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Patterns of Dissaving Among U.S. Elders

Deborah Gray
University of Massachusetts Boston

PATTERNS OF DISSAVING AMONG U.S. ELDERS

A Dissertation Presented

by

DEBORAH GRAY

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DEBORAH GRAY

Approved as to style and content by:

_____

Ellen A. Bruce, Associate Professor
Chairperson of Committee

_____

Frank W. Porell, Professor
Member

_____

Christian E. Weller, Professor
Member

_____

Edward Miller, Program Director
Gerontology PhD Program

_____

Jeffrey Burr, Chairperson
Gerontology PhD Program

ABSTRACT

PATTERNS OF DISSAVING AMONG U.S. ELDERS

June 2014

Deborah Gray, B.S., University of Massachusetts Amherst
M.B.A., Brandeis University
M.S., University of Massachusetts Boston
Ph.D., University of Massachusetts Boston

Directed by Associate Professor Ellen A. Bruce

This paper examined patterns of decumulation and the role that health events and marital disruption play in forming those patterns**.** Study data were drawn from six biennial waves of the HRS (1998 - 2008), and merged RAND HRS data files for the period 1998 – 2008. The a priori expectation was that there will be variation in drawdown strategies households employ. Findings suggest that patterns of dissaving are heterogeneous. The five most prevalent patterns were discussed. Households predominantly transitioned between oversaving and overspending. Households are expected to have a goal of on target spending therefore the observed cycle's dissaving will influence the next cycle's draw down rate in an attempt to maintain a sustainable drawdown rate. Markov model results suggest that households do recalibrate their depletion rate as a function of their last depletion rate. This study hypothesized that the onset of a health condition or a spouse's admission to a nursing home would be

associated with an excessive decumulation of assets. These hypotheses were unsupported by the research. Marital transitions as predictors of decumulation were only partially borne out by the results. Divorce was also expected to increase the likelihood of overspender however this relationship was not significant. Loss of spouse was associated with an increased likelihood of overspending. One of the major contributions of this study is the identification of patterns of dissaving in retirement. Various life course, demographic and decumulation factor variables were determinants of these patterns. Overall results suggest that elders have a difficult time managing to an on target drawdown. This study concludes with a national decumulation policy directive outline.

DEDICATION

I dedicate my dissertation to my family, particularly my grandparents and parents, who each in their own way inspired this work. I give special thanks to my brother and sister for being my best cheerleaders. My nieces and nephews provided me with many laughs throughout the entire doctorate program and a unique perspective on this work; thank you. I owe a debt of gratitude to my friends Barbara, Lisa, and Dennis for their constant encouragement. I will always appreciate what my cohort has done for me. Finally, I dedicate this dissertation to my husband Keith for his infinite patience, love, encouragement and support throughout this process.

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LIST OF ABBREVIATIONS

ADL	Activities of Daily Living
AHEAD	Asset and Health Dynamics among the Oldest Old
ASA	American Society of Anesthesiologists
DB	Defined Benefit
DC	Defined Contribution
GDP	Gross Domestic Product
HRS	Health and Retirement Study
IRA	Individual Retirement Account
IRS	Internal Revenue Service
LTCI	Long Term Care Insurance
LSD	Lump Sum Distribution
MNL	Multinomial Logistic
MRD	Minimum Required Distribution
NBDS	New Beneficiary Data System
PS	Physical Status
RRR	Relative Risk Ratio
SEP	Simplified Employee Pension
SIMPLE	Savings Incentive Match Plan for Employees
VIF	Variance Inflation Factor

CHAPTER 1

INTRODUCTION AND RESEARCH QUESTIONS

The creation and implementation of a sound retirement financial management plan can be a daunting task. As described by a retirement expert:

> "… Consider what would have to happen for it to work for you. First, figure out when you and your spouse will be laid off or be too sick to work. Second, figure out when you will die. Third, understand that you need to save 7 percent of every dollar you earn. (Didn't start doing that when you were 25 and you are 55 now? Just save 30 percent of every dollar.) Fourth, earn at least 3 percent above inflation on your investments, every year. (Easy. Just find the best funds for the lowest price and have them optimally allocated.) Fifth, do not withdraw any funds when you lose your job, have a health problem, get divorced, buy a house or send a kid to college. Sixth, time your retirement account withdrawals so the last cent is spent the day you die." -Ghilarducci, 2012.

This dissertation will focus on dissaving by the aging population. Specifically, it will examine patterns of dissaving and whether or not assets are decumulated over time at a sustainable rate, the association between health status and risk of excessive wealth depletion, as well as how changes to family composition affect dissaving.

According to Pew Research projections (2011) as of December 2010, 13% of the population is 65 or older. This will increase to 18% by the year 2030. For those who reach the age of 65, the average life expectancy is 18.5 years; many of these individuals will survive to considerably higher ages (US Census Bureau, 2010a). Outliving their assets is one of the most serious risks elders face.

Spending in later years so that one does not outlive their assets is a function of assets, expenses, income and lifespan. Many components affect these factors including race/ethnicity and health status. Ethnic diversity in the population is expected to shift as well. It is estimated that the percent of the population that is Black will increase 3% while those reporting Hispanic ethnicity will increase by 13%. The percent of the population which self-identifies as White will decline 10% over this time (Census Bureau, 2010b).

A recent study from the Centers for Disease Control (2009) finds that while overall Americans are living longer, active lives, relative to their younger peers seniors are still at increased risk for disease and disability. This can result in increased out of pocket costs for healthcare and long-term care. Johnson and Mommaerts (2010) finds that the median out of pocket healthcare cost for seniors is $2,600. These costs are expected to increase more than 200% by 2040. As a result, 70% of those in the bottom two quintiles of the income distribution will find that health care costs will account for more than 20% of their consumption costs. Research suggests that racial and ethnic minorities are in poorer health than Whites (US Department of Health and Human Services, 2010; Federal Interagency Forum on Aging-Related Statistics, 2008; Mead et al., 2008), thus increasing their financial burden relative to Whites.

Elders receive income from a variety of sources thus there are complex tradeoffs to consider when devising an income stream in later life. For example, in addition to deciding when to receive Social Security and pension plan benefits, an individual must decide how to draw down their owned assets such as savings in retirement accounts

(IRAs, 401(k)s, etc.), a home, land, and regular savings (non-tax-deferred retirement accounts).

Consumption in later life can be funded from assets as well as income. Many have recommended that seniors target a 70% replacement rate – the post-retirement to pre-retirement income ratio (Munnell & Soto, 2005). On average, it is expected that Social Security will replace 40% of pre-retirement earnings (US Social Security Statement, 2010). To bridge this gap, it is expected that during their working years individuals will accumulate wealth to convert to a stream of income in their later years. However, many households have not saved adequately (Meschede et al., 2010; Haveman et al., 2005; Munnell, 2005).

Their financial security in later years is further jeopardized on several fronts; by the recent housing and financial market turmoil as well as rising healthcare costs. According to Butrica and Issa (2010) retirement account balances have fluctuated wildly over the past 5 years. Between Q3 2007 and Q1 2009 these accounts lost 32% of their peak valuation. During Q1-Q3 2010 retirement accounts lost then regained 5% of their value. Bosworth and Smart (2009) finds that the percent of homeowners who reported a negative home equity increased fifteen fold between 2007 and 2009. While elders did not experience as drastic a decrease as younger cohorts (they had built more equity over time), they have less time relative to younger age groups to recoup their equity loss. Since many elders will enter their later years with less than optimal savings it is important to understand how they decumulate, or spend down, the assets intended to support their late life consumption needs.

The conceptual model employed in this study posits that elders will spend down at a rate so that their assets are completely depleted when they die, not before. That assumption means that the person leaves no bequest to their offspring. This is referred to in the dissertation as "on target" spending. However, households may manage their finances in a manner which puts them at risk for outliving their assets (overspending) or under consuming and leave an unintended legacy bequest (oversaving). The potential problems resulting from overspending or oversaving are discussed in the following pages.

Overspending

Households that decumulate too quickly run the risk of exhausting their savings before they die. While the majority of elders receive Social Security benefits (nine out of ten individuals aged 65+) the average monthly benefit is only $1,269. Approximately 53% of married couples and 74% of single elders rely on Social Security for 50% or more of their monthly income. Almost one third of elders (23% of married couples and 46% of unmarried elders) receive 90% or more of their income from this program (Social Security Administration, 2013). According to the Elder Economic Security Standard Index, the average Social Security benefit is not sufficient to cover daily living expenses (National Economic Security Standard Index, 2012). Elders forced to live on inadequate monthly incomes will face consumption choices and tradeoffs. Asset depletion levels will have to be considered from the perspective of meeting current consumption needs versus preserving capital over their remaining life expectancy. Therefore capital run down rates are an important consideration for elders who have assets. Regardless of the funding decision, a potential for diminished quality of life in the future exists.

An increase in elder's outliving their assets could result in a greater demand on government programs and services. This potential demand needs to be considered in the context of the country's fiscal climate. The Congressional Budget Office's September 2013 (Congress of the United States, 2013) report states that the federal debt is now 73 percent of Gross Domestic Product (GDP). Gross domestic product is the country's economic output and represents the ratio between income and debt. If current policies remain in place, by 2038 federal debt will reach 100 percent of GDP.

While overspending elders will bear the brunt of the consequences, there are societal impacts as well. Among these are the need for rent subsidies, affordable housing, and healthcare subsidies (National Economic Security Standard Index, 2012). Medicaid provides health coverage to 4.6 million seniors who meet income requirements; many of these individuals are also eligible for Medicare ("Seniors & Medicare and Medicaid Enrollees," 2014). Medicaid helps low income Medicare beneficiaries cover out of pocket costs, prescriptions, and extended nursing home stays. An increase to Medicaid eligibility will further stress government finances.

Oversaving

Oversaving also has downsides to both the individual and society. Elders' economic contributions to their local economy are often overlooked; instead studies tend to focus on the costs to society (i.e. health care, entitlement programs). However, spending by the elderly generates income and employment in their local geographic region. According to Goldsmith and Angvik (2006), elders spend most of their money locally which leads to job creation. Retirees generate jobs across the wage spectrum; low wage (trades and services) as well as high paying (health care) jobs. These jobs are year

round, unlike seasonal demands from tourists for example. They also broaden a state's tax base. They estimated that in Alaska retiree spending fuels nearly 4% of the state's wage and salary jobs.

Shields, Stallman and Deller (2002) in their study of relocating elders finds that 500 new low income elderly households results in 156 jobs (0.2 jobs per household member) while the addition of 500 high income household will create 810 jobs (0.7 jobs per household member). The authors attribute the difference in employment impact to larger spending by the high income households.

Furthermore, receipt of government benefits provides economic gains for the community. Gallardo and Myles (2011) reports that the $675 billion in Social Security benefits paid in 2009 generated $1.2 trillion of economic activity.

Finally, Rovner (2013) estimates that those 68+ as of 2013 make 25% of all charitable donations. Those donations will exceed $27 million in 2013 alone. Thus if elders unnecessarily curtail their spending the local economy as well as the non-profit community (and those relying on its services in the near term) could suffer.

Oversaving also has implications for the quality of senior's life. John Hancock's 2013 survey reports that the average cost of adult day care is $71 a day ($18,460 annually), and a home health aide is $19/hourly ($29,640 annually). While these amounts could represent a sizeable portion of an elder person's income, the use of paid in-home non-medical care is correlated with a lower rate of doctor visits and savings on health care expenditures overall (Home Instead Senior Care, 2010). Ironically, it appears that by creating an overly frugal dissaving plan, elders may (at least where their health is

concerned) be placing themselves at risk for greater health care spending in the future, as well as lowering their current standard of living.

Challenges to Creating a Sustainable Dissaving Plan

The creation of a sustainable dissaving plan would be a logical first step for individuals entering this phase of wealth management. An "ideal" decumulation plan would include annuities for a guaranteed lifetime of income, preferably sufficient to finance the desired lifestyle. For those wishing to leave a bequest, annuities with riders that have a death benefit can be purchased. Alternatively, income from the annuity could be used to purchase life insurance (Haithcock, 2013). Some amount of funds should remain liquid, to cover unforeseen expenditures. Finally, if asset levels allow, purchasing long term care insurance to cover future medical costs is advisable. As one advisor asks his clients regarding insurance rates, "…is it easier to come up with $500 a month or $6,000 or 7,000." (McCarthy, 2013).

However, developing a drawdown plan is complicated due to the structure and number of potential sources of income. Individuals can have a combination of taxable, tax deferred, and tax free accounts in their portfolios at the time of decumulation. These accounts can be held by one or more individuals in the household, further complicating the creation of a draw down stream which maximizes income. Long and short term gains must also be factored into the distribution process. Income tax and state tax rates figure into this process as well. Tax implications vary dependent upon how a particular product (i.e. annuities) was purchased. Annuities purchased with pre-tax dollars, after tax dollars and nonqualified retirement accounts are all subject to different tax laws (Brown and Mitchell, 2001).

Furthermore, the number of accounts held also adds a layer of complexity to this exercise. A recent Vanguard study of US investors found that 21% of households had three asset accounts; 45% owned six or fewer accounts, and 18% had ten or more accounts. These numbers could be underestimating the total number of accounts; reports could have been based on asset types not overall number. For example, if respondents held two or more IRA accounts with the same firm it is possible that they reported owning only one account.

A sound knowledge of financial principles is required for any individual attempting to optimally manage their portfolio in the dissaving phase. However, research suggests that financial literacy is low in the US. In a 2009 study conducted by FINRA, (National Financial Capability Study (NFCS), 2009) respondents correctly answered on average only 3 of 5 basic financial literacy quiz questions. Based on 2004 HRS data Lusardi and Mitchell (2008) had similar findings; respondents had low numeracy and lack an understanding of basic concepts such as inflation. Financial literacy skills vary by gender, educational attainment and race. Women have lower skills relative to males (NFCS, 2009; State Farm, 2008; Lusardi and Mitchell, 2007). Minorities and those with lower levels of education also demonstrate low financial literacy (NFCS, 2009; Lusardi and Mitchell, 2006, 2007).

Increasing age and financial literacy have also been shown to be negatively correlated. In their 2011 study of cognitive processing Finke, Howe and Huston found that financial literacy declined 2% annually beginning at age 60. However, individuals failed to recognize this decline. The decline is linked with poor decision making and increases vulnerability to fraud. Ninety-six percent of survey respondents (Investor

Protection Trust, 2012) cited diminished comprehension as a predictor of elder fraud. They also found it "very consistent" with an earlier study linking Alzheimer's and vulnerability to fraud (43.3%). In 2007, Plassman et al. estimated that 13.9% of the population 71 and older had a dementia diagnosis and 9.7% had Alzheimer's; these proportions increase with age. By 2012, of the population 65 and older, 13% has Alzheimer's disease (Alzheimer's Disease Facts and Figures, 2012). Increasing levels of diminished cognitive function may make it more difficult for elders vulnerable to plan and execute a reasonable decumulation strategy, particularly in their latter years.

Retirees could compensate for low financial literacy and/or diminished capacity by employing the help of a professional. However in spite of low financial literacy Hanna (2011) found that only 25% of households aged 30-69 and 16% of those over 70 use a financial planner; the Allsup Medicare Advisor Seniors Survey (2012) found one-third of retirees use financial planners. This is an increase from 2002, when Elmerick, Montalto and Fox reported that 15% of seniors 65+ used financial planners. Usage of these services varies by race; usage is highest for white families (28%), 21% for black families and only 12% for Hispanic families (Hanna, 2011). Women are less likely to use professional services than men (State Farm, 2008).

Reasons cited for not using a planner include risk aversion (with rates of use increasing with risk tolerance) (Hanna, 2011); refusal to pay a fee for service, and insufficient asset levels to warrant advice (Harris 2011). There could be a growing mistrust in financial service providers since they have been identified as perpetrators of elder financial abuse (MetLife, 2011) and named in lawsuits by their employees and the Department of Labor for Employee Retirement Income Security Act violations (Pensions

and Investments, 2013; Investment News, 2013). Another explanation could be that elders perceive their level of financial literacy is greater than it actually is (Agnew and Szykman, 2005) and they do not realize they would benefit from professional services.

This proposed dissertation will address several important gaps in the literature. This study will examine household transitions across categorization of dissaving. It will also address whether wealth depletion rates by households are placing them at risk for outliving their assets. This determination will be based on actual adjustments to health, longevity and financial shocks over the period of study (as opposed to projections). Finally, the impact of changes to family structure and composition will be identified.

The current study will assess 1) the relationship between decumulation categories across time, and 2) wealth depletion as a function of health status and family composition. The dissertation will address the following research questions:

- Do decumulation patterns vary across households?
  - Relative to the current time period, what is the probability of being in each divest outcome category (on target, overspender, oversaver) in the next time period?
  - Is there a relationship between the observed divest category and the divest category in the next observation period?
- How does health status impact depletion?
- Is there a relationship between change to marital status and depletion rate?
- Is there an association between change in family composition and decumulation?

Understanding whether people either divest too slowly or too quickly and who they are is important to a variety of professionals. Financial advisors will be required to manage existing assets over time to ensure that their clients do not outlive their income stream. Research focused on decumulation could also inform policymakers and retirement plan sponsors seeking to create more cost-effective, efficient savings vehicles. Finally, government officials addressing entitlement program modifications may find these types of studies informative.

The remainder of the dissertation is organized as follows. First, the literature on decumulation is reviewed. Next, the conceptual model for assessing the risk of outliving assets is presented. Chapter 4 discusses the measures and methodologies used in the analysis of the research questions. Results of the analysis are found in Chapter 5. Finally, the dissertation concludes with a discussion of the findings and a policy recommendation.

CHAPTER 2

LITERATURE REVIEW

The decision to decumulate assets involves converting assets accumulated in the working years to an income stream in later life. The factors influencing the decision to decumulate are complex and dynamic. This section provides an overview of assets potentially available for decumulation, the current body of knowledge on dissaving, and factors which influence the creation of an income stream.

Sources of Income in Later Life

According to 2010 Social Security Administration calculations, singles and married couples 65 and older derived 37% of their income from Social Security, 9% from government employee pensions, 9% from private pensions, 11% from asset income, 30% from earnings and 4% from other sources (Social Security Administration, 2012). Elders' sources of income are important for multiple reasons. Income can be used to finance late life consumption and researchers have linked the level of asset income to the rate of asset drawdown (DeNardi, French and Jones, 2010). Those with higher levels of income drawdown their assets at a slower rate than elders with lower income levels.

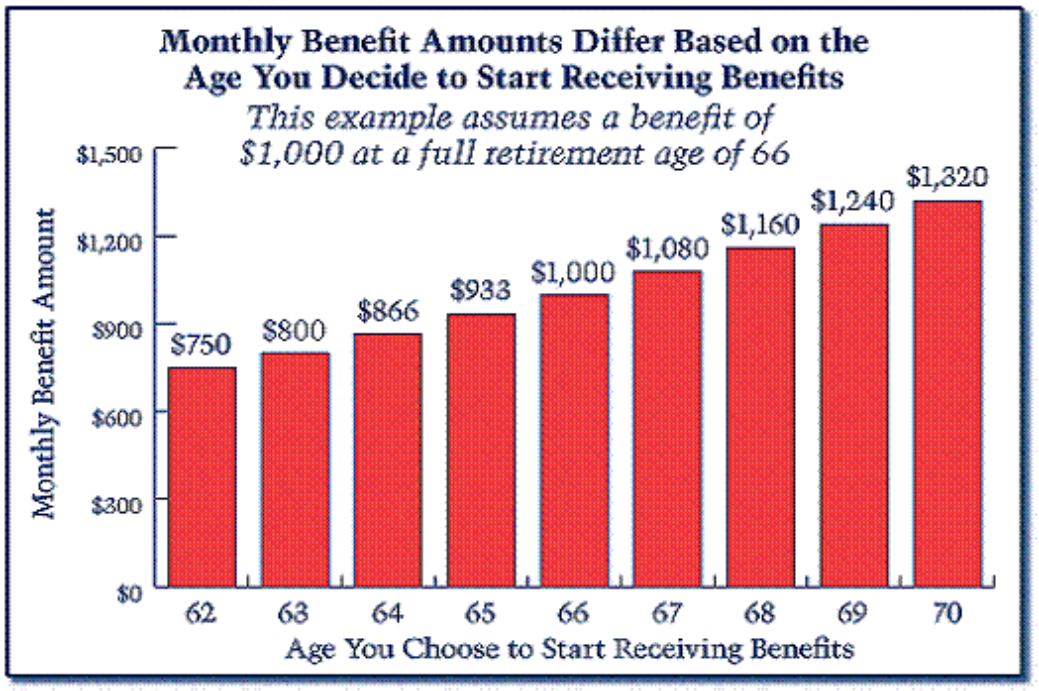
Social Security Income

An individual's Social Security benefit is intended to replace a portion of income and will be paid over an individual's entire lifetime. As of December 2013 over 54 million elders were receiving Social Security retirement benefits. The average monthly

benefit for retired workers was $1,247; a retired couple collected $1,942 on average and a widow or widower received an average benefit of $1,244 per month ("Monthly Statistical Snapshot", December 2013).

The earliest age at which retirement benefits can be claimed is 62. Benefits increase for each year from age 62 until age 70 that you delay claiming your benefit. The timing of the initial election of this program is critical for determining monthly benefit amounts. It sets the base rate for monthly payments, to which annual cost of living adjustments are made. Please refer to figure 1 for an example of how benefit rates will differ by election start.

Figure 1. Monthly Social Security Benefit by Age of Election



Source: When to Start Receiving Retirement Benefits, SSA Publication No. 05-10147, July 2008, ICN 480136

Workers who become disabled and meet earnings criteria can qualify for Social Security Disability Income (SSDI) payments. The monthly disability payment is based on average lifetime earnings (Social Security Administration, June 2012). As of December 2013 over 54 million elders were receiving Social Security retirement benefits. The average monthly benefit for retired workers was $1,247; a retired couple collected $1,942 on average and a widow or widower received an average benefit of $1,244 per month ("Monthly Statistical Snapshot," December 2013).

Defined Benefit Income

Payments from a defined benefit plan (commonly referred to as pensions) have also been an important income stream for the elderly. This is in spite of the fact that over time fixed value pensions will degrade in value due to inflation. Defined benefit (db) plans provide a guaranteed income and typically do not require any contribution from the employee. There are a number of formulas that db plan sponsors can use to determine final retirement benefits; they range from a flat dollar amount per year of service to average earnings for a specified number of years (EBRI, 2009). Regardless of the formula used, the employer agrees to a future benefit amount and assumes the corresponding investment risk required to meet future benefit obligations.

There has been a steady decline in the proportion of employees participating in employer sponsored benefit plans. The Survey of Consumer Finance (Bucks, et al., 2009) shows a 1.6% decline in the number of families with access to a defined benefit plan through either a current or past employer for the period 2004-2007. A 2007 Bureau of Labor Statistics Survey found that 6% of private sectors workers had access to only a defined benefits (db) plan; 40% had access to only a defined contribution (dc) plan; 15%

had access to both db and dc plans and 39% worked for an employer without a pension plan. EBRI (2012) reports that as of 2011 only 3% of private sector workers participated in a defined benefits plan, 31% participated in a defined contribution plan, and 11% participated in both plans. Fifty-five percent of private sector workers are not enrolled in an employer based program.

Annuities

With the challenges of managing increased longevity, market risk, declining income from defined benefit pensions (public and private), and inflation, one way to address this risk is to turn to fixed annuities for a reliable income stream. Annuities transfer risk to the insurance company. The annuitant purchases a life annuity in exchange for a series of future payments (Fullmer, 2007). Single life annuities provide benefits to the individual up until the time of their death. Joint life annuities pay benefits as long as either of the two beneficiaries survives (Ameriks, 2004). A mix of fixed and variable annuities is recommended by financial experts to manage inflation over time (Milevsky and Young, 2007).

According to LIMRA (2012), sales of standard annuities with fixed payments in 2012 decreased 7% from 2011 sales (from $158 to $147 billion) and variable annuity sales declined 10% over 2011. Overall annuity purchases were down 8% in 2012, for total sales of $219 billion.

Why Aren't Individuals Purchasing Annuities?

A number of studies have examined why so few annuity policies are sold. Ameriks (2004) found that some annuitants see annuities as introducing risk; they worry that they will "lose" money if they die young. However, the guarantee period (the

minimum period in which payments will be made) mitigates this risk. If an annuitant dies before the minimum period benefits are paid to a designated beneficiary through the end of the period. Several researchers have found that the cost of annuities has served as a barrier (Brown and Poterba, 2000; Mitchell et al. 1999; Friedman and Warshawsky, 1990) however Babbel and Merrill (2007) found that the markup on such policies has decreased substantially over the past decade. Annuity markups (a one time fee) are also more economical when compared to annual mutual fund loads. Finally, they point out that annuities offer a guaranteed income stream while mutual funds provide no such benefit.

