisfaction, is based on this permanent flow of income. As mentioned above, Friedman's (1957) Permanent Income Hypothesis treated permanent income as the income that could be generated indefinitely from the stock of resources, whereas Modigliani and Brumberg's (1954) life cycle income hypothesis treated permanent income more along the lines of an annuitized income stream that could be generated from the stock of total life resources for a finite life span.

Hanna, Fan, and Chang (1995), used the life cycle income hypothesis to hypothetically model household consumption and net worth over the adult years. Under circumstances of rising real income, their model predicted that rational consumers would borrow to increase consumption in early years, repay the borrowed funds, and then accumulate wealth. Hanna et al. made the simplifying assumption that individuals can borrow and save at the same interest rate. Modigliani (1986) also points to the "hump shape" of wealth accumulation based on the life cycle income hypothesis, namely that households borrow, save, and spend down wealth during

retirement. One result of this hump shape of wealth is that individuals will have debt at a time when they begin saving. If the interest rate on debt and savings is the same, as is the case in Hanna and colleagues' (1995) model, then it makes no difference whether the individual saves through debt repayment or through separate savings. Modigliani does not focus on the cost of debt in his discussion, only the real interest rate on savings, hypothesizing that it may have no effect on the savings of individuals, or will encourage them to postpone some consumption now for greater consumption in the future resulting from the positive savings rate.

In reality, individuals face a multitude of interest rates when borrowing and saving and often find that, as a result, there is a difference in the rate at which funds can be borrowed, and saved or invested. The differences in interest rates may lead individuals to simultaneous borrowing and saving, by maintaining relatively low-cost debt and saving transitory income (the difference between current income and permanent income) in higher yielding accounts.

Financial Leverage

The idea of creating wealth through borrowing at low interest rates and investing at higher rates of return has been extensively explored in corporate finance literature. Financial leverage, or the amount of debt financing relative to assets, has been thought to boost the profitability and the residual worth of corporations. Generally speaking, investors demand a higher rate of return on stocks than they do on corporate bonds because stockholders are the last ones to get paid in good and bad

times. Bondholders always come first. Because bondholders require a lower rate of return, in the past there was a consensus among financial researchers and professionals that some debt, due to its lower cost, made good business sense (Myers, 2001). However, about the same time that Modigliani was formulating the life cycle income hypothesis, he and Merton Miller published *The Cost of Capital, Corporate Finance, and the Theory of Investment* (1958) which changed the way economists thought about debt-enhancing corporate wealth.

Modigliani and Miller (1958) showed that the value of a corporation is independent of how the corporation is financed. Based on the assumption of perfect capital markets, they showed that the corporation's total value is based on its assets' underlying value, which equals the sum value of all of its outstanding securities. The proportion of debt to equity financing is irrelevant to the business' value. Modigliani and Miller showed that if a corporation were to issue debt, then the market would discount the corporation's stock because bond holders' payments (interest and principal) would take precedence over payments to stock holders. Modigliani and Miller showed that the discount placed on the stock, e.g., the higher rate of return demanded by the stockholders, was equal to the savings resulting from the lower-cost debt. This net effect resulted in no change in the total value of the corporation.

In spite of Modigliani and Miller's (1958) findings, the debate over optimal amounts of debt and equity in corporate finance continues mainly because imperfections exist in the capital markets. The original theory assumed imperfections do not exist. Modigliani and Miller noted that when the tax code is taken into

consideration, some exploitation can be achieved through an optimal balance of debt and equity. However, they concluded that the benefit is minimal.

Tradeoff Theory

Myers (2001) reviewed the three main theories (tradeoff, pecking order, and free cash flow) relating firm value with its capital structure. Only the tradeoff theory is relevant to this research. The tradeoff theory takes into account the fact that the tax code allows corporations to deduct interest payments as a cost of doing business. The value of debt is equal to the present value of the future stream of payments associated with it. If a corporation were to maintain the same level of debt indefinitely, then the debt's value is equal to the present value of the interest payments discounted at the debt's coupon interest rate (Modigliani & Miller, 1958). Since the interest is tax-deductible, and assuming the marginal tax rate of the corporation is 35%, the after-tax costs of the interest payments are $p(1 - 0.35)$ where p is the payment. The value of the debt then falls to $D(1 - 0.35)$. Myers illustrates the potential value of this tax savings to shareholders by showing that if a corporation borrows $1 million, with the intent to hold the debt indefinitely, and repurchases outstanding stock worth $1 million, then the value of the corporation has not changed. However, if the interest on the debt is tax-deductible then the debt's cost to the corporation is only $650,000, and the stock and bondholders of the corporation have received an increase in their holdings' value of $350,000.

Based on this illustration, tradeoff theory states, "that the firm will borrow up to the point where the marginal value of tax shields on additional debt is just offset by the increase in the present value of possible costs of financial distress" (Myers, 2001, pp. 88-89). In other words, the corporation will borrow to the point that the financial risks associated with debt, such as bankruptcy and higher required rates of return by stockholders, equal the benefits gained.

Individuals likewise reap benefits from borrowed funds, mortgage debt in particular, and can also experience financial distress, such as foreclosure and bankruptcy (Sullivan et al., 2000). There are limited theoretical or empirical studies directly related to individual capital structure, or the combination of personal savings and borrowed money, and wealth creation. However, several studies have examined how risk tolerance and other household characteristics affect wealth accumulation, what types of consumers have a greater tendency to incur debt, and how households respond to changes in the tax code regarding interest deductions.

Empirical Research

Wealth

A household's portfolio of assets and debts changes over the life cycle. Kennickell and Starr-McCluer (1997) analyzed changes in household wealth to determine what factors were most influential. They found that age, income, initial wealth, receiving an inheritance, having a regular savings plan, and living in a metropolitan area were statistically significant positive indicators of changes in

wealth. In order to maintain an exogenous relationship between initial wealth and changes in household wealth, the researchers used the household's wealth percentile in place of actual initial measures of wealth, which would be part of the independent variable.

The authors acknowledged that their model only accounted for 4 to 6% of the variability in changes in wealth. Similar to other studies, Kennickell and Starr-McCluer (1997) found that households' behavior was consistent with the life cycle hypothesis: debt was most frequently incurred among young households, and then eliminated among middle-aged households. Net worth also appeared to peak around age 55 and then declined for older age groups. However, the decline was relatively small.

Health

Recent research on the relation between health and wealth has highlighted a strong correlation between the two (Adams, Hurd, McFadden, Merrill, & Ribeiro, 2003; Grossman, 1973; Meer, Miller, & Rosen, 2003). An early study by Grossman found that differences in self-reported health were inversely related to the number of work weeks missed. The lost productivity resulted in an immediate loss in wages. Poor health also decreased the cumulative experience, training, and working years; thus, diminishing human wealth (Bryant, 1990).

Meer et al. (2003), using the Panel Study of Income Dynamics (PSID) and instrumental variable methodologies, showed that the dominant path is from health to wealth rather than from wealth to health, especially over short term periods. A

statistically significant relation from wealth to health was also found. However, the magnitude of the effect was very small and when the effect was controlled for through instrumental variables, it was no longer statistically significant.

Adams et al. (2003) also arrived at similar conclusions using the Asset and Health Dynamics of the Oldest Old (AHEAD). They found no evidence between wealth and mortality or the sudden onset of acute disease. However, there was evidence that wealth affected the incidence of mental and psychological problems. Findings regarding wealth and chronic and other illnesses were mixed. Adams et al. did find evidence of a causal link from health conditions to total wealth changes. The effect of health on wealth appears to be consistently established in the literature, while the effect of wealth on health, results in insignificant, mixed, or unsubstantial effects.

Portfolio Allocation

Spencer and Fan (2002) suggested that a household's willingness to incur debt is dependent upon its risk tolerance. Risk tolerance is also an important aspect of wealth accumulation because it is a major determinant of how an individual's portfolio is allocated among different assets, and thus determines the assets' rate of return (Gutter, 2000). Historically, stocks have experienced rates of return approximately twice as high as bonds and a greater allocation towards stocks would likely result in greater overall returns (Ibbotson Associates, 2002). Several studies have examined the determinants of risk tolerance (Grable & Lytton, 1998; Schooley & Worden, 1996; Sung & Hanna, 1996; Wang & Hanna, 1997).

The most consistent household and demographic factors that are positively associated with risk tolerance are net worth, education, being married, being non-Hispanic White, and not being retired (Grable & Lytton, 1998; Schooley & Worden, 1996; Sung & Hanna, 1996; Wang & Hanna, 1997). Other less-consistent factors positively associated with risk tolerance included being self-employed and male (Grable & Lytton; Sung & Hanna). Income was only found to be a statistically significant factor in Grable and Lytton's study. Health was negatively correlated with risk tolerance and was only included in Wang and Hanna's model.

The effect of risk tolerance and portfolio allocation on wealth accumulation is most evident in Gutter's (2000) study. Using the 1998 Survey of Consumer Finances, Gutter classified households as either willing or unwilling to take investment risk. Households that were willing to take financial risks were found to have approximately 3.5 times higher net worth than households not willing to take investment risks. Gutter also classified households based on whether they owned risky assets. Gutter (2000) defined risky assets to be items such as "ownership of stocks or small businesses" (p. 13). Households that owned risky assets had an average net worth 5 times greater than households that did not own risky assets. *t* tests comparing the 2 groups showed statistically significant differences with $p < 0.0001$. Gutter's findings, while cross-sectional, provide strong evidence that a household's risk tolerance and portfolio allocation are influential factors affecting wealth accumulation.

Intergenerational Transfers

Kotlikoff and Summer's (1981) work argued that the stock of U.S. wealth resulting from intergenerational transfers, namely inheritances and bequests, represented the majority of assets held by U.S. households. They estimated that 80% of the stock of U.S. wealth was a result of inheritances from older generations, while only 20% was accounted for by current savings consistent with the life cycle income hypothesis. Modigliani (1986) argued that the amount is much less, and based on a survey of research results estimates the amount of bequeathed wealth at no more than 25% of households' asset holdings. Modigliani was also critical of Kotlikoff and Summer's methods and suggests that when estimation errors were corrected, Kotlikoff and Summer's results were consistent with the 25% figure. Regarding either figure, the percent of households' assets attributable to bequests were substantial.

Using the Asset and Health Dynamics Survey, McGarry and Schoeni (1997) found evidence supporting the altruism theory of familial transfers proposed by Becker (1981). McGarry and Schoeni found that less well-off children were more likely to receive a transfer from their parents and that the amount of the transfer was larger than transfers to better-off siblings. No evidence was found in the study supporting exchange theory.

McGarry (1999) also found that transfers made by parents when living, were disproportionately made to less well-off children, however, bequests made at death were regularly distributed equally among all children. McGarry proposed that living transfers were made based on the child's current income, whereas bequests at death

were made based on the child's permanent income. Chang (2004), summarizing current literature regarding intergenerational transfers also notes that inter-vivos transfers were unequally distributed among children while bequests at death were equally distributed, consistent with McGarry's conclusions. Chang also noted a common finding was that the recipient's earnings and transfers were positively related. This common finding provides no support for Becker's (1981) Rotten Kid Theorem.

Consistent with Chang's (2004) summary, Kao, Hong, and Widdows (1997) found that individuals who had more education were more likely to expect to receive an inheritance. Individuals who were married, White, with living parents, and reporting higher relative health were also more likely to expect to receive an inheritance. On the other hand, individuals with large non-liquid holdings, who were middle-aged, married, and had fewer children had higher expectations of bequeathing assets.

Borrower Characteristics

While interest rates, asset prices, and tax incentives affect the household's willingness to borrow, other demographic factors are also important. Households with outstanding debt were more likely to be single-headed households, younger, non-White, home owners, employed, have less formal education, higher income, lower net worth, and larger household sizes (Chen & Jensen, 1985; Crook, 2001; Salandro & Harrison, 1997; Spencer & Fan, 2002; Zhu & Meeks, 1994). Maki (1995) had similar

results except that married household and more educated households were more likely to carry greater amounts of mortgage debt. The finding that debt declines later in life is consistent with the life cycle income hypothesis and is also found in studies examining household debt holdings. Zhu and Meeks, using the 1983 to 1986 panel data of the Survey of Consumer Finances, found that employment and educational attainment were positively associated with outstanding credit balances while age was negatively associated with outstanding debt.

Spencer and Fan (2002) examined simultaneous debtors and savers and their saving motives. Using the 1995 Survey of Consumer Finances, Spencer and Fan report that 54.7% of their sample were simultaneous debtors and savers. Approximately 40% of simultaneous debtors and savers reported a savings motive consistent with the life cycle income hypothesis. An additional 33.7% of simultaneous debtors and savers have precautionary savings motives. Precautionary savings are for emergencies, illness, or unemployment. Precautionary savings are not incorporated into the life cycle income hypothesis in a direct sense. However, in the sense that old age brings about unemployment (retirement), illness, and unexpected expenses, these costs are included indirectly as one ages, but not for younger households.

Other studies have focused specifically on households that borrow against the value of their home. Households most likely to use home equity credit lines are middle-aged and younger, have larger household size, shorter ownership tenure, fewer assets and lower net worth, and lower income (Chen & Jensen, 1985; Salandro &

Harrison, 1997). Chen and Jensen also noted that the combination of being single and retired is statistically significantly related to home equity use, while non-retired households were more likely to use home equity if they were married. Also, low-income (< $12,500, 1983 dollars) and high-income (> $25,000, 1983 dollars) families were more likely to use home equity compared to middle-income households. Chen and Jensen speculated that low-income households use home equity out of need, whereas high-income households were more risk tolerant and therefore utilized home equity for consumption convenience. Salandro and Harrison also found income statistically significant but did not control for a curvilinear relationship. In their study, the amount of home equity was statistically significant and the interest rate was insignificant, while Chen and Jensen did not control for interest rates. Consistent in both studies was that higher levels of net worth were associated with lower levels of home equity use.

Jones (1996) found that home equity was consumed by the elderly as a last resource. This is consistent with Chen and Jensen's (1985) finding that retired individuals utilized home equity after becoming single. Moreover, liquidity constraints were not a factor in the use of home equity (Chen & Jensen; Jones).

Household Demographics

Key demographic variables, such as marital status and race have been identified by researchers as influential determinants of the household's risk tolerance, the propensity to borrow, and wealth holdings. Marital status is an important

demographic variable to control, because of the greater human capital resulting from two adults (Bryant, 1990). Retirement savings studies have also documented the differences in wealth accumulation between married and single households (Mitchell, Moore, & Phillips, 2000; Moore & Mitchell, 2000; Weir & Willis, 2000) and consistently show the negative economic effects of divorce. Marital status has also been found to affect risk tolerance (Grable & Lytton, 1998; Sung & Hanna, 1996; Wang & Hanna, 1997) as well as borrowing behavior (Chen & Jensen, 1985).

Race has also been found to be correlated with risk tolerance (Grable & Lytton, 1998; Sung & Hanna, 1996; Wang & Hanna, 1997). Discrimination in the labor markets and the resulting negative feedback, also contributed to minority ethnic groups having lower incomes and often lower education (Becker, 1971). The difficulties minorities experienced during their working years were reflected in their wealth at retirement (Honig, 2000; Smith, 1995). Using the Health and Retirement Study data, Smith found that average and median wealth among White households was more than double the wealth among Black and Hispanic households. Honig's findings are similar, and show large discrepancies in the amount of wealth accumulated between different racial/ethnic groups.

Household Portfolio Response to Taxation

The 1986 Tax Reform Act (TRA) provided researchers with the opportunity to investigate household behavior in relation to taxes and debt. Prior to 1986, households could deduct interest expenses on all consumer debts, including credit

cards, auto loans, and mortgages. The 1986 TRA phased out the deductibility of non-mortgage interest payments, significantly lowered the marginal tax brackets for individuals, and increased the standard deduction (Stango, 1999). After the Act passed, Stango examined how households responded to the phase-out of interest deductions on non-mortgage debt. Using aggregate times series data from 1980 through 1991, Stango estimated that by 1991 credit card and auto loan debt were approximately 14% and 9% below what they would have been in the absence of the tax law change, respectively. Total mortgage debt however, was approximately 1% higher than it would have been. When examining aggregate mortgage debt, the effects of interest rates and housing prices dominated the effect of preferential tax treatment and were controlled for in Stango's model. The per capita income and average marginal tax rate were also statistically significant variables in the estimated model. Based on anecdotal evidence at the time, Stango believed that much of the debt shuffling from non-deductible to deductible forms of debt was facilitated through the use of home equity credit lines.

Dunsky and Follain (2000) also examined the effects of the 1986 TRA using the Survey of Consumer Finances 1983 to 1989 panel data series and found evidence of portfolio reshuffling based on tax law changes. Dunsky and Follain argued that because the standard deduction increased as part of the 1986 TRA, the after-tax cost of mortgage debt also increased because the marginal benefit to itemizing households decreased. This was not accounted for in Stango's (1999) analysis. Dunsky and

Follain found that business owners were less sensitive to increases in the cost of mortgage debt compared to non-business owners.

Supporting these findings, Crook (2001) found that the maximum household debt load was observed at incomes of $151,461, which was less than the previously observed relation in 1983 of $173,811. One explanation for this is that the after-tax cost of debt increased between 1983 and 1995 as a result of the 1986 TRA's provisions, namely, lower marginal tax rates and increased standard deductions. In response to the TRA, as Dunsky and Follain (2000) point out, households reduced their overall demand for debt.

In a similar study, Maki (1995, 1996), using successive waves of the Consumer Expenditure Survey and panel tax return data, found that portfolio shuffling to take advantage of the 1986 tax law changes was not uniform across all households. He found that more educated high-income home owners were the only group to show clear evidence that deductible mortgage debt was substituted for non-deductible consumer debt after the 1986 TRA's implementation. High-income home owners reduced the interest paid on consumer debt by 36%, while increasing the amount of interest paid on mortgage debt by 16% from 1987 to 1991. Furthermore, highly educated high-income renters did not show any evidence of portfolio shuffling in response to the tax law change. In fact, they did not reduce their consumer debt holdings.

One of the tools cited by Maki (1995) likely used to reallocate debt holdings was mortgage refinancing. However, other methods of extracting home equity may

also have been used, such as selling the home and reinvesting only part of the money into a subsequent home purchase (Engen & Gale, 1997).

