The Dynamics of Living Arrangements Among the Elderly

Nopphol Witvorapong

A dissertation submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Department of Economics.

Chapel Hill
2011

Approved by:

Donna B. Gilleskie, Advisor

John S. Akin

David K. Guilkey

Helen V. Tauchen

Courtney H. Van Houtven

Abstract

NOPPHOL WITVORAPONG: The Dynamics of Living Arrangements Among the Elderly.
(Under the direction of Donna B. Gilleskie.)

Combining care arrangements and whom the elderly live with, I study the mechanisms behind changes in living arrangements. I estimate a dynamic model of living arrangements, savings, intergenerational transfers and health outcomes. I use the discrete factor random effects estimation method to control for unobserved heterogeneity. I use the rich data available in the 1995-2006 waves of the Health and Retirement Study (HRS) and supplement them with data on Medicaid and costs of care, resulting in a unique dataset. I find that living arrangements are strongly influenced by health and savings. In particular, functional health is the strongest predictor of living arrangements. Inter vivos transfers and bequest intent affect living arrangements only to the extent that they impact the distribution of unobserved heterogeneity, indicating the absence of the exchange hypothesis as far as living arrangements are concerned. Public policies have a small but significant effect in the determination of living arrangements. For example, a twofold increase in the probability of receiving nursing home benefits among Medicaid eligibles increases the use of nursing home only by a 0.1 percentage point. The effects of public policies are more pronounced among elderly individuals with poor initial health and low initial wealth.

To Mom, Dad, Mack and Mike.

Acknowledgments

It is a pleasure to show my appreciation to people who made this dissertation possible. I owe my deepest gratitude to my advisor, Prof. Donna B. Gilleskie for her expertise in Economics, her commitment to the high standards and, most importantly, her patience with me. Donna did not only teach me how to be an economist, but also how to be a good researcher. Every time I had a consultation with her, I left understanding more Economics than I had done. The level of care that Donna puts into her teaching and mentoring and her thirst for knowledge will be something I aspire to, both professionally and personally.

I am grateful for the contributions of my committee members. I am indebted particularly to Prof. Helen V. Tauchen, who, despite the many roles she assumed at the Economics Department, always found the time to read my work, provided useful feedbacks and encouraged me to do my best. Her suggestions on the theoretical model and the regression specifications immeasurably improved the quality and the readability of my dissertation. I would like to express my gratitude to Prof. David K. Guilkey for teaching me how to enjoy Econometrics and for his valuable suggestions on the exclusion restrictions in the model. I also wish to thank Prof. John S. Akin for his constructive comments on the structure of my dissertation. Finally, I thank Dr. Courtney H. Van Houtven, who kindly lent her expertise on Medicaid and intergenerational transfers to me and exposed me to literature that I would not have otherwise been exposed to.

I wish to thank my friends and family. Jack Cheng, Yi Ching Hugo Wu and the other classmates in my year have made my time at UNC both productive and enjoyable. I will never forget the time we spent at the big table on the fourth floor of Gardner staying up to finish the assignments together. I would like to thank all my friends at the UNC-Thai Student

Association for the dinners, the parties and the pep talks. I know that my friendships with them will be long lasting and that I will always be able to count on them. I thank my friends from TK, Oxford and Bath who never fail to keep in touch with me and make me feel missed, despite the long distance between me and them. Most importantly, I would like to thank my family: my parents, Mack and Mike for their unconditional love and for always believing in me. To them, I dedicate this dissertation.

Table of Contents

List of Tables

Chapter 1

Introduction

That the elderly move from living independently to living in an intergenerational household to institutionalization is well documented in the literature, yet the mechanisms behind the switch from one living arrangement to another (and back) are not well understood. The decline in intergenerational coresidence and its replacement by independent living and nursing home entry in the last half of the twentieth century have not been extensively studied (Grabowski, 2001). Also, the association between whom the elderly live with and the type of care they receive has become increasingly blurred. In 2004, according to a study by the National Center for Health Statistics, 75.9% of elderly individuals who needed care lived with their children or relatives and received informal care. The rest either had other living arrangements, received professional care or lived with their children but did not receive informal care. The NCHS study implies a changed definition of intergenerational coresidence and that it should no longer be treated as synonymous with informal care provision. It is important to understand that the elderly decide on their living and care arrangements jointly.

The literature has highlighted two important determinants of living arrangements: health and wealth (Bowers, 1988; Boersch-Supan et al., 1990; Hurd, 1990; Hoerger et al., 1996; Costa, 1997; Schoeni, 1998; Michael et al., 2001). While the elderly may prefer living independently, their health (hence their care requirement) might not accommodate it. Living with adult children or in a nursing home minimizes the transaction costs of care provision and increases the efficiency of care production relative to living alone. The fact that nursing home care (costing an average of $70,912 annually in 2006, according to a report published by Genworth

Financial) can take up a large percentage of the elderly's wealth may induce them to choose a different, cheaper option, holding health constant. Another factor that could be important in determining the household formation outcome is the elderly's tendency to make monetary transfers (Pezzin and Schone, 1999; Heiss et al., 2003). Monetary assistance from elderly parents to adult children can manipulate the source of care the elderly receive and therefore their care arrangement. The theory of exchange proposed by Bernheim et al. (1986) argues that informal care by adult children can be elicited through inter vivos transfers (monetary assistance while the parents are alive) and/or a promise of bequests (a transfer after the parents die). If transfers are large or frequent enough, they could result in an intergenerational coresidence arrangement. Clearly, the decision to choose one living arrangement over others, wealth and health outcomes and the elderly's transfer behavior are interrelated.

Other factors also affect the availability and costs of care faced by the elderly. According to the US Census Bureau, the elderly population grew by a factor of 11 during 1900-1994 and the household size shrank by one body per a 100 million increase in citizens. The decline in fertility and mortality rates in the US indicates that the average burden of elderly care on adult children has increased. Rising opportunity costs of time for female adult children who typically are caregivers (due to more education and a narrowing male-female wage gap) means the cost of informal care borne by adult children has increased. This allows what had been family functions to be replaced by market provisions, such as home health aides or retirement communities. The government has attempted to alleviate the cost of informal care borne by informal caregivers as well as the costs of formal and nursing home care faced by the elderly. Through public programs such as employer accommodation laws (e.g. the Family and Medical Leave Act (1993)) and the provision of tax incentives for informal caregivers, the burden of informal care on adult children decreases, increasing the likelihood of informal care arrangements. Through the provision of home and community based services (HCBS) which include, for instance, respite care, payment for visits by home health professionals and the coverage of nursing home costs by the means-tested Medicaid program, the costs of formal home care and nursing home care faced by qualified elders decline. These social phenomena and public programs have the potential to encourage the elderly to substitute away from one

living arrangement toward another.