Purchasers are also concerned that their benefit could be eroded by inflation. Here again Babbel and Merrill (2007) point to the range of annuity products available which would provide against this risk. Laitner (1997) concludes that a bequest motive serves as a deterrent to annuity purchase. Sinclair and Smetters (2004) found that the need for liquidity to pay for unexpected health care expenses inhibits individuals from purchasing annuities. Others have found that family members provide income for health emergencies or financial insecurity thus individuals informally "self-insure" (Brown and Poterba, 2000; Kotlikov and Spivak 1981). Based on benefits available from other annuities (Social Security and employer pensions) Dushi and Webb (2004) conclude that elders have no need to convert funds into an additional annuity. Support for this comes from Bernheim, 1991 and Vidal-Melia and Lejarraga-Garcia, 2006 who find that government safety net programs "crowd out" annuity purchases.

A recent study by Yogo (2009) has challenged the benefit of purchasing an annuity. Using HRS data and treating health status as an endogenous variable he concluded that median health retirees had an extremely modest gain in overall wealth when their portfolio consisted of an annuity (only 1%) and the healthiest in the sample only improved their wealth position by 10%. A limitation of this study is that it only modeled female wealth therefore it may not generalize to male wealth patterns.

Extended Labor Force Attachment

Finally, there is a growing trend among elders to remain in the workforce longer. Shattuck (2010) reports that as of 1995 17% of men and 9% of women 65 and older were working; by 2009 the percentages increased to 22% and 13% respectively. Shattuck posits that the recession and longevity may contribute to prolonged labor force attachment. Working in later years was more common among better educated elders. This is attributed to their overall better health, decreased likelihood of holding physically demanding jobs, and a greater ability to find work. Bosworth and Burke (2012) finds a similar rise in participation rates and attribute the change to the decrease in db plan coverage and increase in dc plans. For those in db plans, the benefit amount is capped at a certain point and the benefit can only be claimed by those who withdraw from employment, thereby inducing workers to retire whereas benefit levels may increase with future contributions to dc plans.

Using data from the 2011 Census Bureau Copeland (2012) finds that workers age 55 and older were increasingly likely to remain in the workforce through 2011. He attributes this increase to the need to accumulate additional retirement savings and obtain employer-sponsored health care coverage. Drawing from Bureau of Labor Statistics and

Consumer Population Survey data, Rix (2013) reports similar findings, noting increased worker participation rates for those 55+.

Assets Available for Decumulation

Households can enter the decumulation phase with tax-deferred, non-tax-deferred plans, or both. A tax-deferred plan is an investment plan where a contributor can make pre-tax contributions and both the contribution and interest accumulate tax free until after withdrawal at retirement. These can be contrasted with non-tax-deferred plans, where contributions are taxed in the year in which they are made. There are contribution limits set by the IRS. Individuals can contribute up to $5,500 (or $6,500 if you are 50 years or older) to all traditional and Roth IRAs in 2014 ("Retirement Topics – IRA Contribution Limits," 2014). Those wishing to reduce their tax liability during their working years will opt for traditional 401(k) or traditional IRA vehicles while those willing to pay taxes now in exchange for limiting tax liability in retirement and eliminating taxes on the growth of the investment will likely invest in Roth IRAs or Roth 401(k)s. One's tax rate is expected to be lower after retirement because income is typically lower in retirement.

Types of Tax Deferred Plans

A 401(k) plan is a tax deferred plan whereby an employee contributes a portion of his/her wages to the plan on a pretax basis. While these wages are subject to Social Security, Medicare and federal unemployment taxes they typically are not subject to income tax withholding at the time of deferral. The amount of deferred wages is limited by both the Internal Revenue Service (IRS) and the terms of the 401(k) plan (IRS, 2012).

An individual retirement arrangement (IRA) is a tax advantaged vehicle for retirement savings. Typically IRA amounts are not taxed until taken as a distribution. To be eligible for IRA contributions you (or your spouse) must have taxable income for the tax year and be between 59.5 and 70.5 years old at the end of the tax period. Contribution amounts are set by the IRS. An individual can establish a traditional IRA regardless of coverage status by another retirement plan. However, coverage by an employer retirement plan may affect the deduction allowed for your contributions (IRS, 2012).

A Roth IRA is also an individual retirement account. However, unlike the traditional 401(k) the contributions are not deductible. The IRS has established contribution limits for these plans also. Contributions can be made after age 70 ½, and there is no required minimum distribution (IRS, 2012).

Decision making regarding retirement account contributions is complicated. Individuals need to decide whether to defer taxes while employed and elect to invest in a 401(k) or contribute to a Roth IRA in which the contributions have already been taxed and the withdrawal is tax free. Additionally, tax deferred savings require the investor to take a distribution after 70 ½ years of age, which constitutes part of the household's dissaving strategy. There are tradeoffs to both decisions which must be weighed.

Self-employed individuals or small businesses provide retirement savings benefits through Keogh plans. There are many types of such plans; the most common are Simplified Employee Pension (SEP), Savings Incentive Match Plan for Employees (SIMPLE) and Qualified Plans (aka H.R. 10 or Keogh plans). Deductions are allowed

for contributions made to the plan for employees or a sole business proprietor's own contributions (IRS, 2012).

Upon retiring or changing jobs, workers can leave their vested balances in the plan they had been enrolled in, the funds can be converted into an annuity, rolled over into an Individual Retirement Account, or they can take the funds as a lump-sum distribution (LSD). If a retirement account balance is $5,000 or less the employer can cash out the account without the employee's approval ("Deciding what to do with your 401(k) plan when you change jobs," 2014).

Cash out rates have been declining over time. In 1997, Yakoboski reported that 60% of those who changed jobs took LSD; 50% of this group spent a portion of the distribution. More recently, using Health and Retirement Study data from the period 1992-2000, Hurd & Panis (2006) found that 20% of distributions from plans with a lump sum option were cashed out. According to a 2008 survey by the Investment Company Institute of those workers retiring between 2002 and 2007 only 7% of workers spent the entire LSD at retirement. Thirty-four percent reinvested all of the LSD in a retirement account, 18% annuitized the entire balance, distribution was deferred by 16%, 11% divided the LSD between reinvesting and spending, 6% elected installment payments and 9% had multiple dispositions.

Verma & Lichtenstein (2006) analyzed 2003 Survey of Income and Program Participation data to determine how individuals distributed funds taken as a LSD. Nearly 56% paid down debt (debt includes mortgage, loans, medical expenses, taxes). Everyday expenses, vacations, and donations to family members accounted for approximately 30%

of the use; the remainder was invested in retirement savings in various forms or saved for education.

Individuals with lower net worth, those who are divorced or separated, have poor health status or are disabled have the highest LSD cash out rates. Lower cash out rates were correlated with being a high income earner, highly educated, non-black, male, and older. Depending upon how the cashed out money is spent (purchasing an annuity vs. paying off debt) it may not be available as an income stream in later life. In their 1999 study Berman, Coe, & Gale estimated that taking a LSD could result in a reduction in annual retirement income ranging from $1,000 to $3,000.

Cashed out funds lose their tax sheltered status; funds dispersed prior to the worker reaching age 59 ½ are assessed an additional 10 percent penalty; there is also an additional 20% withholding to cover the tax obligation from the withdrawal (Berman, Coe & Gale, 1999). Tax rates, penalties and withholding rules have been demonstrated to influence disposition of LSDs both by interacting with each other and independently (Berman, Coe, & Gale, 1999; Gale & Dworsky, 2006). Berman et al (2008) drawing on data from the Health and Retirement Study and Consumer Pricing Survey found that higher tax penalties or withholdings resulted in significantly higher rollover rates.

Asset Levels in Later Life

As elders are a heterogeneous group one may assume that there will be varying levels and disposition of assets. This assumption is supported by the literature (Poterba, Venti & Wise, 2012; Michaud and van Soest, 2008; Bernheim, Skinner and Weinberg, 2001; Keister, 2000). Chiteji and Walker (2008) reports that relative to other US households, African American elders have lower average net worth and financial assets

(see table 1). They found that on average African Americans 70+ years of age are more reliant on earnings for income than other US households (38 vs. 32.7% respectively), and report almost 6% less in assets/other income. This disparity is expected to continue in the future. Weller and Wolff (2005) estimates that 25% of white households and 40% of African American households aged 47 - 55 can expect to have an income replacement rate of less than 50%.

Table 1.
Retired Households (age 70+)

	African American households	All US households
Net worth	$84,000	$409,000
	[$36,900]	[$165,000]
Net worth minus housing equity	$34,000	$281,200
	[$2,000]	[$61,000]
Financial assets	$14,000	$145,000
	[$300]	[$20,000]

Note: Mean values with median in brackets.
Note: Financial assets includes stocks, bonds, certificates of deposit, checking and savings accounts.
Note: Net worth includes financial assets, housing equity, transportation, business, farm, real estate, IRA, trusts, and other assets.

Source: Chiteji and Walker (2008), using Health and Retirement Survey 2004 data

African Americans are not the only racial group to experience a wealth and income gap relative to whites. As of 2008 (the most recent year for which data are available), Social Security is the only source of income for 36.3% of elderly Latino recipients. This figure is nearly twice that for whites (18.2%) who rely on this program as their sole income (Social Security Administration, 2010). There is also a low level of pension accumulation among Latinos. Nearly 86% of Latinos in this age group report no income from private pensions or annuities, compared with fewer than 70% of similar

aged whites. According to Orszag and Rodriguez (2005) this wealth gap can be expected to continue over time. They found that the median combined retirement account balance for US households aged 55-59 was $120,000 compared with approximately $35,000 for Hispanics in this cohort.

Researchers have posited a number of explanations for these differences. Smith (1995) found that different inheritances and bequests as well as lower minority incomes and poorer health contributed to large racial and ethnic wealth disparities. Smith, Johnson & Muller (2004) suggests that low 401(k) participation levels combined with low contribution levels results in low retirement savings balances for African American retirees. They suffer an additional penalty in that their low wages lead to lower pension payments (as benefits are typically based on earnings). Charles & Hurst (2003) argues that due to lower risk tolerance African Americans will accumulate less wealth relative to similarly aged households. Shapiro (2004) finds that on average blacks and whites begin life with different levels of family wealth and that the gap widens over the life course. A key finding is that relative to whites fewer African Americans buy homes; those who do accumulate less equity.

Latinos have also been found to have low participation rates in retirement plans. A 2004 study (Rodriguez & Martinez) reports that while approximately half the overall workforce participates in an employer pension plan only one-quarter of Latinos participated. Using 2001 Survey of Consumer Finance data Orszag & Rodriguez (2005) found that relative to other contributors, Latinos had lower 401(k) and IRA participation rates and lower contribution rates at all income levels.

Home Equity

As of 2001, on average home values comprise 35% of total assets among the elderly (Sierminska, Brandolini and Smeeding, 2006). Home equity is important to retirement security because in addition to the ability to sell the home a reverse equity mortgage can be used to create an income stream. Home equity is the current market value of a home minus the current mortgage balance. Reverse equity mortgages are loans taken against a home which provide income to the loan holder and result in gradual transfer of ownership of the home to the lender. Reverse equity mortgages and home equity loans were just beginning to be used by elders in the early 2000s to access their home equity (Fisher et al., 2007; Copeland, 2006; Hurst and Stafford, 2004). Triest et al. (2008) finds that taking a reverse mortgage that provides a lifetime income is the best strategy to tap home equity for all but those with excessively high risk tolerance. According to Zedlewski, Cushing-Daniels, & Lewis (2008), based on 2006 home values the typical homeowner could realize an 18 percent increase in annual income from a reverse annuity. Taking into account the housing market decline they estimate that a 10% drop in home values would result in a 16% decrease to retirement income.

Health shocks have been linked to withdrawal of home equity (Venti and Wise, 2004; Banks, Blundell, Oldfield and Smith, 2007). Health shocks include death of a spouse, entering a nursing home, difficulties with activities of daily living, or onset of chronic illness. In their analysis of Health and Retirement Study (HRS) data from 1992-2002 Coile and Milligan (2005) found that that the type of health shock determined what asset was liquidated. Acute shocks led to diminished business and real estate holdings while those experiencing chronic shocks tended to draw down financial assets (stocks,

bonds, IRAs). Acute shocks include heart problems, stroke or cancer; chronic is defined as a new diagnosis of chronic illness such as lung disease or diabetes. Their results also confirmed previous studies in which the death of a spouse was strongly correlated with sale of the principle residence.

Decumulation Studies

Most elders are neither devising their own decumulation plans nor using the services of financial planners. In this section I review the existing decumulation literature to ascertain what we know about drawdown rates.

Implicit in any discussion of decumulation is the notion that assets are actually spent down. A number of studies have called this premise into question. Mirer (1979) using data from the Demographic and Economics Characteristics of the Aged found that wealth decline was modest overall and non-existent for some respondents. Weil (1994) documents that studies conducted using micro data (individual level data) support the notion that elderly do not spend down their assets while studies relying on macro data (aggregated data) reflect cross household relationships which serve to depress savings levels. Zou (1995) finds that savings instead increase with age and that wealth was not decumulated. Others have found evidence of asset run down (see DeNardi, French and Jones, 2006; Danziger et al., 1983; Menchick and David, 1983; Thurow, 1976).

Hogarth (1991) studied Social Security Administration's Longitudinal Retirement History Survey (LRHS) from 1969 to 1979. The study used an unbalanced panel; three waves of participation were required for study inclusion. Participant age at the beginning of the study ranged from 58 to 63 years old. Five patterns emerged from the data analysis. Households could be categorized as alternate savings and dissavings; local

maximum (saving for some consecutive periods then maintaining or spending down assets), local minimum (dissave over consecutive periods then maintain or save), some savings some level periods; and some dissaving some level periods. Nearly forty-four percent of the survey (43.5%) was some savings some level, 26.9% were local maximizers, 17% were local minimum, 8.5% were alternate savings and dissavings and only 4.2% were some dissaving some level periods.

This proposed research differs from Hogarth's work in several important ways. Market effects were measured using the year of retirement as opposed to a year variable therefore actual fluctuations may not have been reflected in coefficient values. Finally, inclusion in the study was dependent upon receipt of Social Security benefits. Decumulation patterns by households that had not elected to receive benefits were not determined nor were changes to decumulation streams pre and post benefit election examined.

As more spending and wealth data have become available research in this area has continued. Kim & Lee (2005) reports on the effects of health shocks and health capital on wealth drawdown using AHEAD and HRS data. While Kim & Lee finds that reporting a severe health condition at baseline is correlated with excessive wealth depletion for Hispanic couples and single Whites, the data are from 1998 and do not reflect the changes to Medicare since that time. For example, the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 established a prescription drug coverage benefit for elders and provided subsidies for eligible individuals. It also fails to account for region of the country, which has been correlated with both frequency of diagnostic

practices (Song, Skinner, Sutherland, et al., 2010) and medical costs (Fisher, Bynum, & Skinner, 2010).

Love & Smith (2007) studied households 50 and older from 1998-2004. Data were from the Health and Retirement Survey. While there was evidence that savings were spent down over this period, households were not drawing down at a rate that offset gains to their wealth. The authors suggest this was a result of housing wealth gains, precautionary savings and the desire to leave an inheritance thus it is not clear how much of the lack of dissaving is intentional. They also examined poverty rates among the elderly and found a significant decline in the ratio for all but the oldest cohort whose rate remained constant. However, poverty rates have been criticized for not being an accurate measure of the standard of living for elders. Among the criticisms is that they do not reflect medical care costs (Census Bureau, 2011) therefore Love & Smith may be overstating the decline in this measure.

Using Health and Retirement Study data from 1998-2006 Smith, Soto & Penner (2009) report that elder households experienced an increase to net worth and their decumulation rates varied by income level. Those in higher income level groups did not dissave until quite late in life; lower income seniors are at risk for outliving their assets and middle income elders may not entirely deplete their savings. Housing equity and capital gains largely contributed to the increase to net worth. However, it is not clear whether the failure for the high income group to dissave is a reflection of intentional saving or unexpected financial gains. Due to the timeframe of their study they also are unable to model the effects of the housing market decline on decumulation. Finally, they

estimated fixed panel models therefore they do not capture the spending patterns of those who died.

Hurd and Rohwedder (2010) using HRS CAMS data from 2001-2007 examined three measures of spending; changes to wealth based on income and spending levels, mean changes to wealth over time, and wealth simulations. Results indicate that all participants age 75+ will dissave. Singles drawdown their assets at age 70, and drawdown rates increase with age. This study excluded households with children living at home. The authors base this exclusion on the assumption that a bequest motive will depress spending and expense allocation cannot be determined. Households with couples where one spouse is more than five years older than the other were also omitted from the analysis since it is presumed they will have a different decumulation strategy. Therefore, due to sample selection criteria it is possible households that either would not dissave or would dissave at low levels have been omitted from the study. Also, the study does not assess whether these decumulation rates are sustainable over time.

Hurd & Rohwedder (2008) analyzed Health and Retirement Study Consumption and Activities Mail Survey data from 2001 – 2005 to determine if consumption rates in recent retirees were sustainable over time, based on annuities and assets at the onset of retirement. Retirees in the survey are community dwelling (respondents are not incarcerated or in nursing homes). For couples, one spouse was 66-69 and the other spouse was at least 62; singles are 66-69. Study results suggest that singles fare worse in retirement than couples. Singles can maintain their consumption based on mean wealth levels but median wealth levels would require a reduction in consumption a decade into retirement. Both average and median calculations indicate that couples can maintain their

consumption with small withdrawals from their asset stock. A problem with these estimates is that health shocks and rising health care costs were not modeled. According to Finkelstein (2007) two-thirds of those 65+ will enter a nursing home. These stays are costly and are funded mostly out of pocket. Banerjee (2012) notes that health related expenses account for the second highest total expenditure for those 75+ years old.

Haider et al (2000) is one of the few studies to examine rates of depletion not entirely based on HRS data. Their study draws on data from the Social Security Administration's New Beneficiary Data System (NBDS) (respondents who first received benefits in 1980-1981 were interviewed in 1982 and 1991) and the 1993 and 1995 waves of the Asset and Health Dynamics among the Oldest Old (AHEAD) panel. Consistent with life cycle hypothesis (LCH), wealth was constant for those in the NBDS sample. However, as the authors note, it is not a representative sample since it is restricted to those first electing Social Security benefits. In the AHEAD sample households with lower income, marital disruption and lower levels of education tended to dissave while married households, those with higher educational attainment and higher levels of income tended to increase their wealth. These findings may not be applicable for other cohorts of retirees. Earlier groups of retirees had more access to defined benefit plans as well as shorter life expectancies. Thus they did not need to rely on savings as much for retirement as future generations will; this could result in different spend down patterns.

Haveman, Holden et al (2005) used NBDS data to estimate annuitized wealth and compare this estimate with two measures of income adequacy (ability to replace 70% of pre-retirement income and whether or not income is above or near National Research Council poverty guideline levels). Wealth figures were estimated for couples, single men

and single women. Twenty percent of those who met the replacement rate in 1982 did not meet that measure of adequacy in 1991. Of the 33% of households with inadequate replacement rates in 1982, nearly 67% were still below the desired replacement rate. Overall 53% of the sample saw an increase to their annuitized wealth while 38% of the sample saw their annuitized wealth decline. Factors associated with increases in wealth include longer work histories, being white, income from earnings while retired, owning a home, higher levels of education, and private health insurance. Similar to Haider et al (2000) this study has sample bias and cohort limitations.

Sun and Webb (2012) compares three common decumulation strategies (spending interest earned, 4% annual drawdown and following the MRD tables) for single men, single women and couples. Based on their models they conclude that the strategy based on MRD tables is the optimal dissaving option. However, they model initial wealth and spend down is based on age 65 life expectancy. Modeling actual changes to wealth and increases to remaining life expectancy may have produced different results from those reported.

Designing an Income Stream in Later Life

Due to the risks imposed by each, a sustainable dissaving strategy should take into account longevity, inflation and uncertain medical costs. These risks are discussed below.

Longevity Risk

For elders designing an income stream one of the first considerations is "how long will I need to survive on my available funds?" or longevity risk. Outliving their assets is one of the most serious risks elders face. According to Michael Falcon, J.P. Morgan

Asset Management's head of retirement "Accumulation is hard but it's not complicated. Decumulation – and hopefully decumulating in a way where you don't outlive your money – is both hard and complicated." (Volz, 2012). Several studies indicate that elders can reasonably plan for their longevity; however they tend to underestimate their life expectancy (Society of Actuaries, 2012; Sondergeld, Drinkwater and Jamison, 2002; Hurd and McGarry, 1997). According to 2010 National Center for Health Statistics data (2013), the average remaining life expectancy for a 65 year old was an additional 19.1 years; nearly half of this group will live longer. Life expectancy estimates vary by race and gender, females are expected to outlive males and white women are expected to outlive black women by on average 1.0 years.

Inflation

Inflation is an increase in the overall price of goods in the economy (Mankiw, 2004). The inflation rate has averaged 4.5% annually over the last 45 years (author's calculation, based on US Inflation Calculator, 2013). Even a historically low inflation rate can erode purchasing power over time. For example, an individual who had $10,000 in savings would find that after 20 years their at a steady 2% rate of inflation they would have the purchasing equivalent of only $6,729 ("The risks of "safe" investing," 2013).

Financial planners will advise elders to diversify the risk of their portfolio into income providing and long term growth portions. Both of these portions are subject to inflationary pressures. Most investors will have a fixed-income portion such as bonds. However, government bonds do not do well during inflationary periods, since rising interest rates erode their buying value. Inflation protected bonds are available, but this protection comes at a cost. Real estate has historically performed well during inflationary

times; however real estate values can plummet during a recession. Some advisers recommend investing up to 50% of the portfolio in stocks (the growth portion) to hedge against inflation. As shown by recent market conditions, this investment is not guaranteed to grow or even retain its value.

Future Medical Expenses

Uncertain medical costs also complicate the creation of a sustainable dissaving strategy. Elders could be expected to protect against health-related risks by purchasing long term care insurance (LTCI). LTCI pays for services needed by those with difficulties performing activities of daily living. AZF Insurance Services estimates that currently about 12.8 million Americans require long term care; only 2.4 million of this group lives in nursing homes. Kemper, Komisar, and Alecxih (2005) report that approximately two-thirds of Americans will need long term care at some point in their lives; services will be required for on average 3 years. Brown and Finkelstein (2009) estimates one third to half will reside in a nursing home and that between 10 and 20 percent of those in nursing homes will be institutionalized for more than five years. MetLife (2012) reports that 2012 costs for in home health care aides and homemaker services are on average $21 and $20/hour respectively. Nursing home costs averaged around $248 per day for a private room or $90,520 annually.

According to LIMRA (2009) sales for individual LTCI in 2008 were 7% lower than the previous year. By year end 2008 there were 4.8 million LTCI policies. In 2008, the average cost of LTCI for a 65 year old wishing to purchase a base benefit policy was $1,342 per year (American Association for Long-Term Care Insurance, 2008). These policies must be renewed annually. Use of benefits will likely result in an increase in

annual premiums; onset of some physical conditions can render an individual uninsurable (J. DeLuca, personal communication, March 28, 2009).

Lack of affordability is one reason why individuals are not purchasing these policies; another is the failures of policies to offer complete long term care coverage (Cutler, 1993). A third reason is substitutes; higher net worth individuals prefer to self-insure against this risk. A study by AARP (2001) found that a majority of those surveyed believed that Medicare would cover long term care costs, therefore LTCI is not necessary. Finally, Pauly (1990) concluded that individuals avoid buying LTCI since it could serve as a disincentive for "no cost" informal services provided by family members.

Inadequate insurance coverage can make creation of a dissaving strategy more difficult. It introduces a level of risk as Medicare only covers a percentage of medical bills, and not all services are covered. Substantial increases to out of pocket cost can lead to unplanned overspending. For households with low assets the ability to meet non-medical household expenses could be compromised.

Do Elders Actually Create a Dissaving Strategy?

Overall it does not appear that a great deal of planning is executed by retirees when it comes to their divestiture strategy. A recent Wells Fargo/Gallup poll (2012) shows that of those surveyed only 38% of retirees have created a documented plan for retirement spending, a 9% decrease from 2011. The Consumer Federation of America survey (2012) reports that 49% of those surveyed (adults 18+ who are responsible for family finances) have created a retirement plan. Only slightly more than half (53%) of

those who have retirement savings and self-identifying as retired have estimated their annual withdrawal amount.