The 1986 TRA affected more than just the deductibility of interest debt, it also affected the deductibility of savings associated with IRAs. New limits and restrictions were imposed on IRAs that made them comparatively less attractive than 401(k) plans. Engen and Gale (1997) found that this contributed to a shift in households' tax-preferred asset holdings. Prior to the 1986 TRA, IRAs represented the majority of tax-preferred household assets. By 1992, IRAs only represented approximately one fifth of tax-preferred assets, while 401(k) holdings accounted for three fourths of tax-preferred holdings.

Engen and Gale (1997) examined the interaction between household debt and asset holdings subsequent to the 1986 TRA. They found that households who had at least one worker eligible to participate in a 401(k) plan increased their financial asset holdings and accumulated more net financial assets than similar households that did not participate in a 401(k) plan. However, the net wealth (assets minus liabilities) of these households was not greater than those who did not participate in a 401(k) plan. The similarity in net wealth, although net financial assets were significantly different, is explained by the fact that 401(k) plan participants had less home equity or greater liabilities relative to non-participants. When controlling for other factors, Engen and Gale found that households participating in 401(k) plans, who also had access to tax-advantaged mortgage debt, appeared to use tax-advantaged mortgage debt to increase their 401(k) plan holdings. The increase in 401(k) assets was offset by a decrease in

home equity. These households appear to be maximizing the benefits allowed under the 1986 TRA by using tax-advantaged debt to invest in a tax-deferred asset, thereby reducing the effective cost of taxes.

Maki (1996) noted that the U.S. Congress' policy goals have been frustrated to a large extent by the portfolio shuffling of high-income home owners. With the passage of the 1986 TRA, Congress wanted to reduce the incentive to borrow for consumer purchases (thereby increasing the national savings rate) and to increase tax revenue by approximately $10 billion annually by eliminating consumer interest as a deductible expense for income tax purposes. Apparently, households do adjust their holdings of assets and debts, in particular the type of holding, to maximize tax savings. However, tax incentives, or disincentives, associated with some forms of debt do not appear to curtail consumption.

Summary

Several theories have been introduced to explain household savings and consumption behavior. The two most robust models of household savings are Friedman's Permanent Income Hypothesis and Ando and Modigliani's (1963) life cycle income hypothesis. The life cycle income hypothesis describes the household's utility as a function of consumption over the life span. Consumption in turn is then based on the availability of the household's total resources at any given time during the life span. The life cycle income hypothesis posits that young households and households, in which the majority of resources are in the form of human capital, incur

debt in order to consume. Later in life, the household pays off the debt and saves for the later years of life when relatively little human capital will remain and consumption will be determined by the household's tangible assets.

As a result of the household having both debt and excess income for savings, the household must decide which form of savings will maximize future period consumption–pay down the debt or accumulate the savings in a separate account. Some theories, such as the tradeoff theory, suggest that low-cost, tax-advantaged debt should be held or maintained rather than paid off. Such behavior would maximize the household's total resources because the government, through favorable tax regulations, would pay for a portion of the interest expense and the household could use subsidized debt to invest in higher yielding investments.

Studies examining household wealth have identified several factors that contribute to the household's ability to accumulate wealth. The age of the household (consistent with the life cycle income hypothesis) the household's willingness to take financial risks, intergenerational transfers in the form of bequests and inheritances, and health status are all strong determinants of the total wealth held by the household. Income has also been found to affect wealth accumulation; however, its effects are not consistent across studies.

Household borrowing behavior has been found to be consistent with the life cycle income hypothesis in that young households borrow more than older households, with debt peaking around middle age and then decreasing into old age.

There is some evidence of debt increasing again in old age, particularly housing debt, after other resources have been depleted.

There is limited empirical literature regarding the relation of low-cost, tax-advantaged household debt and changes in household wealth, as suggested by the tradeoff theory. Such research would fill in gaps in the current body of literature relating to wealth accumulation, the use of debt, and savings choices, and would contribute to clarifying the implications associated with leveraged household savings.

Hypotheses

The framework for this study was based on the review of literature relating to the theory and findings of recent empirical research on wealth and debt holdings of households. Hypotheses are presented in the following sections based on the review of theoretical and empirical research.

Household Leverage

This research assumed the framework of the life cycle income hypothesis, in that households base consumption on the present value of life resources available to them and seek to maximize utility across the life span by maximizing the value of life resources available for consumption subject to their constraints and preferences. For purposes of this study, total resources at a given point in time proxied life resources available at that time. Based on the life cycle income hypothesis and the theoretical models derived in Chapter 3, households may benefit from carrying mortgaged debt

assuming the presence of other characteristics. However, without the other characteristics and assuming equal interest rates on debt and savings, negligible differences in changes in wealth between households carrying mortgage debt and those without mortgage debt should be observed.

Based on the tradeoff theory (Myers, 2001), households may optimize the present value of their total resources by utilizing tax-advantaged debt to the extent that the amount did not create financial distress. Given this theoretical premise, a positive association between mortgage debt and changes in wealth should be observable. Continuing with the tradeoff theory, a concave relation between the square of initial mortgage debt and changes in wealth should also be observable as households take on excessive mortgage debt and experience financial distress.

A major limitation of applying the tradeoff theory to households was that household goals and business goals are very different. To the extent that households use mortgage debt to leverage themselves for investment purposes, the tradeoff theory was applicable. However, if households used mortgage debt to supplement consumption, which, based on Greenspan's (2003) discussion many households did, tradeoff theory would not be applicable. Mortgage debt would thus generally be negatively associated with wealth since the consumption comes with the additional interest cost.

Given the sample restrictions used in this study and based on the life cycle income hypothesis and the tradeoff theory in the presence of taxes, the following hypotheses relating to the household leverage ratio were proposed:

1.1 H_A: Controlling for other factors, the initial household leverage ratio is positively associated with changes in assets and total resources.

Based on the tradeoff theory, those households that maintained or increased financial leverage during the period of interest would be most likely to realize greater benefits of being leveraged. Thus, the following hypotheses were proposed:

2.1 H_A: Controlling for other factors, paying off mortgage debt, as compared to constantly unleveraged households, is negatively associated with changes in assets and total resources.

2.2 H_A: Controlling for other factors, keeping or incurring mortgage debt, as compared to constantly unleveraged households, is positively associated with changes in assets and total resources.

The tradeoff theory, as discussed by Myers (2001), hypothesized that a business will take on debt so long as the benefits exceed the costs of potential financial distress. Similarly, households take on debt in order to increase consumption and shift resources between time periods. Generally, but not always, households will take on debt to the point that the benefits of the debt exceed the psychological and financial burdens associated with it. Supporting this idea were Crook's (2001) findings that the amount of debt demanded by households has a curvilinear relationship with income and beyond a certain income, the demand for debt decreases. Net worth is also negatively related to the amount of debt demanded (Crook). Based on this premise, a curvilinear relation between financial leverage and wealth was hypothesized in the following manner:

3.1 H_A: Controlling for other factors, the square of the initial leverage ratio multiplied by 1,000 is negatively associated with changes in assets and total resources.

Income and Work

The U.S. utilizes a progressive income tax structure so that higher income households pay taxes at higher rates. As a result of this tax structure, higher marginal tax bracket households realize greater tax savings from interest deductions (Stango, 1999). Consequently, households in higher marginal tax brackets have the potential of garnering the greatest benefits from leveraging themselves through mortgage debt. Maki (1995) found evidence that only high-income, sophisticated households showed evidence of shuffling their debt holdings in response to tax law changes. Households with greater income also tend to save more of their income, thus increasing their wealth more than households with low incomes (Kennickell & Starr-McCluer, 1997).

Participation in the labor market by households enables them to convert human capital into financial capital. Households with longer periods of participation, all other things equal, should have greater ability to convert human capital to financial capital. The following hypotheses are proposed regarding household income and trends in labor market participation:

4.1 H_A: Controlling for other factors, household income is positively related with changes in assets and total resources.

5.1a H_A: Controlling for other factors, working in 1992 and not working in 2002, as compared to working in 1992 and 2002, is positively related with changes in assets.

5.1b H_A: Controlling for other factors, working in 1992 and not working in 2002, as compared to working in 1992 and 2002, is negatively related with changes in assets..

5.2a H_A: Controlling for other factors, not working in 1992 and working in 200, as compared to households working in 1992 and 2002, is negatively related with changes in assets.

5.2b H_A: Controlling for other factors, not working in 1992 and working in 200, as compared to households working in 1992 and 2002, is positively related with changes in assets.

5.3a H_A: Controlling for other factors, not working in 1992 and not working in 2002, as compared to households working in 1992 and 2002, is negatively related with changes in assets.

5.3b H_A: Controlling for other factors, not working in 1992 and not working in 2002, as compared to households working in 1992 and 2002, is positively related with changes in assets.

Initial Wealth and Portfolio Allocation

Changes in total resources, in particular financial wealth, had a strong relation with the household's initial wealth standing and risk tolerance, or exposure to risky

assets (Gutter, 2000; Kennickell & Starr-McCluer, 1997). As Kennickell and Starr-McCluer found, higher initial wealth was positively associated with greater increases in wealth. If the percent change in wealth were measured, then lower levels of initial wealth would likely be associated with the greatest changes in wealth. Similar to the methodology used by Kennickell and Starr-McCluer, initial wealth percentiles were used to control for initial wealth holdings. The household's initial total resources were included. Human capital was not explicitly included because it was already proxied by income, health status, and education. Risk tolerance was proxied by the household's allocation of its non-housing assets to risky assets (Friend & Blume, 1975; Gutter). Brinson, Singer, and Beebower (1991) found that the allocation of portfolio assets–between stocks, bonds, and cash–was far more important than timing and specific asset selection. Based on the empirical research the following hypotheses were proposed:

6.1 H_A: Controlling for other factors, the household's initial level of total resources, compared to the 0 to 25th percentile category, is positively related with changes in assets and total resources.

7.1 H_A: Controlling for other factors, the initial ratio of risky assets to total non-housing assets is positively related with changes in assets and total resources.

Maki (1996) noted that the policy goals of the 1986 TRA were frustrated in large measure because households substituted mortgage debt for consumer debt. Using mortgage proceeds to finance current consumption was an important

consideration in this research. In order to proxy the household's preference to borrow for current consumption, the amount of other debt held (credit card debt, medical debt, and other personal loans) by the household was included and its relation to changes in wealth were hypothesized as follows:

8.1 H_A: Controlling for other factors, the amount of other debt is negatively related to changes in assets and total resources.

Inheritance

Many households have bequest motives and this remains an important factor in wealth accumulation and decumulation behaviors (Modigliani, 1986). Modigliani estimated that 20 to 25% of household wealth was a result of inheritances. Because of the impact bequests can have on changes in household wealth, receiving an inheritance and the likelihood of leaving a bequest were included in the model. The following hypotheses regarding initial wealth holdings and bequests were proposed:

9.1 H_A: Controlling for other factors, receiving an inheritance, as compared to those households that did not receive an inheritance during the period of observation, is positively related to changes in assets and total resources.

10.1 H_A: Controlling for other factors, expecting to leave a sizable estate, compared to not expecting to leave a sizable estate, is positively related to changes in assets and total resources.

Health and Demographics

Wealth was also affected by the health status of the individual. Declines in health status shortened expected working years as well as reduced the amount of work performed during working years, reducing the individual's human wealth, and thereby reducing their total resources (Grossman, 1973). The following hypotheses were proposed regarding health:

11.1 H_A: Controlling for other factors, initial self-rated health is positively related to changes in assets and total resources.

12.1 H_A: Controlling for other factors, declines in self-rated health, as compared to those who maintained their health, is negatively related to changes in assets and total resources.

12.2 H_A: Controlling for other factors, improved self-rated health, as compared to those who maintained their health, is positively related to changes in assets and total resources.

Household size was also included in the model to estimate the costs and resources available to the household. Generally, increases in the number of adults in the household increased its earning capacity and thus available resources. On the other hand, increases in the number of children strained the household's resources and may have depleted assets (Bryant, 1990). Household size and changes in household size were included in the model with the following associated hypotheses:

13.1 H_A: Controlling for other factors, initial household size is negatively related to changes in assets and total resources.

14.1 H_A: Controlling for other factors, increases in the household size, as compared to households that remain the same size, is negatively related to changes in assets and total resources.

14.2 H_A: Controlling for other factors, decreases in the household size, as compared to households that remain the same size, is positively related to changes in assets and total resources.

Wealth accumulation patterns were a function of age, generally increasing to a peak and then decreasing as the individual consumed accumulated wealth (Modigliani, 1986). Because of this, age was a key variable when modeling changes in wealth. The square of age was not included in this study because of the limited span of ages included in the sample. Based on the life cycle income hypothesis, the following hypothesis was proposed:

15.1a H_A: Controlling for other factors, age of the individual or oldest partner is positively related to changes in assets.

15.1b H_A: Controlling for other factors, age of the individual or oldest partner is negatively related to changes in total resources.

The household's education level is also important. Maki (1996) found that more educated households with higher incomes were the only households that reshuffled their debt holdings to take advantage of potential benefits in the tax code. The combinations of mortgage debt and education and mortgage debt and income appear to be good indicators of the household's ability to capitalize on tax code

benefits. As a result of Maki's findings, the following was hypothesized regarding education and educated households' ability to successfully leverage themselves:

16.1 H_A: Controlling for other factors, the highest year of schooling completed is positively related to changes in assets and total resources.

Based on Maki's (1995, 1996) findings, the interaction between mortgage debt and income and education was expected to be positive. Based on the idea of borrowing low-cost mortgage debt to invest in more profitable securities also implies that the interaction between the household's allocation of assets to risky investments and mortgage debt was positive (Storms, 1996; Tomlinson, 2002). Observed household borrowing behavior is consistent with the life cycle income hypothesis, therefore, the combination of mortgage debt and age was also included in the model. The following hypotheses were proposed to model the interaction between mortgage debt, as measured by the household leverage ratio, and its interaction with several variables.

17.1 H_A: Controlling for other factors, the combination of the highest year of schooling completed and the initial leverage ratio is positively related to changes in assets and total resources.

18.1 H_A: Controlling for other factors, the combination of household income in 1991 and the initial leverage ratio is positively related to changes in assets and total resources.

19.1 H_A: Controlling for other factors, the combination of the ratio of risky investments to non-housing assets and the initial leverage ratio is positively related to changes in assets and total resources.

20.1 H_A: Controlling for other factors, the combination of the age of the oldest household respondent and the initial leverage ratio, is positively related to changes in assets and total resources.

Demographic characteristics of households were influential determinants of households' risk tolerance, the propensity to borrow, and wealth holdings. Key demographic variables, such as marital status and race, were selected and the following hypothesized relations were proposed:

21.1 H_A: Controlling for other factors, initially single female households, as compared to married households, is negatively related to changes in assets and total resources.

22.2 H_A: Controlling for other factors, initially single male households, as compared to married households, is negatively related to changes in assets and total resources.

23.1 H_A: Controlling for other factors, the household head being African American, as compared to non-Hispanic White household heads, is negatively related to changes in assets and total resources.

24.2 H_A: Controlling for other factors, the household head being Hispanic, as compared to non-Hispanic White household heads, is negatively related to changes assets and total resources.

25.3 H_A: Controlling for other factors, the household head being other, as compared to non-Hispanic White household heads, is negatively related to changes in assets and total resources.

Table 2.1 is a summary of the hypothesized relations, while controlling for other variables.

Table 2.1

Summary of Hypotheses for Changes in Assets and Total Resources

	Hypothesized effects	
Variable	Assets	Total resources
Household leverage		
1992 debt ratio (x 1000)	+	+
Change in ratio[a]		
Paid off	-	-
Kept or borrowed	+	+
1992 debt ratio squared	-	-
Income and work		
1991 income (in 000s)	+	+
Work status (working to working[a])		
Working to not working	+	-
Not working to working	-	+
Not working to not working	-	+
Initial wealth and portfolio		
1992 total resources (0 - 25th [a])		
25th - 49th	+	+
50th - 74th	+	+

Variable	Hypothesized effects	
	Assets	Total resources
75^{th} - 89^{th}	+	+
90^{th} - 100^{th}	+	+
Risky assets to total assets	+	+
1992 other debts (in 000s)	-	-
Inheritance		
Received inheritance	+	+
Leave estate (not likely[a])		
Definitely	+	+
Probably	+	+
Possibly	+	+
Health		
1992 health (fair or poor[a])		
Excellent	+	+
Very good	+	+
Good	+	+
Change in health (declined[a])		
No change	+	+
Improved	+	+
Demographics		
1992 household size	-	-
Change in household size (constant[a])		
Increased	-	-
Decreased	+	+
Age	+	-

Variable	Hypothesized effects	
	Assets	Total resources
Education	+	+
Interactions		
Debt ratio X education	+	+
Debt ratio X income	+	+
Debt ratio X risk	+	+
Debt ratio X age	-	-
Coupled status (married[a])		
Single female	-	-
Single male	-	-
Race (Non-Hispanic White[a])		
African American	-	-
Hispanic	-	-
Other	-	-

[a]Reference category.

CHAPTER 3

METHODOLOGY

Theoretical Model

The theoretical framework for this research was based on the life cycle income hypothesis formalized by Ando and Modigliani (1963) with insights gained from Modigliani and Miller's (1958) work on corporate capital structure and the value of corporations. Ando and Modigliani's mathematical model was adapted to describe consumption over the life cycle and changes in total resources:

$$C_t = \Omega_t V_t \qquad [3.1]$$

where C_t represents the total consumption of goods and services in period t. Ω_t captures the characteristics of the individual, such as age, preference, and the rate of return on investments, and is dependent upon the individual's utility function. V_t denotes the present value of resources available to the individual. V_t can be expanded in a similar manner to what is shown by Ando and Modigliani:

$$V_t = A_{t-1} + Y_t + \sum_{t+1}^{N} \frac{Y_t}{(1+r_t)^{n-t}} \qquad [3.2]$$

where A_{t-1} captures the value of assets remaining from the prior period available for consumption in period t. Y_t is the non-investment income in the n^{th} period t, and $\Sigma(Y_t) / (1 + r_t)^{n-t}$, summed from $n = t + 1$ to N, captures the present value of future non-investment income in the n^{th} period with an earnings span of N years. The discount rate, r, used by Ando and Modigliani to calculate the present value of future labor earnings is the real rate of return on assets.