That the elderly make their living arrangement decision contemporaneously with their wealth and health outcomes as well as their transfer decision, and that these decisions/outcomes are affected by public programs, most prominently Medicaid, imply that, to uncover the mechanisms behind household formation, these decisions/outcomes need to be studied jointly and Medicaid needs to be incorporated. Time-invariant and time-varying unobserved heterogeneity can produce misleading results unless properly accounted for. For example, an elderly individual with an unobserved preference for an informal care living arrangement may have very different saving and transfer behaviors than one with an unobserved preference for a formal home care living arrangement, given the same health outcome and comparable personal characteristics.

I have three main goals in this research. First, I attempt to better understand the mechanisms behind how the elderly switch in and out of a living arrangement, or more specifically, to identify important factors of living arrangements. Second, I assess the impact of intergenerational transfers on living arrangements and see if there is evidence for the exchange hypothesis at the household level as opposed to the child level at which it is usually studied. Finally, I evaluate and quantify the impact of public policies, particularly Medicaid, on living arrangements and come up with policy implications.

I model living arrangements, savings, intergenerational transfers and health outcomes jointly using the nonlinear discrete factor random effects estimation method to control for unobserved heterogeneity and minimize endogeneity bias. I also estimate married households and unmarried households separately in some of the equations to account for the importance of having a spouse. I use the rich data available in the 1995-2006 waves of the Health and Retirement Study (HRS) and supplement them with my own research and my correspondences with state Medicaid offices, resulting in a unique dataset.

Estimates from the analysis suggest that living arrangements are strongly influenced by health and savings, and functional health is the most predominant predictor of living arrangements. Intergenerational transfers in the form of inter vivos transfers and expressed intention to leave a bequest upon death affect living arrangements only to the extent that they impact

the distribution of unobserved heterogeneity. Public policies play a role in the determination of living arrangements. Their effects are small but significant. For example, a twofold increase in the probability of receiving nursing home benefits among Medicaid eligibles increases the probability of using nursing home by only a 0.1 percentage point. The effects of public policies are more pronounced among elderly individuals with poor health and low wealth.

The remainder of the dissertation is organized as follows. In Chapter 2, I provide a literature review. In Chapter 3, I present a simple theoretical model of household formation as a decision made by elderly parents. In Chapter 4, I present an empirical model motivated by the theory and explain the discrete factor random effects estimation method in detail. In Chapter 5, using the multiple waves and cohorts of the Health and Retirement Study, I explain how the final sample is constructed and show descriptive statistics of important variables. I present my results in Chapter 6 and conclude in the final chapter.

Chapter 2

Background

2.1 Living Arrangements, Health and Wealth

Living arrangement is an important decision that the elderly face. The decision includes not only with whom the elderly live but also the type of care they may receive. Possible living arrangements are 1) living in a community, which may or may not entail care, and 2) living in an institution or a nursing home, which certainly includes care. Modes of community living range from living independently (i.e., living by oneself or living with one's spouse), to living with adult children, to living with other relatives, the last of which is relatively rare and not widely discussed in the literature[1] .

The elderly may receive either informal care or formal home care or both. The elderly's level of functioning and thus the extent to which they need any type of care can be measured by the elderly's perception of their health status and how well they perform their Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs). ADLs are loosely defined as self-care tasks, such as getting in and out of bed and getting dressed. IADLs refer to more socially, physically or mentally demanding tasks such as meal preparation and taking medication. Both informal care and formal home care refer to the assistance with ADLs and IADLs that are given to the elderly. The main distinction lies with the fact that informal care is provided by household members, most notably spouses and adult children, while formal

[1]In fact, none of the studies reviewed in this dissertation addresses living with relatives.

home care is a service of medical professionals.

The economics and public health literatures on living arrangements are relatively sparse. Some papers focus on the institutionalization process (Bowers, 1988; Gaugler et al., 2000; Nihtila and Martikainen, 2008). Others concentrate on living with adult children relative to living independently (Mutchler and Burr, 1991; Rosenzweig and Wolpin, 1993; Costa, 1997; Michael et al., 2001; Choi, 2003; Pal, 2006). Relatively few studies incorporate the options of living independently, living with adult children and nursing home care in the same framework (Boersch-Supan et al., 1990; Hoerger et al., 1996; Heiss et al., 2003; Charles and Sevak, 2005). Fewer studies include informal and formal home care as part of the living arrangements (Gardner and Gilleskie, 2009).

Despite the variation in datasets and econometric models, there is much agreement in the literature as to the frequency at which living arrangements are observed. All studies reviewed in this dissertation conclude that, among the elderly, living independently is more frequently observed than living with adult children and living with adult children is more frequently observed than living in an institution. Boersch-Supan et al. (1990) study 3000 elders in Massachusetts in 1982-1986 and find that living independently is the predominant mode of living arrangement. Roughly 60% of the sample lived independently throughout the 4-year period. The percentages of the sample living with adult children and in an institution varied over time. The elders were more likely to be institutionalized as they grew older. In 1982, only 0.8% of the sample were in a nursing home. The proportion reached 22.2% four years later. Charles and Sevak (2005) reach a similar conclusion, using the 1993-2000 waves of the Assets and Health Dynamics of the Oldest Old (AHEAD) dataset.

Changes in living arrangements or the availability of living arrangement options to the elderly are primarily attributable to changes in health. Elders who live independently should be able to perform all ADLs and most if not all IADLs. Once care is necessary, which in the data is reflected by the need for helpers or respite care, the switch from living independently to moving in with adult children or to being institutionalized is expected (Boersch-Supan et al., 1990; Gaugler et al., 2000). The loss of one's spouse can also decrease the probability of living independently. Boersch-Supan et al. (1990) and similarly Nihtila and Martikainen (2008) find

that upon the death of a spouse (usually within one year), the elderly tend to move in with their children and, less frequently, move to an institution. The loss of a spouse may be seen as a deterioration in mental health, as bereavement is highly associated with depression and subsequently worse physical health (Michael et al., 2001).

Effects of a change in living arrangement on health have been studied quite extensively in the epidemiology literature. Castle (2001) documents 121 publications and details how different patterns of relocation induce physiological and psychological disturbances, collectively known as the 'relocation stress syndrome', among the elderly. Overall, the literature seems to suggest that a switch, particularly from living independently to being institutionalized, is generally associated with an increase in mortality and a deterioration in functional health and co-morbid conditions. However, it offers an improvement in some measures of personal life satisfaction, most notably, the number of contacts. The severity of the change in living arrangement depends on the quality of the new environment and whether the move is voluntary. In the case of a spousal loss and the worsening of health, the elderly are unlikely to move voluntarily and will experience rather severe health effects.