Vanguard's 2008 survey found that of those making withdrawals, 21% had no formal strategy. Withdrawals based on consumption needs were the most commonly cited strategy (37%), 21% based their spending on a targeted dollar figure; 20% relied on a self-created "rule of thumb", 10% used a "gut feeling", 9% withdrew a specified percentage, and 6% used a formal spending rule.

Of those with a plan, 80% report they are confident they can meet their financial goals as stated (Wells/Fargo 2012). Retirees in a Wachovia survey (2008) report that 40% of retirees feel "very confident" they will not outlive their assets; only 28% are worried they will incorrectly invest their assets. Survey respondents found saving for retirement more difficult than managing their assets in retirement (61% vs. 39%, respectively).

Perhaps this attitude explains the frequency of plan review; less than half the households surveyed (44%) have an established schedule for ongoing monitoring and review of their drawdown plan, 49% revisit their plan but not on a predetermined timeframe and 7% rarely or never review or modify their plan on a regular basis (Vanguard, 2008). Milliman (2009) recommends that plans be reviewed every three years; specified events could trigger an off-cycle review (market volatility, health shocks, etc.). It appears that most households with plans are not reviewing them on a sufficiently frequent basis, perhaps placing their strategy at risk.

Finally, for those households with a plan implementation and adherence are low. According to the 2013 Retirement Confidence Survey (EBRI, 2013), only 46% of retirees with a decumulation plan followed all of the recommendations. Mistrust of financial advisors is apparently a barrier to adherence; nearly half (48%) did not trust the advice they were given. Cost also is a factor; 44% reported they could not afford professional advice. A small percentage reported they had better sources of financial advice (5%), 4% relied on their own knowledge or financial goals and 3% had a change in their personal circumstances and viewed the advice as non-applicable.

Government Mandated Dissaving

For those holding IRAs, a portion of their decumulation plan is created for them; public policy mandates decumulation of this asset in late life. Contributors must withdraw funds from an Individual Retirement Account (IRA) beginning in the calendar year after age 70 ½ (known as the minimum required distributions, or MRD). Once exception to this tax policy is the Roth IRA; since the balance represents after-tax dollars no distribution is required.

The company holding the IRA calculates the MRD. It is determined by dividing the IRA balance by the life expectancy found in the Uniform Lifetime Table. The Internal Revenue Service (IRS) is responsible for the Uniform Lifetime Table. If the owner of the IRA fails to take the MRD, the IRS will take 50% of the amount s/he should have withdrawn ("Required Minimum Distributions," 2014).

Elders are increasingly responsible for their financial security, yet possess little financial literacy. They are required to perform the increasingly difficult challenge of balancing consumption needs, creating an income stream from existing assets and

annuities, and preserving capital yet they are reluctant to use the services of those trained to design asset streams. Prior research suggests that at some point most households will decumulate, however the ages and rates of decumulation vary with income and demographic factors. As the financial environment for retirees continues to shift towards greater self-funding, increasing longevity and uncertain medical costs the need for continued research on this topic is pressing.

CHAPTER 3

CONCEPTUAL MODEL

The Life Course Model

For the purposes of understanding decumulation, the conceptualization and measurement of sociological as well as economic components has been added by looking to Elder's life course model.

Elder (1985) characterizes time as a series of transitions, or short-term discrete events, which are embedded in trajectories. Trajectories can be thought of as long-term patterns of behavior or pathways. Working careers or parenthood are examples of trajectories while starting a job or having a child is a transition. The impact of these trajectories and transitions are contingent upon when they occur in a person's life. For example, if an individual is forced to retire earlier than they had planned this may lead to designing a different decumulation strategy than an "on time" retirement. Events such as divorce can lead women to reach the decumulation phase with lower assets and small Social Security benefits.

The elements of Elder's life course paradigm are incorporated into the formalized life course model. Support for this comes from Rank (2008) who argues for the importance of timing of events, family structure, human development and sequencing for asset levels across the life span. He posits that the life cycle itself has varying periods of

economic security. He further states that the timing of particular events (such as birth of children or unemployment) and when they occur can also influence family asset levels. Individual development experiences in one's childhood (quality of education, parental resources, etc.) can have lifelong consequences in terms of social and employment skills. If life events are experienced out of sequence (for example, teenage pregnancy and later high school graduation) there can be negative consequences in later life. Overlapping life events (being a member of the "sandwich" generation with your children and parents alive) can lead to high stress levels.

Johnson and Favreault (2004) provide support for the notion that timing of events and structural context (the normative constraints that influence our behaviors and beliefs) matter. They find that being a single mother is linked with financial insecurity in later life, particularly for those who do not have access to spousal benefits.

Within the integrated model it is assumed that the decumulation decision is shaped by the historical time, place and context in which it occurs (Elder, 1998). It is therefore expected that members of different birth cohorts will have different decumulation patterns. Timing of events and transitions are an element of the interdisciplinary model. Interdependent lives and intergenerational ties are also principles of the expanded model (Elder 1985, 1995). It is assumed that the decumulation decision will incorporate the needs of family members and spouses.

Human agency is incorporated into this model. It is assumed that individuals aim to make the most rational choice available to them. Choices are constrained by incomplete information, opportunities and their social context. The incorporation of life course elements will provide the context for human agency and the utility decision.

Finally, the model takes into consideration that not all households accumulate wealth equally. Wealth has been associated with race (Shapiro, 2004; Gittleman & Wolff; 2004), gender (Chang, 2010; Conley and Ryvicker, 2004) and family composition (Chang and Muhammad, 2012; Keister, 2000). Therefore the effects of demographics on dissaving (asset decumulation) will be incorporated in the model.

The Formalized Life Course Model

The decision to decumulate is made based on a number of interacting factors. These elements are shaped over the entire life course of the households involved. The complexity and dynamic nature of these factors has led to the formulation of the hypotheses regarding dissaving. The Formalized Life Course Model (figure 2) illustrates how a modified life cycle theory can be used to identify factors related to establishing divestiture streams. There are a number of factors associated with dissaving in this model. These factors can be categorized into three groupings: demographics, life course variables, and decumulation factors.

Demographic characteristics of households included are race, age, gender, educational attainment, longest held occupation sector and geographic location. Gender can shape the choice of occupation as well as timing and duration of workforce attachment (Warner, Haywood & Hardy, 2007). A survey by Ariel/Hewitt showed that there are different savings rates, levels of participation and different portfolio composition by race (Ariel/Hewitt, 2012). Financial literacy is required to create an optimal decumulation stream. Financial literacy skills vary by gender, educational attainment and age. Lusardi and Mitchell (2011) found that higher education levels and financial literacy are positively correlated.

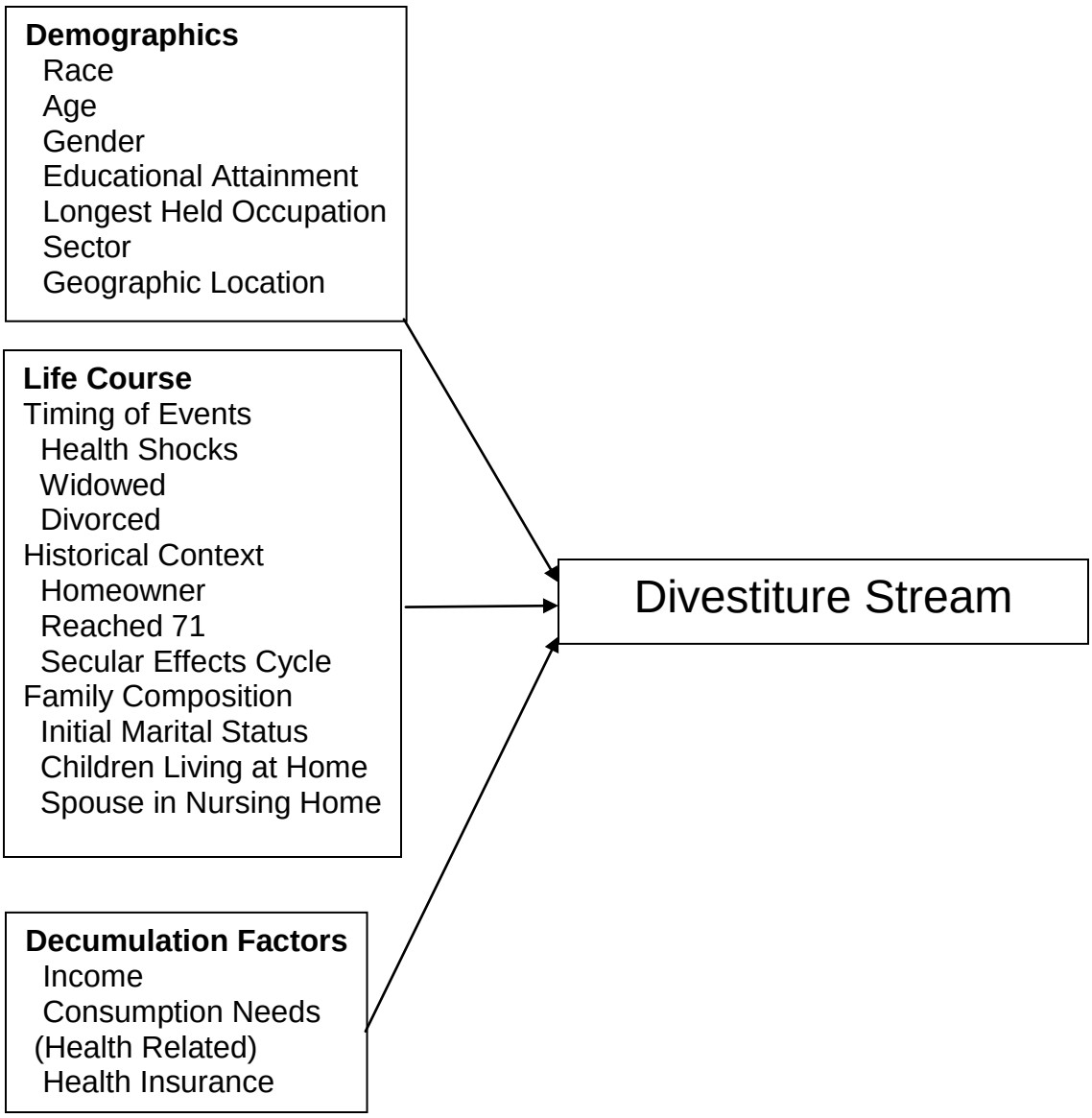


Figure 2 Conceptual Model

Older and young persons have lower financial literacy relative to middle aged individuals and men have higher financial literacy than women.

Hypothesis 1: Decumulation patterns will vary across households; it is expected that household draw down rates will vary with time.

Hypothesis 2: It is difficult to manage assets in retirement therefore it is expected that households will transition among decumulation outcome categories.

Hypothesis 3: The observed cycle's categorization will influence the next cycle's drawdown rate in an attempt to maintain a sustainable drawdown rate.

Life course variables include the timing of events (health shocks, being widowed or divorced), historical context (secular cycle effects) and family composition (initial marital status, children living at home, and a spouse in a nursing home). Cancian and Reed (2009) finds that household size and composition are determinants of draw down rates. An increase to the number of children increases the risk of poverty (due to increased financial demands and decreased working hours) whereas getting married decreases the likelihood of poverty (through economies of scale and the addition of a possible second source of household income). They also find that female headed households are disadvantaged relative to male headed households due to the combined effect of lower earnings and fewer hours worked.

For example, in 2007, large employers reported that 401(k) plans were the primary retirement benefit available to their employees whereas a decade earlier employers cited defined benefit plans (Hewitt, 2009). Since 401(k) and IRA assets can be held in stock, changes in market valuation could affect wealth levels and divestiture plans.

Hypothesis 4: The onset of a health condition will predict an excessive depletion of assets.

Hypothesis 5: Marital dissolution or death of a spouse will be associated with excessive decumulation.

Hypothesis 6: The admission of a spouse to a nursing home will be associated with excessive decumulation.

Decumulation factors include income, health-related consumption needs, and health insurance. In the 21st century, late life consumption is financed by savings and income. Income sources include wages from work, government (Social Security, SSDI), and employer based defined contribution and defined benefit programs. Thus economic security of elders is in part determined by their lifetime experiences of employment and savings. A recent Census Bureau Brief (January 2013) reported a 4 percent increase in labor force participation for those 65+ from 1990 to 2010. This increase was partially attributed to increased longevity and financial pressures. There is also evidence suggesting that health declines can lead to excessive wealth depletion (Lyons & Yilmazer, 2005).

As shown in figure 2, how elder households use their financial assets is determined by a complex set of factors. These factors are in turn influenced by the historical context in which the dissaving decision is made. By examining patterns of dissaving we can identify characteristics associated with different decumulation strategies. These characteristics can be used by financial advisers to shape financial planning services.

Similarly policymakers can take these characteristics into consideration when evaluating the structure of social programs and changes to tax laws. Chapter 4 discusses how the patterns of dissaving will be examined.

CHAPTER 4

RESEARCH METHODOLOGY AND DATA

The objective of this study is to examine wealth depletion over time and factors associated with depletion. In this section I present the data source, sample selection criteria, variable definitions, and the specifications of the statistical models used to address my research questions.

Data

This study used multiple waves of the Health and Retirement Study (HRS) and RAND HRS files to examine patterns of asset decumulation. The HRS is a nationally representative longitudinal study of community dwelling older adults (Juster and Suzman, 1995). The original HRS cohort included those in the contiguous United States born from 1931–1941. They provided three waves of data; 1992, 1994 and 1996. The AHEAD survey population was residents born in 1923 or earlier and provided study data for 1993 and 1995. In 1998 the studies were merged and two additional cohorts were included. These were the Children of the Great Depression (born 1924-1930) and the War Babies cohort (born 1942-1947). Respondents were tracked until death and exit interviews with surviving family members were conducted where possible.

The HRS uses a stratified multistage area probability sample and is designed to be representative of all non-institutionalized civilian individuals in the contiguous United States. An over sampling of Blacks and Hispanics was taken due to their growing numbers in the total population. Currently respondents enter the sample at age 51 and are tracked until their death. Spouses/partners are included regardless of their age. (University of Michigan, Health and Retirement Study, accessed November 19, 2012).

The HRS was chosen as it contains detailed health, demographic, housing, work, employment history, family structure, insurance, asset, and income measures. Its longitudinal design allows for tracking individual household changes over time.

Study Sample Selection

Study data were drawn from six biennial waves of the HRS (1998 - 2008), and merged RAND HRS data files for the period 1998 – 2008. RAND HRS data set Version J was used as it contains the relevant HRS variables and has consistent variable definitions across waves. A twelve year period was selected to allow for patterns of decumulation to be observed. This time span accommodated the loss of one wave of data for lagged variables. It also corresponds to a period of economic fluctuation, allowing for those effects to be studied over time. As of the inception of this study, the latest year with final data for the RAND HRS data set was 2008, thus it was selected as the last wave of the study. The 1998 wave serves as the baseline year of analysis for this study.

The unit of observation for this study is the household. Financial respondent attributes were specified to characterize households because they provided the financial responses. The study sample is first restricted to financial respondents who were 60 years or older during the 1998 interview period. Respondents 60 years and older were

included to allow for early claiming of Social Security benefits at age 62. Spouses/partners of any age were included.

A working restriction was also imposed. The working restriction was to allow for the possibility of supplementing income but not include those on an earnings path in the research. Financial respondents who reported working full time (40 hours a week) were excluded from the sample. This same restriction was imposed on the respondent's spouse/partner. If the spouse/partner reported working 40+ hours, the household was excluded from the study sample.

There were a large number of missing values for the set of longest held occupation sector categorical variables (5,085). Since longest held occupation sector is not a key predictor variable, a variable named missing occupation sector was coded and specified in the analytic models. The remaining variables with the greatest number of missing were other insurance (365 missing values) and government insurance (361 missing values). After deleting observations with any missing values in study variables other than occupation sector 51,499 person wave observations were available for analysis.

The dataset was further restricted to those households providing survey data for a minimum of three waves; those who were lost due to death or attrition in Wave 3 or later were retained in the sample if proxy interview data were available for Wave 3. This exclusion was imposed due to the requirements of the Markov MNL model. The Markov model requires three waves because a separate model is run for each of the last period's decumulation outcomes. In this model, the decumulation outcome between waves 1 and 2 is a factor explaining decumulation outcomes between waves 2 and 3. This last

exclusion resulted in the loss of 3,486 cases. A total of 48,013 person wave observations were eligible for analysis.

The multinomial model is an unbalanced panel with 9,274 households spanning six time periods. There are 3 observations for 12.43% of the households (the minimum number of observations required for inclusion in the study); 4 observations for 14.85%, 5 observations for 15.29% of households and 57% of households have observations in all 6 time periods.

Multinomial Logistic Regression Analysis

A multinomial logistic regression was used to analyze if health has a differential impact on the probability of wealth depletion. Study data from the six biennial waves of the HRS (1998 - 2008), and merged RAND HRS data files for the period 1998 – 2008 were combined to create one concatenated analysis file. The multinomial logistic model was used to examine Hypotheses 4-6**.**

A dependent variable was created for the periods 1998-2000, 2000-2002, 2002-2004, 2004-2006, and 2006-2008 indicating whether or not a household's observed depletion rate was within a defined range, above, or below the range. The target range has a 10% allowable margin of error to account for the challenge households face when reacting to changes in market rates and planning for their financial future. Definitions for the dependent variable as well as the independent variables are provided in the following section.

Measures

Dependent Variable

A categorical dependent variable was created for the primary multinomial logit model. It was coded for the periods 1998-2000 (Divest1), 2000-2002 (Divest2), 2002-2004 (Divest3), 2004-2006 (Divest4), and 2006-2008 (Divest5). The data contain imputed values for households with missing data. Imputed values were calculated by the HRS. Income and asset data reported were converted to 2008 Consumer Price Index-Urban-Research Series adjusted dollars.

Each dependent variable was constructed as follows. First I annuitized the household baseline wealth for each pair of waves. The formula for calculating the annuity is as follows:

$$W_{y0} = w[(1+r)^{LE}-1]/[(1+r)^{LE}r]$$

where:

W_{y0} = Wealth in baseline year

r = real rate of interest

LE = remaining life expectancy

w = annual withdrawal amount

Centers for Disease Control and Prevention gender and race specific mortality tables were used for the life expectancy values (National Center for Health Statistics, 2012). Life expectancy figures for Other race respondents were taken from the life tables for Whites. Life expectancy figures for Hispanic respondents were taken from the life tables for Blacks. Since couples will create their retirement spending plans jointly, an average of remaining life expectancy was used for married couples. The real rate of

interest used (2.9%) is the intermediate assumption rate from the 2012 Social Security Trustee's Report (The 2012 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds, 2012, p.103).

There is a relatively low level of financial literacy among US residents (National Financial Capability Study, 2009). Yet households must manage their income stream and finances in later life. Since managing wealth draw down can be difficult I allow for a margin of error or tolerance corridor around the annual withdrawal rate. The question then became which corridor target to choose. The bounds had to be wide enough to accommodate market fluctuations but not so large that any decumulation choice would fall within tolerance. I reviewed the pension literature for guidance. The 2006 Pension Protection Act (Pension Protection Act, 2006) and The Worker, Retiree, Employer and Recovery Act of 2008 (Worker, Retiree, and Employer Recovery Act, 2008) both allow for a 10% corridor. Based on these pieces of legislation the corridor of +/- 10% was selected.

Next, the 10% +/- tolerance corridor was calculated by multiplying the annual withdrawal amount by 0.9 to determine the lower limit and 1.1 to determine the upper limit.

I then calculated the actual withdrawal amount. The formula for the actual withdrawal is:

$$a = W_{y0} - W_{y2}$$

where:

W_{y0} = Wealth in baseline year

W_{y2} = Wealth in final year

a = actual withdrawal amount

Since the annuity tolerance corridor is based on an annual calculation and the actual withdrawal is for a two year period, the tolerance corridor was doubled. The annuitized withdrawal corridor was then compared to the actual withdrawal amount.

The dependent variable for each wave was assigned a value of 3 if the actual withdrawal amount was within the tolerance corridor. If the actual withdrawal amount was greater than the upper limit of the tolerance corridor a value of 1 was assigned to the dependent variable. Finally, if the actual withdrawal amount was less than the lower limit of the tolerance corridor the dependent variable was assigned a value of 2. Category 3 is the omitted reference group, and referred to as "on target". Category 1 is referred to as "overspender" and category 2 is referred to as "oversaver."

An example calculation for the multinomial logit dependent variable is provided below. Recall that the annuity formula is:

$$W_{y0} = w[(1+r)^{LE}-1]/[(1+r)^{LE}r]$$

For a married couple (a 79 year old white male financial respondent and his 68 year old wife of Other race) the following values are plugged into the formula:

W_{y0} = Wealth in baseline year = $512,820

r = real rate of interest == .029

LE = remaining life expectancy = ((9.8 + 18.6)/2) = 14.2

w = annual withdrawal amount

By substituting these values into the annuity formula and re-arranging the terms we solve for w.

$$w= (((1+.029)^{14.2}-1)/((1+.029)^{14.2}.029)))/ \$512,820$$

The annual withdrawal amount (w) for this couple is $44,572.

To calculate the tolerance corridor I multiplied the annual withdrawal amount by 0.9.

$$\$44,572 * 0.9 = \$40,114.80$$

Next I multiplied the annual withdrawal amount by 1.1.

$$\$44,572 * 1.1= \$49,020$$

The tolerance corridor is $40,114.80 - $49,020.

Taking into account that this is an annual figure (versus the study data which span two years) the tolerance range for the household was doubled. The tolerance range for the couple is $80,229.60 to $98,040.

Next the actual withdrawal is calculated. The formula for the actual withdrawal is

$$a= W_{y0} - W_{y2}$$

The couple in this example had an ending wealth of $352,000. Substituting their wealth values into the formula we solve for actual withdrawal.

$$a=\$512,820 - \$352,000$$

The actual withdrawal for this couple is $160,820.

The actual withdrawal amount ($160,820) is larger in value than the upper limit of the target corridor ($98,040), therefore the household is assigned a value of 1, overspender.

Covariate Definitions

Following the conceptual model (see Figure 1 for diagram) a number of time invariant and time varying characteristics were specified in the model as covariates. These are discussed below for different classes of variables. These variables are categorized as life course variables, demographics, and decumulation factors.

Life Course Variables

The life course variables incorporate personal, social and historical factors (Elder, 1975; Hareven, T. 1978; Hareven, T.K. 1978). Categorical dummy variables for married baseline, never married baseline, divorced baseline and widowed baseline were created with married baseline as the reference group. Based on a 2011 study by the National Endowment for Financial Education finding that more than half of parents are providing financial support to adult children, a continuous variable indicating the number of children living with the respondent was coded. A dummy variable was created where a value of 1 indicates that a spouse/partner is in a nursing home and 0 otherwise.

Unmarried individuals do not have the economies of scale afforded to married couples, and dissolution of marriage has negative financial implications therefore it is anticipated that relative to being married, not being married at baseline will be associated with greater likelihood of overspending and lower likelihood of oversaving relative to being on target. Since the flow of intergenerational support cannot be determined (it is not known if the respondent is supporting children or if the children are providing financial assistance to the respondent) the expected sign for children is unspecified. Nursing home admission can be associated with an increase in out of pocket costs for medical expenses not covered by insurance as well as the loss of services the spouse may

have provided in the home. Thus it is anticipated that a spouse residing in a nursing home will result in a household being more likely to overspend and less likely to oversave, relative to being on target.

There are numerous financial consequences to divorce. These include legal fees, increased living expenses (maintaining separate homes), tax implications for dissolution of retirement accounts, and loss of health insurance. Widowhood can also jeopardize financial security. Large out of pocket medical expenses may have been incurred prior to the spouse's death; there is also a potential for loss of spousal benefits (social security, pension). Due to the financial implications presented, marital disruption is captured using the following two variables. Divorced is a binary variable indicating whether or not a respondent experienced divorce in the past two years. Widowed is a binary variable indicating whether or not a respondent experienced widowhood in the past two years. Since divorce involves the dissolution of joint property and widowhood can represent the loss of pension income and a decrease in social security income, it is anticipated that those reporting marital disruption are more likely to be overspenders and less likely to be oversavers relative to being on target.

A growing body of literature suggests that onset (Smith, 2005) and severity of health events (Lee & Kim, 2003) negatively affects wealth. This study controls for the incidence of health conditions (health shocks). Binary variables were created for respondents and spouse/partner which have the value of one to indicate the onset of mild conditions (high blood pressure, psychiatric problems, and arthritis) between waves. Binary variables were created to capture the onset of severe conditions (diabetes, cancer, lung disease, heart disease, and stroke) between waves, with 1 indicating onset of

condition and 0 otherwise. Conditions are classified as either mild or severe based on the American Society of Anesthesiologists (ASA) Physical Status (PS) classification system. This system was designed to standardize communication of patient health status across various clinicians (Maloney and Weinberg, 2008). It is anticipated that the presence of health conditions will result in a household being more likely to overspend and less likely to oversave, relative to being on target.