Hanna et al. (1995) conducted their simulations under the assumption that the interest rate on debt equaled the rate of return on assets. Following this assumption, and allowing the household to borrow and invest the proceeds of the loan, I, the resources remaining from the prior period are shown in equation 1.3.

$$V_t = \left[\left(A_{t-1} + I_{t-1}\right) - I_{t-1}\right] + Y_t + \sum_{t+1}^{N} \frac{Y_t}{\left(1 + r_t\right)^{n-t}} \qquad [3.3]$$

If the proceeds from the loan are saved, then the addition of the debt makes no difference in the total resources available for consumption, V_t. Continuing with Hanna and colleagues' (1995) simplifying assumption that the rate of return on investments equals the interest rate on debt, the present value of the payments on the debt, assuming they last for n years, equals the value of the debt as follows:

$$I_{t-1} = \sum_{t+1}^{N} \frac{P_t}{\left(1 + r_t\right)^{n-t}} \qquad [3.4]$$

Equation 1.4 represents *I* as an offsetting cash flow against future non-investment income and therefore, future non-investment income can be shown as net future non-investment income and the offsetting *I* will be removed from the prior period assets as shown in equation 1.5:

$$V_t = \left(A_{t-1} + I_{t-1}\right) + Y_t + \left[\sum_{t+1}^{N} \frac{Y_t}{\left(1+r_t\right)^{n-t}} - \sum_{t+1}^{N} \frac{P_t}{\left(1+r_t\right)^{n-t}}\right] \qquad [3.5]$$

OR

$$V_t = \left(A_{t-1} + I_{t-1}\right) + Y_t + \sum_{t+1}^{N} \frac{Y_t - P_t}{\left(1+r_t\right)^{n-t}} \qquad [3.6]$$

Again, the total resources available for consumption are unchanged. If the assumption of equal interest rates on debt and assets is relaxed, and the household has a higher average rate of return across all assets than the cost of debt, then the household will be able to increase the total resources available for consumption by borrowing and investing the proceeds. The increase in the total resources available for consumption can be calculated as the difference between the proceeds of the loan less the present value of the payment based on the interest rate of the loan, *d*, and discounted at the rate of return on the assets, *s*. The value of the debt, when invested, is equal to the proceeds of the loan because they will be generating a rate of return

equal to the discount rate used to estimate their present value. The payments on the loan, K, are shown in equation 1.7.

$$K_t = \frac{Id_t(1+d_t)^n}{(1+d_t)^n - 1} \qquad [3.7]$$

Substituting K for P in equation 1.5 with the assumption that $d < s$, and isolating their effects, the change in V_t is shown in equation 1.8.

$$\Delta V_t = I_{t-1} - \sum_{t+1}^{N} \frac{K_t}{(1+s_t)^{n-t}} \qquad [3.8]$$

The individual will continue to borrow to invest until the marginal costs of borrowing equal the marginal benefits gained from borrowing. As an individual becomes more indebted, the cost of debt rises because of the risks of bankruptcy. The individual may also invest more conservatively, driving down the rate of return on assets, in order to increase their certainty that fixed debt payments can be made without causing financial distress. This speculation is supported by Fratantoni's (2001) finding that heavily indebted individuals, such as home owners with a mortgage, exhibit lower risk tolerance with their investments.

Two important assumptions were made regarding the conclusion, first the individual's risk tolerance is such that they currently earn an average rate of return on their assets in excess of the debt's cost. Second, that the individual's intertemporal utility function is optimized by such borrowing and saving behavior. These two assumptions are represented by Ω_t in equation 1.1.

The effect of taxes is similar to the effect of differences in the interest rates on savings and debt. For illustration of this effect, the assumption that the interest rate on debts is equal to the rate of return on assets is applied. Based on this assumption, equation 1.5 is relevant.

$$V_t = \left(A_{t-1} + I_{t-1}\right) + Y_t + \left[\sum_{t+1}^{N} \frac{Y_t}{\left(1+r_t\right)^{n-t}} - \sum_{t+1}^{N} \frac{P_t}{\left(1+r_t\right)^{n-t}}\right] \qquad [3.5]$$

If taxes are introduced into the model, and assuming they are constant across periods, then equation 1.5 can be rewritten as:

$$V_t = \left(A_{t-1} + I_{t-1}\right) * (1-g_a) + Y_t * (1-g_i) + \left[\sum_{t+1}^{N} \frac{Y_t * (1-g_i)}{\left(1+r_t\right)^{n-t}} - \sum_{t+1}^{N} \frac{P_t * (1-g_i)}{\left(1+r_t\right)^{n-t}}\right] \qquad [3.9]$$

where g_a is the marginal tax rate on income from assets faced by the individual and g_i is the marginal tax rate on non-investment income. Two different tax rates are

included in the model in order to demonstrate that interest can be deducted at the marginal non-investment income tax rate, while investment income generated from assets, in particular dividends and capital gains, is taxed at lower marginal rates.

Since the principal from the debt is the only argument in equation 1.9 that is affected by the different tax rates on non-investment and investment income, only those arguments will determine the change in resources, ΔV_t. Arguments in equation 1.9 not containing I or P will be treated as constants. Equation 1.10 shows the change in total resources, ΔV_t, resulting from the unequal marginal tax rates at which the cost of debt is deducted and the earnings on the invested debt are taxed. The last argument in equation 1.9 equals the sum of future debt payments discounted by the interest rate on debt. Since, in this example, the interest rate on debt is equal to the interest rate on savings, and treating $(1 - g_a)$ as a constant, the sum of future payments can be written as $(1 - g_a) * I_{t-1}$, as shown in equation 1.10, where $g_a < g_i$.

$$\Delta V_t = \left(I_{t-1} * \left(1 - g_a\right)\right) - \left(\left(1 - g_i\right) * I_{t-1}\right) = I_{t-1} * \left(g_i - g_a\right) \qquad [3.10]$$

Equation 1.10 shows that when the interest rates on assets and debt are the same, some combination of debt and individual savings will maximize current resources. This conclusion is similar to the conclusion of the tradeoff theory and represents the upper bound of potential economic benefits that could be gained from leverage. The last equation in 1.10 is rewritten below to incorporate the leverage ratio

into the equation, which is equal to the ratio of debt to total assets multiplied by total assets.

$$\Delta V_t = \frac{I_{t-1}}{\left(A_{t-1} + I_{t-1}\right)} * \left(A_{t-1} + I_{t-1}\right) * \left(g_i - g_a\right) \qquad [3.11]$$

Thus, equations 1.8 and 1.11 are mathematical depictions of how household leverage can positively affect changes in total resources available. The purpose of this study was not to determine whether equation 1.8 or 1.11 dominates, but rather to determine whether there is any empirical support of a positive relation between debt and wealth.

As mentioned previously, a comparison of historical rates of return expected from the various savings options was appropriate, assuming that the individual remains committed to his or her decided course of action. However, as research has shown (Dalbar, 2001), the average investor experiences a rate of return significantly below the market rate of return and therefore the individual's actual experience should be used.

Model Specification and Design

Based on the review of literature and theoretical frameworks for the study, a conceptual diagram can be drawn depicting the relation between household leverage and changes in total resources, while controlling for various factors. This was a

correlational study employing a balanced panel longitudinal design using the 1992, 1994, 1996, 1998, 2000, and 2002 waves of the Health and Retirement Study (HRS). Three factors were used to proxy the change in total resources, ΔV, in equation 1.1: household leverage, income and work status, and initial wealth. The household's preferences, which must also be accounted for in order to measure the affects of leverage on changes in wealth, were represented by Ω in equation 1.1. Three additional factors were included in the conceptual model representing Ω; these factors were health, bequests and inheritance, and demographics. The following diagram depicts the conceptual model.

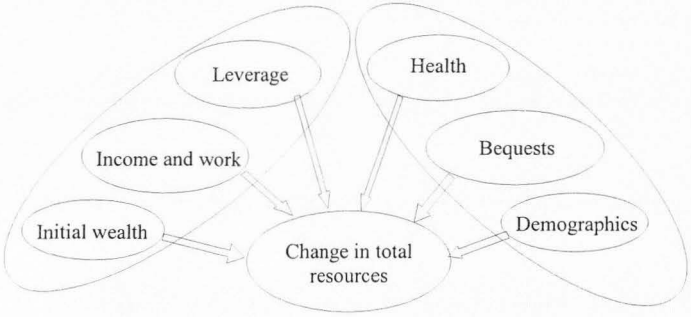

Figure 3.1. Illustration of the conceptual model.

Based on the conceptual model developed in the proceeding section, an individual's utility can be expressed as a function of their consumption, subject to their preferences.

$$U = u(C; \Omega) \quad [3.12]$$

Consumption in turn is a function of the individual's resources, also subject to their preferences.

$$C = c(V; \Omega) \quad [3.13]$$

Furthermore, a household's total resources can be estimated in the following manner:

$$V = v(L, I, W; \Omega) \quad [3.14]$$

where L, I, W, and Ω represent vectors of variables. L is the degree of household leverage, I is the current income and work status, and W is the household's initial wealth. Based on the conceptual model diagramed in Figure 3.1, Ω is represented by vectors of variables for health status, bequests and inheritance, and demographic characteristics. The change in total resources is likewise a function of these same variables and is denoted as:

$$\Delta V = v(L, I, W; H, B, D) \quad [3.15]$$

where *H* represents the household's health status, *B* bequest motives and inheritance, and *D* the household's demographic characteristics.

Data Analysis

Comparative Statistics

Chi-square and *t*-test statistics were used to address the first objective of this study, namely to compare and contrast the characteristics (i.e., total resources, income and savings, portfolio allocation, health, and demographics) of leveraged households (households with mortgage debt) with unleveraged households (households without mortgage debt) in 1992 and 2002.

Trends in assets and total resources were charted based on the year of observation. Trends in the leverage ratio and mortgage debt were charted by the year of observation and by the age of the household, respectively.

Empirical Model

Robust multivariate regression was used to address the second objective, namely to examine the relation between household leverage and the change in the household's total resources during the period from 1992 to 2002 while controlling for other factors such as non-investment income, initial wealth, portfolio allocation,

health status, and demographics. To account for possible sample selection bias introduced by non-random attrition of the sample from 1992 to 2002, Heckman's (1979) two-stage procedure was also used.

The full balanced panel design eliminates all households that were not surveyed in each of the six survey waves. Ziliak and Kniesner (1998) have argued that sample attrition over time may not be random. If the attrition is non-random, then the estimated regression parameters are biased. The bias results in non-zero covariance in the error term of the estimated regression model, which in turn biases the estimated parameters. This is a result of the model predicting not only the effects of the individual variables on the change in total resources, but also attempting to predict that the household did not drop out of the sample.

Ziliak and Kniesner (1998) recommended using Heckman's (1979) procedure to control for non-random sample attrition resulting in sample selection bias. First the probability of dropping out was estimated for the sub sample of home owners in 1992, using probit or logit procedures. Second, the inverse Mill's ratio, or λ (lambda), was estimated. Third, λ was included in the estimated model as an exogenous variable. By including λ in the regression model, sample selection bias was controlled for and the resulting regression parameters were consistent.

Following the procedure outlined by Heckman (1979), equation 1.16 represents the probability that a household surveyed in 1992 was also surveyed in 2002.

$$P_i = E(Y = 1|X_i) = \frac{1}{1+e^{-(\alpha+\beta_i X_i)}} \quad [3.16]$$

where $Y = 1$ if the i^{th} household was surveyed in 2002, X_i is a vector of exogenous variables, α is a constant, and β_i is a vector of parameters associated with the exogenous variables. Equation 1.16 is nonlinear with respect to β_i and X_i. As illustrated by Gujarati (2002) Equation 1.16 can be transformed in the following manner:

$$\frac{P_i}{1-P_i} = e^{\alpha+\beta_i X_i} \quad [3.17]$$

Where the ratio of P_i over $1 - P_i$ is simply the odds ratio of the i^{th} household being surveyed in both 1992 and 2002. The model can be made linear with respect to β_i by taking the natural log of both sides, as shown in Equation 1.18.

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = \alpha + \beta_i X_i \quad [3.18]$$

The natural log of the odds ratio, or L_i, also called the logit, in Equation 1.18 represents the logit model (Gujarati, 2002). The logit model is linear with respect to β_i and can be estimated by using maximum likelihood procedures. Once the logit was

estimated for each household surveyed in 1992, the probability of that household also being surveyed in 2002 could be estimated using Equation 1.16.

The estimated probability found in Equation 1.16 was then used in the inverse of the standard normal cumulative distribution function to obtain the equivalent output of a probit procedure (Lee, 1983; Smits, 2003). The results of the transformation, Z_i, were then included in the estimation of λ_i for each household. λ_i was estimated in the following manner, as illustrated by Heckman (1979):

$$\lambda_i = \frac{\varphi(Z_i)}{1-\Phi(Z_i)} = \frac{\varphi(Z_i)}{\Phi(-Z_i)} \qquad [3.19]$$

where φ is the probability density function of a standard normal variable and Φ is the cumulative distribution function of a standard normal variable. The resulting λ_i could then be included as a regressor in the ordinary least squares regression model to control for possible bias arising from non-random sampling.

Heckman's (1979) two-stage estimation procedure has been suggested to correct for sample selection bias (Kim, 2002; Ziliak & Kniesner, 1998). Kim used age, marital status, race, education, income, home ownership, mobility status, and region as determinants of sample attrition. Similar determinants were used in this study to obtain the inverse Mills ratio, or lambda, from the Heckman procedure.

Robust multivariate regression was an appropriate method of analysis for the data and objectives because of the heavy-tailed and continuous distribution of the

dependent variables. This approach was similar to Kennickell and Starr-McCluer (1997) analysis of changes in wealth using the Survey of Consumer Finances 1983 to 1989 panel data.

Robust multivariate regression uses an iterative process to weight the individual cases. In OLS regression, each case receives a weight equal to 1. Outlier cases can exert substantial influence on estimated model coefficients and errors. This problem is particularly acute for heavy-tailed data where a significant number of cases could be deemed "outliers." Robust regression analysis provides a method whereby outlier cases are identified and systematically down weighted so they can be included in the analysis without resulting in severe estimation errors (Hamilton, 1992).

Hamilton (1992) suggests a robust weighting procedure where cases are first weighted using Huber estimation followed by Tukey's biweight estimation procedure. Huber estimation begins with the estimation of an OLS model for the data. Residuals are scaled using some scale estimate. A tuning constant is specified and cases with residuals greater than the tuning constant are assigned weights less than one. A second weighted least squares model is estimated incorporating the weights derived from the results of the preceding estimated model. Again, cases with residuals greater than some constant are assigned a weight less than one and the process is again repeated. The process is repeated until the maximum change in case weights is less than 0.05.

Once the maximum change in weights falls below 0.05, Tukey's biweight procedure is applied to the model. The procedure is similar to Huber estimation;

however, a different weight function is used. Tukey's biweight procedure (Mosteller & Tukey, 1977, as cited in Hamilton, 1992) assigns weights to all cases in the sample. Any extreme residuals remaining after the initial iterative weighting procedure using Huber estimation are assigned a weight equal to zero. A weighted least squares model is estimated using Tukey's biweights and the biweight function is applied to the resulting case residuals. The process is repeated until maximum changes in the estimated weights are less than 0.01. Because the weights used in the estimated model are a random variable, the standard errors must be adjusted to reflect the bias introduced in the weighting procedure. The following section provides greater detail on the procedure used in this study.

A common scale factor for the residuals of the estimated OLS model is the standard deviation of the residuals; however, the residual's standard deviation can be significantly influenced by outliers. An alternative scale to the standard deviation of the error (e_i) was used in this study. The alternative scale was the median absolute deviation of the error, or MAD:

$$\text{MAD} = \text{median}\,|e_i - \text{median}(e_i)| \qquad [3.20]$$

MAD was standardized by dividing it by the constant 0.6745. The constant is the midpoint of the absolute value of a standard normal variable (Fox, 2002). Dividing MAD by the midpoint of the standard normal variable gives a scale estimate that was

resistant to the effects of outliers, because it is based on the median, rather the mean of the residual's distribution (Hamilton, 1992). The resulting scale estimate was:

$$s = \frac{MAD}{0.6745} \qquad [3.21]$$

residuals were then scaled in the following manner:

$$u_i = \frac{e_i}{s} \qquad [3.22]$$

Using Huber estimation, the following weight function was applied to the scaled residuals from the estimated OLS model:

$$w_i = 1 \qquad \text{if } |u_i| \leq c \qquad [3.23a]$$

$$w_i = \frac{c}{|u_i|} \qquad \text{if } |u^i| > c \qquad [3.23b]$$

The tuning constant, c, for this study was 1.345 which resulted in an estimation procedure 95% as efficient as OLS estimation (Hamilton, 1992). The estimated weights were then used in a weighted least squares procedure using SPSS 12.0 for Windows. The same weight function and tuning constant were reapplied to the data

and new weights were estimated. Six iterations of the procedure were performed before the maximum change in the weights was 0.02.

For the two estimated models in this study for change in assets and change in total resources, the 7th and 6th iterations of the procedure applied Tukey's biweight estimate function to the residuals from the 6th and 5th iterations, respectively. The biweight function applied to the residuals was:

$$\psi\{u_i\} = u_i\left[1-\left(\frac{u_i}{c}\right)^2\right]^2 \qquad \text{if } |u_i| \le c \qquad [3.24a]$$

$$\psi\{u_i\} = 0 \qquad \text{if } |u_i| > c \qquad [3.24b]$$

A new tuning constant equal to 4.685 was used with the biweight function. The tuning constant used resulted in 95% efficiency relative to OLS models (Hamilton, 1992). The procedure was repeated using weighted least square regression. After the 15th and 11th iterations for the two models the maximum change in the estimated weights was 0.0045 and 0.0086, respectively. The estimated coefficients' standard errors were corrected using a procedure outlined by Street, Carroll, and Rupert (as cited in Hamilton).