Another factor that impacts living arrangements among the elderly is wealth. Clearly, individuals with larger budget sets can afford a wider range of living arrangements and do not have to or do not always choose the cheapest option. Nevertheless, for an average individual, living independently seems to be a normal good; the arrangement is chosen as income rises. Residence in a nursing home seems to be an inferior good and living with adult children seems to be somewhere in between, depending on the sample considered (Boersch-Supan et al., 1990; Hoerger et al., 1996; Costa, 1997).

In addition to the amount of wealth, the type of wealth held by the elderly may also have implications on living arrangements. Generally, the elderly hold wealth in two broad forms. Annuitized wealth exists in the form of regular income flows such as Social Security benefits or pensions. Most annuities cease upon the death of the owner, although some continue providing limited benefits to survivors (i.e., spouses of deceased individuals who were primary wage earners of the household). The other form is bequeathable wealth, which includes cash, bank accounts, stocks, real estate properties and life insurance policies as well as any assets

that can be passed on to the next generation[2] . More heavily annuitized elderly individuals are likely to have less leeway in choosing their living arrangements. They are constrained by the income streams that they receive at a certain point in time, so if the change from their current living arrangement to a different one requires more resources than they are annuitized for, it may be difficult to switch. Elders with a higher percentage of bequeathable wealth can downsize or liquidate their assets such that it is easier for them to change their living arrangements (Jones, 1996). Also, Hoerger et al. (1996) find that living with adult children is a more common phenomenon among households with larger housing (bequeathable) wealth. Children move in with their parents to receive better housing and may provide care services in return. However, the effect is statistically significant only among households with cognitively aware parents, when the burden of care on the children's part is low.

Health and wealth affect not only living arrangements but also each other. In addition to the widely known positive correlation between wealth and health, a strand of literature is dedicated to studying the relationship between health and the portfolio of wealth or the degree of annuitization, to be more precise. In the face of longevity uncertainty, annuities provide insurance against outliving one's wealth. The elderly hedge the uncertainty of death by trading their initial resources for streams of income that last until they die. The relationship between the degree of annuitization and health seems to run both ways. Based on the 1992-2000 waves of the Health and Retirement Study, Dushi and Webb (2004) find that healthier elders expect to live longer so they annuitize more. The mortality rate of the average annuitant is significantly higher than that of the average population. However, Philipson and Becker (1998) make a case that elders live longer because they annuitize more. Annuitized individuals have a piece rate incentive for longevity and may be more likely to put efforts into self care, finding it cheaper to live than less annuitized individuals do.

As an alternative to annuities, the elderly may be insured against depleting wealth before death by their family members. The literature distinguishes among family members: the

[2]Based on data from the Health and Retirement Survey, Butrica and Mermin (2006) estimate that more than 50% of retirement wealth is annuitized while less than 20% comes from financial assets, a form of bequeathable wealth.

elderly's spouses or their adult children. There is clear evidence for longevity risk pooling between husbands and wives (Altonji et al., 1997; Walliser, 2000). Couples are able to rely on each other's resources in events of under-consumption and health risks. On the other hand, children do not seem to step up as old-age insurance (Walliser, 2000). Mellor (2001) uses data from two sources: the 1993 wave of Assets and Health Dynamics of the Oldest Old (AHEAD) and the 1990 wave of Panel Study of Income Dynamics (PSID). He finds that children are not potential substitutes of long-term care insurance. Parents who buy long-term care insurance do not take into account whether they are provided with informal care by their children. They are not convinced that informal care will be provided at a constant, reliable rate. Annuities may replace family functions as old-age insurance, especially if the elderly are without a spouse.

The discussion above shows that living arrangements, health and wealth of the elderly are strongly linked and that the three outcomes are jointly determined. Living independently is the most common living arrangement. Healthier and wealthier individuals are more likely to live independently. In general, the elderly switch from living independently to intergenerational coresidence or institutionalization when their health deteriorates. The relocation can in turn affect health; a move into a nursing home is largely linked to worsening health. The impact of wealth on the move from living independently to the other arrangements is unclear. Nevertheless, living independently is associated with more wealth, and in particular more bequeathable wealth. Intergenerational coresidence is correlated with more housing (also bequeathable) wealth on the parents' part. Health and wealth also impact each other. In addition to the healthier-wealthier relationship, the elderly's portfolio of wealth or, in particular, the degree of annuitization seems to affect longevity (and health) positively. The relationship between health and wealth adds another complexity to their contributions to the determination of living arrangements.

2.2 Inter Vivos Transfers and Bequests in Relation to Living Arrangements

With regard to intergenerational transfers of wealth, this dissertation considers only downstream intergenerational transfers or transfers that are made from parents to adult children. I leave out of the discussion the child-to-parent monetary transfers, as they are much less frequently observed. According to the Health and Retirement Study (HRS) from 1993-2006, the percentage of households making monetary gifts downstream is approximately 35% and is higher with the inclusion of bequests. Approximately half of the interviewed households reported an intention to leave a bequest to their children. In contrast, the percentage of the HRS households that received upstream monetary transfers hovers around 5% across years. Only a small number of studies on upstream intergenerational transfers have been published. Sloan and Zhang (2002) offer mixed evidence of their existence depending critically on the definition of transfers. Nishiyama (2002) acknowledges the existence of upstream transfers but decides to disregard it completely upon lack of data.

Transfers of wealth can take place at different points in time. The term 'inter vivos transfers', used interchangeably with 'gifts', refer to transfers made when the donor is alive. 'End-of-life transfers', or 'bequests', refer to transfers made upon or after the donor's death. Inter vivos transfers and bequests differ and interconnect on many levels. In addition to their difference in time references, stylized facts suggest that inter vivos transfers are often distributed unequally among children of the same household while bequests tend to be divided equally. McGarry (1999) and Norton and Van Houtven (2006) find that 95% of children of households that engage in intergenerational transfers in the US receive a bequest while only 40% of them receive an inter vivos transfer. The joint consideration of inter vivos transfers and bequests facilitates a better understanding of the transfer profile of parents over their life cycles.

The relationship between transfers of wealth and living arrangements lies with the fact that, by making inter vivos transfers or making a bequest promise, parents may receive informal care from their adult children. According to the theory of 'exchange', otherwise known as the 'strategic bequest motive', older parents make a financial transfer to their adult children to

elicit or to compensate for informal care or services provided (Bernheim et al., 1986). The theory has some support in the literature. Based on data from the 1993 and 1995 waves of the Assets and Health Dynamics of the Oldest Old (AHEAD), Norton and Van Houtven (2006) use logistic regressions with household fixed effects and find evidence in support of the exchange hypothesis for inter vivos transfers but not for bequests. Cox and Rank (1992) use data from the 1987-1988 National Survey of Family and Households and estimate two equations at the child level, one for the probability of receiving inter vivos transfers and the other for the amount. The authors find that an increase in child income decreases the probability but increases the amount of inter vivos transfers. As their income rises, adult children have higher opportunity costs of time, will be less likely to provide informal care and therefore less likely to receive a transfer. Nevertheless, when/if they decide to provide care, their time will be valued more and have to be compensated for accordingly. The authors conclude that their results are consistent with the exchange hypothesis.