Historical context was measured as follows. Homeowner is a binary variable indicating whether or not a respondent owns a home. A dummy variable Reached 71 was created where 1 indicates the respondent is 71 years of age or older and required to take a retirement distribution and 0 otherwise.

A dummy cycle variable captures secular effects not reflected in the time trend variable; it ranges from 2000-2002 (cycle2) to 2006-2008 (cycle5). Since the dependent variable is lagged, 1998-2000 (cycle1) is not specified for the multinomial logit model. 2000-2002 (cycle2) is the omitted reference group.

The expected sign for homeownership will be unspecified. While owning a home can protect against the uncertainties of the rental market, and homeowners tend to hold higher levels of retirement assets elders (Nakajima and Telyukova, 2012), they rarely access their home equity and instead spend down other assets (Triest, Sun, & Webb, 2008). The expected sign for Reached 71 is unspecified as it is not known if the required distribution was spent or rolled back into a retirement savings vehicle. The secular effects cycle variable is uncertain as the effect will be dependent upon the wave-specific economic conditions.

Demographic Variables

Race is specified using a set of categorical dummy variables (Black non-Hispanic, Other non-Hispanic, and White non-Hispanic). White non-Hispanic serves as the omitted reference group for race. Ethnicity is coded as 1 equals Hispanic 0 otherwise. Age is measured in years and has been centered around 60. Female is a dummy variable indicating gender. A series of categorical dummy variables describing educational attainment were coded as follows: less than high school, high school, some college, college, and masters, with less than high school serving as the reference group.

A set of categorical dummy variables were created indicating the sector a respondent's longest held job belonged to (service job, blue collar job, or white collar) with white collar serving as the omitted reference group. Sector assignments were classified using the Bureau of Labor Statistics 2001 National Compensation Survey. Those cases with incomplete sector data were assigned to the sector missing variable. There are a number of reasons for incomplete sector data. Sector data questions are asked differently in different waves. This data is collected for jobs which lasted a minimum of five years and not all waves collected occupation codes.

Categorical regional variables indicating geographic region of the country where the respondent resides were coded. Northeast, with its highest Medicare spending per capita (Cuckler, Martin, et. al., 2011), serves as the omitted reference group. It is expected that educational attainment beyond less than high school diploma, living in the south, west or Midwest and being a white collar worker will be associated with an increased likelihood of oversaving and decreased likelihood of overspending, relative to being on target. Conversely, age (Hurd and Reardon, 2003), being female (Chang, 2010),

black (Shapiro, Meschede, & Sullivan, 2010), Hispanic (Taylor, et. al., 2011) or non-married (Pew Research Center, 2012; Hurd and Rohwedder, 2010) are anticipated to predict a greater likelihood of overspending and a decreased likelihood of oversaving, relative to being on target.

Blue collar and service workers on average earned less than white collar workers thus they could be expected to save less. Therefore they are anticipated to predict a greater likelihood of overspending and a decreased likelihood of oversaving, relative to being on target. The expected sign for missing sector is unspecified as there is insufficient information to determine how the respondents will draw down relative to white collar.

Decumulation Factors

Kim and Lee (2006) suggests that co-morbidities have an effect on wealth. Following Kim & Lee (2005), and Smith (2005), this study controls for prevalence of health conditions (health capital) at each wave. Health variables were created for respondent and spouse/partner (if married/partner). Based on ASA-PS classifications health capital was coded as either mild or severe. Count variables for the presence of mild conditions were specified for a "yes" response to a physician diagnosis of the following conditions: high blood pressure, psychiatric problems, and arthritis. Count variables for the presence of severe conditions were created for a "yes" response to a physician diagnosis of the following conditions: diabetes, cancer, lung disease, heart disease and stroke. Respondents were not allowed to dispute reports from a previous wave. As a number of health studies have found that health events have a negative impact on wealth (Hurd and Kapetyn, 2003; Wu 2003; Lee and Kim, 2008) it is

anticipated that health events for respondents and spouses will increase the likelihood of overspending and decrease the likelihood of oversaving.

Income

Several income variables were tested, as the presence of income can influence wealth draw down. Dummy variables were coded for social security, pension, social security disability insurance (SSDI) and income from earnings. A 1 indicates the household reported this income source; 0 otherwise.

The sign will be unspecified for the social security, SSDI and pension variables. The presence of income from these sources could serve as an incentive to spend down excessively (based on the belief that the income from these sources will be adequate for future consumption). Conversely, households may under spend to mitigate the fact many pensions are not adjusted for inflation and social security is not intended to be the primary source of income in later life. The sign for income from earnings is unspecified; it is unclear whether the respondent is working as a matter of choice or financial necessity.

Health Insurance

Health insurance can mitigate the cost of out of pocket health expenses therefore a number of insurance variables were tested. A government insurance dummy variable was created where a value of one indicates the presence of Medicare, Medicaid, veterans or other government health coverage and 0=otherwise. A dummy variable was created indicating whether or not the respondent has health insurance through a current or former employer. If the respondent reported they have health insurance coverage and the coverage is not provided by the government or an employer or union, the Other insurance

variable was assigned the value of 1, or 0 if no such insurance was reported. Finally, a variable was coded to reflect cases where the respondent reported not being insured; it was assigned a value of 1 if there was no health insurance and 0 otherwise.

The presence of insurance will serve to offset the cost of health care thus is anticipated to decrease the likelihood of being an overspender and increase the odds of oversaving, relative to being on target. Table 2 presents the definitions of the variables. Expected signs are found in Table 3.

Table 2.
Variable Definition and Coding

Variable		Definition
Dependent Variable		
Divest		1=Household has depleted an excessive amount, 2=Household has depleted less than the expected amount, 3=Household has depleted the expected amount (+/- 10%) (omitted reference group).
Life Course Variables		
Marital Status		
	Married baseline	Dummy variable 1=Married, 0=otherwise.
	Never married baseline	Dummy variable 1=Never married, 0=otherwise.
	Divorced baseline	Dummy variable 1=Divorced, 0=otherwise.
	Widowed baseline	Dummy variable 1=Widowed, 0=otherwise.
Children		Continuous variable indicating the number of children living with the respondent.
Spouse/partner in Nursing Home		Dummy variable 1 = Spouse/partner in a nursing home, 0=otherwise.
Marital disruption		
	Divorced	Dummy variable 1=Respondent is divorced in the past two years, 0=otherwise.
	Widowed	Dummy variable 1=Respondent is widowed in the past two years, 0=otherwise.

Health Shock	
Respondent Incidence Mild*	Dummy variable 1=Respondent reports mild health condition after baseline, 0=otherwise.
Spouse Incidence Mild*	Dummy variable 1=Spouse/partner reports mild health condition after baseline, 0=otherwise or no spouse/partner.
Spouse Incidence Severe**	Dummy variable 1=Spouse/partner reports severe health condition after baseline, 0=otherwise or no spouse/partner.
Homeowner	Dummy variable 1=Respondent owns their home, 0=otherwise.
Reached 71	Dummy variable 1= respondent is 71 years old or older, 0=otherwise.
Secular effects Cycle	Dummy variable captures secular effects not reflected in the time trend variable; 1=cycle, 0=otherwise. Ranges from 2000-2002 (cycle2) to 2006-2008 (cycle 5). 2000-2002 (cycle2) omitted reference group.
Demographic Variables	
Race	
White non-Hispanic	Dummy variable 1=White non-Hispanic, 0=otherwise.
Black non-Hispanic	Dummy variable 1=Black non-Hispanic, 0=otherwise.
Other non-Hispanic	Dummy variable 1=Other non-Hispanic, 0=otherwise.
Hispanic	Dummy variable 1=Hispanic, 0=otherwise.
Age	Age in years at baseline (1998), centered around 60.
Female	Dummy variable indicating gender. Female=1, male=0.
Educational Attainment	
Less than high school	Dummy variable 1= Less than high school, 0=otherwise.
High school	Dummy variable 1= High school, 0=otherwise.
Some college	Dummy variable 1= Some college, 0=otherwise.
College	Dummy variable 1= College, 0=otherwise.
Masters	Dummy variable 1= Masters, 0=otherwise.
Sector	
White collar job	Dummy variable 1=Longest held job is in white collar sector, 0=otherwise.

Blue collar job	Dummy variable 1=Longest held job is in blue collar sector, 0=otherwise.
Service job	Dummy variable 1=Longest held job is in service sector, 0=otherwise.
Missing sector	Dummy variable 1=Longest held job was missing, 0=otherwise.
Region	
Northeast	Dummy variable 1=Respondent lives in Northeast, 0=otherwise.
Midwest	Dummy variable 1=Respondent lives in Midwest, 0=otherwise.
South	Dummy variable 1=Respondent lives in South, 0=otherwise.
West	Dummy variable 1=Respondent lives in West, 0=otherwise.
Decumulation Factors	
Health Capital	
Respondent Prevalence Mild*	Count variable of number of mild health conditions Respondent reports.
Respondent Prevalence Severe**	Count variable of number of severe health conditions Respondent reports.
Spouse Prevalence Mild*	Count variable of number of mild health conditions Spouse/Partner reports.
Spouse Prevalence Severe**	Count variable of number of mild health conditions Spouse/Partner reports.
Income	
Social Security Income	Dummy variable 1=Respondent has Social Security income, 0=otherwise.
Pension Income	Dummy variable 1=Respondent has Pension income, 0=otherwise.
Social Security Disability income	Dummy variable 1=Respondent has Social Security Disability income, 0=otherwise.
Income from earnings	Dummy variable 1=Respondent has Income from earnings, 0=otherwise.
Health Insurance	
Government insurance	Dummy variable 1=Respondent has Medicare, Medicaid, veterans or other government insurance, 0=otherwise.
Employer insurance	Dummy variable 1=Respondent has insurance through a current or past employer, 0=otherwise.

Other insurance	Dummy variable 1=Respondent has basic health privately purchased, supplemental insurance (set to yes if covered by basic health, medigap or any other health insurance programs besides long term care, and the coverage is not provided by the government or an employer or union), 0=otherwise.
No insurance	Dummy variable 1=Respondent does not report having insurance, 0=otherwise.

* Mild conditions include high blood pressure, psychiatric problems and arthritis.
**Severe conditions include diabetes, cancer, lung disease, heart disease and stroke.

Table 3.
Expected Variable Signs

Variable	Expected Sign DV=1 Overspender	Expected Sign DV=2 Oversaver
Dependent Variable		
Divest	DV	DV
Life Course Variables		
Marital Status		
Married Baseline	Reference Group	Reference Group
Never married Baseline	+	-
Divorced Baseline	+	-
Widowed Baseline	+	-
Children	+/-	+/-
Spouse/partner in Nursing Home	+	-
Marital disruption		
Divorced	+	-
Widowed	+	-
Health Shock		
Respondent Incidence Mild*	+	-
Respondent Incidence Severe**	+	-
Spouse Incidence Mild*	+	-

Spouse Incidence Severe**	+	-
Homeowner	+/-	+/-
Reached 71	+/-	+/-
Secular Effects Cycle	+/-	+/-
Demographic Variables		
Race		
White non-Hispanic	Reference Group	Reference Group
Black non-Hispanic	+	-
Other non-Hispanic	+	-
Hispanic	+	-
Age	+	-
Female	+	-
Educational Attainment		
Less than high school	Reference Group	Reference Group
High school	-	+
Some college	-	+
College	-	+
Masters	-	+
Sector		
White collar job	Reference Group	Reference Group
Blue collar job	+	-
Service job	+	-
Missing Sector	+/-	+/-
Region		
Northeast	Reference Group	Reference Group
Midwest	-	+
South	-	+
West	-	+
Decumulation Factors		
Health Capital		
Respondent Prevalence Mild*	+	-
Respondent Prevalence Severe**	+	-
Spouse Prevalence Mild*	+	-
Spouse Prevalence Severe**	+	-
Income		
Social Security	+/-	+/-
Pension Income	+/-	+/-

Social Security Disability Income	+/-	+/-
Income from earnings	+/-	+/-
Health Insurance		
Government Insurance	-	+
Employer Insurance	-	+
Other Insurance	-	+
No Insurance	+	-

* Mild conditions include high blood pressure, psychiatric problems and arthritis.
**Severe conditions include diabetes, cancer, lung disease, heart disease and stroke.

Decumulation Pattern Analysis

After examining movement across outcome categories over time, the next step was to determine the most common patterns of asset drawdown. A variable called divest pattern was created to record the dependent variable outcome category for each period of observation using an integer with up to five digits. Each digit represents the result from one period. The first result is recorded in the right most digit and subsequent results are stored in adjacent digits from right to left. A digit is assigned a value of 1 for overspender, 2 for oversaver, and 3 for on target. For example, the pattern for five periods is represented as 1,3,2,1,3; 3 for on target (1998-2000), 1 for overspender (2000-2002), 2 for oversaver (2002-2004), 3 for on target (2004-2006) and 1 for overspender (2006-2008). Frequencies for the divest pattern variable were run for all households regardless of how many waves of data were present. Analytic results are found in Chapter 5.

Markov Models

A set of multinomial logistic regressions were estimated to analyze factors that influence transitions across outcome categories. A Markov model is used to represent a changing set of states over time, where there is a known probability or rate of transition from one state to another. The model assumes that the probability of an observation at time n depends only on the observation at time n-1 (known as a first order Markov assumption) (Fosler-Lussier, 1998). Due to their simplicity Markov models are typically used as a building block of a larger analysis (Agresti, A. & Finlay, B., 1999).

Before specifying the Markov models, I coded a variable (lagdivest) that is the divest outcome from the previous period. With the exception of the dependent variables, the MNL variables and Markov model variables are identical.

Three additional models were specified, one for each of the three categories of the lagdivest dependent variable. To facilitate comparison across models, on target was specified as the base outcome in each of the three models. Relative risk ratios and confidence intervals are displayed for all re-estimated models.

First I re-estimated the original mnl regression model for cases where lagdivest was equal to on target. Next the model was re-estimated to include cases where lagdivest was equal to overspender. Finally, the mnl regression model was again re-estimated, this time for cases where lagdivest was equal to oversaver. Results for these models are displayed in Chapter 5.

Post Hoc Tests

I tested the sensitivity of the multinomial logistic regression empirical results to alternative assumptions regarding variable measurement and specification, economic cycle, life expectancy, and wealth expectations. The first model used a five-point scale (excellent, very good, good, fair, and poor) as a measure of self-reported health. Within this sample a change of 2 points between waves (for example, from excellent at baseline to good at wave 2) was observed for greater than 5% of respondents thus it is considered a negative change in health status. The second model used a measure of functional status based on the Centers for Medicare & Medicaid Services RAI 3.0 manual, v1.09. The onset of Activities of Daily Living (ADLs) (baseline=0 ADLS reported to ADLs=1 at any wave) or an increase of 2 or more ADLs between waves (for example, Wave 3 ADLs=2, Wave 4 ADLs=4) were both used as indicators of a negative change to health.

I tested an alternative assumption of the economic cycle by specifying the model over a period with different economic stages (2000-2006) from those in the study (1998-2008). Household time preferences for consumption were tested by including a life expectancy variable in the model. Results of all the sensitivity analyses are discussed in the Results chapter; details of the analyses can be found in Appendix C.

CHAPTER 5

RESULTS

This paper focused on the rate and determinants of asset drawdown in later life. In this section I first examine characteristics of the dataset to be analyzed. Next a multinomial logistic model is estimated to identify predictors of decumulation rates over the time period 1998 – 2008.

Descriptive Analysis of Multinomial Logistic Regression Sample

The study sample for the multinomial model contains 30,100 person wave observations. The majority of this sample is white non-Hispanic (84.6%), with black non-Hispanic respondents comprising 12.6% and other non-Hispanic less than 3%. The average respondent is nearly 71 years old at baseline. Nearly two-thirds are female (62%); most have a high school diploma or less education (66%). Almost 40% reported living in the south. Of those reporting a longest held occupation sector, most were employed in service jobs (27%).

Regarding life course variables, more than half the sample was married at baseline (65%), while 25% was widowed. Nearly 5% of the sample became widows over the period of study, and more than 28% had an adult child living with them at some point in time. At baseline, 11.7% of respondents indicated a mild health shock and 14.4% reported a severe health shock.

The overwhelming majority of this group reported having some type of government insurance (96%); many had additional insurance (26%) or insurance from a current or former employer (36%) while less than one percent reported being uninsured. Income sources were varied; nearly all respondents (96%) had income from social security; 15% worked for pay after baseline and 56% were receiving pension benefits.

Table 4.
Descriptive Statistics Multinomial Logistic Regression Sample

Variable	Mean	Standard Deviation
Life Course Variables		
Marital Status		
Married Baseline	.644	.479
Never married Baseline	.026	.160
Divorced Baseline	.082	.275
Widowed Baseline	.247	.431
Children	.285	.616
Spouse/partner in Nursing Home	.006	.075
Marital disruption		
Divorced	.009	.097
Widowed	.048	.214
Health Shock		
Respondent Incidence Mild*	.117	.319
Respondent Incidence Severe**	.144	.374
Spouse Incidence Mild*	.055	.237
Spouse Incidence Severe**	.068	.277
Homeowner	.784	.411
Reached 71	.519	.500
2000-2002	.311	.463
2002-2004	.256	.436
2004-2006	.219	.413
2006-2008	.215	.411
Demographic Variables		
Race		
White non-Hispanic	.846	.361
Black non-Hispanic	.126	.332
Other non-Hispanic	.029	.167
Hispanic	.072	.259

Age	10.463	6.919
Female	.621	.485
Educational Attainment		
Less than high school	.312	.463
High school	.350	.477
Some college	.173	.379
College	.082	.274
Masters	.083	.276
Sector		
White collar job	.192	.394
Blue collar job	.187	.390
Service job	.273	.446
Missing Sector	.347	.476
Region		
Northeast	.167	.373
Midwest	.259	.438
South	.387	.487
West	.185	.388
Decumulation Factors		
Health Capital		
Respondent Prevalence Mild*	1.358	.834
Respondent Prevalence Severe**	.848	.929
Spouse Prevalence Mild*	.722	.890
Spouse Prevalence Severe**	.469	.803
Income		
Social Security	.959	.198
Pension Income	.575	.494
Social Security Disability Income	.066	.249
Income from earnings	.148	.355
Health Insurance		
Government Insurance	.958	.201
Employer Insurance	.359	.480
Other Insurance	.259	.438
No insurance	.009	.093

* Mild conditions include high blood pressure, psychiatric problems and arthritis.
**Severe conditions include diabetes, cancer, lung disease, heart disease and stroke.

Multinomial Logistic Regression Analysis

A multinomial logit (MNL) regression was estimated on pooled data for 1998 – 2008. The analysis was conducted to analyze Hypothesis 4 (the onset of a health condition will predict an excessive depletion of assets), Hypothesis 5 (marital dissolution or death of a spouse will be associated with excessive decumulation) and Hypothesis 6 (the admission of a spouse to a nursing home will be associated with excessive decumulation). Results are displayed in table 5 below. The model was estimated with on target as the base outcome. The regression coefficients are the relative risk ratios (RRRs) for a unit change in the predictor variable. The substantive interpretations of the RRRs refer to expected changes as in the concept of expected value.

Multinomial logistic regression does not have an equivalent to the ordinary least squares R-squared, therefore many researchers use the pseudo R-squared as an indicator of model fit. The pseudo R-squared for the multinomial regression is 0.0105. While this pseudo R-squared value is low (common values are between 0.10 and 0.20), the statistic should be interpreted cautiously as it does not have the same meaning as an R-squared statistic. An R-squared summarizes the proportion of variance in the dependent variable associated with the independent variables. When comparing R-squared values, larger values indicate a better fit. This study estimated McFadden's pseudo R-squared. This statistic compares the intercept only model and the fully specified model. Although this model's pseudo R-squared is low, the model is superior to an intercept-only model.

Table 5.
Empirical Results for Multinomial Logit of Divest Target Outcomes

	Overspender (Base Outcome On Target)		Oversaver (Base Outcome On Target)	
Variables	RRR	95% CI	RRR	95% CI
Life Course Variables				
Marital Status				
Married Baseline	Reference Group	Reference Group	Reference Group	Reference Group
Never married Baseline	.78	.56 – 1.07	.81	.62 – 1.06
Divorced Baseline	1.23	1.00 – 1.52	1.24	1.01 – 1.52*
Widowed Baseline	1.10	.93 – 1.29	1.05	.90 – 1.23
Children	1.00	.93 – 1.07	1.02	.95 – 1.09
Spouse/partner in Nursing Home	.86	.50 – 1.47	.89	.53 – 1.49
Marital disruption				
Divorced	.94	.61 – 1.43	.84	.55 – 1.29
Widowed	1.26	1.00 – 1.59*	1.14	.91 – 1.43
Health Shock				
Respondent Incidence Mild[1]	1.04	.98 – 1.11	.92	.80 – 1.06
Respondent Incidence Severe[2]	1.06	.98 – 1.10	1.06	.94 – 1.20
Spouse Incidence Mild[1]	1.03	.85 – 1.25	.96	.79 – 1.15
Spouse Incidence Severe[2]	.89	.75 – 1.04	.94	.80 – 1.09
Homeowner	1.14	1.00 – 1.29	1.22	1.08 – 1.38**
Reached 71	1.06	.92 – 1.24	.99	.85 – 1.14
2000-2002	Reference Group	Reference Group	Reference Group	Reference Group
2002-2004	1.19	1.05 – 1.34**	1.00	.89 – 1.13
2004-2006	.95	.84 – 1.08	.92	.82 – 1.05
2006-2008	1.04	.89 – 1.20	.93	.81 – 1.08

Demographic Variables				
Race				
White non-Hispanic	Reference Group	Reference Group	Reference Group	Reference Group
Black non-Hispanic	.62	.53 - .74**	.64	.55 - .74**
Other non-Hispanic	1.09	.79 – 1.51	.97	.71 -1.33
Hispanic	.52	.41 - .65**	.56	.45 - .70**
Age	1.00	.99 – 1.01	1.02	1.00 – 1.03**
Female	1.13	1.00 - 1.27	1.05	.94 – 1.18
Educational Attainment				
Less than high school	Reference Group	Reference Group	Reference Group	Reference Group
High school	.92	.81 – 1.05	1.01	.90 – 1.15
Some college	.94	.80 – 1.106	1.03	.88 – 1.20
College	.89	.72 – 1.08	1.02	.85 – 1.24
Masters	.84	.68 – 1.04	1.02	.83 – 1.24
Sector				
White collar job	Reference Group	Reference Group	Reference Group	Reference Group
Blue collar job	1.29	1.08 – 1.55**	1.25	1.06 – 1.48**
Service job	1.19	1.01 – 1.39*	1.18	1.01 – 1.37*
Missing Sector	1.15	.98 – 1.36	1.21	1.03 – 1.41*
Region				
Northeast	Reference Group	Reference Group	Reference Group	Reference Group
Midwest	.91	.78 - 1.06	.95	.82 – 1.10
South	.98	.84 – 1.13	.97	.84 – 1.11
West	1.03	.86 – 1.23	1.04	.88 -1.22
Decumulation Factors				
Health Capital				
Respondent Prevalence Mild[1]	1.04	.98 – 1.11	1.02	.96 – 1.09
Respondent Prevalence Severe[2]	1.04	.98 – 1.10	1.04	.99 – 1.10

Spouse Prevalence Mild[1]	1.01	.94 – 1.09	1.00	.93 – 1.07
Spouse Prevalence Severe[2]	.97	.90 – 1.04	.99	.93 – 1.06
Income				
Social Security	1.18	.93 – 1.50	1.19	.96 – 1.48
Pension Income	.89	.80 - .99**	.96	.87 – 1.07
Social Security Disability Income	.50	.41 - .62**	.52	.43 - .64**
Income from earnings	1.28	1.10 – 1.48**	1.35	1.17 – 1.56**
Health Insurance				
Government Insurance	1.04	.79 – 1.37	1.05	.81 – 1.38
Employer Insurance	1.03	.91 – 1.16	1.09	.97 – 1.22
Other Insurance	1.00	.88 – 1.14	1.04	.93 – 1.18
No insurance	1.46	.80 – 2.67	1.17	.66 – 2.08
Pseudo R^2	0.0105			

n=23,569
RRR=Relative Risk Ratio, CI=Confidence Interval
1. Mild conditions include high blood pressure, psychiatric problems and arthritis.
2. Severe conditions include diabetes, cancer, lung disease, heart disease and stroke.
*p<0.05
**p<0.01

Analysis of the life course variables suggests that if a respondent experienced widowhood during the study the relative risk of overspender relative to on target would increased by a factor of 1.26 given the other variables in the model are held constant. Effects from 2002-2004 (cycle3) increased the relative risk of overspender (1.19). The sign for the widow variable was consistent with expectations; the cycle variable sign was not specified. None of the other life course variables predicted divest rates. It is possible that the health variables did not predict overspender since this sample has a high degree of insurance coverage.