Continuing from the conceptual model, the following empirical model was used to determine the effects of leverage on changes in asset and total resources while controlling for other characteristics:

$$G^{\frac{1}{2}}\Delta TR_i = G^{\frac{1}{2}}\{\beta_{0i} + \beta_{1i}L_i + \beta_{2i}I_i + \beta_{3i}W_i + \beta_{4i}B_i + \beta_{5i}H_i + \beta_{6i}D_i + \beta_{7i}\lambda_i\} + G^{\frac{1}{2}}\varepsilon_i$$

[3.25a]

$$G^{\frac{1}{2}}\Delta AST_i = G^{\frac{1}{2}}\{\beta_{0i} + \beta_{1i}L_i + \beta_{2i}I_i + \beta_{3i}W_i + \beta_{4i}B_i + \beta_{5i}H_i + \beta_{6i}D_i + \beta_{7i}\lambda_i\} + G^{\frac{1}{2}}\varepsilon_i$$

[3.25b]

where *L, I, W, B, H,* and *D* were vectors of independent variables and β_1, β_2, β_3, β_4, β_5, and β_6 were vectors of parameters associated with the independent variables. $G^{1/2}$ was a vector of weight variables derived from robust regression procedure, *L* was a vector of the variables related to the household's leverage ratio, *I* was a vector of variables related to the household's income and savings behavior, *W* was a vector of variables related to initial wealth. These three vectors were the principal components of total resources and proxy V_i in Equation 1.1. *B, H,* and *D* represented vectors of variables related to bequests, health status, and demographics, respectively, and proxy Ω_i in Equation 1.14. The model also included λ_i, which controlled for sample selection bias. The error term, ε_i, is normally distributed with a mean of zero.

Two models were estimated. The first model estimated the change in household assets from 1992 to 2002. The dependent variable for the second model was the change in the household's total resources from 1992 to 2002. Because the data was longitudinal, the stationarity of the dependent variables was examined to determine whether a more appropriate estimation method would be an autoregressive integrated moving average (ARIMA) model. The data was tested for non stationarity and no evidence of that problem was found. The models were also tested for autocorrelation, heteroskedacity, and multicolinearity. Autocorrelation was tested using the Durbin-Watson statistic and the presence of multicolinearity was checked using the condition index and variance inflation factors. Heteroskedacity in the estimated changes in wealth was checked by examining the estimated squared residuals against changes in assets (Gujarati, 2002).

Data and Measurement

Data

The Health and Retirement Study is an ongoing national longitudinal survey conducted every two years by the Survey Research Center at the University of Michigan. This study used data gathered in the 1992, 1994, 1996, 1998, 2000, and 2002 waves of the Health and Retirement Study (Institute for Social Research, 1995, 1998, 2002, 2003a, 2003b, 2003c). The study is funded largely by the National Institute on Aging (Juster & Suzman, 1995). The original HRS sample consisted of individuals and their partners, if applicable, who were between the ages of 51 and 61

at the time of the first wave in 1992. The intent of the HRS is to provide researchers from a variety of different fields with insight into the transition from the labor force into retirement.

The sample size for the initial wave of the HRS consisted of 12,654 individuals. Approximately 81% of the initial sample was married, and women represented 53.6% of the original sample. Where possible, both spouses were interviewed and included in the sample, even if only the selected spouse met the age criteria. The sample design over-sampled African Americans and Hispanics in order to allow researchers the ability to investigate these groups individually. The sample design also over-sampled individuals in Florida. As a result of over-sampling of some groups and geographic areas, and the inclusion of age ineligible spouses in the sample, the data set includes individual and household weights, which when applied to the individual or household cases make the data a nationally representative sample.

The HRS is an ideal sample to address the objectives of this study because of its representative nature and age of respondents. The respondents in the HRS are likely in their peak savings and investing years as they prepare for retirement or enter retirement. The idea of utilizing household leverage to increase wealth would be most applicable to this population because of their stage in the life cycle.

This study limited the sample to stable households–households that did not experience a change in marital status during the period of observation, were interviewed in each wave of the study, and reported owning their home in 1992. Household leverage, income and savings, health status and some demographic

variables were calculated over the 1992 to 2002 time period. All dollar calculations were adjusted to reflect constant 2002 dollars.

The HRS includes imputed values for missing financial information. Missing values for some other variables associated with pensions are also imputed. In order to preserve the sample size for this study, imputed values for missing information were used in this study.

Measurement

Dependent Variables

The dependent variables in this study were the first differences between: total resources in 2002 and total resources in 1992, and household assets in 2002 and household assets in 1992. This approach was similar to Kennickell and Starr-McCluer's (1997) approach when they examined changes in wealth using panel data from the 1983 to 1989 Survey of Consumer Finances. The first model estimated the change in assets between 1992 and 2002, while the second model estimated the change in total resources during the period.

Total resources and household assets were estimated for each observation period in the following manner. First, all variables denoted by dollars were adjusted to 2002 dollars. This adjustment was based on the historical inflation information in Ibbotson Associates (2002). Second, all reported net worth was summed for each household. Reported net worth included: bank accounts, CDs, stocks, bonds, mutual funds, IRAs, Keoghs, cash value life insurance, annuities, defined contribution

retirement plans, collectibles, vehicle equity, home equity, other real estate, and business holdings. Assets reported in the HRS were reported at their net value, or what the household would have had if they had sold the asset and paid off all debts associated with the asset. This constitutes household assets for each period of observation. Additional steps were necessary to calculate the total resources for the household.

The next step in calculating the household's total resources required the estimation of the present value of future cash flows such as defined benefit pensions, VA pension, and Social Security benefits. In order to estimate the present value of these assets, an appropriate discount rate was determined. Because of the guaranteed nature of Social Security, and the cost of living adjustments included with it, the future payments were discounted using the average real yield on long-term U.S. Treasury Bonds for the period of January 1, 1992 to December 1, 2002. The real rate of return was calculated using data reported by Ibbotson Associates (2002). Defined benefit pension plans that include a cost of living adjustment were also discounted using the average real yield discussed above. The average real yield on the 10-year U.S. Treasury Bond was used because of the long-term nature of these payments. The majority of households will receive these cash flows for at least 10 years, but not more than 20 years based on life expectancies. The 10-year U.S. Treasury Bond most closely approximated this time horizon. The average nominal yield was used to discount defined benefit pensions that did not have cost-of-living adjustment features.

The age of the sample provided an advantage in determining the present value of Social Security and defined benefit pensions because many individuals in the sample began drawing on these assets during the observation period and the actual benefits were observed rather than estimated. The anticipated duration of such cash flows as reported by the respondent was used in the present value calculation. For life-long cash flows, the life tables published by the U.S. Center for Disease Control were used to determine the life expectancy of White and Black males and females (United States Center for Disease Control, 2003). The life tables did not include estimates for Hispanic males and females; therefore, Hispanics were assigned life expectancies based on the life tables for White males and females.

The present value of Social Security benefits in each wave was estimated by taking the present value of the payments received by the household. For years when benefits had not yet begun, the amount of reported benefits in later years was discounted back to that year. For households that had not begun to receive Social Security benefits by 2002, their expected Social Security benefits were used. The expected Social Security benefit was based on the individual's response to the following questions, "Do you expect to receive Social Security benefits at some time in the future?" (Institute for Social Research, 2003b, variable #HJ479), "At what age do you expect to start collecting these benefits?" (Institute for Social Research, 2003b, variable #HJ480), and "If you start collecting Social Security benefits then, about how much do you expect the payments to be in today's dollars?"(Institute for Social Research, 2003b, variable #HJ481). The 1992 present value of Social Security

payments was calculated as the discounted present value of Social Security benefits found in subsequent waves.

A similar approach to that outlined above was used to determine the present value of any defined benefit pensions to which the household was entitled. First, the present value of current defined benefit pension payments was calculated for those households that began to receive benefits during the period of observation. The present value of such payments was estimated based on whether the payments were adjusted for cost-of-living increases and whether the term of payments were designed to be single-life, joint-life, or for a specific term. If the respondent indicated that the payments were periodically adjusted for cost-of-living increases, the real rate of return on the 10-year U.S. Treasury note was used to calculate the present value. If the payments were not adjusted for increases in the cost of living, the nominal rate of return on the 10-year U.S. Treasury note was used in the calculations. Defined benefit pension payments observed in the later years of the period of observation were discounted back to previous years.

The present value of future benefits was estimated for those individuals in the 2002 wave that reported being covered by a defined benefit plan, but who had not yet begun to receive payments. For these individuals, the expected payments and terms of payment were calculated using information provided by the respondent. In 2002, at least one individual in 427 households reported being covered by an employer sponsored defined benefit pension program sponsored by their employer. Of these cases, 218 lacked sufficient data to estimate the amount of the expected benefit

payments or the present value of such payments. If the individual responded that they "Don't know" or "Refused" to state the amount of future benefits, then the interviewer asked a series of questions to obtain some range within which the expected amount laid. Using the midpoint of these ranges, 6 additional present value calculations were made reducing the number of missing cases to 212. These cases were dropped from the sample because the present value of expected defined benefit pensions could not be estimated.

Ando and Modigliani (1963) discounted all future earnings by the real rate of return earned on assets by the household. The data did not provide sufficient detail to calculate an accurate rate of return on all assets. Gutter (2000), when estimating the value of an individual's human capital, discounted future earnings using the long-run rate of return on large cap stocks reported by Ibbotson Associates. A similar approach was used in this study. All future earnings were discounted using the nominal rate on large cap stocks, as reported by Ibbotson Associates (2002), for the period 1992 through 2002. This time period was unusual because it captured one of the longest periods of economic expansion in U.S. history resulting in a discount rate higher than the long-run average. However, the higher discount rate on future earnings used in this study was warranted because of the rapid pace at which the economy was changing during this time period as a result of new technology, innovation, and general modernization. This change in the economy resulted in substantial job turnover and job elimination. Older workers may have been a vulnerable segment of the labor force during this time period, thus increasing the uncertainty of future

earnings. The greater uncertainty regarding future earnings was captured with the higher discount rate.

Actual constant dollar earnings from 1992 to 2002 were used to estimate the present value of the individual's, and household's, future earnings. The present value of future earnings was calculated for individuals still working in 2002 based on the individual's 2002 earnings from employment and the earlier of the respondent's expected age at retirement, age when they expect to reduce their work hours, or life expectancy.

Independent Variables

Mortgage debt. The household's initial amount of mortgage debt in 1992 was equal to the total amount of any debt secured against the household's primary and secondary residence, including outstanding home equity lines of credit and any mortgages on second homes. This amount was adjusted to reflect 2002 dollars.

Leverage ratio. The household's initial leverage ratio was calculated by dividing the household's mortgage debt by total assets. All model estimations included the leverage ratio calculated using total assets. A second leverage ratio was also calculated using the household's total resources in the denominator for illustrative purposes. For all calculations the value of the household's residencies was included at full value rather than net value.

Changes in housing debt were also observed from 1992 to 2002. A dichotomous variable (1, 0) was used to indicate whether a household paid off, maintained or incurred, or remained without mortgage debt from 1992 to 2002.

Households without mortgage debt in 1992 and 2002 were used as the reference group.

Based on the tradeoff theory and findings among bankruptcy filers, too much leverage could result in very negative consequences for households and could act to diminish rather than increase total resources available. In order to proxy this effect, the square of the initial leverage ratio multiplied by 1,000 was included in the model.

Total household income. Total household income included income from all sources before taxes. Total household income was used to proxy the household's marginal tax bracket. Because of the variety of tax rates on various types of income, as well as the variety of deductions, credits, and exemptions offered in the IRS tax code, no attempt to estimate the household's marginal tax rate was made. In addition to the complexities of the tax code, significant changes were made to the tax code in 1992 which introduced new tax rates and brackets (Tax Policy Center, n.d.).

Work trend. The household's trend in work status from 1992 to 2002 was also included in the models. The household was deemed to be working if the respondent was employed, temporarily laid off, or looking for work. Individuals that reported being disabled or retired were categorized as not working. For married households, if either spouse was working, the household was categorized as working. Individuals that reported being a homemaker were assigned the work status of their partner, if partnered; if not partnered, homemakers were categorized as not working. Individuals that refused to provide their working status, or reported an other status, were assigned their partner's status if married. If not married, or neither partner reported their status,

the status was assigned the status in 1992 or 2002, whichever wave had reported information. If neither wave contained the individual's or partner's status, the case was dropped from the sample. Fifteen cases were dropped.

Initial total resources. Initial total resources were calculated for all households in 1992. Households were then ranked and separated into percentile categories similar to those used by Kennickel and Starr-McCluer (1997). A dichotomous variable was then used to classify each household into its respective percentile category. The group with the least amount of total resources was used as the reference group.

Risky asset allocation. The household's allocation of non-housing assets to risky investments was calculated. Previous studies, such as Friend and Blume (1975), defined risky assets as those having uncertainty associated with their returns. Included in this definition would be bonds, home equity, and human capital. This study examined the effect of household leverage, through the use of mortgages, on changes in wealth. One way for leveraging to be effective was to invest the borrowed funds in assets yielding rates of return greater than the rate of interest being charged on the borrowed funds. For this study, risky assets were those assets that have historically earned higher rates of return than the interest rate on mortgage debt. Since the interest rate on mortgage debt is based on interest rates in the bond market plus a spread, bonds were not considered risky assets for this study. Higher-yielding bonds were available to investors, however, the HRS does not differentiate between high-yield and other bonds. Furthermore, the interest income from bonds (other than

municipal bonds) does not receive favorable tax treatment and is taxed at the household's marginal tax rate, thus offsetting the favorable tax treatment of the mortgage debt.

Ownership, or equity assets, have historically earned rates of return higher than that charged for mortgage debt. This asset category included stocks, business holdings, investment real estate, and equity mutual funds. For IRAs and defined contribution retirement accounts in which the individual could direct the investment choices, respondents were asked how the money was invested and then given the following choices: (1) mostly or all stocks; (2) mostly or all interest earning; (3) evenly split; (4) other; (8) don't know; or (9) refused (Institute for Social Research, 2003a, variable #F4907, #F4928, #F3472). The HRS did not contain asset allocation information for every IRA or defined contribution retirement plan the respondent mentioned. The reported asset allocation of existing IRAs or defined contribution plans was applied to those accounts for which asset allocation information was not available.

To determine the amount of risky assets in these accounts, two-thirds of the account was counted as risky if the respondent said it was "mostly or all stocks," half of the account value was deemed risky if the respondent selected "evenly split," and one-third of the account value was considered to be allocated to risky assets if the respondent selected "mostly or all interest earning." For respondents who did not know the asset allocation within the account, refused to answer the question, or who had allocated the assets within the account differently than the choices available, the

account was treated as if it were split evenly between risky and non-risky assets. Asset allocation was measured in the 1998 wave of the study. Waves prior to 1998 did not contain sufficient information to record asset allocation.

Inheritances. A dichotomous variable (1, 0) was used to measure whether the household received an inheritance from 1992 to 2002, based on the household's response to the following question in each wave of the study, "In the last two years did you (or your husband/or your wife/ or your partner/...) receive a lump sum of money or property that you have not already told me about/ Do not include loans or gifts?" (Institute for Social Research, 2003c, variable #E4748). Inheritances were specifically identified as one of the answer choices.

The household's intentions to leave an inheritance was measured by its response to the following question in the first wave of the study, "Do you [and you (husband/wife/partner)] expect to leave a sizable inheritance to your heirs?" (Institute for Social Research, 1995, variable #V5349). The responses to the question were categorical and included the following: (1) yes, definitely; (2) yes, probably; (3) yes, possibly; (4) probably not; (5) no, definitely; (8) don't know; and (9) NA. Responses 1 through 3 were assigned to their own categories, responses 4 through 9 were combined and represent the reference category.

Other debt. The amount of other debt was a continuous variable, measured in thousands of dollars, and was equal to the all other household debts such as credit cards, medical, and other consumption debts. Auto loans and investment debts were

indirectly reported with their corresponding assets since all assets were reported net of any debt owed for them.

Health status. Health status was measured by the individual's response to the following question, "Next I have some questions about your health. Would you say your health is excellent, very good, good, fair, or poor?" (Institute for Social Research, 1995, variable #V301). If the household was married, the average of the respondent's reported health status was used as a proxy for the household's initial health status in 1992. A dichotomous variable (1, 0) was used to categorize households' self-rated health in 1992 as excellent, very good, good, or fair/poor health. Fair/poor health was the reference category for initial health status.

The change in self-rated health status for the household from 1992 to 2002 was measured with a dichotomous variable (1, 0) indicating whether the household's health status improved, declined, or remained the same. Those households that experienced declining health were used as the reference group.

Household size. The size of the household equaled the total of all individuals residing at the home. In 1992, if a child was attending school, who otherwise would have lived with the household, they were included in the household size calculation. Household size was measured in 1992 and 2002.

Age. The age of the individual was measured by the calculated age of the respondent based on his or her year of birth, or variable number 46 in 1992. If the household was married, the age of the oldest spouse in 1992 was used.

Education. The education of the household was measured by the response to the question, "What is the highest grade of school or year of college you completed?" (Institute for Social Research, 1995, variable #207). The highest year of schooling completed by the individual for single households, or the average of the highest year of schooling completed by partnered households, as reported in 1992, was used. The highest year of college completed was top coded at 17 years of education.

Marital status. Initial marital statuses were measured using responses to the following questions, "Please remind me, are you currently married, living with a partner, separated, divorced, widowed, or have you never been married?" (Institute for Social Research, 1995, variable #225), and an interviewer designated variable "Sex of respondent" (Institute for Social Research, 1995, variable #47). Based on the individual's responses a dichotomous variable (1, 0) was created and used to classify the individual as married, single female, or single male. Married households served as the reference group.

Race or ethnicity. The race of the household was measured by the family respondent's response to the following questions: "Do you consider yourself to be Hispanic or Latino?" (Institute for Social Research, 1995, variable #216), and "Do you consider yourself primarily White or Caucasian, Black or African American, American Indian, or Asian?" (Institute for Social Research, 1995, variable #221). Using a dummy variable (1, 0), the responses were categorized into Black or African American, Hispanic, non-Hispanic White, and other.

The following table summarizes the variables used in the models and how the variables were measured. All dollar figures are in constant 2002 dollars.