The theory of exchange is not the only theory that explains why elderly parents make financial transfers and it is not always supported empirically[3] . But, as Norton and Van Houtven (2006) and Cox and Rank (1992) point out, the theory has some validity. I do not test the theory in this dissertation. Instead I allow for the possibility that it may affect the manner in which the elderly receive informal care and choose their living arrangements. Also, households that make inter vivos transfers or a bequest promise may have characteristics that are different from those that do not, which has an implication on the distribution of unobserved

[3]Most studies that attempt to understand the elderly's decision to transfer assets to adult children concentrate heavily on three theories. The theory of 'exchange' argues that older parents receive care by their children and will compensate them according to the amount of informal care provided (Bernheim et al., 1986; Norton and Van Houtven, 2006). The theory of 'altruism' refers to the fact that older parents wish to equalize consumption levels among their children, thereby transferring more assets to poorer children (Altonji et al., 1997; McGarry, 1999; Brown, 2004, 2007). In contrast with the first two theories where transfers are intentional and the focus is on an unequal distribution of wealth within the same household, the final theory argues that transfers are accidental. The 'accidental' theory does not distinguish between children who receive transfers and children who do not. Bequests are simply assets that are not exhausted because parents cannot anticipate their death with certainty. According to the accidental theory, the consumption behavior of older parents should be consistent with the life cycle hypothesis; the elderly spend down at an increasing rate as they expect their end of life (Hurd et al., 2007). These three theories have been treated as separate subjects of research with few studies attempting to address them together (Cox and Rank, 1992; Wilhelm, 1996; Sloan and Norton, 1997; Light and McGarry, 2004) . Empirical evidence in support of either theory has been mixed. I do not attempt to test or validate any of the theories in this dissertation.

heterogeneity of the population.

The literature provides reasons why elderly parents make monetary transfers to their children. First, as Mellor (2001) suggests, children cannot always be relied on for informal care. Parents with preferences for informal care make a transfer to elicit care. Second, informal care is associated with an improvement in health and can delay institutionalization for the elderly, where institutionalization is potentially the least preferred living arrangement for the average individual. Charles and Sevak (2005) find that informal care reduces the risk of a nursing home entry, replacing care that is provided in a nursing home. Gaugler et al. (2000) and similarly Bowers (1988) argue that even when informal care is not the primary source of care for the parents, children's involvement (especially with ADLs and overnight respite) helps alleviate stress on the professional helper's part and delays institutionalization. Finally, parents may simply enjoy their children's company and make a transfer (in-cash or in-kind) to induce coresidence. Choi (2003) identifies cases where parents are healthy and wealthy and yet live with their adult children who may not provide any services in return.

2.3 The Role of Public Policy

The joint evolution of living arrangements, health, wealth and intergenerational transfers is further complicated by two other factors: Medicaid eligibility and estate and gift taxes. Details of Medicaid elibility criteria and of the interactions between estate and gift taxes are included in Appendix A and Appendix B respectively.

Medicaid alters the relative prices of living arrangements. It significantly reduces the cost of nursing home care and, in some states, provides subsidies for home health care when the elderly live in the community[4] . The reduction in the price of a living arrangement relative to the other options as a result of Medicaid eligibility alters the relative value of different living arrangements. The literature on the impact of Medicaid on living arrangements is rare and the conclusions are mixed. Hoerger et al. (1996) find that loosening Medicaid eligibility criteria increases only the use of nursing home services and does not affect living independently nor

[4]The benefit is known as Home and Community-Based Services (HCBS).

shared housing. Muramatsu et al. (2007) and Grabowski and Gruber (2007) argue that nursing home utilization is price inelastic. Changes in Medicaid-related policies at the state level, including increasing the level of commitment to providing home health care relative to nursing home care and relaxing Medicaid eligibility criteria, do not affect the level of nursing home use and do not delay institutionalization. The efforts to keep the elderly in the community, thereby reducing costs of nursing home care borne by the states, do not seem to have support empirically.

Estate and gift taxes enter the elderly's decision to make a monetary transfer to adult children directly. As explained in Appendix B, transfer tax incentives alter the choice between bequests and inter vivos transfers. The government allows annual and lifetime exclusion thresholds, below which parents can make monetary (inter vivos) transfers to their children without having to pay tax. Taxable gifts made within three years of the parent's death are subject to the estate tax. However, if gifts are distributed earlier and their values are below the exclusion thresholds, taxes need not apply at all. The bias is in favor of inter vivos transfers. In light of longevity uncertainty, parents who wish to maximize the amount of intergenerational transfers should make frequent inter vivos transfers and do so at an increasing rate as death approaches.

Joulfaian and McGarry (2004) and Poterba (1998) explore whether the elderly attempt to maximize the amount of transfers to their children by exploiting tax avoidance channels. They similarly conclude that the elderly do not do so. Based on data from 1992-2000 waves of AHEAD and HRS, Joulfaian and McGarry (2004) restrict their sample to the initially wealthy or those with a higher level of bequeathable wealth than the lifetime exclusion limit in 1992 and 1993. They find weak evidence in support of spending down, even when they control for life expectancy and health. The elderly do not accelerate the amount of intergenerational transfers as they become older and less healthy. Poterba (1998) finds that only a small percentage of the elderly with bequeathable wealth (about one-third) make inter vivos transfers as they become more frail.

That tax incentives have smaller effects than expected implies that they do not explain the transfer behavior in its entirety. The elderly may wish to keep their resources for later

life care; they save in anticipation of future morbidity. It is also possible that the 'exchange' motive operate counteractively to tax incentives. Because there may be moral hazard in giving children a lump sum now and expecting the promise of care to be fulfilled later, parents may wish to award an amount smaller than the exclusion threshold to their children in order to elicit a greater frequency of informal care.

To better understand the dynamics of living arrangements, it is important to know that the outcomes of living arrangements, health, wealth and intergenerational transfers are jointly determined. These outcomes are also affected by public policies, including Medicaid and transfer taxes, which need to be incorporated into the analysis.