If a respondent reported being divorced at baseline the relative risk of oversaver relative to on target increased by a factor of 1.24, holding all other model variables constant. Similarly, if a respondent owns a home, the relative risk of oversaver increased by a factor of 1.22. Being divorced at baseline decreased the risk of oversaver; the effect of homeowner was uncertain. Taking into account the average age of the respondent at baseline (71) and gender (mostly female) they would not be expected to return to the workforce in large numbers to compensate for diminished net worth after marital dissolution. Perhaps this led those divorced at baseline to spend conservatively. This is an area for future research. Contrary to expectations none of the other variables predicted divesting.

Several of the demographic factors are predictors of household decumulation rates. An increase in age is associated with oversaver (RRR = 1.05; $p<.01$). Not surprisingly the results suggest that longest held occupation sector predicts draw down rates. Having held a blue collar or service job (relative to white collar) increased the relative risk of overspender by a factor of 1.29 and 1.19, respectively. It was also associated with an increased risk of oversaver by a factor of 1.25 for blue collar, 1.18 for service jobs and 1.21 for missing sector. Blue collar and service sector occupations predicted contrary to what was expected for oversaver. Even though pension income is controlled for, it is possible that the results are still picking up the effect.

Being black or Hispanic relative to white is also predictive of both overspender and oversaver. An examination of the results shows that being a member of either racial group decreases the risk of overspender and oversaver relative to whites. This result is unexpected; it is explored in later sections of the dissertation.

Finally, the following decumulation factors were associated with divesting rates. Having income from a pension or social security disability (SSDI) were associated with lower risk of overspender, whereas income from earnings was associated with overspender. It is plausible that those with disability and pension income were conservative with spending given the likelihood of future pension benefit cuts and the small benefit amount provided by SSDI. It is also possible that the purpose of employment was to obtain employer health insurance and increased income was a secondary motivation; this is an area for future research.

Hypothesis 4 was not supported; the onset of a health condition did not predict an excessive decumulation of assets. This finding is unexpected as prior research has suggested a link between health shocks and depletion. This result may in part be explained by the high degree of medical insurance coverage reported by this sample. Given the age of the sample, the relative size of the coefficients indicating onset of conditions is not large. It is possible that the change in health related consumption needs could be large for those households experiencing onset but the effect is not significant when averaged across the sample. The results provide mixed support for Hypothesis 5, death of spouse was associated with overspending however marital dissolution was not significant. The empirical results did not support Hypothesis 6, admission of a spouse to a nursing home was not a significant predictor for overspender. Taking into consideration the average age of the sample, it is possible that households were anticipating that at least one member would be admitted to a nursing home, and planned accordingly.

Given market performance during the period under study it is possible that unexpected gains were experienced by some households therefore unintentional saving could have occurred. It may be the case that the intended drawdown strategy was implemented and executed well, however asset balances exceeded expectations and no alteration to the drawdown plan was made. This could result in a household being classified as oversaver even though its plan would otherwise have led it to be classified as on target.

I ran a Wald test for combining alternatives. The null hypothesis is that all coefficients except intercepts associated with a given pair of alternatives are 0 (i.e., alternatives can be combined). Based on the results below the null hypothesis can be rejected; no alternatives can be combined.

Table 6.
Wald Tests for Combining Alternatives Multinomial Logit

Alternatives Tested	$\chi 2$	df	$P > \chi 2$
Oversavers – On Target	246.965	43	0.000
Oversavers – Overspenders	172.060	43	0.000
On Target - Overspenders	216.930	43	0.000

Model Diagnostics

I ran a variance inflation (VIF) test to examine how much of the variance in the coefficients is inflated due to colinearity. I used the postestimation command estat VIF after regress. The VIF can range from 1.0 to infinity. The tolerance (1/VIF) ranges from 0.0 to 1.0 where the absence of colinearity is 1.0.

The variable measuring whether or not the respondent had reached the age of 71 in any wave had the highest VIF (2.77) and 1/VIF (0.36). Following O'Brien (2007) these values are within acceptable limits therefore there does not appear to be a colinearity problem with the model. See table 13 in Appendix A for the full VIF output.

The longest held occupation sector variable was missing a large number of cases (19,476). There were no potential substitutes in the dataset for this variable, and it was the only variable in the pooled dataset to have a large number of missing cases. The analysis was performed using STATA (which uses listwise deletion) thus to exclude cases missing sector data from analysis would have greatly reduced the sample size. Therefore, a missing data indicator dummy variable was coded for the longest held sector.

To analyze potential bias, descriptive statistics for the missing sector cases and the MNL final sample were run; these are contained in Appendix B. Examining the missing sector mean values we see that those missing sector are older (~78 years old vs. ~71) and a larger percent are female (72% vs. 62%).

Given their age and gender, the missing sector group is less likely than the MNL sample to have worked for pay outside the home. Additionally, homemaker is not an option for longest held occupation sector. It is likely that either respondents were not asked about longest held sector or that they did not provide a valid response survey. Since longest held sector is not a key independent variable this difference may not be substantively important.

Descriptive Analysis of Longitudinal Patterns

I ran the STATA xttrans procedure to test independence of outcomes in successive time periods. The outcome probabilities are presented as a transition matrix (see Table7), with sample numbers on the first line and percents below. For example, the elements of the first row represent the probabilities of moving to different states or remaining in the current state if state=1. State 1= overspender, state 2= oversaver, and state 3= on target. This analysis was undertaken to examine Hypothesis 2 (it is difficult to manage assets in retirement therefore it is expected that households will transition among decumulation outcome categories).

Through examination of the probabilities several patterns emerge. Of the households that overspent, most are likely to become oversavers in the next observation period (61%). Only 10% are expected to be on target and 29% can be expected to continue to overspend. Oversaving households show a similar pattern. While slightly more than a third will once again oversave, 56% will overspend and 11% will be on target. Nearly 30% of the households with on target spending for the current time period will be in the same category in the next period and greater than 40% will be oversavers; the remaining 27% are expected to overspend.

Table 7.
Estimated Transition Probabilities between Divestiture States for Successive Data Waves

	Divest Status (Wave t+1)			
Divest Status (Wave t)	Overspender	Oversaver	On Target	Total
Overspender	2,539	5,444	892	8,875
	28.61	61.34	10.05	100.00
Oversaver	5,706	3,716	1,159	10,581
	53.93	35.12	10.95	100.00
On Target	787	1,249	862	2,898
	27.16	43.10	29.74	100.00

Total	9,032	10,409	2,913	22,354
	40.40	46.56	13.03	100.00

Each wave a household would transition to a (possibly) new decumulation outcome based on the probabilities in Table 7. Similar to Fosler-Lussier (1998), these probabilities can be used to draw a probabilistic finite state automaton (see figure 3 below).

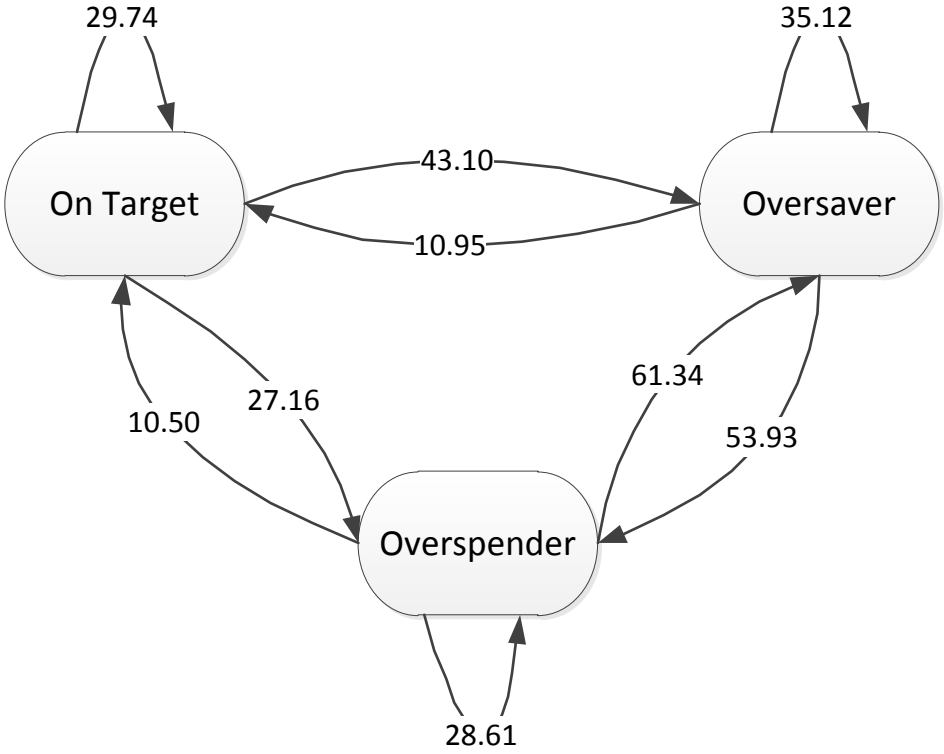


Figure 3. Probabilistic Finite State Automaton

A chi-square test of independence was performed to examine the relationship between outcomes in successive periods. Based on the results ($\chi 2$ (4) = 2,300, $p<.001$) the null hypothesis is rejected. The next period divest outcome probabilities differ

depending upon the last period's actual divest outcome. These results support Hypothesis 2; households can be expected to transition among outcome categories. If a household overspent in a wave, they tend to adjust and oversave in the next wave.

Decumulation Pattern Analysis

Having verified that there is movement across outcome categories over time, the next step was to determine the most common patterns of asset drawdown. Frequencies for the divest pattern variable were run for all households regardless of how many waves of data were present. The five most common patterns and their valid percents were determined; results are displayed in table 8 and figure 4 below.

Table 8.
Decumulation Patterns

Decumulation Numerical Pattern	Decumulation Pattern Description	Valid Percent
2,1,2	Oversaver-overspender-oversaver	8.0
1,2,1	Overspender-oversaver-overspender	6.1
1,1,2	Oversaver-oversaver-overspender	4.8
1,2,1,2	Oversaver-overspender-oversaver-overspender	4.3
2,1,1	Overspender-oversaver-oversaver	3.9

From the results of the analysis we see that there is a great variety in decumulation patterns for households in this study, providing support for Hypothesis 1 (decumulation patterns will vary across households; it is expected that household draw down rates will vary with time). It is interesting to note that of the top five patterns that emerged, no households were categorized as on target. It appears that oversavers are most likely to be overspenders and oversavers become overspenders in the following period. However, results should be interpreted with caution. It is not clear whether households are overshooting and undershooting short-term adjustments to be on target in

the short-term or if they over-adjust in an attempt to get to a long term on target draw down.

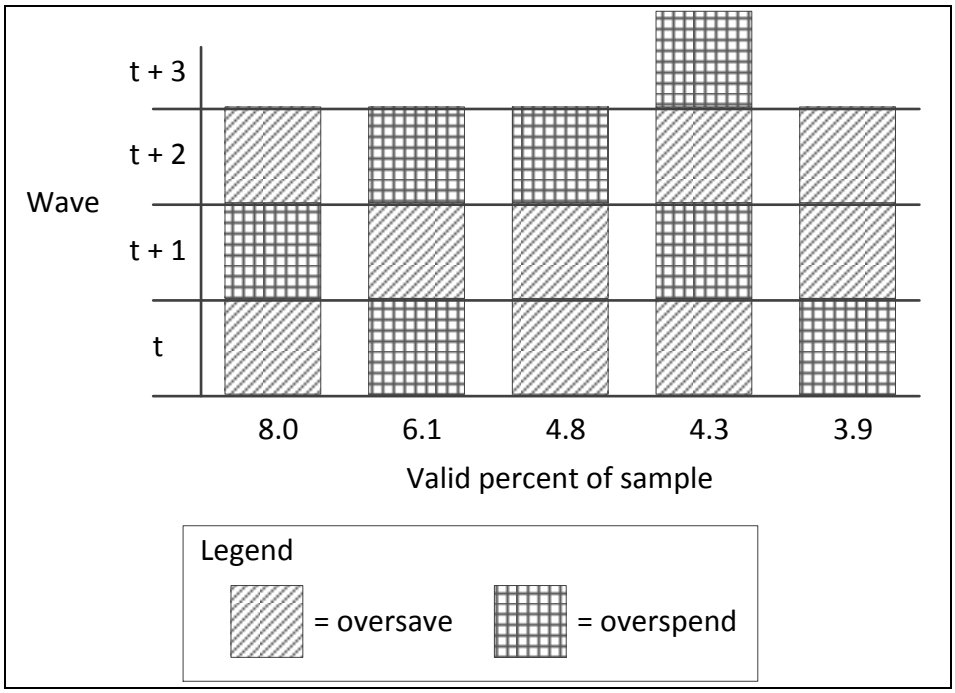


Figure 4. Overspending and Oversaving Patterns by Wave

Markov Models

While the above analyses tell us that households transition across outcome categories they did not provide any insight regarding factors that influence transitions. To examine what factors explain the over-adjustments in Table 7, I ran a series of Markov models. Before specifying the Markov models, I coded a variable (lagdivest) that is the divest outcome from the previous period.

Three additional models were specified, one for each of the three categories of the lagdivest dependent variable. To facilitate comparison across models, on target was specified as the base outcome in each of the three models. Relative risk ratios and confidence intervals are displayed for all re-estimated models.

First I re-estimated the original MNL regression model for cases where lagdivest was equal to on target. Results for this model are displayed in table 9.

Table 9.
Empirical Results for Markov Model of Lagdivest Target Outcome = On Target

	Overspender		Oversaver	
Variable	RRR	95% CI	RRR	95% CI
Life Course Variables				
Marital Status				
Married Baseline	Reference Group	Reference Group	Reference Group	Reference Group
Never married Baseline	.42	.18 - .99*	1.10	.62 – 1.98
Divorced Baseline	1.10	.58 – 2.09	.92	.51 – 1.65
Widowed Baseline	.72	.45 – 1.17	.54	.35 - .84**
Children	1.15	.90 – 1.47	1.08	.86 – 1.35
Spouse/partner in Nursing Home	2.37	.25 – 22.84	2.11	.28 – 16.11
Marital disruption				
Divorced	2.17	.81 – 5.83	1.29	.47 – 3.57
Widowed	2.52	1.42 – 4.48**	1.27	.72 – 2.24
Health Shock				
Respondent Incidence Mild[1]	1.59	.98 – 2.58	1.14	.71 – 1.82
Respondent Incidence Severe[2]	1.16	.79 – 1.71	1.23	.86 – 1.76
Spouse Incidence Mild[1]	2.05	.97 – 4.32	1.83	.89 – 3.78
Spouse Incidence Severe[2]	1.10	.62 – 1.93	1.27	.76 – 2.12
Homeowner	1.56	1.05 – 2.29*	2.30	1.62 – 3.25**
Reached 71	1.04	.67 – 1.62	1.12	.74 – 1.68
2002-2004	Reference Group	Reference Group	Reference Group	Reference Group
2004-2006	1.65	1.18 – 2.31**	1.47	1.07 – 2.01*
2006-2008	.93	.59 – 1.47	1.35	.87 – 2.10
Demographic Variables				
Race				
White non-Hispanic	Reference Group	Reference Group	Reference Group	Reference Group
Black non-Hispanic	.32	.20 - .52**	.56	.37 - .83**

Other non-Hispanic	.51	.21 – 1.26	1.35	.69 – 2.62
Hispanic	.18	.10 - .33**	.31	.19 - .50**
Age	.99	.96 – 1.02	1.02	.99 – 1.05
Female	1.23	.84 – 1.78	1.12	.80 – 1.58
Educational Attainment				
Less than high school	Reference Group	Reference Group	Reference Group	Reference Group
High school	.87	.59 – 1.29	1.12	.87 – 1.60
Some college	1.44	.87 – 2.37	1.60	1.01 – 2.53*
College	1.33	.71 – 2.50	1.28	.70 – 2.32
Masters	1.35	.70 – 2.60	1.65	.92 – 2.95
Sector				
White collar job	Reference Group	Reference Group	Reference Group	Reference Group
Blue collar job	1.41	.83 – 2.41	1.38	.85 – 2.23
Service job	1.15	.71 – 1.85	1.01	.66 – 1.54
Missing Sector	1.11	.69 – 1.77	1.05	.69 – 1.59
Region				
Northeast	Reference Group	Reference Group	Reference Group	Reference Group
Midwest	.73	.46 – 1.15	.69	.46 – 1.05
South	.81	.54 – 1.22	.72	.49 – 1.04
West	.87	.53 – 1.42	.71	.44 – 1.12
Decumulation Factors				
Health Capital				
Respondent Prevalence Mild[1]	.96	.80 – 1.15	.91	.78 – 1.07
Respondent Prevalence Severe[2]	1.07	.92 – 1.25	.99	.86 – 1.14
Spouse Prevalence Mild[1]	.83	.67 – 1.03	.77	.63 - .93**
Spouse Prevalence Severe[2]	.93	.76 – 1.14	.93	.78 – 1.11
Income				
Social Security	1.05	.52 – 2.10	.86	.50 – 1.48
Pension Income	1.26	.90 – 1.76	1.27	.93 – 1.73
Social Security Disability Income	.57	.32 – 1.02	.46	.29 - .73**
Income from earnings	1.53	.99 – 2.38	.97	.63 – 1.49
Health Insurance				
Government Insurance	.66	.16 – 2.79	.55	.14 – 2.11
Employer Insurance	1.21	.82 – 1.80	1.20	.83 – 1.74
Other Insurance	1.12	.75 – 1.68	1.11	.77 – 1.62
No insurance	.30	.03 – 3.04	.29	.04 – 1.94
Pseudo R^2	0.0994			

Note: n=2,088
Note: RRR=Relative Risk Ratio, CI=Confidence Interval
1. Mild conditions include high blood pressure, psychiatric problems and arthritis.
2. Severe conditions include diabetes, cancer, lung disease, heart disease and stroke.
*p<0.05, **p<0.01

Next the model was re-estimated to include cases where lagdivest was equal to overspender. Results for this model are displayed in table 10.

Table 10.
Empirical Results for Markov Model of Lagdivest Target Outcome = Overspender

	Overspender		Oversaver	
Variable	RRR	95% CI	RRR	95% CI
Life Course Variables				
Marital Status				
Married Baseline	Reference Group	Reference Group	Reference Group	Reference Group
Never married Baseline	1.08	.55 – 2.13	1.03	.55 – 1.95
Divorced Baseline	1.25	.81 – 1.92	1.36	.91 – 2.04
Widowed Baseline	1.12	.82 – 1.54	1.04	.77 – 1.40
Children	.93	.79 – 1.09	1.04	.90 – 1.20
Spouse/partner in Nursing Home	.45	.10 – 2.01	.93	.26 – 3.39
Marital disruption				
Divorced	1.21	.43 – 3.39	.88	.33 – 2.37
Widowed	1.28	.77 – 2.12	1.09	. 67 – 1.77
Health Shock				
Respondent Incidence Mild[1]	.92	.68 – 1.24	.78	.59 – 1.04
Respondent Incidence Severe[2]	1.15	.88 – 1.50	1.22	.95 – 1.56
Spouse Incidence Mild[1]	.70	.46 – 1.06	.77	.53 – 1.12
Spouse Incidence Severe[2]	.84	.60 – 1.17	.95	.70 – 1.28
Homeowner	.66	.50 - .87**	.84	.65 – 1.09
Reached 71	1.25	.90 – 1.74	1.11	.82 – 1.51
2002-2004	Reference Group	Reference Group	Reference Group	Reference Group
2004-2006	.83	.65 – 1.06	.93	.74 – 1.16
2006-2008	1.14	.83 – 1.56	1.07	.80 – 1.44
Demographic Variables				
Race				
White non-Hispanic	Reference Group	Reference Group	Reference Group	Reference Group

Black non-Hispanic	.91	.65 – 1.25	.88	.65 – 1.19
Other non-Hispanic	1.64	.89 – 3.03	1.27	.68 – 2.37
Hispanic	.79	.49 – 1.25	.87	.56 – 1.34
Age	.99	.97 – 1.02	1.02	1.00 – 1.05
Female	.98	.77 – 1.26	1.01	.81 – 1.27
Educational Attainment				
Less than high school	Reference Group	Reference Group	Reference Group	Reference Group
High school	.82	.63 – 1.07	.86	.67 – 1.10
Some college	.93	.67 – 1.30	.92	.69 – 1.25
College	.69	.45 – 1.05	.83	.56 – 1.23
Masters	.70	.43 – 1.12	.83	.54 – 1.29
Sector				
White collar job	Reference Group	Reference Group	Reference Group	Reference Group
Blue collar job	1.28	.89 – 1.83	1.20	.86 – 1.66
Service job	1.29	.94 – 1.78	1.20	.90 – 1.61
Missing Sector	1.34	.94 – 1.92	1.35	.97 – 1.88
Region				
Northeast	Reference Group	Reference Group	Reference Group	Reference Group
Midwest	.65	.47 - .89**	1.20	.86 – 1.66
South	.78	.58 – 1.06	1.20	.90 – 1.61
West	.97	.68 – 1.40	1.35	.97 – 1.88
Decumulation Factors				
Health Capital				
Respondent Prevalence Mild[1]	1.07	.94 – 1.22	1.01	.90 – 1.14
Respondent Prevalence Severe[2]	1.14	1.01 – 1.28*	1.12	1.00 – 1.26*
Spouse Prevalence Mild[1]	.93	.80 – 1.08	.95	.83 – 1.09
Spouse Prevalence Severe[2]	1.19	1.02 – 1.40*	1.19	1.03 – 1.37*
Income				
Social Security	.85	.43 – 1.70	.62	.33 – 1.16
Pension Income	.74	.59 - .92**	.78	.63 - .96*
Social Security Disability Income	.78	.48 – 1.25	.79	.50 – 1.23
Income from earnings	1.15	.86 – 1.54	1.34	1.02 – 1.76*
Health Insurance				
Government Insurance	1.04	.35 – 3.07	1.06	.38 – 2.91
Employer Insurance	1.15	.89 – 1.49	1.29	1.02 – 1.63*
Other Insurance	1.06	.82 – 1.38	1.07	.84 – 1.36

No insurance	4.64	.43 – 49.58	3.46	.35 – 34.22
Pseudo R^2	0.0169			

Note: n=6,433
Note: RRR=Relative Risk Ratio, CI=Confidence Interval
1. Mild conditions include high blood pressure, psychiatric problems and arthritis.
2. Severe conditions include diabetes, cancer, lung disease, heart disease and stroke.
*p<0.05, **p<0.01

Finally, the MNL regression model was again re-estimated, this time for cases where lagdivest was equal to oversaver. Results for the third model are displayed in table 11 below.