Table 3.1

Measurement of Variables

Variable	Measurement
Change in assets	Assets in 2002 minus assets in 1992 (in 000s)
Change in total resources	Total resources in 2002 minus total resources in 1992 (in 000s)
Household leverage	
Leverage ratio	The sum of all outstanding debt secured by the primary or secondary residence divided by the household's assets or total resources (x 1000)
Change in mortgage debt	
Paid off	1 if mortgage debt in 1992 was greater than zero and equal to zero in 2002, 0 otherwise
Kept or incurred	1 if mortgage debt in 2002 was greater than zero, 0 otherwise
No debt (reference)	1 if mortgage debt was zero in 1992 and 2002, 0 otherwise
Leverage ratio squared	Square of 1992 leverage ratio
Income and work	
Income	Total household income reported in 1991
Work status	

Variable	Measurement
Working to not working	1 if at least one respondent in the household was working in 1992 and no respondents were working in 2002, 0 otherwise
Not working to working	1 if no respondents in the household were working in 1992 and at least on respondent was working in 2002, 0 otherwise
Not working to not working	1 if no respondents in the household were working in 1992 or 2002, 0 otherwise
Working to working (reference)	1 if at least one respondent was working in 1992 and 2002, 0 otherwise
Initial wealth and portfolio	
Initial percentile of total resources	
25^{th} to 50^{th}	1 if the household's total resources in 1992 were greater than or equal to the 25^{th} percentile for the total sample and less than the 50^{th} percentile for the total sample, 0 otherwise

Variable	Measurement
50^{th} to 75^{th}	1 if the household's total resources in 1992 were greater than or equal to the 50^{th} percentile for the total sample and less than the 75^{th} percentile for the total sample, 0 otherwise
75^{th} to 90^{th}	1 if the household's total resources in 1992 were greater than or equal to the 75^{th} percentile for the total sample and less than the 90^{th} percentile for the total sample, 0 otherwise
90^{th} to 100^{th}	1 if the household's total resources in 1992 were greater than or equal to the 90^{th} percentile for the total sample, 0 otherwise
0 to 25^{th} (reference)	1 if the household's total resources in 1992 were less than the 25^{th} percentile for the total sample, 0 otherwise
Risky asset allocation	Total risky assets / (Total assets minus net housing assets)
Amount of other debt	Credit card, medical, and other consumption debt (in 000s)
Inheritance	

Variable	Measurement
Received inheritance	1 if the household received an inheritance between 1992 and 2002, 0 otherwise
Likelihood of leaving a sizable estate	Expected likelihood of leaving an estate measured on a continuous scale from 0 to 100
Definitely	1 if the household definitely expects to leave a sizable estate, 0 otherwise
Probably	1 if the household probably expects to leave a sizable estate, 0 otherwise
Possibly	1 if the household possibly expects to leave a sizable estate, 0 otherwise
Not likely (reference)	1 if the household does not expect to leave a sizeable estate, 0 otherwise
Health	
Initial health status	
Excellent	1 if the average self-rated health status is excellent in 1992, 0 otherwise
Very good	1 if the average self-rated health status is very good in 1992, 0 otherwise
Good	1 if the average self-rated health status is good in 1992, 0 otherwise
Fair or poor (reference)	1 if the average self-rated health status is fair in 1992, 0 otherwise
Change in health status	

Variable	Measurement
No change	1 if self-rated health was unchanged in 2002 compared to 1992, 0 otherwise
Improved	1 if self-rated health in 2002 was higher than self-rated health in 1992, 0 otherwise
Declined (reference)	1 if self-rated health in 2002 was less than self-rated health in 1992, 0 otherwise
Demographics	
Household size	Total number of individual residing in the household
Change in household size	
Increased	1 if household size in 1992 was less than the household size in 2002, 0 otherwise
Decreased	1 if household size in 1992 was greater than household size in 2002, 0 otherwise
Constant (reference)	1 if household size in 1992 was equal to household size in 2002, 0 otherwise
Age	Age of individual, or oldest spouse, in 1992
Education	Highest grade of schooling completed by individual, highest average grade completed for married households
Marital status	
Single female	1 if household was a single female in 1992, 0 otherwise

Variable	Measurement
Single male	1 if household was a single male in 1992, 0 otherwise
Married (reference)	1 if household was married or living together in 1992, 0 otherwise
Race/ethnicity	
African American	1 if household head is African American, 0 otherwise
Hispanic	1 if household head is Hispanic, 0 otherwise
Other	1 if household head is Other, 0 otherwise
Non-Hispanic White (reference)	1 if household head is non-Hispanic White, 0 otherwise

CHAPTER 4

RESULTS

This chapter presents the results of the empirical analysis. The chapter begins with a discussion of the sample characteristics. The next section reports the results of independent *t* tests comparing unleveraged and leveraged households across continuous variables. This section is followed by the results of the chi-square tests for independence on categorical variables. The chapter concludes with a presentation of the regression models generated for each of the dependent variables.

Sample Characteristics

The final sample of continuously participating households with constant marital statuses from 1992 to 2002 with housing assets consisted of 3,060 households. As a result of missing values for defined benefit and defined contribution pensions, an additional 212 and 53 cases, respectively, were dropped from the sample. Fifteen households refused to report their work status in 1992 and 2002, these were also dropped from the final sample. Ten additional cases were treated as influential leverage cases and eliminated from the sample. The final sample consisted of 2,770 households. All dollar figures were adjusted to be 2002 equivalent dollars. For sample statistics, means testing, and chi-square tests, the 1992 household weights–included with the data set–were applied to the households. Household weights provided by HRS were not applied in the regression analysis.

Average household assets increased substantially over the period of observation. Mean assets increased $405,510. The median household's assets increased $179,250. Based on the observed standard deviation for the results, there was substantial variation among households in terms of both absolute and percent increases. In contrast to household assets, average total resources available to the house decreased by $270,780. Similar to household assets, substantial variation across households was observed. These results are summarized in Table 4.1.

The increase in assets and the simultaneous decrease in total resources was consistent with the life cycle income hypothesis, in that prior to retirement, households accumulated assets, however, their human capital–measured by the present value of future earnings–declined as a result of fewer anticipated years of

Table 4.1

Descriptive Statistics for Changes in Assets and Total Resources from 1992 to 2002 (Weighted)

Dependent Variables	Mean (Median)	*SD*
Assets (000s)		
1992	401.97 (220.24)	651.03
2002	807.48 (465.94)	1,452.98
Change in assets	405.51 (179.25)	1,289.55
Total resources (000s)		
1992	1,544.50 (1,087.16)	2,043.34
2002	1,273.71 (793.36)	2,254.67
Change in total resources	-270.78 (-272.28)	1,313.92

work. The present value of public and private defined benefit pensions was also reduced as the household ages because they have fewer years left to draw on life pensions. A breakdown of total resources is presented in Table A.1 of the Appendix.

Initial amounts of mortgage debt and changes in that debt were reported in Table 4.2. Just less than one third of the sample reported no mortgage debt in 1992 and 2002. Over the period of observation 43.95% of households kept or incurred mortgage debt while 25.49% decreased their mortgage debt.

Average household income from all sources in 1991 was $70,796, as reported in Table 4.3. The higher income was a result of the sample selection process. The average allocation of non-housing assets to risky assets was 34.69%.

The median percentage of assets allocated to risky investments was 30.77. More than one fifth of the households received an inheritance during the period of observation and 14.59% of households, when asked in 1992, definitely planned

Table 4.2

Descriptive Statistics for Mortgage Debt from 1992 to 2002 (Weighted)

Variables	Mean (Median)	*SD*	%
1992 Housing debt (000s)	44.45 (15.40)	81.82	
Mortgage debt to assets (x 1,000)	148.05 (57.44)	203.18	
Change in housing debt			
Paid off			25.49
Kept or borrowed			43.95
No housing debt[a]			30.56

[a]Reference category.

to leave a sizable estate to their heirs, whereas 49.55% thought that it was not likely that they would leave a sizable estate. Median household consumer debt was zero in 1992.

Self-rated health and other demographic variables are reported in Table 4.4. The majority of households in the sample reported having "Excellent" or "Very Good" health with only 13.66% reporting "Fair or Poor" health, as shown on Table

Table 4.3

Descriptive Statistics for Household Income, Risky Assets, Other Debt, and Inheritances from 1992 to 2002 (Weighted)

Variables	Mean (Median)	*SD*	%
1991 income (000s)	70.80 (56.46)	64.75	
Work trend			
Working 1992: not working 2002			41.36
Not working 1992: working 2002			2.05
Not working 1992: not working 2002			14.36
Working 1992: working 2002[a]			42.23
Risky assets to total assets (x 100)	34.69 (30.77)	30.79	
1992 other debts (000s)	3.29 (0.00)	14.56	
Received inheritance			21.89
Plan to leave sizable estate			
Definitely			14.59
Probably			19.38
Possibly			16.28
Not likely[a]			49.55

[a]Reference category.

4.4. Self-reported health status in 2002 was unchanged for 49.11% of the sample. A large percentage, 39.04%, of the sample reported lower self-rated health in 2002 than in 1992. This was not surprising given that these households were 10 years older and the high percentage of households reporting "Excellent" or "Very Good" health in 1992.

Table 4.4

Descriptive Statistics for Household Health and Demographics from 1992 to 2002 (Weighted)

Variables	Mean (Median)	*SD*	%
1992 self-reported health status			
Excellent			14.20
Very Good			40.81
Good			31.33
Fair or Poor[a]			13.66
Change in self-reported health			
No change			49.10
Improved			11.86
Declined[a]			39.04
1992 household size	2.40 (2.00)	1.03	
Change in household size			
Increased			11.39
Decreased			28.73
Constant[a]			59.88
1992 Age	57.59 (57.00)	4.55	

Variables	Mean (Median)	*SD*	%
1992 Education	12.82 (12.50)	2.60	
Coupled status			
Single female			15.95
Single male			5.56
Married or partnered[a]			78.49
Race			
Black or African American			6.82
Hispanic			3.94
Other			1.86
Non-Hispanic White[a]			87.38

[a] Reference category.

The average household size was 2.40 individuals per household. The relatively large household size for this age group was a result of the restriction placed on the ending sample. The average age of the household in 1992 was 57.59 years old. This was slightly older than the midpoint of the HRS sample because spouses of age-eligible individuals were included in the household sample. The average education of the household indicated some post-secondary education for the individuals. The majority of the sample was married while single men accounted for only 5.56% of the group. The sample was overwhelmingly non-Hispanic White.

Figures 4.1 and 4.2 illustrate the mean and median trends in household assets and total resources, respectively, for the period of observation. An upward-sloping

trend was observed for average and median household assets. Both mean and median household assets experienced increases over the period 2000 to 2002. During this same period, the overall U.S. economy was stagnant and equity investments were generally declining in value. However, bond values increased dramatically during this period as a result of falling interest rates and weak stock market performance. Home prices also experienced substantial increases during this time period.

While households did well during the 2000 to 2002 time period, the median households' assets experienced modest growth from 1994 to 2000, a period which saw exceptional growth in the stock market. The counter intuitive trend in assets during times of rapid gains and losses in the stock market suggests that households in this age group hold fairly conservative portfolios. The majority of the sample's non-housing

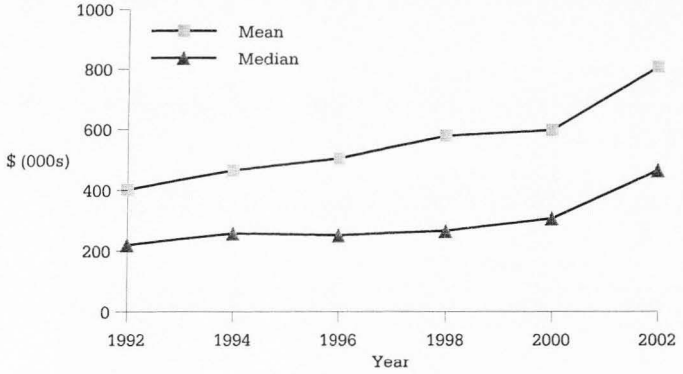

Figure 4.1. Household assets from 1992 to 2002 (weighted).

assets were not allocated to risky assets, such as stocks, but rather were held in more conservative investments, such as bonds. The ratio of risky assets to non-housing assets strengthens this explanation.

In contrast to Figure 4.1 is Figure 4.2, which shows a steady decrease in the total resources of the household at both the mean and median measures. The most influential factor contributing to the steady decline of total resources was the sample's age. As the sample aged, the present value of future earnings and public and private defined benefit pension plans decreased. It appears that for households in this age group, the decline in total resources as a result in age occurred at a greater rate than the increase in assets used to offset the loss of wages during retirement.

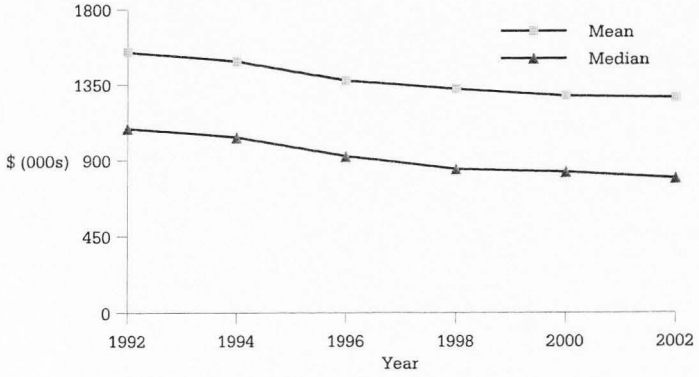

Figure 4.2. Household total resources from 1992 to 2002 (weighted).

Figure 4.3 depicts the mean and median trend in mortgage debt during the period of observation. Two groups of households are apparent in Figure 4.3, namely, those households with mortgage debt, versus those households without mortgage debt. In 2002 dollars, average mortgage debt has remained relatively constant. However, as seen in Table 4.8, the percentage of households with zero mortgage debt in 2002 was higher than in 1992, yet the average mortgage debt appears to be stable. As shown in Table 4.6, the average amount of mortgage debt, in real terms, for borrowing households increased substantially from 1992 to 2002.

Complementing Figure 4.3 is Figure 4.4, which shows the mean mortgage debt to assets ratio and mean mortgage debt to total resources ratio over the time period. While average mortgage debt appeared to remain constant, the ratio of mortgage debt to assets steadily declined as a result of the rising value of household assets.

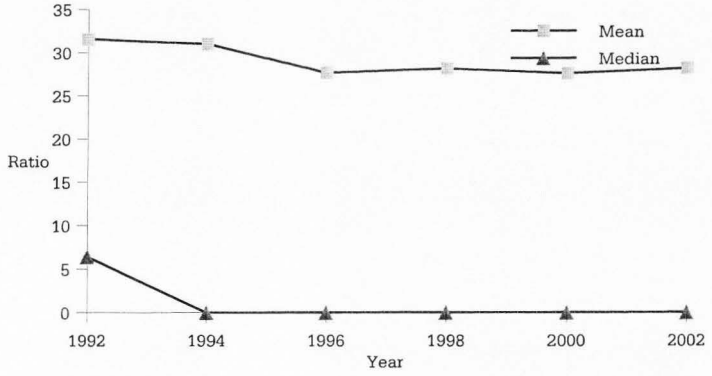

Figure 4.3. Mortgage debt (000s) from 1992 to 2002 (weighted).

In general, even households that did not pay down their mortgage debt during the time period saw their leverage ratios fall.

The trend in mortgage debt to total resources initially follows the ratio of mortgage debt to assets, however, as the sample aged and total resources were depleted more rapidly than assets were accumulated, the household began to become more leveraged. This is the opposite of the mortgage debt to assets ratio and brings to light the increasing leverage that older households take on when mortgage debt is held constant.

Figure 4.5 depicts selected age cohorts and the average amount of mortgage debt carried by each household for each year of observation. The age of the cohort was as of 1992. The amount of mortgage debt fell for each cohort during the

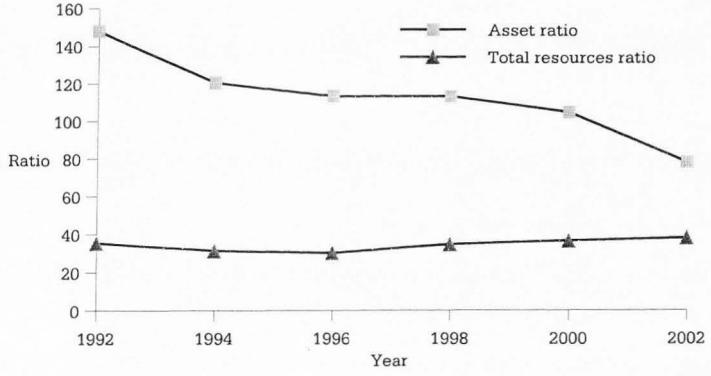

Figure 4.4. Leverage ratios (x 1,000) from 1992 to 2002 (weighted).

first years of observation. The oldest cohort's debt continued to decrease while the younger cohorts' average mortgage debt increased and decreased more sporadically over the remainder of the period. The youngest cohort consistently had the highest or near highest debt loads relative to the other cohorts while the oldest cohort consistently had the lowest amounts of mortgage debt. The differences between cohorts are consistent with the life cycle income hypothesis in that younger households carry more mortgage debt than older households.

Younger cohorts appeared to be more responsive to changes in interest rates than older cohorts. Historically low interest rates from 2000 to 2002 appeared to have motivated younger households to increase their mortgage debt in real terms. Consistent with the life cycle income hypothesis, the oldest households appeared to be less responsive to changes in interest rates than younger households. However, for

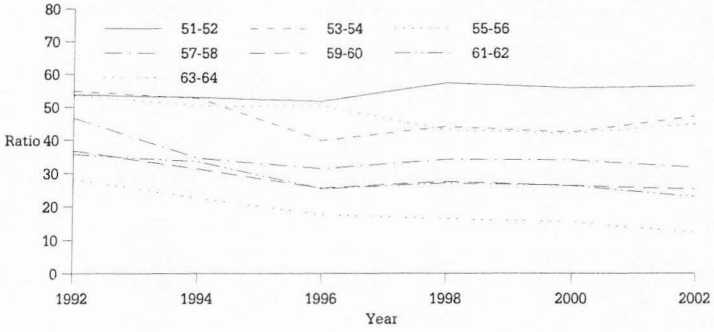

Figure 4.5. Mean housing debt (000s) by age of oldest individual in 1992 from 1992 to 2002 (weighted).

some older households the falling interest rates appeared to have slowed the rate at which mortgage debt was declining. In general, the younger cohorts increased or maintained mortgage debt holdings, while the two oldest cohorts decreased or maintained mortgage debt balances.

Comparison of Unleveraged and Leveraged Households

Independent t-*Test Results*

The sample was divided into two subgroups: those households without mortgage debt and those with mortgage debt in 1992. The creation of subgroups was repeated in 2002. Table 4.5 contains the results of the independent *t* tests comparing 1992 group means along selected continuous variables. Unleveraged households accounted for 36.10% of the total sample in 1992. Statistically significant differences existed between leveraged and unleveraged households. Leveraged households in 1992 were statistically significantly younger than unleveraged households and had statistically significantly higher household incomes, education, total resources, consumption debt, and household size than unleveraged households.