2.4 Limitations of the Literature

Overall the literature seems to suffer some limitations. Most living arrangement studies treat health and wealth as exogenous. With regard to health, the living arrangement literature is largely based on narrowly defined samples such as institutionalized elderly individuals or disabled individuals (Hoerger et al., 1996; Costa, 1997). This takes away the importance of health transitions since individuals included in these samples already have chronic health conditions and require care at all times. Their selection into a living arrangement is likely to be time-invariant. Weath is also treated as given, with the exception of Heiss et al. (2003). Few studies account for the importance of intergenerational transfers on living arrangements (and vice versa). Only Rosenzweig and Wolpin (1993) and Pezzin and Schone (1999) incorporate intergenerational transfers into the living arrangement framework, but both papers are limited to the comparison between living independently and coresidence and do not take into account unobserved preferences of the parents. The existing literature has not sufficiently incorporated the joint evolution of living arrangements, health, wealth and intergenerational transfers.

Studies that consider care arrangements of the elderly fall within the intergenerational transfer literature and focus on informal caregiving according to the 'exchange' hypothesis (Cox and Rank, 1992; Wilhelm, 1996; Norton and Van Houtven, 2006). They attempt to explain the characteristics of informal caregivers and factors affecting the level of informal caregiving but

they take wealth and living arrangements as exogenous, even though they are strongly linked. For example, intergenerational coresidence likely induces informal caregiving and at the same time the provision of informal care may necessitate intergenerational coresidence. In addition, the development of market-provided paid care is largely ignored in the literature. The fact that formal home care can be a potentially perfect substitute for informal care has important implications on the changes of living arrangement over time. With competing demand for time of adult children due to labor force participation, marriage, etc., it has become increasingly more likely that elderly parents can no longer rely on informal care (which they traditionally would) and have to resort to formal home care instead (Pezzin and Schone, 1999).

Relatively few studies have attempted to control for the endogeneity of outcomes that affect the living arrangement decision. While not directly addressing the interrelationships among health, wealth, intergenerational transfers and living arrangements, Boersch-Supan et al. (1990) and Hoerger et al. (1996) model unobserved heterogeneity (and autocorrelated errors) across living arrangement alternatives using a multiperiod multinomial probit model. Heiss et al. (2003) consider the joint trajectories of health, wealth and living arrangements in the US, using data from the Health and Retirement Study. The authors use a method similar to the Vector Autoregression (VAR) system. The technique requires conditional independence among the dependent variables over time such that their estimates are conditional on the first observation of each individual. Therefore, the state variables are estimated separately, unlike the discrete factor estimation method that this dissertation uses. The authors also do not explicitly model asset transfer behavior. Instead, they argue that coresidence implies transfers to the needy since it benefits whoever is poorer in the living arrangement. The argument would not hold true for wealthy elderly individuals who need care and prefer to receive it from their adult children rather than from professional helpers. They may make an intergenerational transfer that induces informal caregiving and also coresidence. To the extent that the elderly care about the source of care, the living arrangement could benefit the elderly more than the adult children, relative to before coresidence is realized. Unobserved preferences across related outcomes can produce misleading results, if not properly accounted for.

Most closely related to this paper is Gardner and Gilleskie (2009). Also using the discrete

factor random effects estimation method and the HRS data, the authors jointly estimate health transitions, health insurance coverage, long-term care arrangements, savings and gifting decisions over time. The paper focuses on whether Medicaid eligibility criteria impact savings and gifting behavior of the elderly. Medicaid policies are found to have a small but significant effect on the savings decisions but an insignicant effect on the gifting decisions. This paper differs from Gardner and Gilleskie (2009) in that its focus lies with the provision of care through household formation decisions and that this paper accounts for how inter vivos transfers and bequests affect living arrangements of the elderly.

This study fills the gap in the literature by modeling the living arrangement, health, wealth and monetary transfer outcomes jointly using the nonlinear discrete factor random effects method. It combines together living arrangements (which are categorized as independent living, coresidence and nursing home) and care arrangements (with the categories of informal care, formal home care and nursing home care) such that when the elderly choose whom to live with, they also choose the type of care received. The study is one of the few existing studies that model living arrangements with transfer behavior, that extend the scope of care to include formal home care realizing the substitutability between informal and formal home care, and that incorporate Medicaid benefits and eligibity criteria as well as transfer taxes over a long panel of data.

Chapter 3

Theoretical Model

I present a simple theoretical model that describes how elderly parents choose their living arrangements as they age and the impact of these decisions on health, wealth and intergenerational transfers (and vice versa). For notational simplicity, I assume the representative household consists of one parent (denoted by P) and one child (denoted by K). I allow for interactions between the parent and the child through the inclusion of downstream intergenerational transfers in the budget contraint and the fact that the child can choose to provide informal care for the parent. Because the empirical analysis is at the parent level, I focus on the decisions made by the parent.

3.1 Timing Assumptions

The following timing assumptions are made based on the timing in which key variables are measured in the Health and Retirement Study (HRS), on which this dissertation is based.

1. The elderly parent enters each period with her personal characteristics (X_t^P), a subjective health status entering period t (H_t), a functional health status entering period t (D_t), wealth composed of 1) an annuitized stream of income entering period t that ceases upon death (Y_t) and 2) savings that can be used for contemporaneous consumption or bequeathed to the child upon death (A_{t-1}) as well as the experience of her living arrangement in the previous period (LA_{t-1}). The parent also knows the child's characteristics at t (X_t^K).

Even though subjective health and functional health represent the same thing: health

status, I include them both in the model[1] . Subjective health contains different characteristics of the parent than functional health[2] . Subjective health measures the extent to which the parent is optimistic about her overall health status, which could include, for example, whether the parent feels hindered by her health conditions, if any. Functional health represents the extent to which the parent needs help with daily activities and her level of independence.

2. Based on the information entering the period, the parent simultaneously makes decisions on whether or not an inter vivos transfer is made (IV_t) and its amount (IVA_t), the amount of savings or bequeathable wealth (A_t) and the per-period living arrangement (LA_t). The parent also states her intention to leave a bequest (B_t), should she pass away by the end of the period. Living arrangement takes one of the following six states:

$$LA_t = \begin{cases} 0 \text{ if the parent lives independently and receives no care;} \\ 1 \text{ if the parent lives independently and receives informal care;} \\ 2 \text{ if the parent lives independently and receives formal home care;} \\ 3 \text{ if the parent lives with an adult child and receives no care;} \\ 4 \text{ if the parent lives with an adult child and receives informal care;} \\ 5 \text{ if the parent lives with an adult child and receives formal home care;} \\ 6 \text{ if the parent lives in a nursing home or a hospice.} \end{cases}$$

Formal home care is defined as receiving assistance with ADLs or IADLs from professional helpers or having had visits or in-home services from professional helpers. Informal care is defined as receiving assistance with ADLs or IADLs from the child. Since formal home care and informal care are exclusive options, whenever the parent receives both types of care in the data, I assume that informal care is insufficient or irregular such that the parent is treated as receiving just formal home care.