Table 11.
Empirical Results for Markov Model of Lagdivest Target Outcome = Oversaver

	Overspender		Oversaver	
Variable	RRR	95% CI	RRR	95% CI
Life Course Variables				
Marital Status				
Married Baseline	Reference Group	Reference Group	Reference Group	Reference Group
Never married Baseline	1.01	.59 – 1.73	.97	.54 – 1.72
Divorced Baseline	1.36	.94 – 1.94	1.38	.95 – 2.00
Widowed Baseline	1.66	1.27 – 2.18**	1.69	1.29 – 2.23**
Children	1.06	.92 – 1.22	1.07	.93 – 1.24
Spouse/partner in Nursing Home	2.27	.65 – 7.89	1.61	.46 – 5.67
Marital disruption				
Divorced	.82	.32 – 2.10	.83	.31 – 2.56
Widowed	1.16	.75 – 1.79	1.24	.79 – 1.95
Health Shock				
Respondent Incidence Mild[1]	1.04	.81 – 1.33	.90	.69 – 1.18
Respondent Incidence Severe[2]	.93	.75 – 1.14	.97	.78 – 1.21
Spouse Incidence Mild[1]	1.10	.81 – 1.50	1.06	.76 – 1.48
Spouse Incidence Severe[2]	.81	.63 – 1.04	.88	.68 – 1.15
Homeowner	.97	.77 – 1.21	.88	.70 – 1.11
Reached 71	1.10	.84 – 1.45	1.06	.80 – 1.41

2002-2004	Reference Group	Reference Group	Reference Group	Reference Group
2004-2006	1.16	.89 – 1.51	1.06	.81 – 1.40
2006-2008	.95	.71 – 1.28	.97	.71 – 1.31
Demographic Variables				
Race				
	Reference Group	Reference Group	Reference Group	Reference Group
White non-Hispanic				
Black non-Hispanic	.86	.65 – 1.14	.84	.62 – 1.14
Other non-Hispanic	1.23	.70 – 2.15	.78	.41 – 1.51
Hispanic	1.30	.85 – 1.99	1.55	1.02 – 2.37*
Age	1.00	.97 – 1.01	1.01	.99 – 1.03
Female	1.08	.89 – 1.31	.94	.77 – 1.15
Educational Attainment				
	Reference Group	Reference Group	Reference Group	Reference Group
Less than high school				
High school	.82	.66 – 1.03	.89	.71 – 1.23
Some college	.75	.57 - .98*	.82	.63 – 1.08
College	.70	.51 - .98*	.74	.53 – 1.04
Masters	.70	.50 - .98*	.84	.59 – 1.20
Sector				
	Reference Group	Reference Group	Reference Group	Reference Group
White collar job				
Blue collar job	1.10	.83 – 1.46	1.09	.81 – 1.46
Service job	1.07	.83 – 1.37	1.18	.91 – 1.52
Missing Sector	1.18	.92 – 1.53	1.29	.99 – 1.69
Region				
	Reference Group	Reference Group	Reference Group	Reference Group
Northeast				
Midwest	.70	.55 - .90**	.74	.57 - .95*
South	.97	.76 – 1.24	1.02	.79 – 1.31
West	.77	.59 – 1.01	.89	.67 – 1.18
Decumulation Factors				
Health Capital				
Respondent Prevalence Mild[1]	1.04	.94 – 1.16	1.04	.93 – 1.15
Respondent Prevalence Severe[2]	.97	.88 – 1.06	.98	.89 – 1.07
Spouse Prevalence Mild[1]	1.05	.93 – 1.17	1.03	.92 – 1.16
Spouse Prevalence Severe[2]	.91	.81 – 1.01	.96	.86 – 1.07
Income				
Social Security	.74	.43 – 1.27	.84	.49 – 1.45
Pension Income	.74	.62 - .89**	.86	.71 – 1.04
Social Security Disability Income	.70	.46 – 1.08	.64	.41 – 1.00

Income from earnings	1.29	1.01 – 1.62*	1.38	1.08 – 1.77*
Health Insurance				
Government Insurance	1.47	.80 – 2.71	1.38	.69 – 2.75
Employer Insurance	1.02	.83 – 1.24	1.12	.92 – 1.38
Other Insurance	.95	.77 – 1.17	.96	.78 – 1.20
No insurance	1.94	.37 – 10.32	1.21	.22 – 6.75
Pseudo R^2	0.0139			

Note: n=7,725
Note: RRR=Relative Risk Ratio, CI=Confidence Interval
1. Mild conditions include high blood pressure, psychiatric problems and arthritis.
2. Severe conditions include diabetes, cancer, lung disease, heart disease and stroke.
*p<0.05, **p<0.01

An analysis of results across these models shows that coefficients and significance levels of variables differ by recent depletion experience. For those who were oversavers in the previous wave, the relative risk for overspender relative to on target for those widowed at baseline increased by a factor of 1.66, while the risk for oversaver relative to on target increased by a factor of 1.69. However, for those widowed at baseline who were on target in the previous wave the relative risk for oversaver relative to on target decreased by .54, given all other variables in the model are held constant.

For those who oversaved in the previous wave, owning a home decreased the risk of overspender relative to on target by a factor of .66 (p<.01); for those who were on target in the prior wave the risk of overspender relative to on target increased by a factor of 1.56 (p<.05) and increased the risk of oversaver relative to on target by a factor of 2.30 (p<.01).

Racial identity demonstrated sensitivity to the analysis as well. For respondents identifying as Hispanic relative to otherwise similar whites the relative risk of on target versus oversaver decreased by a factor of .31 (p<.01) when the previous wave category

was on target, overspender relative to on target decreased by .18 ($p<.01$) when the previous wave category was on target, while the relative risk of oversaver relative to on target increased by a factor of 1.55 ($p<.05$) for those who were oversavers in the prior wave. Results suggest that being Hispanic lowers the risk of leaving a specific categorization once it is achieved.

Respondents living in the Midwest who were overspenders in the previous wave decreased the risk of overspender relative to on target by a factor of .65 ($p<.01$); the decreased risk for oversaver relative to on target is .74 ($p<.05$) relative to those living in the Northeast. The risk for Midwest residents of being in overspender versus on target decreased by a factor of .70 ($p<.01$), and by a factor of .74 ($p<.05$) for oversaver relative to on target if their previous wave was oversaver.

The goodness of fit indicator used to evaluate the model (pseudo R-squared) suggests that there is different predictive ability across models. While the pseudo R-squared values for the models with overspender and oversaver specified as the outcome in the prior observation periods are comparable (0.0169 and 0.0139 respectively) the on target value is much higher (0.0994). Based on the pseudo R-square measure of model fit the model conditional on being on target has a much better model fit.

Figure 5 below is a pictorial representation of all significant variables in any of the three Markov models. This depiction will help to identify patterns of transitions. Variables predicting a decreased risk of assignment to the category are noted with a "-" and those predicting an increased risk of assignment to a category are noted with a "+".

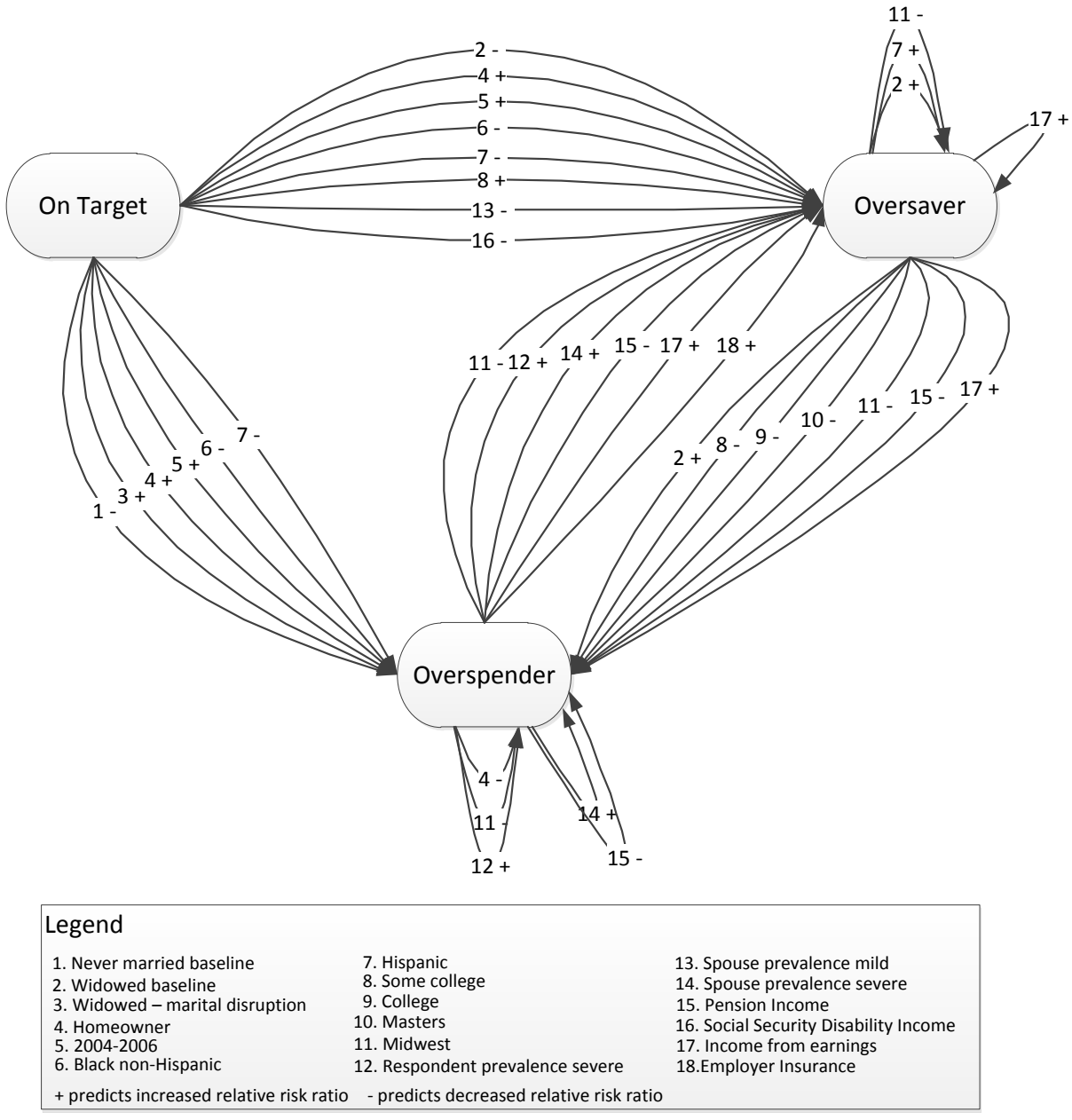


Figure 5. Variables Significantly Predicting Decumulation Outcome Transitions

Being single at baseline, Black or Hispanic are associated with a decreased likelihood of transitioning from on target to overspender while the loss of a spouse, owning a home, and the macroeconomic effects from 2004-2006 predict an increased likelihood of on target to overspender.

Similar to the MNL, Markov model results where the prior period was an on-target drawdown have several variables that are "dual predictors." Owning a home and the macroeconomic effects of 2004-2006 predict an increased risk of transitioning from on target to oversaver and overspender. Being Black or Hispanic predict a decreased risk of transitioning from on target to oversaver and overspender. Here we see life course variables predicting a transition away from on target while the transition is less likely to occur for those with certain demographic characteristics.

Being widowed at baseline, Black or Hispanic, having a spouse with a mild health condition and Social Security Disability income all predicted a decreased likelihood of transitioning from on target to oversaver while the macroeconomic effects from 2004-2006 predict an increased likelihood of transitioning from on target to oversaver. These variables do not predict any of the oversaver/overspender transition possibilities.

Being a homeowner and living in the Midwest are associated with a decrease in the likelihood of consecutive periods of overspending. By comparison, having either a respondent or spouse report a severe health condition and pension income are associated with an increased likelihood of consecutive periods of overspending.

Living in the Midwest (relative to the North) is associated with a decrease in the likelihood of consecutive periods of oversaving. Conversely, being widowed at baseline, being Hispanic and having income from earnings are associated with an increased likelihood of consecutive periods of oversaving.

Living in the Midwest, pension income, and income from earnings predict the transition between oversaver and overspender however these variables do not predict a transition from on target in the previous period to either overspender or oversaver.

Households with a respondent or spouse reporting a severe health condition have an increased risk of oversaving after a period of overspending as well as overspending in consecutive waves. However, these variables do not predict for oversaving to overspending or consecutive periods of oversaving.

A spouse reporting a severe health condition is associated with an increased likelihood of overspender to oversaver and overspender to overspender. Pension income is associated with a decreased likelihood of overspender to oversaver, oversaver to overspender and overspender to overspender.

Oversaver and overspender Markov models have "dual predictor" variables as well. Pension income predicts a decreased risk of transitioning from oversaver to overspender as well as a decreased risk of transitioning from overspender to oversaver.

Income from earnings predicts an increased risk of transitioning from oversaver to overspender as well as an increased risk of transitioning from overspender to oversaver. However, pension income is associated with an increased likelihood of overspending in consecutive periods and income from earnings is associated with an increased likelihood of consecutive periods of oversaving.

A number of variables were significant predictors for exactly one transition. Single at baseline is associated with a decreased risk of on target to overspender. Loss of a spouse increases the risk of on target to overspender. A spouse with a mild health condition and Social Security Disability income both predict a decreased risk of transitioning from on target to oversaver. Finally, having a college or masters degree decreases the risk of overspending following a period of oversaving while having employer provided insurance increases the risk of oversaving then overspending.

Living in the Midwest is the only variable that predicts consistently (a decreased likelihood) for overspender to oversaver, oversaver to overspender, overspender to overspender and oversaver to oversaver.

In summary, the review of the Markov model results suggests that households do adjust their depletion rate as a function of their last depletion rate, providing support for Hypothesis 3.

Patterns and Variable Significance across Regression Models

Table 12 was created to facilitate variable predictive ability and patterns across the multiple models run. This table contains the results of the Multinomial Logistic Regression and Markov Models. All models have the same base outcome (On Target) to facilitate comparison. An increased risk of being in a drawdown outcome category (relative to on target) is represented by "+". A decreased risk of being in a drawdown category (relative to on target) is denoted by "-". Variable significance at $p < .05$ level is denoted by a "*"; significance at the $p < .01$ level is "**".

This table illustrates several interesting prediction patterns. No variables predicted significantly for each outcome category in every model type. In the context of a richly specified model this result is surprising. It suggests that the study of this behavior is more nuanced than initially posited.

In a few instances variables were associated with only one of the outcome categories of the MNL model. Divorced at baseline and age are associated with an increased likelihood of oversaving**.** There were no variables with patterns of predicting decreased likelihood of oversaving only nor was this pattern observed for overspender in either direction.

Some model factors predict that a household will be on or off target, but not the specific direction. They also fail to explain transitions between categories. For example, the blue collar and service sector variables are significant for predicting a greater likelihood of overspender and oversaver in the MNL regression.

Other model variables are associated only with transitions to/from a specific category. Several of the health capital variables (respondent prevalence severe and spouse prevalence severe) were associated with a higher likelihood of being an overspender if the household overspent in the previous wave, as well as being an oversaver in a wave following a period of overspending. The variable was not significant in the MNL regression. These results suggest that severe health conditions are predictive for transitioning to/from overspender once a household has been categorized as overspender. However, it does not appear that severe health conditions influence the initial spending categorization (MNL).

Table 12.
Multinomial Logit and Markov Regression Results

	MNL Regression	Markov Model Lagdivest Target Outcome = On Target	Markov Model Lagdivest Target Outcome = Overspender	Markov Model Lagdivest Target Outcome = Oversaver	MNL Regression	Markov Model Lagdivest Target Outcome = On Target	Markov Model Lagdivest Target Outcome = Overspender	Markov Model Lagdivest Target Outcome = Oversaver
	Overspender (Base Outcome On Target)	Overspender (Base Outcome On Target)	Overspender (Base Outcome On Target)	Overspender (Base Outcome On Target)	Oversaver (Base Outcome On Target)	Oversaver (Base Outcome On Target)	Oversaver (Base Outcome On Target)	Oversaver (Base Outcome On Target)
Variable								
Life Course Variables								
Marital Status								
Married Baseline	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group
Never married								
Baseline	-	-*	+	+	-	+	+	-
Divorced								
Baseline	+	+	+	+	+*	-	+	+
Widowed								
Baseline	+	-	+	+**	+	-**	+	+**
Children	+/-	+	-	+	+	+	+	+
Spouse/partner in Nursing Home	-	+	-	+	-	+	-	+
Marital disruption								
Divorced	-	+	+	-	-	+	-	-
Widowed	+*	+**	+	+	+	+	+	+

Health Shock								
Respondent Incidence Mild[1]	+	+	-	+	-	+	-	-
Respondent Incidence Severe[2]	+	+	+	-	+	+	+	-
Spouse Incidence Mild[1]	+	+	-	+	-	+	-	+
Spouse Incidence Severe[2]	-	+	-	-	-	+	-	-
Homeowner	+	+*	-**	-	+**	+**	-	-
Reached 71	+	+	+	+	-	+	+	+
2000-2002	Reference Group	N/A	N/A	N/A	Reference Group	N/A	N/A	N/A
2002-2004	+**	Reference Group	Reference Group	Reference Group	+/-	Reference Group	Reference Group	Reference Group
2004-2006	-	+**	-	+	-	+*	-	+
2006-2008	+	-	+	-	-	+	+	-
Demographic Variables								
Race								
White non-Hispanic	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group
Black non-Hispanic	-**	-**	-	-	-**	-**	-	-
Other non-Hispanic	+	-	+	+	-	+	+	-
Hispanic	-**	-**	-	+	-**	-**	-	+*
Age	+/-	-	-	+/-	+**	+	+	+
Female	+	+	-	+	+	+	+	-
Educational Attainment								
Less than high school	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group
High school	-	-	-	-	+	+	-	-
Some college	-	+	-	-*	+	+*	-	-

College	-	+	-	-*	+	+	-	-
Masters	-	+	-	-*	+	+	-	-
Sector								
White collar job	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group
Blue collar job	+**	+	+	+	+**	+	+	+
Service job	+*	+	+	+	+*	+	+	+
Missing Sector	+	+	+	+	+*	+	+	+
Region								
Northeast	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group	Reference Group
Midwest	-	-	-**	-**	-	-	+	-*
South	-	-	-	-	-	-	+	+
West	+	-	-	-	+	-	+	-
Decumulation Factors								
Health Capital								
Respondent Prevalence Mild[1]	+	-	+	+	+	-	+	+
Respondent Prevalence Severe[2]	+	+	+*	-	+	-	+*	-
Spouse Prevalence Mild[1]	+	-	-	+	+/-	-**	-	+
Spouse Prevalence Severe[2]	-	-	+*	-	-	-	+*	-
Income								
Social Security	+	+	-	-	+	-	-	-
Pension Income	-**	+	-**	-**	-	+	-*	-
Social Security Disability Income	-**	-	-	-	-**	-**	-	-
Income from earnings	+**	+	+	+*	+**	-	+*	+*

Health Insurance								
Government Insurance	+	-	+	+	+	-	+	+
Employer Insurance	+	+	+	+	+	+	+*	+
Other Insurance	+/-	+	+	-	+	+	+	-
No insurance	+	-	+	+	+	-	+	+
Pseudo R^2	0.0105	0.0994	0.0169	0.0139	0.0105	0.0994	0.0169	0.0139

Note: n=23,569

1. Mild conditions include high blood pressure, psychiatric problems and arthritis.
2. Severe conditions include diabetes, cancer, lung disease, heart disease and stroke.

*p<0.05, **p<0.01

+ predicts increased risk relative to base outcome, - predicts decreased risk relative to base outcome

+/- variable coefficient =1.00

It is surprising to note that the health shock variables failed to predict in any of the models. This is contrary to the large body of literature linking health shocks and changes to decumulation as well as economic theory. These results warrant future exploration. Having a spouse/partner enter a nursing home, getting divorced, reaching age 71, being Other non-Hispanic, being female, living in the South or West, respondent having a mild health condition, income from Social Security, and the majority of the insurance variables (with the exception of having employer insurance) also failed to achieve significance in any of the models.

Health insurance variables had little predictive ability in this study. Of the four variables included (government insurance, employer insurance, other insurance and no insurance) only employer insurance was significant. Having employer insurance was associated with a greater likelihood of being classified as oversaver when the household was classified as overspender in the previous wave.

Another pattern that emerged was significance in the MNL and Markov models as shown by the pension income variable. The results suggest that households with pension income appear to be managing to an on target drawdown rate. These households were less likely to be overspenders relative to on target (MNL). They were less likely to transition to overspender if they were overspenders or oversavers in the previous wave and they were also more likely to oversave after a period of overspending.

Being a homeowner, Black non-Hispanic, Hispanic, and reporting Social Security Disability income or earnings income were predictive in the models included in the study (MNL and Markov models). Homeowners were likelier to be overspenders and oversavers relative to on target, they were likelier to continue overspending if they were

overspenders in the previous period, and they were likelier to oversave if they were on target in the previous wave. The MNL and Markov results suggest homeowners are likelier to be off target than on target.

Both Blacks and Hispanics are less likely to be oversavers or overspenders relative to being on target and less likely to transition to overspender or oversaver when they were previously on target. Thus, unlike homeowners, these groups appear to be likelier to be on target than off target. One difference across these groups is that Hispanics are likelier to be oversavers after a period of oversaving; this is not the case for Blacks in this analysis.

Households with income from Social Security Disability are less likely to be off target than on target. They are also less likely to transition to oversaver when they were on target the previous period. Benefit levels for this program are fairly low and health care costs higher than the average household thus it would be challenging to oversave. Additionally, employment options for program beneficiaries in this age group would be limited; therefore it is reasonable SSDI recipients would not amass large amounts of assets from employment. Therefore, it is reasonable to expect these households would be less likely to move to oversaver.

Finally, households reporting income from earnings are likelier to be off target than on. Earnings income is associated with a higher likelihood of both being an oversaver and an overspender, as well as being off target. Markov results indicate these households are likelier to be off target in either direction after a period of oversaving as well as moving from oversaver to overspender.

Multinomial Logit Sensitivity Analyses

I tested the sensitivity of the primary multinomial logistic regression empirical results to alternative assumptions regarding variable measurement and specification, economic cycle, life expectancy, and wealth expectations. Results are found in Appendix C.

Self-reported health data were used in this study. Some factors that may influence self-reported health status are the severity of the disability or health condition, age of the person with the disability, and the type of activity limitation. Therefore I examined the issue of whether the multinomial logit results were sensitive to the choice of health measure by estimating two additional models. The first model used a five-point scale (excellent, very good, good, fair, and poor) as a measure of self-reported health. A dummy variable *Self-Reported Health* was created where 1=2 point decline in health status 0=otherwise.

The second model used a measure of functional status based on the Centers for Medicare & Medicaid Services RAI 3.0 manual, v1.09. A dummy variable *ADLs* was coded 1=onset of ADL or increase of 2+ ADLs between waves, 0=otherwise.

A review of the self-reported health results indicates that there were very minor changes to significance within the life course variables and one change to decumulation factor variables. The pseudo R-squared value for this model is comparable to the MNL logit (0.0105). However, a direct comparison of it with the multinomial logistic regression should not be made due to the different sample sizes.

The ADL sensitivity analysis shows a similar pattern of changes to significance for variables. The pseudo R-squared value for this model is comparable to the MNL logit (0.0105). Again, due to sample size variations a comparison to the multinomial logistic regression model is not valid.

Economic Cycle Effects

Economists typically study patterns of economic activity bounded by the same phase of the business cycle (i.e. peak to peak or trough to trough). Therefore I tested an alternative assumption of the economic cycle by specifying the model over a period with different economic stages (2000-2006/peak to peak) from those in the primary study (1998-2008/peak to trough).

Minor changes to life course and demographic variables are reported for the overspender and oversaver outcomes. There were no changes to decumulation factors predicting overspender and few changes to oversavers. Due to sample size difference (23,569 vs. 16,233) I cannot state whether the primary multinomial logit regression or the model with data from 2000-2006 is superior in fitting the outcome data.

In summary the model including a longevity measure showed a very modest increase in model fit. The model fit for alternatively specified health measures and the different economic cycle cannot be compared due to the difference in sample sizes. Overall, for models with similar sample sizes, the coefficients and significance are close across models, suggesting that the results are robust.

CHAPTER 6

DISCUSSION

This study identified and examined the patterns of how households decumulate the portion of their assets that is not annuitized. First a multinomial logit model was specified to evaluate the probability of elders' category membership between two dissaving strategies (oversaving and overspending) relative to being on target. The model examined how demographic variables, life cycle factors, and decumulation factors influenced the probabilities of selecting either dissaving category relative to being on target. Next a decumulation pattern analysis and determination of factors influencing the probability of being in each dissaving category were conducted. The goal is to understand which groups are at risk for outliving their assets, which households are decumulating at a sustainable rate, and which households are oversaving and potentially foregoing consumption.

This chapter will describe the major findings of the study and its limitations, put forth suggestions for future research and outline a policy directive.

Study Findings

This study examined the relationship between life course variables, demographic factors, decumulation factors and dissaving strategies. Six main hypotheses serve as the focus of this investigation. Hypotheses 1 through 3 are based on insights from the conceptual model and financial literacy literature regarding the low literacy levels of

most households. The a priori expectation was that there will be variation in drawdown strategies households employ. Results in table 7 support Hypothesis 1. Households are predominantly transitioning between oversaving and overspending. The next period divest outcome probabilities differ depending upon the last period's actual divest outcome. Nearly 29% of the households categorized as overspenders in the current period will be in the same category in the next period, 30% of on target households in the current wave will be on target in the next wave and 35% of oversavers will be categorized as oversavers at the next observation. Results as shown in table 8 support Hypothesis 2, households can be expected to transition among outcome categories. These patterns suggest it is difficult for households to manage to an on target asset draw down.

Markov model results suggest that households do recalibrate their depletion rate as a function of their last depletion rate. These results provide support for Hypothesis 3 (households are expected to have a goal of on target spending therefore the observed cycle's categorization will influence the next cycle's draw down rate in an attempt to maintain a sustainable drawdown rate).