Leveraged households also experienced statistically significantly larger decreases in total resources over the subsequent period of observation. Unleveraged households reported statistically significantly higher assets. The higher income, younger age, and higher total resources of the leveraged group may be indicative of a larger percentage of the subgroup working.

Table 4.5

Results of Independent t *tests Comparing the Leveraged and Unleveraged Households by Continuous Variables in 1992 and for the Period from 1992 to 2002 (Weighted)*

	Households		
	Unleveraged	Leveraged	
	(36.10%)	(63.90%)	
	Mean	Mean	
Variable	(*SD*)	(*SD*)	*t* score
Assets (000s)	438.05	381.59	2.30*
	(693.79)	(624.85)	
Change in assets ($, 000s)	349.85	436.94	-1.79
	(1,178.80)	(1,347.36)	
Total resources (000s)	1,314.85	1,674.18	-4.68***
	(2,396.33)	(1,801.70)	
Change in total resources ($, 000s)	-151.65	-338.06	3.77***
	(1,033.58)	(1,444.38)	
Mortgage debt (000s)	0.00	69.55	-24.68***
	(0.00)	(93.43)	
1991 household income (000s)	57.06	78.55	-8.91***
	(57.98)	(67.06)	
Risky asset allocation (%)	33.43	35.40	-1.70
	(30.49)	(30.95)	
Other debt (000s)	1.72	4.17	-4.49***
	(11.93)	(15.79)	

Variable	Mean (*SD*)	Mean (*SD*)	*t* score
1992 household size	2.26	2.49	-5.80***
	(0.93)	(1.08)	
Age	58.83	56.88	11.60***
	(4.80)	(4.25)	
Education level	12.20	13.17	-10.12***
	(2.70)	(2.48)	

*$p < .05$., **$p < .01$., ***$p < .001$.

Table 4.6 compares unleveraged and leveraged households in 2002 along the same variables used in Table 4.5. In 2002, 56.06% of the sample had no mortgage debt. There were no statistically significant differences in the amount of assets held or the change in assets over the preceding period of observation between the two groups. Several of the differences observed in 1992 remained in 2002. Leveraged households continued to be statistically significantly younger and also have higher household incomes, education, and household size. In 2002, leveraged households did not have statistically significantly different total resources than unleveraged households, however, leveraged households experienced a statistically significantly larger decrease in total resources during the preceding 10 years compared with unleveraged households. Leveraged households had statistically significantly more consumer debt in 2002 than unleveraged households.

Table 4.6

Results of Independent t *tests Comparing the Leveraged and Unleveraged Households by Continuous Variables in 2002 and for the Period from 1992 to 2002 (Weighted)*

	Households		
	No debt	Debt	
	(56.06%)	(43.94%)	
	Mean	Mean	
Variable	(*SD*)	(*SD*)	*t* score
Assets (000s)	861.61	738.43	2.32*
	(1,717.49)	(1,017.10)	
Change in assets ($, 000s)	444.01	356.41	1.86
	(1,500.07)	(954.35)	
Total resources (000s)	1,264.67	1,285.25	-0.25
	(2,682.83)	(1,546.12)	
Change in total resources ($, 000s)	-123.00	-459.26	7.07***
	(1,401.45)	(1,166.65)	
Mortgage debt (000s)	0.00	79.76	-30.34***
	(0.00)	(108.65)	
2001 household income (000s)	62.11	80.41	-5.17***
	(97.72)	(96.17)	
Risky asset allocation (%)	33.98	35.60	-1.45
	(30.39)	(31.29)	
Other debt (000s)	2.53	4.37	-2.76**
	(19.12)	(17.25)	

Variable	Mean (*SD*)	Mean (*SD*)	*t* score
2002 household size	2.08	2.31	-6.93***
	(0.80)	(1.06)	
Age	58.54	56.36	13.53***
	(4.65)	(4.11)	
Education in years	12.53	13.19	-7.04***
	(2.62)	(2.53)	

*$p < .05$., **$p < .01$., ***$p < .001$.

Chi-square Tests of Independence

Similar to the analysis performed for continuous variables in 1992 and 2002, chi-square tests of independence were performed comparing unleveraged and leveraged households in 1992 and 2002 for categorical variables. The results shown in Table 4.7 are similar to those shown in Tables 4.5 and 4.6 in that statistically significant differences between unleveraged and leveraged households existed.

Leveraged households differed from unleveraged households based on their work trend over the period of observation, whether they received an inheritance during the period of observation, initial total resources, bequest expectations, self-rated health, changes in health status, changes in household size, and race. Consistent with the results presented in Table 4.5, leveraged households were more likely to be

Table 4.7

Results of Chi-Square Tests of Independence Comparing the Leveraged and Unleveraged Households by Categorical Variables in 1992 and for the Period from 1992 to 2002 (Weighted)

	Households		
	No debt	Debt	
Variable	(36.10%)	(63.90%)	χ^2, *df*
Change in mortgage debt			2,408.94***,2
Kept or borrowed	15.29	60.14	
Paid off	0.00	39.86	
No mortgage debt[a]	84.71	0.00	
Work status			98.40***, 3
Working to not working	43.31	40.27	
Not working to working	2.46	1.80	
Not working to not working	21.38	10.37	
Working to working[a]	32.85	47.56	
Initial total resources percentile			109.00***, 4
25th to 50th	24.91	24.09	
50th to 75th	21.45	24.55	
75th to 90th	10.64	15.97	
90th to 100th	5.45	12.69	
0 to 25th [a]	37.55	22.70	
Received inheritance	18.91	23.57	8.95**, 1
Likelihood of leaving an estate			21.83***, 3
Definitely	16.11	13.71	
Probably	21.11	18.39	
Possibly	17.65	15.51	

Variable	No debt	Debt	χ^2, *df*
Definitely or probably not[a]	45.13	52.39	
Initial health status			62.92***, 3
Excellent	9.91	16.64	
Very good	36.91	43.04	
Good	34.91	29.28	
Fair or poor[a]	18.27	11.04	
Change in health status			6.19*, 2
Maintained	51.59	47.71	
Improved	12.10	11.71	
Declined[a]	36.31	40.58	
Change in household size			30.26***, 2
Increased	9.91	12.22	
Decreased	23.73	31.54	
No change[a]	66.36	56.24	
Coupled status			1.61, 2
Single female	17.09	15.31	
Single male	5.45	5.60	
Married[a]	77.45	79.10	
Race			17.30**, 3
African American	5.18	7.76	
Hispanic	5.09	3.29	
Other	1.18	2.26	
White[a]	88.55	86.70	

[a] Reference category.

*$p < .05$., **$p < .01$., ***$p < .001$.

working in 1992 and 2002 than unleveraged households. Higher proportions of unleveraged households reported not working in both 1992 and 2002.

Statistically significant differences in initial total resources also distinguished the two groups. Consistent with results from Table 4.5, higher proportions of leveraged households were observed in the highest two total resources percentile brackets, whereas, larger proportions of unleveraged households were observed in the lowest percentile category. Leveraged households were much more likely than unleveraged households to have received an inheritance during the time period. Expectations to leave a sizable estate were higher among unleveraged households

Higher percentages of leveraged households reported "Excellent" or "Very Good" health as well as experiencing a decline in health over the period. The number of individuals in a household was less stable among leveraged households than unleveraged households during the period of observation with larger proportions of leveraged households experiencing an increase or decrease in household size relative to unleveraged households. Higher percentages of Hispanics and non-Hispanic Whites were observed in the unleveraged group while African Americans and Other races were over represented among leveraged households.

Several of the difference in categorical variables that were observed in 1992 between leveraged and unleveraged households continued to be observable in 2002. Table 4.8 presents the results of chi-square tests of independence on the same categorical variables in 2002. Statistically significant difference remained in work status trends, initial total resources, bequest expectations, health status, changes in

household size, and race. Looking back over the period from 2002, statistically significant differences in coupled status were also observable with higher percentages of single households categorized as unleveraged and married households belonging to the leveraged group.

Over half of the leveraged households in 2002 reported working in 1992 and 2002 and only 33.90% of unleveraged households were working in 1992 and 2002. Leveraged households were more likely to be working than unleveraged households. Complementing the household's work status was its ability to work. Higher proportions of leveraged households continued to report "Excellent" or "Very Good" health relative to unleveraged households.

Similar to differences observed in 1992, larger proportions of leveraged households belonged to higher initial total resources percentiles than unleveraged households. This was largely a result of leveraged households being much more likely to be working compared to unleveraged households, thus having higher present values of future earnings. While leveraged households generally had greater total resources, bequest expectations were more likely to be higher among unleveraged households.

Leveraged households remained more fluid than unleveraged households with higher proportions reporting changes in household size over the period. Statistically significant differences in the racial and ethnic composition of leveraged and unleveraged households remained in 2002. African Americans and Other households

Table 4.8

Results of Chi-Square Tests of Independence Comparing the Leveraged and Unleveraged Households by Categorical Variables in 2002 and for the Period from 1992 to 2002 (Weighted)

	Households		
	No debt	Debt	
Variable	(56.04%)	(43.96%)	χ^2, *df*
Change in mortgage debt			3,046.00***, 2
Kept or borrowed	0.00	100.00	
Paid off	45.46	0.00	
No debt[a]	54.54	0.00	
Work status			123.59***, 3
Working to not working	46.43	34.88	
Not working to working	1.76	2.39	
Not working to not working	17.92	9.86	
Working to working[a]	33.90	52.88	
Initial wealth percentile			100.92***, 4
25th to 50th	27.05	20.99	
50th to 75th	22.72	24.35	
75th to 90th	10.71	18.30	
90th to 100th	7.20	13.82	
0 to 25th [a]	32.32	22.55	
Received inheritance	21.49	22.40	0.37, 1
Likelihood of leaving an estate			12.07*, 3
Definitely	15.47	13.45	
Probably	20.21	18.31	
Possibly	16.81	15.62	

Variable	No debt	Debt	χ^2, *df*
Definitely or probably not[a]	47.51	52.62	
Health status in 2002			21.57***, 3
Excellent	4.34	6.27	
Very good	30.70	34.80	
Good	41.42	41.22	
Fair or poor[a]	23.55	17.70	
Change in health status			3.37, 2
Maintained health	50.15	47.80	
Health improved	12.24	11.35	
Health declined[a]	37.61	40.85	
Change in household size			50.93***, 2
Increased	10.60	12.41	
Decreased	24.06	34.68	
No change[a]	65.34	52.91	
Coupled status			6.92*, 2
Single female	16.04	15.83	
Single male	6.50	4.33	
Married[a]	77.46	79.84	
Race			16.52**, 3
African American	5.51	8.51	
Hispanic	3.93	3.96	
Other	1.35	2.46	
White[a]	89.22	85.06	

*$p < .05$., **$p < .01$., ***$p < .001$.,

were over represented among leveraged households relative to unleveraged households.

Based on the results of independent *t* tests and chi-square tests there were statistically significant differences between leveraged and unleveraged households. The general difference between the two groups was that greater proportions of leveraged households were working in 1992 and 2002 than unleveraged households. This observation was supported by the differences in earned income, work status trends, age, total resources, and changes in total resources. However, with respect to asset holdings and changes in assets the findings were mixed. Subgrouping households based on mortgage debt status in 1992 resulted in no statistical differences in assets or subsequent changes in assets. In contrast, subgrouping households based on 2002 mortgage debt status and looking back, unleveraged households had statistically significantly higher assets, however, there was no statistical difference in the change in assets between the two groups.

Robust Regression Results

The results of the robust regression analysis were mixed. The results of the logit model used to control for non-random attrition leading to sample selectivity bias are reported in Table 4.9. The results of the logit model were then incorporated into the robust regression models by way of the independent variable lambda. Based on lambda's significance in the first model, sample selectivity bias was present in the

model and was corrected. Standard errors of the estimated coefficients were adjusted to reflect the inclusion of lambda and the robust weights in the models.

Table 4.9

Logistic Regression Results used to Control for Sample Selectivity Bias (sample attrition) from 1992 to 2002 (n = 5,869)

Variables	*B*	*SE B*
Married or partnered	0.238***	0.066
Children at home	0.035	0.030
Age of individual, or oldest spouse, in 1992	-0.036***	0.006
Poor health	-0.450***	0.070
Received welfare assistance in 1991	-0.331	0.172
Region of residence		
Northeast	0.008	0.077
Midwest	0.149*	0.068
West	0.170*	0.080
South[a]		
Race		
Black or African American	-0.252**	0.079
Hispanic	-0.428***	0.106
Other	-0.730***	0.186
Non-Hispanic White[a]		
Constant	2.06***	0.326
χ^2	180.31***	
-2 log likelihood	7,945.11	

[a]Reference category. *$p < .05$., **$p < .01$., ***$p < .001$.

Table 4.10 presents the results for the estimated model for absolute changes in household assets. The first column of numbers in Table 4.10 is the estimated coefficient and significance obtained using OLS regression. The next three columns report the estimated model using robust regression. Both models were presented so that differences in the two models can be observed. The reported R^2 value is only applicable to the OLS results. The R^2 value for robust regression is not directly comparable to OLS results and was not reported.

Keeping or incurring mortgage debt, relative to households that did not have a mortgage over the period, was statistically significant and negatively related to changes in assets. Households that kept their mortgage debt or incurred new mortgage debt had assets decline $62,850 compared to households without mortgage debt in 1992 and 2002, all other factors held constant. Neither initial mortgage debt, or the square of initial mortgage debt were statistically significant. Paying off mortgage debt during the period was not statistically different from not having a mortgage during the period.

Total household income in 1992 was statistically significant and positively related to changes in total household assets. Beginning the period with one or more respondents working and ending the period with all household respondents retired, compared to households that began and ended the period working, was statistically significant and positively related to changes in assets.

Receiving an inheritance, relative to not receiving an inheritance, was positively associated with changes in assets. The household's initial total resources

Table 4.10

Robust Regression Results for the Change in Household Assets from 1992 to 2002 (n=2,770)

	OLS	Robust		
Variables	*B*	*B*	*SE B*	*t* score
Household leverage				
1992 debt ratio (x 1000)	-0.17	0.06	0.43	0.17
Change in ratio[a]				
Paid off	-2.25	-26.81	19.24	-1.38
Kept or borrowed	-168.83*	-62.85	18.89	-3.31**
1992 debt ratio squared	0.00	0.00	0.00	-0.08
Income and work				
1991 income (in 000s)	1.16*	0.78	0.18	4.39***
Work status (working to working[a])				
Working to not working	100.88	60.04	14.40	4.16***
Not working to working	81.39	32.52	41.16	0.78
Not working to not working	166.39	36.65	20.92	1.77
Initial wealth and portfolio				
1992 total resources (0 - 25th [a])				
25th - 49th	-2.15	-6.27	18.15	-0.34
50th - 74th	40.41	10.10	20.14	0.51
75th - 89th	65.95	27.62	24.84	1.11
90th - 100th	277.70*	58.32	32.05	1.81
Risky assets to total assets	-0.15	-0.11	0.27	-0.42
1992 other debts (in 000s)	6.66***	-0.61	0.46	-1.30
Inheritance				
Received inheritance	76.54	40.36	15.99	2.51*

Variables	OLS	Robust		
	B	*B*	*SE B*	*t* score
Leave estate (not likely[a])				
Definitely	157.19	22.34	19.10	1.15
Probably	111.18	18.53	16.79	1.10
Possibly	47.23	-4.70	17.48	-0.28
Health				
1992 health (fair or poor[a])				
Excellent	-0.99	-13.93	33.19	-0.42
Very good	-80.94	4.68	27.85	0.16
Good	-58.84	-20.82	24.58	-0.85
Change in health (declined[a])				
No change	53.58	29.90	14.77	2.00*
Improved	80.02	11.49	22.83	0.49
Demographics				
1992 household size	-45.42	-9.22	9.32	-0.99
Change in size (constant[a])				
Increased	-18.88	8.26	19.16	0.44
Decreased	45.60	17.10	19.19	0.89
Age	3.96	3.92	2.34	1.67
Education	24.42*	13.52	3.37	3.99***
Interactions				
Debt ratio X education	-0.02	0.00	0.01	-0.12
Debt ratio X income	0.00	0.00	0.00	0.19
Debt ratio X risk	0.00	0.00	0.00	2.62**
Debt ratio X age	0.01	0.00	0.01	0.11

Variables	OLS	Robust		
	B	*B*	*SE B*	*t* score
Coupled status (married[a])				
Single female	-90.52	-17.48	23.03	-0.76
Single male	-85.45	37.89	33.42	1.14
Race (Non-Hispanic White[a])				
African American	8.71	4.68	22.42	0.20
Hispanic	-41.74	-11.03	31.96	-0.35
Other	177.84	38.53	58.86	0.64
Lambda	-730.23	-250.45	106.76	-2.34*
Model constant	261.13	-106.54	122.21	-0.86

Note. $R^2 = .052$ is the model fit for the OLS model using unweighted data. The corresponding F statistic, $F = 3.92$***, is also associated with the OLS results. Corresponding statistics are not reported for the robust model.

[a]Reference category.

*$p < .05$., **$p < .01$., ***$p < .001$.

percentile categorization was not statistically significantly associated with changes in assets in the robust model nor was a household's allocation to risky assets.

Initial health status was not a statistically significant variable in the estimated model. However, change in health status was statistically significant and was substantially related to changes in assets. Experiencing constant health in 1992 and 2002, relative to declining health was positively associated with changes in assets. Households with constant health reported a $29,900 greater increase in assets than

households with declining health. Education was also statistically significant and substantially related to changes in assets. Each additional year of schooling increased changes in assets by $13,520, all other things equal.

The interaction between the ratio of mortgage debt to total assets and the households risky asset allocation was positive. This was consistent with the theoretical model in that households can potentially earn higher rates of return than the interest rate charged on mortgage debt and would experience a positive net increase in wealth.

The following model was estimated for the absolute change in total resources, Table 4.11, for the period of observation. Consistent with the previous results, keeping or incurring mortgage debt during the period, relative to not having mortgage debt, was negatively associated with changes in total resources. Also consistent with the previous model, neither the initial leverage ratio, or square of the initial leverage ratio were statistically significant. Households eliminating mortgage debt during the period were not statistically different from households without mortgage regarding changes in total resources for the period.