In the HRS, there are a total of six ADL and five IADL questions. ADLs consist of

[1]Empirically, health may not be measured perfectly with one objective (and available) measure. Rather, the data provide several measures of health.

[2]Also, individually, subjective health and functional health may affect the distribution of unobserved heterogeneity in different ways. As will be seen in the estimation results, both subjective health and functional health are statistically significant across the equations estimated. This supports the fact that both of them should be included in the model.

the elderly's ability to dress, walk, bathe, eat, get in and out of bed, and use the toilet. IADLs include meal preparation, grocery shopping, making phone calls, taking medication, and managing money.

3. Subjective health and functional health status are updated at the end of the period, becoming H_{t+1} and D_{t+1} respectively. Subjective health takes one of the following four states:

$$H_{t+1} = \begin{cases} 0 \text{ if the parent is reported deceased;} \\ 1 \text{ if the parent reports poor health;} \\ 2 \text{ if the parent reports good or fair health;} \\ 3 \text{ if the parent reports excellent/very good health.} \end{cases}$$

Functional health takes one of the following three states:

$$D_{t+1} = \begin{cases} 0 \text{ if the parent has severe disability;} \\ 1 \text{ if the parent has moderate disability;} \\ 2 \text{ if the parent has no disability.} \end{cases}$$

Severe disability is defined as having difficulties with three or more ADLs, regardless of how many IADLs the parent has difficulties with. Moderate disability is defined as having difficulties with less than three ADLs, regardless of how many IADLs the parent has difficulties with. The parent is said to have no disability when she has no difficulty with any ADLs or any IADLs.

Death is an absorbing health state. Conditional on the parent's death, a bequest arrangement ($B_{t+1}|H_{t+1} = 0$) and its amount ($BA_{t+1}|H_{t+1} = 0$) may be observed. The vector of information available to the parent entering period t is denoted by the state vector $s_t = \{H_t, D_t, A_{t-1}, LA_{t-1}, Y_t, X_t^P, X_t^K\}$, where $s_t \in S_t$, the entire state space.

A number of features of the model are implicit in the timing assumptions. First, experience with a living arrangement in the past (and/or fixed costs associated with moving due to the decision to change the current living arrangement) affects decisions made in the present. Suppose that, everything else being equal, the parent prefers living independently to living in an intergenerational household or being institutionalized. Past experience with an intergenerational household or a nursing home may reduce the parent's aversion to either living

arrangement and induce her to choose one of them again in the current period. Second, I assume that past inter vivos transfers do not affect the child's current informal care behavior. If the receipt of inter vivos transfers motivates informal care, its effect is contemporaneous. The parent cannot incentivize the child into providing care in the current period by recalling past transfers[3] .

Savings (bequeathable wealth) is a choice variable in the model; annuitized wealth is not. The per-period level of annuitized wealth for retirees typically does not change over time, except for inflation-proof pension schemes and Supplemental Security Income (SSI) which may be withdrawn or added depending on the value of assets in the elderly's possession. Also, annuitized wealth is determined by work history and occupational decisions that were made prior to data collection for most HRS respondents. Therefore the choice variable that represents wealth in the estimation is savings. Changing over time, savings include assets that are relatively liquid such as checking, IRA or KEOGH accounts and those that are less liquid such as stocks, bonds, vehicles, businesses and real estate. In addition to changes in interest rate and portfolio adjustments, savings also change if the parent overspent or underspent her annuitized income in the earlier period or if the parent purchases life insurance using her annuitized income.

3.2 The Elderly's Optimization Problem

The elderly parent maximizes a utility function defined over her own consumption (C_t^P), her child's consumption (C_t^K), her health (H_t and D_t) and an error term (ε_t). The utility function is increasing in all arguments. The parent's health is subject to a production function, which depends on inputs of informal care provided by the child (I_t^K), formal home care (F_t), personal characteristics and health shocks (υ_t and ω_t). Both I_t^K and F_t are captured in the choice of living arrangement (LA_t). The error term ε_t can be decomposed into a time-invariant component (μ), a time-varying component (ν_t) and an idiosyncratic, independently

[3]Considering that the amount of transfers is relatively small in the dataset (an average of $11570 for 24 months), the assumption is quite reasonable. Also, some papers in the literature model the provision of informal care as a simultaneous game, e.g., Pezzin and Schone (1999) and, more implicitly, Hoerger et al. (1996).

and identically distributed term (u_t).

The elderly parent lives for T periods after the child becomes an adult. From period 1 to $T-1$, the parent chooses the level of her own consumption (C_t^P), whether to receive formal home care or informal care (LA_t), the rate of informal care compensation (P_t^I), how much to save (A_t) and the amount of inter vivos transfers made to the child (IVA_t). The parent may also state her intention to leave a bequest if/when she dies. Although I include the bequest intent variable in my empirical model, I leave it out of the theoretical framework for simplicity and for two other reasons. First, because time of death is uncertain, the intention to leave a bequest represents whether it is optimal for the parent to leave bequests when she actually dies. I discuss actual bequests later in the chapter. Second, to a certain extent, inter vivos transfers represent the intention to leave a bequest. Both may induce informal care according to the theory of exchange. At the end of time T, the parent leaves a bequest to her child (BA_{T+1}). Essentially, BA_{T+1} can be treated as a limiting case of IVA_t at T[4] .

Under a given living arrangement, the parent's utility function is given by:

$$U^P(C_t^P, C_t^K, H_t, D_t, \varepsilon_t).$$

The budget constraint facing the parent is:

$$\begin{aligned} C_t^P + P_t^F(la_t^2 + la_t^5) + P_t^I(la_t^1 + la_t^4) + P_t^N(la_t^6) + P_t^{IL}(la_t^0 + la_t^1 + la_t^2) + P_t^{IC}(la_t^3 + la_t^4 + la_t^5) \\ +(1+\tau_t^{IVA})^{-1} IVA_t + A_t \leq Y_t + (1+r_t)A_{t-1} \\ +G_t^{sm}\mathbf{1}[Y_t + (1+r_t)A_{t-1} \leq \overline{Q}_t^{sm}](la_t^1 + la_t^2 + la_t^4 + la_t^5 + la_t^6), \forall t, \end{aligned}$$

where la_t^j=1 if the living arrangement j is chosen and 0 otherwise. The living arrangement alternatives $j = \{0, 1, 2, 3, 4, 5, 6\}$ are defined above. The parent purchases consumption. She chooses to purchase either formal home care with the total cost of P_t^F, informal care with the total cost of P_t^I or nursing home care with the total cost of P_t^N. If the parent lives independently, she pays P_t^{IL}, which may include, for instance, the costs of housing maintenance and

[4]Under a given living arrangement, BA_{T+1} should be a function of savings at time T, the amount of inter vivos transfers at $t = 1, 2, ...T$, and the exclusion thresholds over time.

rent. If her living arrangement is intergenerational coresidence, she faces P_t^{IC} which theoretically represents, for instance, in-kind transfers or the costs of shared household responsibilities such as taking care of her grandchildren, for example[5] . The parent may make an inter vivos transfer subjected to τ_t^{IVA}, the statutory gift tax. The gift tax is conditional on the annual and lifetime exclusion amounts, discussed in Appendix B. The distinction between informal care purchases (P_t^I) and inter vivos transfers (IVA_t) is blurred in the data. It is not possible to determine if transfers were made as a payment for informal care or for other (altruistically motivated) reasons.