Results for Hypotheses 1 through 3 suggest that households are willing to alter their spending patterns. In so doing, households might be reacting to macro or micro environmental changes. Potential macroeconomic changes include changes in interest rates, inflation, or Social Security benefits. Possible microeconomic influences to spending include becoming widowed or reporting income from earnings. However, varied patterns in dissaving could also represent a "trial and error" approach to money management. Because controls for the strategy of drawdown were not included it is not

clear from the study why these decisions were made. Future research should explore the drawdown decision making process.

This study hypothesized that the onset of a health condition or a spouse's admission to a nursing home would be associated with an excessive decumulation of assets. These hypotheses were unsupported by the research. This is unexpected as prior research has suggested a link between health shocks and depletion. The conceptual model also predicts that households will adjust spending at the time of a consumption shock. To investigate this result the model was re-estimated with different measures of health conditions (see Appendix C). Results of the re-estimated models did not reveal stronger effects; the health variables remained insignificant.

A possible explanation for the lack of results is that health events increased costs for medical care however the increase was offset by decreases in other types of spending. For example, leisure travel and entertainment expenses could be eliminated at the onset of an illness. Members of this sample also had high levels of supplemental insurance, which may buffer the shock of unexpected health costs.

The failure of the spousal nursing home admission to predict excessive decumulation is puzzling. Past research has found that long term care costs are associated with excessive depletion. Medical costs associated with an admission may lead to overspending for those households with a spouse entering a nursing home, however the small number of households (less than one percent) likely prevents the variable from achieving significance. Future work remains to better understand this result.

Finally, marital transitions as predictors of decumulation (Hypothesis 5) were only partially borne out by the results. Loss of spouse was associated with an increased likelihood of overspending. Divorce was also expected to increase the likelihood of overspender however this relationship was not significant. A small percent of the sample reporting divorcing during the study (less than one percent) which may have contributed to its failure to predict.

Measures of life cycle effects, demographics, and decumulation were used to explore the determinants of the three types of mutually exclusive dissaving specified (overspender, oversaver, on target). As expected, the life course variables predicted differently for overspender and oversaver relative to on target. Overspenders responded to marital disruption and macroeconomic effects; oversavers were influenced by homeownership and baseline marital status. The demographic and decumulation measures behaved contrary to expectations. A number of variables predicted both an increase in the risk of oversaver and an increase in the risk of overspender relative to on target.

In another study which looked at decumulation patterns, Hogarth (1991) also found that some variables were providing "mixed messages" (1991, p. 117) about saving behaviors. For example, household size was associated with both a need for higher levels of resources and creating economies of scale.

Although there are some important differences, this study did confirm a number of the Hogarth (1991) findings. Similar to Hogarth this study found that dissaving patterns vary across and within households over time. It is interesting to note that households had difficulty managing spending during the Hogarth study (1969 – 1979).

While the predictive ability measures for this study and Hogarth's study cannot be directly compared, the values reported were extremely low for both studies. The studies used different category membership criteria however it is worth noting that there were no households in Hogarth that were consistently level spenders and in the current study only 2% of households were on target for consecutive waves. This suggests that money management is not a skill households are developing over time. The current study was more richly specified however there were some variables common to both studies. Of those variables modeled in both of the studies, homeownership and change to marital status predicted similarly across models. Becoming a widow was associated with overspending while homeownership was associated with an increased risk of oversaving.

One of the major contributions of this study is the identification of patterns of dissaving in retirement. Various life course, demographic and decumulation factor variables were determinants of these patterns. These patterns had a high degree of fluctuation. Recognizing and understanding drawdown patterns is important as this insight can be used to both predict and shape future decumulation decisions and behaviors.

For those households providing six survey periods of data, no households had patterns of continuously overspending, continuously oversaving or continuously being on target. Only 2% of the entire study sample was classified as consistently on target, 2.3% were classified as consistently overspender and 4.1% were consistently classified as oversavers. (To be referred as being consistently in one category a household had to be in the same outcome category for each period in which they provided study data.) This suggests that it is difficult for households to be on target and difficult to stay there.

Of the five most commonly observed patterns of decumulation (representing 27.1% of the study sample), three are categorized as oversavers at the first period measured and two are overspenders initially. None of the top five patterns identified include a categorization of on target in any period. Finally, only oversavers have repeated successive observations of their categories.

Results indicate that once a household has an off target decumulation period it is unlikely they will transition to on target. It is likelier that they will transition between the two off target categories. There is a very low probability of going from being an oversaver to on target in the next period (10.95%) or overspender to on target (10.5%). Once a household has been categorized as on target there is a 70% change of going away from on target in the next period and only a 30% chance of remaining on target.

A number of factors may be influential in the formation of these patterns. The observed patterns reported may be attributable to how the on target corridor is defined (+/- 10% of the calculated drawdown). With a broader corridor of on target the probability of remaining or being on target could be expected to increase. It is also plausible that households are transitioning between off target categories in an attempt to be on target overall but they lack the financial literacy to accomplish an on target strategy. As the average respondent's age is nearly 71 it is also possible cognitive decline is contributing to these findings. Fluctuations in income, expenses, and/or asset levels could also contribute to the dissaving patterns. The low percentage of households that are consecutively on target coupled with the difficulty of getting to on target suggests that how elders decumulate their assets is a problem that needs additional attention.

In addition to identifying patterns, this study attempts to understand how those patterns are formed. These findings indicate that different sets of variables emerged as predictive of spending type categorization (MNL model) and/or predictive of category transition in the next wave (Markov models).

Several of the life course variables (divorced at baseline, homeownership, and age) predicted an increased likelihood of oversaver relative to on target. Age predicted contrary to economic theory; a decreased likelihood of oversaver relative to on target was the a priori expectation. Given the average age of the sample, perhaps respondents were preserving assets in anticipation of medical bills. Benartzi (2010) reports that retirees weight losses nearly 10 times more heavily than gains. In addition, they are five times more loss averse than the average person. Households may be retaining assets because they are more risk averse than gain seeking. Unfortunately the basis for these unexpected results (divorced at baseline and homeownership predicting an increased likelihood of oversaver relative to on target) is not clear from the research.

Demographic variables (Black non-Hispanic, Hispanic) predicted that relative to Whites, minorities have a lower likelihood of being in the oversaver or overspender category (relative to on target). Results suggesting that Blacks and Hispanics are less likely to be off target than Whites are contradictory to expectations. The longest held employment sector variables predict better for a household being off target relative to on target, but do not provide much insight into which direction (oversaver vs. overspender). It is difficult to provide a plausible explanation for these unexpected results.

A distinct set of predictors was identified for consecutive periods of overspender. Being a homeowner and living in the Midwest were associated with a decreased likelihood of being an overspender conditional on having been an overspender in the previous time period. Respondent having a severe health condition, a spouse with a severe illness, and pension income are all associated with an increased likelihood of overspender to overspender. Having a severe health condition or a severe illness is consistent with expectations but it is unclear why persons with pension income would have consecutive periods of overspending.

Income from earnings predicts a greater likelihood of oversaving conditional on having been an oversaver in the previous wave, an increased likelihood of transitioning from overspender to oversaver in the next period and an increased likelihood of transitioning from oversaver to overspender in the following wave. To counter the effects of credit card, auto loan, and home mortgage debt some elders may be returning to work. Perhaps the increase in entrepreneurs who liquidate their savings to start new companies after retirement age is the driver behind the oversaver to overspender pattern. Since more individuals are planning to work later in life than in previous generations it is important to expand our understanding of how this variable predicts.

Living in the Midwest was also associated with a decreased likelihood of oversaver to oversaver. Being widowed at baseline, being Hispanic and income from earnings are all associated with an increased likelihood of oversaver to oversaver.

Finally, living in the Midwest is associated with both a decrease in likelihood of overspender to overspender and decreased likelihood of oversaver to oversaver. This is the only variable that significantly predicts both the overspender to overspender transition

and oversaver to oversaver transition. It also predicts that Midwesterners who oversaved in the previous period will be less likely to overspend in the next observation. This would appear to suggest that Midwesterners are attempting to get to on target. A recent study by Rentfrow et al. (2013) found that regions can be defined in terms of characteristic personality profiles, and these profiles tend to cluster geographically. These profiles are also linked to political, social, and economic metrics. According to this study, Midwesterners can be characterized as conservative. Conservative is often linked with fiscal responsibility thus it is possible that Midwesterners are more frugal than other US residents and may be more inclined to manage to an on target draw down. Additionally, according to Forbes (2012), ten of the top 20 most affordable places to live are in the Midwest. Midwesterners have on average a lower cost of living thus it may be easier for them to have an on target drawdown.

With the baby boomer generation beginning to enter retirement the demand for financial products that facilitate decumulation will increase. Retirement product design will need to accommodate declining cognitive ability, low financial literacy, and increasing longevity. Financial service professionals will need to review and revise existing products as well as design new products with an eye towards the needs of future retirees. In particular, these results suggest attention should be paid to products that facilitate an on target drawdown.

One such existing product is target date funds (also known as age-based or life cycle funds). According to Morningstar (2013), assets invested in target date funds exceeded $500 billion in 2013. Each fund name includes a date. Target date funds are typically selected by the date you expect to begin dissaving ("Asset Allocation Funds,"

2013). While target date funds are being widely used their drawdown structure is based on life expectancy tables. Therefore as currently designed 50% of those who purchase the product will outlive the income stream. Assisting retirees in estimating a more accurate life expectancy would be an important first step in addressing this challenge while using an existing product.

One approach to addressing this challenge is to base the target date fund purchased to subjective life expectancies. Subjective life expectancies are based on individual and family health histories. Education programs tied to workplace 401(k) savings plans etc. can be used to instruct investors on how to estimate a subjective life expectancy.

Overall results suggest that elders have a difficult time managing to an on target drawdown. Having a product such as a fixed annuity as part of the retirement income stream provides a guaranteed source of income and offers some protection against the risk of outliving assets. One type of annuity product, the longevity annuity (or advanced life delayed annuity) begins paying out at age 80 and continues paying until the owner dies. Unlike other types of annuities, this product does not provide a benefit to heirs if the owner dies before payout begins ("Ultimate Guide to Retirement", 2014). The lack of a death benefit will make this product unacceptable to many investors.

Another product that is being widely touted as a tool in the decumulation strategy is the reverse mortgage. One criticism of this product is its high fee structure, with some lenders charging up to 5% of the home's value (Greene and Tergesen, 2010). Elders have historically been reluctant to use these tools, due to a desire to leave the house as an inheritance to surviving family members (Goodfield, 2013). This product may not be a

viable option for many nearing or currently in the early stages of retirement. Many of the reverse home mortgages require that a homeowner be a minimum age (62), own the home or have a very low mortgage balance, and live in the home as the primary residence. Unlike the previous generation, many in the baby boom generation are retiring with mortgage debt. Additionally, it is increasingly common for boomers to have credit card debt. These changing financial circumstances will potentially impact how baby boomers decumulate, what products are available, which groups can utilize these products, as well as what products should be developed.

While variables contributing to pattern formation have been identified in this study, the drawdown strategy cannot be fully understood from this research alone. The significance of the cycle variable for 2004-2006 illustrates this point. The variable represents the effects of a period of economic slowdown leading into a recession. Economic growth was slowing, consumer spending was down, housing stock was increasing and prices were not appreciating at previous levels (Weller, 2006). Are households that oversave during this period reacting to declining economic conditions? Are overspending households simply not adjusting their drawdown strategy to reflect reduced asset levels? Additional work remains to understand motivations and drivers of variable significance.

Study results suggest that patterns of decumulation are heterogeneous and factors predict differently across models. Financial services and insurance companies will need to take into account variation in spending when designing product offerings and services as well as shaping spend down patterns. Economists can use these findings to model

dissaving patterns. Without a national decumulation policy however, the question is what is the desired pattern of spend down behaviors?

Would it be beneficial for society to have households overspending so that all potential tax revenue is realized? Is a goal of oversaver best (assuming that health needs are met and a reasonable quality of life exists)? Oversaving would leave households precautionary savings to cover future spending shocks, accommodate a bequest motive, or living longer than projected. However, this could deprive local economies of income and employment. Is it acceptable for households to transition between categories if the net effect is an on target drawdown? If on target dissaving is the goal, annuitized wealth should be a major part of a household's portfolio. Historically the majority of households have been reluctant to purchase this product. Should households be encouraged to purchase annuities? These and other questions will need to be considered if a national decumulation policy is developed.

Study Limitations

The definition of on target, overspender, or oversaver made an ad hoc choice regarding tolerance corridor (+/- 10%). It is not clear what size this tolerance should be. This investigation is the first study to use this classification scheme. Some might argue it could be smaller or larger. Future studies could model multiple tolerance corridors to determine the sensitivity of results to corridor specification. Finke, Pfau, and Williams (2011) suggest that the tolerance should be linked to the household's overall risk tolerance.

Households were categorized as oversavers, overspenders, or on target at each wave (every two years). Given the overall low financial literacy rates it is possible that households did not have time to alter their divestment strategy to reflect macroeconomic changes in the two year period. Use of a different measurement period might yield different categorizations. However, there is no industry standard for how often to review plans, suggesting there is no optimal time to assess whether or not a household is meeting its divestiture goals. For example, Milliman (2009) suggests that once plans are created they should be reviewed every 3 years or at pre-specified events (personal or market fluctuations). A 2011 Money Management Institute Report surveyed 14 financial services firms and found that suggestions for monitoring the plan included annually, ongoing, unspecified, and proprietary.

This study assessed whether households were predominantly on target, overspending, or oversaving. Drawdown rates were not compared with an assessment of income adequacy. Therefore no conclusions can be drawn about actual standards of living. Result implications are limited to the risk of outliving one's assets or under-consuming based on the household exhibiting a particular dissaving pattern.

Taking into account market performance during the period under study it is possible that unexpected gains were experienced by some households therefore unintentional saving could have occurred. It may be the case that the intended drawdown strategy was implemented and executed well, however asset balances exceeded expectations and no alteration to the drawdown plan was made. This could result in a household being classified as oversaver even though its plan would otherwise have led it to be classified as on target.

Finally, the category assignments were based on spend down rates using remaining life expectancy. The remaining household life expectancy was recalculated at each wave. We know that a number of those in the sample will live longer than the average life expectancy. Therefore they should be drawing down at a slower rate than the average life expectancy would predict. Should they actually exceed life expectancy their categorization may be inaccurate. While this is a limitation, this study is an improvement over past research. For example, Sun and Webb (2012) modeled decumulation strategies using remaining life expectancy at 65; Love and Smith (2007) found that households do not appear to be spending down assets too quickly relative to remaining life expectancy. However this determination was conditional only on life expectancy at the onset of the study; since many elders will outlive life expectancy and life expectancy increases with each year of survival their findings may not have been accurate.

In spite of the limitations this study has provided useful insights into the decumulation process and characteristics of households with different drawdown patterns. Unlike most other studies these patterns reflect realized asset levels and recalibrated life expectancy calculations tied to survival of household members.

Directions for Future Research

While this study has provided some insight into household characteristics associated with varying patterns of asset drawdown, the models have low predictive ability therefore much remains unexplained. Future research in this area should include qualitative studies designed to ascertain how the dissaving decision is made, how it varies over time and how it varies across households. There are a vast number of socio-economic influences to be considered in the decumulation strategy; in addition changes to

government policies and behavioral factors must be factored into the decision. Curtis (2006) finds spending goals differ in priority and importance across households.

In addition, we should not assume that the importance of household-specific variables remains constant across time, nor should we expect that the same set of variables are influential within a specified household at the time of each unique decumulation decision. For example, household members may enter retirement planning to spend time traveling and use assets to pay for leisure activities. After the onset of a severe disease medical expenses could assume a greater priority over the entertainment budget. Future studies should explore the dynamics and drivers behind how variables achieve importance in the decision process and how that prioritization changes over time.

Future quantitative studies should then estimate household spending patterns based on these qualitative findings. It is common that intentions and actions are not perfectly aligned (Ajzen, Brown, & Carvajal, 2004).

As discussed in the Results section, coefficients were the same in magnitude for overspender relative to on target and oversaver relative to on target for some variables. In an attempt to explain this result the model was re-estimated as a binary logit model, which indicates whether households were on or off target. Test results confirmed that the dependent variable classifications used in the multinomial logit regression are statistically independent therefore the binary logit is not a better fit for the data. This anomaly remains unexplained and should be the subject of future exploration.

This study demonstrated that dissaving patterns change over time. Many of the explanatory factors are still to be determined. In an attempt to more fully understand these patterns future studies might use an alternative parameter for on target. Another

potential avenue for future research is to test the hypothesis that households do not plan to spend down all their assets. The inclusion of variables measuring bequest motive and/or precautionary savings should be considered. An additional area for future exploration is to study the extent to which households executed their financial plans and how well the plans performed vis-à-vis the decumulation goals.

The consistency and quality of advice across financial planners is another area of concern which remains unexplored. A related area for study would be to determine if there is an association between using an investment adviser and to which category households are assigned.

There is a body of literature that has posited oversaving is indicative of a bequest motive however alternative hypotheses bear investigation. The current study has based spend down rates in part on life expectancy table data. In practice, households are poor at estimating their remaining life expectancy. It is possible that oversavers were not intentionally under-depleting; they may have been planning for a longer life expectancy than was warranted.

It is plausible that oversaving is a result of a poorly designed or nonexistent dissaving plan. It is also possible that households are not sophisticated enough to manage assets in a way that provides for excess consumption devoted to leisure activities in the early retirement years and lower income for diminished consumption in later life. Work to identify the determinants of oversaving remains.

Future research should consider whether decumulation patterns change if the majority of a household's assets have been annuitized. The expectation is that it would be easier for households to manage to an on target withdrawal (assuming there is some amount of non-annuitized asset remaining to handle unforeseen expenses).

In this study categorized household spend down based on reported household asset levels. Household assets levels were not distinguished by low, middle or high levels of holdings (similar to Smith, Soto and Penner, 2009). It remains unexplored whether variables would predict similarly if the asset holdings were modeled as subsamples.

Finally, this study examined whether or not a household was at risk for outliving its assets. Outliving your assets by one year versus two decades could have vastly different consequences for consumption levels and quality of life. Future research should estimate the remaining life expectancy during which the household would have no assets to draw from.

Future Policy Direction

The responsibility for managing income and assets in retirement now rests with the individual household. Those with assets are required to balance drawdown from a (potentially) complex variety of sources in the context of changing economic and inflation risk for an estimated twenty to thirty year period. Few households have the money management skills to do so.

Some households will turn to financial service representatives for advice on products and decumulation strategies. However, in the words of one retirement industry channel manager "…while everyone is aware that decumulation is coming – with those

10,000 or so boomers joining the ranks of Retired America every day – the notion of A. letting go of those invested funds and B. accurately and helpfully providing retirees with a steady source of income in retirement … well, they both fail to get much traction in the industry" (Stonehouse, 2013). Thus, US elders find they are facing this daunting task largely ill-equipped and with few resources they can trust for advice.

A great deal of policy attention has been focused on accumulation of assets; with the exception of Minimum Required Distributions there has been little attention on the decumulation phase. Recent pension reforms may have strengthened the existing system but defined benefit plans are largely being supplanted by defined contribution plans. While Social Security benefits are intended to replace a portion of lifetime earnings there is no overarching national policy citing a specific income replacement goal or an income floor for the decumulation phase. National efforts to drive a decumulation strategy appear to be piecemeal at best. With the ever-increasing number of elders entering the drawdown phase and the evolving retirement environment that they face, an argument can be made for the creation of a national decumulation policy.

Creation of such a policy is an important step toward guaranteeing income security for elders. National retirement goals and principles would be explicitly stated, roles and responsibilities of stakeholders could be clarified, programs and laws can be created to support the policy, and funding sources identified. Administration of the policy would also need to be identified. Currently the Department of Labor, Internal Revenue Service and Securities and Exchange Commission have an oversight role for particular drawdown components. However it is likely that financial services and life insurance companies would want to provide input as well. Due to the recent financial

market scandals there is a high degree of mistrust of institutions and concerns about long term stability. The role the government, financial services, and insurance companies play in this process must be carefully considered.

Brown and Nijman (2011) outline a decumulation framework for the Netherlands. This policy could serve as the basis of discussion for a US decumulation policy. Their work assumes two targets for wealth annuitization, dependent upon societal preferences. The first is an inflation-indexed annuity to replace 50% of pre-retirement income. This solution is intended to provide for basic necessities. For those capable of financing a higher standard of living an annuity to replace 70% of pre-retirement income would be the goal. An additional annuity is recommended above and beyond either of these minimum annuity targets if so desired by the consumer but full annuitization is not recommended. Lastly, in addition to income minimums, provisions for spousal security should be made. While Brown and Nijman have created a useful framework to begin the national discussion there is one area they have not addressed. A provision for financial literacy training should also be included.

Summary and Conclusions

This paper examines patterns of decumulation and the role that health events and marital disruption play in forming those patterns**.** In addition, the justification for the creation of a national decumulation policy is presented.

Although this study has highlighted the role of specific factors in determining decumulation patterns much work remains in this field. Given the changing landscape of retirement there is no reason to expect that these patterns would not change over time. A smaller proportion of future retirees will receive pension benefits and their benefit

levels will be lower relative to current retirees. This change in income will need to be modeled and understood. The percentage of the aging population that identify as a racial or ethnic minority is increasing over time; racial variables predicted a different decumulation pattern from whites. As the US deficit increases and demand for social welfare programs also increase it is likely that benefit levels and eligibility for Social Security and Medicare will be revised. Older workers who experience long term unemployment may be drawing down retirement savings or electing Social Security earlier than expected to be able to meet their current consumption needs. Along with health, financial security is a significant predictor of retirement well-being (Leung, Earl; 2012). For these reasons it is necessary to continue to develop our understanding of how factors influence future decumulation.

We are just beginning to understand how households turn their nest egg into income streams. Overall findings suggest that how households plan their wealth decumulation phase, decision making regarding dissaving, plan review and revision, and how well the plan is executed all merit greater attention. These results have implications for future retirees and society at large; they suggest that past research has paid too little attention to the decumulation decision process. As greater numbers of elders move to the decumulation phase it will become increasingly important to understand the factors shaping their decisions about dissaving.

APPENDIX A

VARIABLE INFLATION FACTOR RESULTS

Table 13.
Variable Inflation Factor Results

Variable	VIF	1/VIF
LIFE COURSE VARIABLES		
Marital Status		
Married Baseline	Reference Group	Reference Group
Never married Baseline	1.16	0.861981
Divorced Baseline	1.39	0.719721
Widowed Baseline	1.98	0.504746
Children	1.01	0.991734
Spouse/partner in Nursing Home	1.02	0.982080
Marital disruption		
Divorced	1.02	0.983444
Widowed	1.13	0.884897
Health Shock		
Respondent Incidence Mild[1]	1.05	0.951108
Respondent Incidence Severe[2]	1.02	0.984571
Spouse Incidence Mild[1]	1.06	0.942321
Spouse Incidence Severe[2]	1.06	0.944666
Homeowner	1.24	0.809268
Reached 71	2.77	0.361180
2000-2002	Reference Group	Reference Group
2002-2004	1.46	0.684067
2004-2006	1.55	0.643408
2006-2008	2.07	0.483382
Demographic Variables		
Race		
White non-Hispanic	Reference Group	Reference Group
Black non-Hispanic	1.12	0.889287
Other non-Hispanic	1.10	0.911731
Hispanic	1.24	0.807473
Age	2.37	0.421403
Female	1.49	0.671315
Educational Attainment		
Less than high school	Reference Group	Reference Group
High school	1.69	0.590631

Some college	1.58	0.632380
College	1.42	0.706679
Masters	1.62	0.617040
Sector		
White collar job		
Blue collar job	2.03	0.492051
Service job	2.13	0.470466
Missing Sector	2.52	0.397471
Region		
Northeast	Reference Group	Reference Group
Midwest	1.83	0.545115
South	1.93	0.517325
West	1.73	0.578229
Decumulation Factors		
Health Capital		
Respondent Prevalence Mild[1]	1.18	0.846765
Respondent Prevalence Severe[2]	1.12	0.890256
Spouse Prevalence Mild[1]	1.99	0.503707
Spouse Prevalence Severe[2]	1.47	0.681821
Income		
Social Security	1.16	0.862153
Pension Income	1.26	0.792833
Social Security Disability Income	1.29	0.777263
Income from earnings	1.08	0.922511
Health Insurance		
Government Insurance	1.41	0.710129
Employer Insurance	1.55	0.643708
Other Insurance	1.37	0.732471
No insurance	1.25	0.801952
Mean VIF	1.49	

Note: n=23,569

1. Mild conditions include high blood pressure, psychiatric problems and arthritis.
2. Severe conditions include diabetes, cancer, lung disease, heart disease and stroke.