Belonging to a household that began the period working and then stopped working prior to 2002, relative to those households working in both 1992 and 2002, was positively associated with changes in total resources. Not working in 1992 or 2002, relative to households that were working in 1992 and not working in 2002, was positively associated with changes in total resources. This is a reflection of the

Table 4.11

Robust Regression Results for the Change in Household Total Resources from 1992 to 2002 (n = 2,770)

	OLS	Robust		
Variables	*B*	*B*	*SE B*	*t* score
Household leverage				
1992 debt ratio (x1000)	0.51	0.04	129.92	0.09
Change in ratio[a]				
Paid off	25.37	-12.78	20.45	-0.62
Kept or borrowed	-168.02*	-47.70	20.13	-2.36*
1992 debt ratio squared	0.00	0.00	0.00	1.53
Income and work				
1991 income (in 000s)	-0.88	-0.10	0.20	-0.50
Work status (working to working[a])				
Working to not working	122.17*	122.67	15.31	8.00***
Not working to working	144.02	81.31	45.07	1.80
Not working to not working	267.95***	164.22	22.45	7.31***
Initial wealth and portfolio				
1992 total resource (0 - 25th [a])				
25th - 49th	-219.88**	-209.64	19.42	-10.80***
50th - 74th	-319.02***	-385.06	21.65	-17.80***
75th - 89th	-585.83***	-658.13	26.26	-25.07***
90th - 100th	-1,178.76***	-962.44	34.15	-28.13***
Risky assets to total assets	1.46	0.93	0.28	3.27**
1992 other debts (in 000s)	8.38***	-0.02	0.49	-0.05
Inheritance				
Received inheritance	72.01	37.40	16.98	2.21*

Variables	OLS	Robust		
	B	*B*	*SE B*	*t* score
Leave estate (not likely[a])				
Definitely	218.19**	52.33	20.36	2.56*
Probably	94.56	61.83	17.90	3.45**
Possibly	104.40	16.31	18.60	0.87
Health				
1992 health (fair or poor[a])				
Excellent	-30.85	-54.14	35.53	-1.53
Very good	-108.16	-33.22	29.83	-1.11
Good	-88.13	-50.66	26.42	-1.92
Change in health (declined[a])				
No change	21.71	23.66	15.68	1.51
Improved	29.54	18.67	24.21	0.77
Demographics				
1992 household size	-45.33	-4.82	10.02	-0.47
Change in size (constant[a])				
Increased	11.80	6.84	20.60	0.33
Decreased	22.90	-3.21	20.45	-0.16
Age	2.76	2.64	2.50	1.05
Education	32.01**	13.01	3.61	3.59***
Interactions				
Debt ratio X education	-0.05	-0.02	0.01	-2.14*
Debt ratio X income	0.00	0.00	0.00	-1.98*
Debt ratio X risk	0.00	0.00	0.00	0.44
Debt ratio X age	0.00	0.00	0.01	0.44

Variables	OLS	Robust		
	B	*B*	*SE B*	*t* score
Coupled status (married[a])				
Single female	-2.58	49.36	24.82	2.00*
Single male	-86.40	5.87	36.13	0.17
Race (Non-Hispanic White[a])				
African American	-47.61	-39.36	24.21	-1.62
Hispanic	14.94	-13.20	34.55	-0.39
Other	256.44	122.81	62.86	1.96
Lambda	-588.70	-130.08	114.91	-1.13
Model constant	-53.81	-346.01	129.92	-2.66**

Note. $R^2 = .104$ is the model fit for the OLS model using unweighted data. The corresponding F statistic, $F = 8.353$***, is also associated with the OLS results. Corresponding statistics are not reported for the robust model.

[a]Reference category.

*$p < .05$., **$p < .01$., ***$p < .001$.

growth of household assets over the period since non-working households in 1992 had little or no portion of total resources derived from future earnings. Having initial total resources in any percentile other than the 0 to 25th was negatively related to both percent and absolute changes in total resources, largely reflecting the greater initial potential for decreases in total resources.

The household's allocation of non-housing assets to risky investments was positively related to changes in total resources available to the household. However,

the estimated effect of risky asset allocation on changes in total resources was relatively small.

Receiving an inheritance, relative to not receiving an inheritance was positively associated with changes in total resources, and based on the robust regression estimates increased total resources by $37,400, all other factors being equal.

Similarly, bequest expectations were also statistically significantly associated with changes in total resources. Compared to households that thought it unlikely that they would leave a sizeable estate to their heirs, households definitely and probably expecting to leave a sizable estate were positively related to changes in total resources.

Education was also positively associated with changes in total resources. A one unit increase in the highest year of schooling completed resulted in an increase in total resources over the 10-year period of $13,010, based on the estimated robust coefficient.

The combination of the leverage ratio and education was negatively associated with changes in total resources, while the interaction of the leverage ratio and income was positively associated with changes in total resources. These results are partially consistent with Maki's (1995) findings in that high-income households did benefit from the use of mortgage debt. However, Maki noted that it was particularly highly educated high-income households that showed the greatest likelihood of maximizing the associated tax benefits of mortgage debt. In this study, the negative association between the combination of the leverage ratio and education is inconsistent with other

studies. Being a single female household, compared to married households, was negatively associated with changes in total resources.

Table 4.12 presents in summary form the hypothesized and expected results for each variable. The initial leverage ratio and square of the initial leverage ratio were not significant in the model, thus no support was found for tradeoff theory in households. The combination of household leverage with other variables, specifically risky asset allocation and income, were consistent with the hypothesized results and supported the life cycle income hypothesis. The effects of the combined variables were consistent with the Equations 1.8 and 1.11. Both equations were derived from the life cycle income hypothesis. Based on these results the life cycle income hypothesis appeared to dominate tradeoff theory in explaining household leverage.

Table 4.12

Hypothesized and Actual Results for Changes in Assets and Total Resources Using Robust Regression (n = 2,770)

	Assets		Total resources	
Variable	Hypoth.	Actual	Hypoth.	Actual
Household leverage				
1992 debt ratio (x 1000)	+	0	+	0
Change in ratio[a]				
Paid off	-	0	-	0
Kept or borrowed	+	-	+	-
1992 debt ratio squared	-	0	-	0
Income and work				
1991 income (in 000s)	+	+	+	0

Variable	Assets		Total resources	
	Hypoth.	Actual	Hypoth.	Actual
Work trend (working: working[a])				
Working: not working	+	+	-	+
Not working: working	-	0	+	0
Not working: not working	-	0	+	+
Initial wealth and portfolio				
1992 total resources (0 - 25th [a])				
25th - 49th	+	0	+	+
50th - 74th	+	0	+	+
75th - 89th	+	0	+	+
90th - 100th	+	0	+	+
Risky assets to total assets	+	0	+	+
1992 other debts (in 000s)	-	0	-	0
Inheritance				
Received inheritance	+	+	+	+
Leave estate (not likely[a])				
Definitely	+	0	+	+
Probably	+	0	+	+
Possibly	+	0	+	0
Health				
1992 health (fair or poor[a])				
Excellent	+	0	+	0
Very good	+	0	+	0
Good	+	0	+	0
Change in health (declined[a])				

Variable	Assets		Total resources	
	Hypoth.	Actual	Hypoth.	Actual
Constant	+	+	+	0
Improved	+	0	+	0
Demographics				
1992 household size	-	0	-	0
Change in size (constant[a])				
Increased	-	0	-	0
Decreased	+	0	+	0
Age	+	0	-	0
Education	+	+	+	+
Interactions				
Debt ratio X education	+	0	+	-
Debt ratio X income	+	0	+	+
Debt ratio X risk	+	+	+	0
Debt ratio X age	-	0	-	0
Coupled status (married[a])				
Single female	-	0	-	-
Single male	-	0	-	0
Race (Non-Hispanic White[a])				
African American	-	0	-	0
Hispanic	-	0	-	0
Other	-	0	-	0

[a]Reference category.

Retained or incurred mortgage debt during the period of observation, relative to not having mortgage debt, had a consistent negative effect on changes in assets and

total resources. The initial leverage ratio and square of the initial leverage ratio were not statistically significant in either of the models. The effect of eliminating mortgage debt, relative to not having mortgage debt, on changes in assets and total resources was not statistically different from zero.

CHAPTER 5

DISCUSSION AND IMPLICATIONS

Discussion of Results

Comparison of Leveraged and Unleveraged Households

Leveraged and unleveraged households were statistically significantly different from each other in several aspects in 1992 and 2002. A key distinguishing factor of the two groups was their apparent work status and human capital. In 1992, leveraged households had higher earned income, education, and total resources. Consistent with Grossman's (1973) findings regarding health and work, a larger proportion of the leveraged households were working in 1992 and 2002 and also reported higher levels of self-rated health. This contributed to the higher amount of total resources among leveraged households.

The leveraged households in 1992 and 2002 were also statistically significantly younger, which gave them more time to work and accumulate resources, they also had larger households. The younger age and larger household size of the leveraged households are consistent with the life cycle income hypothesis, as well as the findings of Hanna and Rha (2000) and Chen and Jensen (1985). The leveraged households, as a result of their larger initial total resources and human capital, experienced a much larger reduction in total resources over the 10 years than unleveraged households. However, the more abundant human capital among the leveraged households provided them with resources which could be converted to

financial capital. While the potential existed for greater savings among the leveraged group, there was no statistically significant difference in the change in assets between leveraged and unleveraged households.

The younger cohorts in this study appeared to be carrying more mortgage debt in real terms later into life than earlier cohorts. Historically low interest rates and rapidly appreciating home prices may have contributed to this. Another factor could have been that younger households are not as conservative as their older counterparts regarding debt. A greater willingness may have been prevalent among the younger households in the sample to carry debt into retirement rather than eliminate it. As the definition of retirement is continuously changing, younger households may have anticipated a longer working life, and therefore may have been more willing to maintain or even increase their mortgage debt later in life.

In 1992, the receipt of an inheritance during the observed period was more likely to be among the leveraged households, while unleveraged households were more likely to expect to leave a sizable estate. Looking back over the period of observation in 2002 and categorizing the households based on leverage status in 2002, there was no statistically significant difference between the two groups regarding the receipt of an inheritance or the household's expectation to leave a sizable estate.

One possible explanation of the lack of difference between the two groups in 2002 with regards to mortgage debt, could be that inheritance monies were used to pay off housing debt. Some households holding mortgage debt in 1992 were perhaps borrowing against the expected proceeds of an anticipated inheritance. Such

households, after receiving the anticipated inheritance, then eliminated their debt holdings. These households, in the absence of the expected inheritance may have chosen to hold no mortgage debt during the period of observation. Similarly, the anticipated inheritance may also have served as the expected bequest among this group of households. Further research would be necessary to determine whether this was the case.

Unleveraged households were also more likely to expect to leave a sizable inheritance to their heirs. The unleveraged house represents a large non-liquid asset that can be bequeathed to heirs during life or upon death. This finding was consistent with Kao and colleagues' (1997) finding that households with non-liquid assets were more likely to expect to leave an inheritance.

Initially there was a cultural difference in carrying mortgage debt; Hispanic households were more likely to be unleveraged. However, by the end of the observation period, African Americans were over represented among leveraged households.

The results were also consistent with Maki's (1995) findings that more educated higher earners were more likely to incur home mortgage debt because of its tax advantages. In this study, leveraged households had substantially higher household income than unleveraged households. Higher income generally results in higher tax rates for an individual thus the deduction of mortgage interest on personal income taxes would also be of greatest benefit to those individuals with the highest tax rates. The combination of mortgage debt and income was positively related to

changes in total resources in the robust regression model–all other things equal, mortgage debt was advantageous in preserving total resources for high income households.

The statistically significant difference in consumer debt in 1992 and 2002 may suggest a greater preference for current period consumption among leveraged households. In 1992 and 2002 leveraged households had statistically significantly more consumer debt than unleveraged households. Greenspan's (2003) delineation of the uses of extracted home equity indicates that a large amount of mortgage debt was used for current consumption. If mortgage debt was being used for consumption during the period, the observed negative relation between keeping or incurring mortgage debt and changes in assets and total resources would be expected.

In light of all of the differences taken together, the major underlying divergence between leveraged and unleveraged households appears to be work status and human capital of the household. Those households still working were more inclined to be leveraged via mortgage debt than those households which were not working, or stopped working, and have relatively lower amounts of human capital and total resources.

Estimated Regression Models

The estimated models for changes in assets and total resources provided no support for tradeoff theory when explaining household leverage. Neither the initial leverage ratio nor the square of the initial leverage ratio were significant in either of

the estimated models. A positive and concave relation between mortgage debt levels and changes in wealth was not supported by the findings.

Support was found for the life cycle income hypothesis. The life cycle income hypothesis in its simplest form states that households will dissave or borrow when young, save in middle age, and then dissave in old age. The results of the comparative statistics and estimated regression models support the idea that households generally borrow and repay debt in accordance with work and life patterns. While there were positive benefits derived by some subgroups with mortgage debt, in general households were better off when borrowed funds were repaid rather than maintained, in order to potentially accumulate other forms of assets. In this study the life cycle income hypothesis was dominant over tradeoff theory.

Based on the estimated regression model's results, when controlling for other factors, keeping or incurring mortgage debt had a negative impact on changes in assets and total resources, compared to not having mortgage debt. Household leverage in combination with other variables, such as income or risk tolerance, was positively associated with changes in assets and total resources. Households which paid off their mortgage debt during the observed period did not experience changes in total resources or assets statistically significantly different from households that did not hold mortgage debt during the period. In other words, those households in the sample working towards eliminating mortgage debt experienced statistically similar results to those households that did not have any mortgage debt.

Initial mortgage debt was not a statistically significant variable in either of the models. However, what households did with their mortgage debt over the subsequent 10 year period appears to have been the important factor relating to mortgage debt. Households that paid off their mortgage experienced changes in assets and total resources statistically similar to those households that did not have a mortgage during the period. Households that did not eliminate their mortgage debt during the period experienced less favorable changes in assets and total resources, relative to those households that did not have any mortgage debt during the period. This is an encouraging and important finding for consumers, financial educators, and other financial planners working with clients who wish to eliminate their mortgage debt.

In general, household leverage appeared to be negatively associated with changes in assets and total resources. However, household leverage, when combined with an additional variable, had a positive association with wealth gains. High-income households with mortgage debt experienced positive benefits from mortgage debt relating to changes in total resources. Similarly, the combination of household leverage and the household's allocation of assets to risky investments (ownership investments) had a positive relation with changes in assets. These positive relations were consistent with the theoretical model illustrating the marginal benefits of tax-advantaged mortgage debt and leveraged risky investments. The positive benefits of the interaction variables contrast the negative association of keeping or incurring mortgage debt relative to not having mortgage debt. This contrast underscored the

caution that should be exercised when using mortgages to potentially earn greater financial gains.

In general for this particular sample, households would have preserved or increased assets and total resources best by having no mortgage debt, rather than be leveraged over the period of observation. Exceptions to this were high-income or more risk-tolerant households that also held mortgage debt. This conclusion was arrived at after observing a period of exceptional gains in the financial markets. Periods of less robust growth in the financial markets would likely result in similar and more pronounced results.

The empirical findings of this study regarding mortgage debt and changes in assets and total resources were consistent with the hypothetical findings of Waggle and Johnson (2003). Waggle and Johnson recommended that households' portfolio decisions should consider mortgage debt, and that for moderately risk averse households, the optimal allocation to stocks would be substantially less for households with mortgage debt. Waggle and Johnson also conclude that households without mortgage debt would be best served by remaining debt-free and not borrowing against their home for investment purposes.

Education was statistically significant in both estimated models and has a very substantial effect on changes in assets and total resources. The substantial influence that education has on changes in wealth is consistent with human capital theory (Bryant, 1990). The education variable may also be capturing other latent characteristics of the household as well, such as: type of occupation, household health

behaviors, financial knowledge, and preferences. Educated households may be more likely to have less labor intensive jobs allowing them to continue in their jobs later into life. Similarly, health knowledge and behaviors may be more in line with recommended health practices, providing them better objective health status than households with less formal education. And finally, education may also influence the household's knowledge and effectiveness regarding financial decisions and preferences that result in positive changes in household assets.

There was a statistically significant relation between the interaction of education, mortgage debt, and changes in total resources. Contrary to hypothesized results and implications drawn from Maki's (1995) results, the relation was negatively associated with changes in total resources. The negative relation suggests that without the presence of an enabling household characteristic such as higher income or higher risk tolerance, which were controlled for, the combination of mortgage debt and education was the same as keeping or incurring mortgage debt over the period of observation.

This study provided some limited support for the health and wealth connection. Only the estimated model for the change in assets indicated that changes in health status have an effect on changes in assets. The positive relation between having constant health and changes in assets, relative to households that reported decreased health, is consistent with the health-wealth connection. Changes in health were not statistically significant in the estimated model for changes in total resources. The insignificance of health-related variables in the second model may partly have

been a result of how total resources were estimated. Actual, rather than expected, earnings over the period of observation were used to calculate the present value of future earnings. If a household member experienced a loss of health which reduced their earning capacity over the observed time period, a reduction in total resources should also have been seen, assuming the loss of health was unforseen by the household. However, since actual earnings were used over the ten-year period, changes in earnings were treated as known at the beginning of the period, masking the effect of declining or improving health.

The trend in work status reflected the household's decision to retire or exit the labor market, reenter the labor market, or continue as retired, relative to those households that continued to participate in the labor force. Exiting the labor market by disability or retirement during the period of observation, or remaining retired during the period, relative to households that remained working during the period of observation, was positively related to changes in assets and total resources. The positive relation suggested that working households that later exited the labor market were effective in converting human capital to financial or real capital. The conversion of human capital to financial capital resulted in an overall increase in total resources available to the household, even though the household's human capital, as measured by the present value of future earnings, had decreased significantly.

Similarly, households that began and ended the period as retired had little, if any human capital, as measured in earned income, that would be lost over the period of observation. A chart depicting the change in total resources of retired households

would likely look more similar to the chart shown in Figure 4.1, than that shown in Figure 4.2. Strong financial markets over the period of observation contributed to the positive relation to changes in total resources enjoyed by this group.

Based on these results, households similar to those in this study would have been better off to pay off their mortgage debt, rather than use it as financial leverage for investment purposes. Generally, households appeared to be ineffective in leveraging themselves for investment or financial gains. Debt appeared to be more a function of life cycle stage–younger, working, larger households–than of financial leverage for investment purposes. An exception to the general finding was that high-income and more risk-tolerant households with mortgage debt appeared to experience larger increases in total resources and assets, respectively, than did unleveraged households.