The parent's current wealth is composed of Y_t, a fixed stream of income and A_{t-1}, the amount of savings from the previous period. I assume the same rate of interest (r_t) across all types of assets for notational ease. The parent who receives any form of care may receive a government transfer G_t^{sm}, including Medicaid benefits[6] . The threshold $\overline{Q}_t^{sm}$ refers to a level of wealth (assets and/or income) below which the parent's wealth has to be in order to qualify for public benefits in state s at time t, through pathway m where the pathway may be the categorically needy, the medically needy or the HCBS pathway, to name a few. Table A.1 in Appendix A shows different income and asset thresholds used by states to determine Medicaid eligibility in 1998 according to living arrangements and personal characteristics.

The health production functions take the following forms:

$$H_{t+1} = H(H_t, D_t, F_t, I_t^K, M_t, \upsilon_t)$$

$$D_{t+1} = D(H_t, D_t, F_t, I_t^K, M_t, \omega_t).$$

---

[5]The model assumes everyone receives the same amount of formal home care and/or informal care so that the P_t are not unit prices. Although the HRS has a measure of how much care each elderly individual received in their helper-level files, the measure is very incomplete and scattered across years. Some people may report how much care they received each day (in terms of hours), but not how many days of the week nor if they received care every week. Email correspondences with the HRS staff have not resolved the issue.

[6]If we are to think of the government transfer G_t^s as a (Medicaid) discount applied to the cost of care, then it applies to all types of care: formal, informal or nursing home care. Medicaid provides nursing home care which drastically reduces P_t^N, and it also provides Home and Community Based Services (HCBS) benefits (which include, for example, private duty nursing, family training, home health aides, life-sustaining utility reimbursement, habilitation services and respite care) which reduce P_t^F. Some states also provide subsidies and/or tax credits to informal or full-time caregivers e.g. the 500 USD tax credit in Missouri and Calfornia, which reduce P_t^I.

Current health, subjective and functional, is determined not only by inputs of formal home care or informal care, but also by past health and health-facility characteristics in the area in which the parent lives (M_t).

The child is assumed to outlive the parent and maximizes her utility function based on her own consumption, leisure and informal care provision[7] (C_t^K,L_t^K, I_t^K) and her parent's health[8] (H_t, D_t). Under the living arrangement j chosen by the parent[9] , the child's per-period optimization problem takes the following form:

$$\max_{C_t^K L_t^K, I_t^K} U^K(C_t^K, L_t^K, I_t^K, H_t, D_t | LA_t = j)$$

$$\text{subject to } C_t^K \leq IVA_t + P_t^I \mathbf{1}[I_t^K \geq \overline{I_t}(H_t, D_t)] + w_t^K(TT - L_t^K - I_t^K), \forall t,$$

where TT represents the total amount of time available in each period and $\mathbf{1}[I_t^K \geq \overline{I_t}]$ is an indicator function that takes the value of 1 if the child provides at least as much informal care as the parent requires. $\overline{I_t}$ can be thought of as the time needed to assist the parent with all the ADL difficulties that she faces; it is increasing as the parent's subjective and/or functional health worsens. The child only receives a payment for her informal care services if she spends more time than $\overline{I_t}$[10] .

A contemporaneous demand function for the child is given by:

$$Z^K = \{C_t^K, L_t^K, I_t^K\} = Z^K(P_t^I, IVA_t, w_t^K)$$

---

[7]The marginal utility of informal care provision may vary by the parent's health.

[8]Note that even though health of adult children may seemingly be important in the decision to provide informal care, it is a norm in the literature to leave it out in a model with parental health. Including the child's health, researchers would run into the problem of two-sided altruism in a bargaining solution framework where health of adult children and health of the parents enter each other's utility function and are correlated with other decisions, ultimately overcomplicating the analysis and taking away from the focus of the study. I provide examples of studies that deal with parental health in the literature review section and none of the studies incorporates children's health, implicitly or explicitly. An example of a study that deals directly with children's health is Coe and Van Houtven (2009), which does assume parental health to be exogenous.

[9]I assume the living arrangement to be chosen by only the parent (as opposed to a negotiation between the parent and the child) or the model would change significantly. Examples of studies that model intra-household negotiations with regard to informal care and living arrangements include Stern (1995) and Hiedemann and Stern (1999).

[10]Alternatively, we can rewrite the above constraint by replacing $P_t^I \mathbf{1}[I_t^K \geq \overline{I_t}(H_t, D_t)]$ with $P_t^I(la_t^1 + la_t^4)$.

where P_t^I and IVA_t are decisions made by the parent and w_t^K is exogenous.

The parent incorporates the child's demand functions into her optimization process. Substituting the child's consumption level and informal care with the demand functions above, the parent's utility function and budget constraint become:

$$U^P(C_t^P, C^K(P_t^I, IVA_t, w_t^K), H_t = h, D_t = d, \varepsilon_t); \text{ and}$$

$$\begin{aligned} C_t^P + P_t^F(la_t^2 + la_t^5) + P_t^I(la_t^1 + la_t^4)\mathbf{1}[I_t^K(P_t^I, IVA_t, w_t^K) \geq \overline{I}_t(H_t, D_t)] + P_t^N(la_t^6) \\ + P_t^{IL}(la_t^0 + la_t^1 + la_t^2) + P_t^{IC}(la_t^3 + la_t^4 + la_t^5) + (1+\tau_t^{IVA})^{-1} IVA_t + A_t \\ \leq Y_t + (1+r_t)A_{t-1} + G_t^{sm}\mathbf{1}[Y_t + (1+r_t)A_{t-1} \leq \overline{Q}_t^{sm}](la_t^1 + la_t^2 + la_t^4 + la_t^5 + la_t^6), \forall t \end{aligned}$$

respectively, where h is the subjective health state and d is the functional health state of the parent entering the period.