APPENDIX B

MISSING SECTOR SAMPLE ANALYSIS

To analyze potential bias, descriptive statistics for the missing sector cases and the mnl final sample were run. Results are contained in the table below.

Table 14.
Descriptive Statistics MNL Final Sample and Missing Sector Sample

	MNL Final Sample N=30,100	Missing Sector Sample	
Variable	Mean	Mean	N
Life Course Variables			
Marital Status			
Married Baseline	.644	.484	21205
Never married Baseline	.026	.027	21205
Divorced Baseline	.082	.052	21205
Widowed Baseline	.247	.437	21205
Children	.285	.348	21205
Spouse/partner in Nursing Home	.006	.008	21205
Marital disruption			
Divorced	.009	.007	16120
Widowed	.048	.042	16120
Health Shock			
Respondent Incidence Mild*	.117	.124	19464
Respondent Incidence Severe**	.144	.146	19464
Spouse Incidence Mild*	.055	.030	19464
Spouse Incidence Severe**	.068	.039	19464
Homeowner	.784	.687	16316
Reached 71	.519	.604	21205
2000-2002	.311	.214	21205
2002-2004	.256	.186	21205
2004-2006	.219	.157	21205
2006-2008	.215	.121	21205

Demographic Variables			
Race			
White non-Hispanic	.846	.845	21196
Black non-Hispanic	.126	.130	21196
Other non-Hispanic	.029	.025	21196
Hispanic	.072	.078	21196
Age	10.463	17.690	21205
Female	.621	.722	21205
Educational Attainment			
Less than high school	.312	.430	21205
High school	.350	.313	21205
Some college	.173	.145	21205
College	.082	.065	21205
Masters	.083	.045	21205
Sector			
White collar job	.192	N/A	N/A
Blue collar job	.187	N/A	N/A
Service job	.273	N/A	N/A
Missing Sector	.347	1.00	21205
Region			
Northeast	.167	.138	21205
Midwest	.259	.195	21205
South	.387	.313	21205
West	.185	.122	21205
Decumulation Factors			
Health Capital			
Respondent Prevalence Mild*	1.358	1.414	16238
Respondent Prevalence Severe**	.848	.915	16213
Spouse Prevalence Mild*	.722	.402	21205
Spouse Prevalence Severe**	.469	.311	21205
Income			
Social Security	.959	.968	21205
Pension Income	.575	.637	21205
Social Security Disability Income	.066	.064	21205

Income from earnings	.148	.335	21205
Health Insurance			
Government Insurance	.958	.970	16229
Employer Insurance	.359	.282	16037
Other Insurance	.259	.282	16042
No insurance	.009	.007	21205

Note: n=23,569

* Mild conditions include high blood pressure, psychiatric problems and arthritis.

**Severe conditions include diabetes, cancer, lung disease, heart disease and stroke.

APPENDIX C

SENSITIVITY ANALYSES

A number of sensitivity analyses were performed to test the robustness of my primary multinomial logistic regression model empirical results. Self-reported health data were used in this study. Some factors that may influence self-reported health status are the severity of the disability or health condition, age of the person with the disability, and the type of activity limitation. Therefore I examined the issue of whether the multinomial logit results were sensitive to the choice of health measure by estimating two additional models. The first model used a five-point scale (excellent, very good, good, fair, and poor) as a measure of self-reported health. Within this sample a change of 2 points between waves (for example, from excellent at baseline to good at wave 2) was observed for greater than 5% of respondents thus it is considered a negative change in health status. A dummy variable *Self-Reported Health* was created where 1=2 point decline in health status 0=otherwise.

The second model used a measure of functional status based on the Centers for Medicare & Medicaid Services RAI 3.0 manual, v1.09. The onset of Activities of Daily Living (ADLs) (baseline=0 ADLS reported to ADLs=1 at any wave) or an increase of 2 or more ADLs between waves (for example, Wave 3 ADLs=2, Wave 4 ADLs=4) were both used as indicators of a negative change to health. A dummy variable *ADLs* was coded 1=onset of ADL or increase of 2+ ADLs between waves, 0=otherwise. Due to differences in how the chronic conditions, ADL, and the count of mild and severe condition questions are asked of respondents sample sizes will differ. For example, in the primary analysis respondents are asked if a doctor has ever told the respondent s/he has a

particular health condition. These questions are more likely to have missing data because they are more complex to respond to than the ADL and self-reported health measures. The questions for mild and severe conditions can be interpreted by respondents as to whether or not s/he has the condition at the time of the interview. If a condition is being treated and under control, the condition may not be reported (RAND, 2010). Results are found in tables 15 and 16 below.

A review of the self-reported health results indicates very minor changes to significance within the marital status and disruption groupings. Within the oversaver outcome, reporting being divorced at baseline was no longer a predictor. The demographic variables predicted similarly to the fully-specified MNL logit regression. The sole change to decumulation factors was that income from pension is now significant for oversaver. The pseudo R-squared value for this model is comparable to the MNL logit (0.0105). However, a direct comparison of it with the multinomial logistic regression should not be made due to the different sample sizes.

Table 15.
Empirical Results for Self-Reported Health Sensitivity Analysis

	Overspender		Oversaver	
Variables	RRR	95% CI	RRR	95% CI
Life Course Variables				
Marital Status				
Married Baseline	Reference Group	Reference Group	Reference Group	Reference Group
Never married Baseline	.74	.56 - .99*	.79	.62 – 1.01
Divorced Baseline	1.20	1.00 – 1.45	1.14	.95 – 1.37
Widowed Baseline	1.18	1.03 – 1.34*	1.10	.97 – 1.24
Children	1.00	.93 – 1.06	1.02	.95 – 1.09

Spouse/partner in Nursing Home	.93	.56 – 1.54	.98	.61 – 1.56
Marital disruption				
Divorced	.80	.56 – 1.16	.85	.59 – 1.23
Widowed	1.18	.97 – 1.45	1.10	.90 – 1.34
Homeowner	1.10	.97 – 1.24	1.22	1.09 – 1.37**
Reached 71	1.02	.90 – 1.16	.91	.81 – 1.03
2000-2002	Reference Group	Reference Group	Reference Group	Reference Group
2002-2004	1.20	1.07 – 1.34**	1.03	.92 – 1.15
2004-2006	.97	.87 – 1.09	.96	.86 – 1.08
2006-2008	1.03	.90 – 1.19	.92	.80 – 1.06
Demographic Variables				
Race				
White non-Hispanic	Reference Group	Reference Group	Reference Group	Reference Group
Black non-Hispanic	.63	.54 - .73**	.63	.55 - .74**
Other non-Hispanic	1.11	.82 – 1.51	.98	.73 – 1.33
Hispanic	.51	.41 - .62**	.52	.43 - .65**
Age	1.00	.99 – 1.01	1.02	1.01 – 1.03**
Female	1.09	.98 – 1.22	1.03	.93 – 1.14
Educational Attainment				
Less than high school	Reference Group	Reference Group	Reference Group	Reference Group
High school	.95	.84 – 1.08	1.03	.91 – 1.15
Some college	.94	.81 – 1.09	1.02	.89 – 1.18
College	.93	.78 – 1.23	1.05	.89 – 1.26
Masters	.90	.74 – 1.10	1.09	.90 – 1.31
Sector				
White collar job	Reference Group	Reference Group	Reference Group	Reference Group
Blue collar job	1.30	1.11 – 1.54**	1.27	1.09 – 1.49**
Service job	1.23	1.06 – 1.43**	1.21	1.05 – 1.39**
Missing Sector	1.16	1.00 – 1.35	1.20	1.41 – 1.38*
Region				
Northeast	Reference Group	Reference Group	Reference Group	Reference Group
Midwest	.96	.83 – 1.11	.96	.83 – 1.09
South	1.00	.87 – 1.15	.96	.84 – 1.10
West	1.05	.89 – 1.23	1.08	.93 – 1.26
Decumulation Factors				
Self-Reported Health	1.11	.92 – 1.33	1.01	.84 – 1.21

Income				
Social Security	1.18	.94 – 1.48	1.19	.97 – 1.47
Pension Income	.85	.77 - .94**	.91	.83 – 1.00*
Social Security Disability Income	.51	.42 - .62**	.52	.43 - .63**
Income from earnings	1.27	1.14 – 1.42**	1.27	1.14 – 1.42**
Health Insurance				
Government Insurance	1.02	.78 – 1.33	1.03	.80 – 1.33
Employer Insurance	1.03	.92 – 1.15	1.07	.96 – 1.18
Other Insurance	1.00	.89 – 1.12	1.03	.92 – 1.15
No insurance	1.09	.62 – 1.88	.89	.52 – 1.52
Pseudo R^2	0.0106			

Note: n=28,659
Note: RRR=Relative Risk Ratio, CI=Confidence Interval
*p<0.05, **p<0.01

The ADL sensitivity analysis shows a similar pattern of changes to significance for the life course variables. Here again we find that changes to significance are found within the marital status and disruption groupings. Widowed at baseline achieved significance for households in the overspender outcome, whereas experiencing widowhood over the study was no longer significant. Within the oversaver outcome, reporting being divorced at baseline was no longer a predictor. The age demographic variable is now significant for overspender. Further mirroring the self-reported health results we see that the sole change to decumulation factors was that income from pension is now significant for oversaver. The pseudo R-squared value for this model is comparable to the MNL logit (0.0105). Again, due to sample size variations a comparison to the multinomial logistic regression model is not valid.

Table 16.
Empirical Results for ADLs Sensitivity Analysis

	Overspender		Oversaver	
Variables	RRR	95% CI	RRR	95% CI
Life Course Variables				
Marital Status				
Married Baseline	Reference Group	Reference Group	Reference Group	Reference Group
Never married Baseline	.75	.56 – 1.00	.79	.62 – 1.01
Divorced Baseline	1.20	1.00 – 1.45	1.14	.95 – 1.37
Widowed Baseline	1.18	1.03 – 1.33*	1.10	.97 – 1.24
Children	1.00	.93 – 1.06	1.02	.95 – 1.09
Spouse/partner in Nursing Home	.93	.56 – 1.53	.98	.61 – 1.56
Marital disruption				
Divorced	.81	.56 – 1.16	.85	.59 – 1.23
Widowed	1.18	.97 – 1.45	1.10	.90 – 1.34
Homeowner	1.10	.98 – 1.24	1.22	1.09 – 1.37**
Reached 71	1.02	.90 – 1.15	.91	.81 – 1.03
2000-2002	Reference Group	Reference Group	Reference Group	Reference Group
2002-2004	1.20	1.08 – 1.34**	1.03	.92 – 1.15
2004-2006	.97	.97 – 1.09	.96	.86 – 1.08
2006-2008	1.03	.90 – 1.19	.92	.80 – 1.06
Demographic Variables				
Race				
White non-Hispanic	Reference Group	Reference Group	Reference Group	Reference Group
Black non-Hispanic	.63	.53 - .73**	.63	.55 - .74**
Other non-Hispanic	1.11	.82 – 1.51	.98	.73 – 1.33
Hispanic	.51	.41 - .63**	.52	.43 - .65**
Age	1.00	.99 – 1.01	1.02	1.01 – 1.03
Female	1.09	.98 – 1.22	1.03	.93 – 1.14
Educational Attainment				
Less than high school	Reference Group	Reference Group	Reference Group	Reference Group
High school	.95	.85 – 1.08	1.03	.91 – 1.15
Some college	.94	.81 – 1.09	1.02	.89 – 1.18
College	.94	.78 – 1.13	1.05	.88 – 1.26
Masters	.90	.74 – 1.10	1.09	.90 – 1.31

Sector				
White collar job	Reference Group	Reference Group	Reference Group	Reference Group
Blue collar job	1.31	1.11 – 1.54**	1.28	1.09 – 1.49**
Service job	1.23	1.06 – 1.43**	1.20	1.05 – 1.39*
Missing Sector	1.16	1.00 – 1.35	1.20	1.04 – 1.38*
Region				
Northeast	Reference Group	Reference Group	Reference Group	Reference Group
Midwest	.96	.83 – 1.10	.96	.83 – 1.09
South	1.00	.87 – 1.15	.96	.84 – 1.10
West	1.05	.89 – 1.24	1.08	.93 – 1.26
Decumulation Factors				
ADLs	1.09	.96 – 1.24	1.00	.88 – 1.13
Income				
Social Security	1.18	.94 – 1.48	1.19	.97 – 1.47
Pension Income	.85	.77 - .93**	.91	.83 – 1.0*
Social Security Disability Income	.51	.42 - .61**	.53	.43 - .63**
Income from earnings	1.27	1.14 – 1.42**	1.27	1.14 – 1.42**
Health Insurance				
Government Insurance	1.02	.78 – 1.33	1.03	.80 – 1.33
Employer Insurance	1.04	.93 – 1.16	1.07	.96 – 1.18
Other Insurance	1.00	.90 – 1.12	1.03	.92 – 1.15
No insurance	1.09	.63 – 1.89	.89	.52 – 1.52
Pseudo R^2	0.0106			

Note: n=28,659
Note: RRR=Relative Risk Ratio, CI=Confidence Interval
*p<0.05, **p<0.01

Economic Cycle Effects

Economists typically study patterns of economic activity bounded by the same phase of the business cycle (i.e. peak to peak or trough to trough). Therefore I tested an alternative assumption of the economic cycle by specifying the model over a period with different economic stages (2000-2006/peak to peak) from those in the primary study

(1998-2008/peak to trough). 1998-2000 (cycle 1) was excluded from the model since it is no longer within the period under study. 2000-2002 (cycle 2) is the omitted reference group. 2006-2008 is excluded from the model as well since it is not within the period being analyzed. Results are in table 17.

Changes to life course variables are reported only for the overspender outcome; divorced at baseline is now significant while experiencing widowhood no longer predicts. Demographic results show being Hispanic now predicts overspender. Within the longest held occupation sector, having held a blue collar job lost its predictive ability for oversaver, service sector fails to predict either overspender or oversaver, and missing sector is significant for overspender. Living in the Midwest relative to Northeast is now significant for both overspender and oversaver. Finally, income from earnings no longer predicts for oversaver while employer insurance attained significance. There were no changes to decumulation factors predicting overspender. Due to sample size difference (23,569 vs. 16,233) I cannot state whether the multinomial logit regression or the model below is superior in fitting the outcome data.

Table 17.
Empirical Results for 2000 – 2006 Sensitivity Analysis

	Overspender		Oversaver	
Variables	RRR	95% CI	RRR	95% CI
Life Course Variables				
Marital Status				
Married Baseline	Reference Group	Reference Group	Reference Group	Reference Group
Never married Baseline	.84	.58 - .122	1.01	.73 – 1.39
Divorced Baseline	1.35	1.04 – 1.75*	1.37	1.06 – 1.77*
Widowed Baseline	1.11	.92 – 1.35	1.10	.92 – 1.33
Children	1.03	.94 – 1.13	1.07	.98 – 1.17

Spouse/partner in Nursing Home	1.61	.76 – 3.41	1.48	.72 – 3.07
Marital disruption				
Divorced	.98	.57 – 1.68	.93	.55 – 1.58
Widowed	1.23	.93 – 1.64	1.16	.87 – 1.54
Health Shock				
Respondent Incidence Mild[1]	1.09	.92 – 1.29	.90	.76 – 1.07
Respondent Incidence Severe[2]	1.06	.92 – 1.22	1.10	.95 – 1.27
Spouse Incidence Mild[1]	1.06	.84 – 1.34	1.01	.80 – 1.28
Spouse Incidence Severe[2]	.84	.70 – 1.00	.93	.78 – 1.11
Homeowner	1.09	.94 – 1.27	1.18	1.03 – 1.36*
Reached 71	1.10	.92 – 1.33	1.07	.89 – 1.28
2000-2002	Reference Group	Reference Group	Reference Group	Reference Group
2002-2004	1.12	.94 - 1.33	1.01	.85 – 1.20
2004-2006	.89	.74 – 1.08	.93	.77 – 1.12
Demographic Variables				
Race				
White non-Hispanic	Reference Group	Reference Group	Reference Group	Reference Group
Black non-Hispanic	.63	.52 - .75**	.65	.55 - .78**
Other non-Hispanic	1.23	.85 – 1.78	1.04	.72 – 1.50
Hispanic	.50	.38 - .64**	.57	.44 - .73**
Age	.99	.98 – 1.01	1.01	1.00 – 1.03
Female	1.06	.92 – 1.23	1.00	.87 – 1.16
Educational Attainment				
Less than high school	Reference Group	Reference Group	Reference Group	Reference Group
High school	.89	.76 – 1.04	.96	.82 – 1.11
Some college	.95	.78 – 1.15	.98	.81 – 1.17
College	.80	.63 – 1.01	.85	.68 – 1.07
Masters	.81	.63 – 1.04	.92	.73 – 1.17
Sector				
White collar job	Reference Group	Reference Group	Reference Group	Reference Group
Blue collar job	1.26	1.02 – 1.55*	1.21	1.00 – 1.48
Service job	1.17	.97 – 1.41	1.16	.98 – 1.38
Missing Sector	1.22	1.01 – 1.48*	1.25	1.04 – 1.50*
Region				
Northeast	Reference Group	Reference Group	Reference Group	Reference Group
Midwest	.74	.62 - .89**	.79	.66 - .94**
South	.92	.77 – 1.09	.94	.79 – 1.12
West	.94	.76 – 1.15	.95	.78 – 1.15

Decumulation Factors				
Health Capital				
Respondent Prevalence Mild[1]	1.04	.96 – 1.11	1.01	.94 – 1.08
Respondent Prevalence Severe[2]	1.04	.97 – 1.11	1.03	.97 – 1.10
Spouse Prevalence Mild[1]	.97	.89 – 1.06	.98	.90 – 1.07
Spouse Prevalence Severe[2]	.98	.91 – 1.07	1.02	.94 – 1.10
Income				
Social Security	1.06	.77 – 1.45	.95	.71 – 1.27
Pension Income	.83	.73 - .94**	.90	.80 – 1.02
Social Security Disability Income	.48	.38 - .62**	.47	.37 - .60**
Income from earnings	1.24	1.04 – 1.48*	1.28	1.08 – 1.52
Health Insurance				
Government Insurance	1.03	.61 – 1.75	1.02	.61 – 1.71
Employer Insurance	1.10	.95 – 1.27	1.18	1.03 – 1.35*
Other Insurance	1.01	.87 – 1.18	1.04	.90 – 1.20
No insurance	.89	.36 – 2.24	.68	.27 – 1.68
Pseudo R^2	0.0105			

Note: n=16,233
Note: RRR=Relative Risk Ratio, CI=Confidence Interval
1. Mild conditions include high blood pressure, psychiatric problems and arthritis.
2. Severe conditions include diabetes, cancer, lung disease, heart disease and stroke.
*p<0.05, **p<0.01

Life Expectancy Analysis

Studies indicate that households plan for their expected longevity. Household time preferences for consumption were tested by including a life expectancy variable in the model. Beginning in 2000, respondents were asked the probability that they would live 10 or more additional years. The *longevity expectation* variable was coded 1=expect to live 10 or more years 0=otherwise. Since the question was not asked in 1998, this resulted in fewer cases available for analysis. Therefore a missing variable (missing

longevity expectation) was created for those households that did not provide data for the additional life expectancy question.

Inclusion of this variable had a small effect on model results. Homeownership achieved significance in predicting an increased risk for overspender relative to on target, however the coefficient was the same as the MNL model. The longevity expectation variable did not achieve significance. The missing longevity expectation variable did not predict significantly for either overspender or oversaver relative to on target. All other variables which were significant predictors in the MNL model continued to predict in the revised model, and coefficient magnitude remained the same with two exceptions. There was a very small increase to the coefficient for Social Security Disability income for the oversaver category (.52 to .53) and a slight decrease to the coefficient for Hispanic in the overspender category (.52 to .51).

The pseudo r-squared (0.0107) is higher than that of the MNL logit regression, indicating it is a modest improvement over the MNL regression. Results are reported in table 18.

Table 18.
Empirical Results for Longevity Sensitivity Analysis

	Overspender		Oversaver	
Variables	RRR	95% CI	RRR	95% CI
Life Course Variables				
Marital Status				
Married Baseline	Reference Group	Reference Group	Reference Group	Reference Group
Never married Baseline	.78	.56 – 1.07	.81	.62 – 1.06
Divorced Baseline	1.23	1.00 – 1.52	1.24	1.01 – 1.52*
Widowed Baseline	1.10	.93 – 1.29	1.05	.90 – 1.23
Children	1.00	.93 – 1.07	1.02	.95 – 1.09

Spouse/partner in Nursing Home	.86	.50 – 1.48	.88	.53 – 1.48
Marital disruption				
Divorced	.94	.61 – 1.43	.84	.55 – 1.29
Widowed	1.26	1.00 – 1.59	1.14	.91 – 1.43
Health Shock				
Respondent Incidence Mild[1]	1.04	.90 – 1.20	.92	.80 – 1.06
Respondent Incidence Severe[2]	1.06	.94 – 1.19	1.07	.95 – 1.20
Spouse Incidence Mild[1]	1.03	.85 – 1.25	.96	.79 – 1.15
Spouse Incidence Severe[2]	.89	.76 – 1.04	.93	.80 – 1.09
Homeowner	1.14	1.00 – 1.29*	1.22	1.08 – 1.38**
Reached 71	1.07	.92 – 1.24	.99	.85 – 1.14
2000-2002	Reference Group	Reference Group	Reference Group	Reference Group
2002-2004	1.19	1.05 – 1.34**	1.00	.89 – 1.13
2004-2006	.95	.84 – 1.08	.93	.82 – 1.05
2006-2008	1.04	.90 – 1.20	.94	.81 – 1.08
Demographic Variables				
Race				
White non-Hispanic	Reference Group	Reference Group	Reference Group	Reference Group
Black non-Hispanic	.62	.53 - .73**	.64	.54 - .74**
Other non-Hispanic	1.09	.78 – 1.50	.97	.71 – 1.33
Hispanic	.51	.41 - .64**	.56	.45 - .70**
Age	1.00	.99 – 1.01	1.02	1.01 – 1.03**
Female	1.13	1.00 – 1.27	1.05	.93 – 1.18
Educational Attainment				
Less than high school	Reference Group	Reference Group	Reference Group	Reference Group
High school	.93	.81– 1.06	1.01	.89 – 1.14
Some college	.95	.81– 1.11	1.02	.88 – 1.19
College	.89	.73– 1.09	1.01	.84 – 1.23
Masters	.84	.68– 1.05	1.01	.83 – 1.23
Sector				
White collar job	Reference Group	Reference Group	Reference Group	Reference Group
Blue collar job	1.29	1.08 – 1.55**	1.25	1.06 – 1.49**
Service job	1.19	1.01– 1.39*	1.18	1.01 – 1.37*
Missing Sector	1.15	.98 – 1.36	1.21	1.04 – 1.41*

Region				
Northeast	Reference Group	Reference Group	Reference Group	Reference Group
Midwest	.91	.78 – 1.06	.95	.82 – 1.10
South	.98	.84– 1.13	.97	.84 – 1.11
West	1.03	.87– 1.23	1.03	.88 – 1.22
Decumulation Factors				
Health Capital				
Respondent Prevalence Mild[1]	1.04	.98 – 1.11	1.02	.96 – 1.09
Respondent Prevalence Severe[2]	1.04	.98 – 1.10	1.05	.99 – 1.10
Spouse Prevalence Mild[1]	1.01	.94 – 1.09	1.00	.93 – 1.07
Spouse Prevalence Severe[2]	.97	.90 – 1.04	.99	.93 – 1.06
Income				
Social Security	1.19	.94 – 1.50	1.18	.95 – 1.47
Pension Income	.89	.80 - .99*	.96	.87 – 1.06
Social Security Disability Income	.50	.41 - .62**	.53	.43 - .64**
Income from earnings	1.28	1.11 – 1.48**	1.35	1.17 – 1.56**
Health Insurance				
Government Insurance	1.04	.80 – 1.37	1.05	.80 – 1.37
Employer Insurance	1.03	.91 – 1.16	1.08	.97 – 1.22
Other Insurance	1.00	.88 – 1.14	1.04	.93 – 1.18
No insurance	1.46	.80 – 2.68	1.16	.65 – 2.07
Longevity Expectation	1.00	1.00 – 1.00	1.00	1.00 – 1.00
Missing Longevity Expectation	1.04	.89 – 1.20	.99	.85 – 1.14
Pseudo R^2	0.0107			

Note: n=23,569

Note: RRR=Relative Risk Ratio, CI=Confidence Interval

1. Mild conditions include high blood pressure, psychiatric problems and arthritis.

2. Severe conditions include diabetes, cancer, lung disease, heart disease and stroke.

*p<0.05, **p<0.01

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