From the standpoint of maximizing resources, maintaining mortgage debt did not appear to be the best alternative for most households. However, for certain households mortgage debt was beneficial and enhanced increases in assets and total resources. While the use of mortgage debt for investment capital had the potential to increase total resources, the household may have derived greater satisfaction from using the mortgage proceeds for consumption, given their preferences and expectations.

Implications

Some key implications for consumers and financial professionals working with clients can be drawn from the results. Most notable is that consumers and professionals working with most consumers nearing retirement can have some confidence that mortgages should be eliminated from the household's portfolio rather than maintained. Households appear to be ineffective in using leverage to achieve greater asset gains. However, for more risk-tolerant and higher-income households mortgage debt may help to maximize resources available for retirement. Financial professionals should refrain from making general recommendations, such as in books or popular press literature or on radio or TV talk shows, that would encourage the average household to keep mortgage debt rather than eliminate it.

Results of empirical studies cannot be applied to specific individuals. Consequently consumers and financial professionals working with them should carefully evaluate the client's risk tolerance and capacity to successfully leverage their portfolios, and a decision should be made based on specific analysis of the situation. As with the results of any empirical research, exceptions exist. However, the decision to use mortgage debt for investment purposes should be carefully analyzed.

Consumers and financial professionals working with clients should also consider how much of the borrowed funds would be used for investment purposes, rather than consumption, and how those funds would be invested. The most appropriate expected rates of return for comparison would be the individual's own experienced return, based on their asset allocation mix. Hypothetical returns on

portfolios not currently utilized by the individual should not be used in the comparison of alternatives.

While not included in this study, some implications may be drawn relating to the Baby Boomers. First, younger cohorts in the study appeared to be carrying more mortgage debt; Baby Boomers may follow that same trend and continue to carry more mortgage debt later into life. Second, Baby Boomers may be more comfortable with the responsibility of managing their own assets in a 401(k) plan and consistent with Engen and Gale's (1997) findings, may leverage their 401(k) accounts with mortgage debt. Third, given increasing life expectancies, the concept of retirement continues to change, particularly for Baby Boomers who have time to plan and make arrangements for self-defined retirement. Thus, historical work patterns may no longer be relevant to the Baby Boomers and the rapid decrease in human capital, as measured by the present value of future earnings, may not be as pronounced in their cohort. Based on the results of this study, working households were more likely to carry mortgage debt and if Baby Boomers adapt a retirement concept that includes some work, mortgage debt may be maintained much later in life.

Policy implications derived from this analysis regarding mortgage debt and its favorable tax status are limited largely because of the restricted nature of the sample. However, some implications can be noted. Mortgage debt in the near-retirement population is associated with negative changes in wealth. To promote self-sufficiency among all households, particularly among those nearing or in retirement, policies should encourage households to eliminate mortgage debt prior to retirement.

Under current tax policy, deductibility of mortgage interest may be an incentive to hold mortgage debt (Dunsky & Follain, 2000; Maki, 1995; Stango, 1999). If the tax code discrepancies in the treatment of consumer versus mortgage debt were eliminated, households might reduce their overall debt portfolios. The elimination of incentives, or subsidies, for mortgage debt may be a strong motivation for households to reduce mortgage debt. Consistent with other studies, this study found that high-income households were more likely to carry mortgage debt than lower income households. This study also found that high-income households and households with greater allocations to risky assets derive positive benefits of mortgage debt regarding changes in wealth.

While the elimination of subsidies for mortgage interest may discourage mortgage debt in general, it may also make home ownership a more difficult goal to achieve for some households. Bourassa and Grigsby (2000) discussed the impact that eliminating the deductibility of mortgage debt would have on home ownership rates, housing starts, and housing prices. They concluded that a phase out period of 15 to 20 years would be sufficient to minimize or reduce any adverse effects of the policy change. Furthermore, they argued that because high-income households are the main beneficiaries of the mortgage interest deduction, it is unlikely that lower income households, who have itemized expenses generally below the standard deduction, gain much if any marginal benefit from mortgage interest deductions.

Because of the small effect mortgage interest deductibility has on home ownership rates, the concentration of benefits among higher income households, and

the negative relation between mortgage debt and wealth growth, policymakers should seriously reconsider the appropriateness of the mortgage interest deduction. Drawing from this study's findings, a diminishing incentive, or deductibility of mortgage interest, that would offer the benefits of mortgage interest deductibility in the early years of home ownership when the interest expenses are the largest, and then gradually decrease to zero in later years of home ownership, would assist younger home owners in acquiring and maintaining a home. A diminishing incentive would also discourage older home owners from keeping mortgage debt because of artificial, and perhaps unusable, incentives.

Implementations of such policies are unlikely because they have the drawback of adding additional complexities to an already overwhelming tax code. Additionally, such policy changes would surely be opposed by significant political interest groups, such as the banking and real estate industries, which regularly include the potential tax benefits of mortgage interest deductions in advertising and loan solicitation material. Furthermore, because of the entrenched status of the mortgage interest deduction in the tax code, any attempt to change it would require a long and dedicated political battle.

Limitations

There are several limitations of this study. First, the study is not generalizable beyond the population of 51- to 61-year-olds in 1992. Second, while the HRS data contains a representative sample of 51- to 61-year-olds and their households residing

in the U.S. in 1992, the sub-sample used for this study does not. Specifically, this study used only households that did not experience a change in marital status during the period of observation and that owned a home in 1992. Furthermore, the resulting sample, even after applying the HRS provided weights, was not representative of African American and Hispanic households. Because of this limitation, conclusions drawn relative to African American and Hispanic households may not be reliable nor representative of the total population. Even among the remaining sample, non-Hispanic White households are over represented relative to their proportions in the overall population. Generalizations beyond the sample population, particularly to African American and Hispanic households should be avoided as a result of the demographically non-representative sample.

While the study examined the effects of mortgage debt on wealth, and how it was managed, there is no assurance that the households in the sample consciously made the choice of whether they would carry mortgage debt or not. Furthermore, while some attempt was made to distinguish between households that carried mortgage debt for consumption versus investment purposes, no clear distinction could be achieved, either because one did not exist, or the proxy variable was not adequate in isolating the effects.

The original HRS sample, as well as each subsequent sample wave, contains household weights that, when applied, generate a nationally representative sample. Household weights in this study were applied for descriptive and comparative statistics; however, HRS provided weights were not applied to the OLS regression

analysis. Separate weights were estimated for the robust regression analysis based on the ending sample's characteristics. HRS weights were not used in the regression analysis because the ending sample was not randomly selected from the original sample. Because of this, original sample weights may no longer accurately reflect a nationally representative sample. The use of robust regression techniques in the data analysis effectively weighted the data on the basis of changes in assets or total resources, with extreme cases receiving a lower overall weight. The robust weights may be different from those provided with the HRS data.

The original sample was also unique because defined contribution plans were becoming more popular among employers during the period of observation, since the risks associated with retirement income were transferred to the employees. Prior to this point, the traditional defined benefit pension plan was the norm. Under the defined benefit pension plan individuals did not need to be knowledgeable about investments and other financial topics in order to ensure adequate resources at retirement. However, with the increasing popularity of defined contribution plans, employees were forced to learn about investment related topics or naively participate in their employer's plan. Younger cohorts may have been more accustomed to defined contribution pensions and may have felt more confident and comfortable assuming the responsibility for managing their retirement assets. Because of this, the application of this age cohort's experiences is limited to those of the same cohort and should not be extended to younger cohorts.

The period of observation was also unique. Record gains in the financial markets were observed, combined with periods of historically low interest rates on mortgage debt. While unemployment rates were historically low, job turnover was relatively high and the job tenure of labor market participants was relatively short compared to historical job tenure periods (Sullivan et al., 2000). Mortgage debt could have been used to smooth the transitions in employment. Similarly, because of the relative short job tenures, households may not have desired to pay down mortgage debt when they expected to relocate within a few years. These factors could have significantly influenced the household's decision regarding mortgage debt.

The economy, although relatively stagnant during the last year of the observation period, enjoyed a period of unprecedented expansion and prosperity. The period of observation was also marked by rapid increases in bankruptcy filing rates in general and foreclosure rates in certain areas. At first glance tradeoff theory would help to explain the increase in foreclosures and housing related bankruptcies, however, no evidence was found for this. While there may be similar periods in the future, no two periods of observation will have the same overall experiences, and subsequent cohorts may experience periods more or less favorable than that observed in this study.

Future Research

Future research could look more closely at the more risk tolerant and highly compensated groups separately to determine whether these households have greater

financial sophistication with regard to mortgage debt for investment purposes. Previous studies suggested that these groups were different regarding investment risk and financial sophistication (Chen & Jensen, 1985; Grable & Lytton, 1998; Gutter, 2000; Maki, 1995).

The association between mortgage debt and employment status found in this study suggested the need for additional research on the relation between mortgage debt and transitions from the labor force to retirement. Studies examining the transitions from retirement back into the labor force may also benefit by including mortgage debt as an independent variable. In general, the relation between mortgage debt and the permanence of exits from the labor force may also be an applicable line of financial planning research.

The large impact that human capital exhibited in this study may have hidden or confounded certain relations that otherwise would have been present. Future research might look specifically at retired households and the effects of mortgage debt on the change in household assets. Limiting the sample to retired households might create a more accurate model showing positive or negative relations which may yield direct implications for financial professionals working with retirees.

The relation between health status and mortgage debt may also be a fruitful area of future research. It may provide a means to examine households, through observed behavior, to determine what households are encumbering when they take out mortgage debt: the home itself, other financial and real assets, or future earnings.

Mortgage debt is an often substantial and unique element of a household's portfolio of assets and debts. How mortgage debt is managed can have a significant impact on the financial well-being of the home owners. Recent attention to mortgage debt reflects financial professionals' increasing awareness of the important implications mortgage debt has for households. This study has furthered that literature with an empirical examination of mortgage debt's impact on changes in assets and total resources. Future research could continue to clarify and broaden the existing body of literature to develop an accurate picture illustrating the relation between mortgage debt and the economic well-being of households.

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APPENDIX

Table A.1

Breakdown of Total Resources in 1992 and 2002 in 000s (Weighted)

	1992		2002	
	Mean		Mean	
Dependent variables	(Median)	*SD*	(Median)	*SD*
Housing	170.58	163.40	204.91	230.95
	(121.90)		(150.00)	
Stock, bonds, real estate,	137.77	368.54	293.83	914.93
business, IRA/Keoghs	(28.47)		(65.00)	
Cash, checking, CD's,	24.03	60.51	60.86	191.37
gov. savings bonds	(7.00)		(14.00)	
Other (vehicles,	32.88	96.81	130.03	607.23
annuities, life ins., other)	(12.00)		(18.04)	
DC plan assets	27.20	108.28	27.90	148.59
	(0.00)		(0.00)	
PV of DB plan	235.87	546.62	171.72	395.38
	(20.33)		(33.42)	
PV of Social Security	238.07	150.95	207.31	112.24
	(243.43)		(207.33)	
PV of VA pensions	22.38	121.11	14.79	72.81
	(0.00)		(0.00)	
PV of future earnings	677.89	1,711.00	213.51	1,289.75
	(296.06)		(0.00)	

CURRICULUM VITAE

Lance Palmer, Ph.D., CPA

EDUCATION

Ph.D. Consumer Sciences, Utah State University, 2004
M.B.A., University of Utah, 2000
B.S. Accounting, Cum Laude, University of Utah, 1999

WORK EXPERIENCE

Teaching Assistant, Department of Family, Consumer, and Human Development. January 2004 – May 2004.
Responsibilities: Introduce students in the Advanced Family Finance course to basic principles of investing, stocks, bonds, mutual funds, retirement planning, estate planning, and college savings plans. Prepare and administer exams and other course work to evaluate the student's progress.
Supervisor: Tom Lee, Ph.D.

Instructor, Department of Family, Consumer, and Human Development. September 2003 – December 2003.
Responsibilities: Taught the career seminar course introducing students to a variety of professional opportunities after graduation. Arranged for working professionals to be guest lecturers to inform and educate students about potential careers.
Supervisor: Tom Lee, Ph.D.

Teaching Assistant, Department of Family, Consumer, and Human Development. September 2003 – December 2003.
Responsibilities: Assisted in teaching, observing, and evaluating undergraduate students in a financial counseling course. Observed and provided feedback to students as they counseled individuals at the USU Family Life Center. Lectured based on instructor's needs.
Supervisor: Alena Johnson, M.A.

Assistant Grant Writer, USU Family Life Center, Department of Family, Consumer, and Human Development. May 2003 – June 2003.
Responsibilities: Wrote and reviewed various sections of two local housing counseling grants submitted to HUD requesting a total of approximately $71,000 of funding. Assisted with the preparation of the budgets, grant application, write-up, and compilation of the grant.

Supervisor: Tamera Hinck, Director, Housing and Financial Counseling, USU Family Life Center.

Research Assistant, Department of Family, Consumer, and Human Development. September 2002 – June 2003.
Responsibilities: Assisted with research on intergenerational transfers, using the HRS/AHEAD national data on the elderly. Examined the characteristics of U.S domestic leisure traveler expenditures. Used SPSS and SAS in data analysis and assisted with write-up and presentation of findings. Submitted findings to peer reviewed journals.
Supervisor: Gong-Soog Hong, Ph.D.

Reviewer, Department of Family, Consumer, and Human Development. January 2003.
Responsibilities: Reviewed poster presentations and article submissions for acceptance to the Asian Consumer & Family Economics Association conference.
Supervisor: Yoon Lee, Ph.D.

Instructor, Department of Family, Consumer, and Human Development, USU 1340. May 2002 – May 2003.
Responsibilities: Developed and presented material for the online USU 1340 Social Systems and Issues course. Introduced students to social science research methods and how they are used to understand current social issues.
Supervisor: Tom Lee, Ph.D.

Research Assistant, Department of Family, Consumer, and Human Development. September 2001 – August 2002.
Responsibilities: Assisted in researching, developing, and evaluating a guidebook to help late savers prepare for retirement. Presented guidebook and related materials at national conferences. The guidebook was presented to the National Endowment for Financial Education in accordance with the grant and is available on their website.
Supervisor: Jean Lown, Ph.D.

Auditor, KPMG, Salt Lake City, UT. July 2000 – August 2001.
Responsibilities: Performed external financial audits on a variety of companies and organizations in the Intermountain region. Performed different procedures and examinations to determine the validity and reliability of clients' financial statements. Reported audit findings to supervisors and company management.
Supervisor: Lee Imlay, CPA

HONORS

Jewell L. Taylor Fellowship, American Association of Family and Consumer Sciences, May 2003

T. Clair and Enid Johnson Brown Scholarship, College of Education and Human Services, Utah State University, March 2003

Phyllis R. Snow Scholarship, Department of Family, Consumer, and Human Development, College of Education and Human Services, Utah State University, March 2003

Robins Award Nominee (USU Research Assistant of the Year), Utah State University, March 2003

Research Assistant of the Year, College of Education and Human Services, March 2003

Ford Motor Company Fund Student Travel Award, American Council on Consumer Interest, April 2002

Nominee for the 2002 Research Assistant of the Year, Department of Human Environments, College of Family Life, Utah State University, January 2002

Presidential Fellowship Award, Utah State University, August 2001 B May 2002

MBA Committee Student Representative, University of Utah, August 1999 B May 2000

John R. Anderson Scholarship, College of Business, University of Utah, 1999

PROFESSIONAL MEMBERSHIPS

American Council on Consumer Interests
American Association of Family and Consumer Sciences
Association for Financial Counseling and Planning Education
Western Family Economics Association
Academy of Financial Services

REFEREED PUBLICATIONS

Conference Proceedings

Lown, J. M. & Palmer, L. (2003). Long-term care insurance decisions: An

alternative strategy. Western Family Economics Association Annual Conference, October 29-31, 2003, Salt Lake City, UT. Available from http://www.csus.edu/indiv/a/andersenj/WR/research.html

Lown, J. M. & Palmer, L. (2002). Assessing the Retirement Preparation of Baby Boomers. *Papers of the 42nd Annual Conference: Western Region Home Management-Family Economics Educators, Spokane, WA, 2002,* 25–31.

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Palmer, L., Bhargava, V., & Evans, D. (2003). Recovery from bankruptcy: Evidence from the 2001 Survey of Consumer Finance. *Proceedings of the Association for Financial Counseling and Planning Education, Savannah, GA,* 27–36.

Palmer, L., O'Neill, B., & Lown, J. (2002). Last chance retirement planning with late savers guidebook. *Proceedings of the Association for Financial Counseling and Planning Education, Scottsdale, AZ, 2002,* 11.

Conference Presentations

Palmer, L., O'Neill, B., & Lown, J. (2002). Development of a guidebook to help late savers prepare for retirement. Financial Security in Later Life: National Initiative Roll-Out Conference, Myrtle Beach, N.C.

Invited Proceeding Publication

Hong, G. S., Bhargava, V., & Palmer, L. (2003). Intergenerational transfer behavior of single senior households: Does gender matter [Electronic version]? *Consumer Interests Annual, 49.*

Manuscripts Under Revision

Hong, G. S., Bhargava, V., & Palmer, L. (under revision). Intergenerational transfer behavior of single senior households: Does gender matter? *Hallym International Journal of Aging.*

Hong, G. S., Fan, J., Palmer, L., & Bhargava, V. (under revision). Consumer leisure travel expenditure patterns by family life cycle stages. *Journal of Travel and Tourism Marketing.*

Research in Progress

Examining the relation between household leverage, via mortgages, and financial well being of households approaching and entering retirement, and the effect of leverage on the volatility of household wealth and net worth.

Exploring the relation between the presence of a mortgage and debtors' labor market participation in later life.

Identifying characteristics and motives of households that payoff mortgage debt ahead of schedule rather than investing in assets with higher potential yields.

Exploring the financial recovery of previous bankruptcy petitioners. In particular examining which behavioral characteristics are important in the recovery from bankruptcy and how these practices can be emphasized in proposed mandatory debtor education courses.

Examining the effects of life events and individual / family characteristics on the likelihood of adopting a will in later life.

Evaluating the student financial aid counseling project, funded by Utah Higher Education Assistance Authority and sponsored by the USU Family Life Center and the USU Financial Aid Office.