The health state entering the period can take the subjective health values h where $h = \{0, 1, 2, 3\}$, the functional health values d where $d = \{0, 1, 2\}$. The available alternatives of living arrangement are denoted as j where $j = \{0, 1, 2, 3, 4, 5, 6\}$, the available alternatives of savings as a, the available alternatives of inter vivos transfers as i and the available alternatives of informal care purchases as w where a, i and w are continuous values. The lifetime value of the alternatives available to the parent at time t is:

$$\begin{aligned} V_{jaiwt}^{hd}(s_t, \varepsilon_t) = U^P(C_t^P, C^K(P_t^I = w, IVA_t = i, w_t^K), H_t = h, D_t = d) + \varepsilon_{jaiwt}^{hd} \\ + \beta[\sum_{h'=1}^{3} P(H_{t+1} = h')P(D_{t+1} = d')V_{t+1}^{h'd'}(s_{t+1}) \\ + P(H_{t+1} = 0)V_{t+1}^0(s_{t+1})], \end{aligned}$$

$$\begin{aligned} \text{where } C_t^P = Y_t + (1+r_t)A_{t-1} + G_t^{sm}\mathbf{1}[Y_t + (1+r_t)A_{t-1} \leq \overline{Q}_t^{sm}](la_t^1 + la_t^2 + la_t^4 + la_t^5 + la_t^6) \\ - P_t^F(la_t^2 + la_t^5) \\ - (P_t^I = w)(la_t^1 + la_t^4)\mathbf{1}[I_t^K(P_t^I = w, IVA_t = i, w_t^K) \geq \overline{I}_t(H_t = h, D_t = d)] \\ - P_t^N(la_t^6) - P_t^{IL}(la_t^0 + la_t^1 + la_t^2) - P_t^{IC}(la_t^3 + la_t^4 + la_t^5) \\ - (1+\tau_t^{IVA})^{-1}(IVA_t = i) - (A_t = a). \end{aligned}$$

The utility associated with the deceased health state is $V^0(s_{t+1})$, where $V^0(s_{t+1}) = f(A_t)$. By definition, individuals die at the end of T, hence $V(s_{T+1}) = f(A_T)$. The parent receives

utility leaving her lifetime bequest to the child after she dies. The maximal expected value of lifetime utility is given by:

$$V_t^{hd}(s_t) = E_{t-1}[\max_{z=\{jaiw\}\in Z}[V_{zt}^{hd}(s_t, \varepsilon_t)\forall h, \forall d, \forall t]],$$

where Z is the set of all available alternatives.

Chapter 4

Empirical Framework

The theoretical framework and the available variables in the Health and Retirement Study (HRS) motivate the dynamic empirical model that I estimate. The analysis is at the parent (respondent) level. The observable outcomes in my model include 1) living arrangements, 2) bequeathable wealth or savings, 3) the probability of making inter vivos transfers and the amount of inter vivos transfers made to adult children, 4) the intention to leave bequests to adult children when the parent is still alive, 5) subjective health including death, 6) functional health and 7) the decision to leave bequests to adult children and the amount, conditional on the parent's death.

4.1 Level of Analysis

Using data from the Health and Retirement Study (HRS), one can conduct an empirical analysis at (at least) three meaningful levels: parent/respondent, household or child. In the discussion that follows, I focus on justifying why the parent/respondent level is appropriate for my estimation, comparing it with the household level. Child-level analyses are irrelevant to the model as parents are the decision makers.

First, it is important to distinguish between unmarried households and married households. There is only one person in an unmarried household, in which case all the dependent variables and explanatory variables in the model are already at the respondent level. However, there are two individuals in a married household and the HRS study keeps some information at the individual level and other information at the household level. It is in the case of married

households that choosing the level of analysis becomes critical.

The HRS keeps wealth variables (A_t) and the decision to make an inter vivos transfer (IV_t) at the household level. Individuals in a married household do not differ on these outcomes. Income variables (including annuitized wealth (Y_t) and earned income which are part of bequeathable wealth) are also stored in the household files but can be individualized. Other key variables in the model are stored at the respondent level, namely subjective health (H_t), functional health (D_t), bequest (B_t), and informal care provision (I_t). Individuals in a married household can differ on these outcomes.

Married couples can also differ on their living arrangements (LA_t) partly by construction. Whether the couple lives with their children or not is a household-level outcome because the couple shares the same children. However, the receipt of formal home care or informal care and being institutionalized are individual-level outcomes. For example, it is possible that only one of the parents receives informal care from their children even though both parents live together in the same household. Combining whether parents live with their children with the type of care they receive means that two individuals in a married household may (or may not) have different living arrangements.

Clearly, some of the outcomes may be better estimated at the household level, yet I estimate all the equations at the respondent level to avoid overcomplicating the analysis. Outcomes that individuals in a married household share or may share include living arrangements, savings, and inter vivos transfers. If the husband and the wife were to be treated as separate units of analysis in these equations, the correlation in their error terms may not be properly accounted for. But with the long panel of data that I have, there should be enough variation within the same household over time to minimize estimation bias. Morever, I use two strategies to address the importance of marital status in the model. First, I separate out married households from unmarried households when I estimate the living arrangements, savings and inter vivos transfers equations[1] so that discrepancies between the two groups of households, if any, can

[1]To see if the vector of coefficients for married and unmarried households are statistically different, I estimate these equations, without unobserved heterogeneity. For each equation, I include both groups of households, interact the explanatory variables with the marital status indicator and use the explanatory variables and the interacted variables on the right hand side of the equation. Essentially, I conduct the Wald test (or, in the case

be easily identified. Second, I include some spousal variables on the right hand side in hopes of capturing the costs/benefits of the outcomes borne by the spouse.

In fact, as an experiment, I estimated the equations without unobserved heterogeneity at the household level and compared it with the results from the respondent level. To represent the married households, I chose the oldest of the couple in one estimation and the youngest in another. I formally tested cross-model hypotheses of whether or not the vector of coefficients depends on the level of analysis in seeming unrelated estimations. When the coefficients from the parent level estimation are compared with those from the household level estimations (one including only the oldest member and the other only the youngest member of the household), the Chi-square test statistics on all endogeneous variables are quite small and most of them are not statistically significant at the 5% level. Overall, while the results of the experiment do not necessarily support estimating the equations of interest at the parent/respondent level, they also do not rule it out as inappropriate.

4.2 Specifications

The timing assumptions and the value function in the theoretical model motivate the empirical specifications. Based on the theoretical model, explanatory variables include the parent's annuitized income (Y_t), her characteristics (X_t^P), health-facility characteristics in the area (M_t), the child's average characteristics and income (X_t^K and w_t^K respectively[2]), a tax incentive variable (τ^{IVA}), government transfer variables that vary by the parent's state of residence and over time($\overline{Q}_t^{sm}$) and variables that measure the price of formal home care (P_t^F), the price of nursing home care (P_t^N), the cost of independent living (P_t^{IL}) and the cost of living with children (P_t^{IC}), all of which vary by state and over time. Some of the explanatory

---

of continuous dependent variables, the Chow test) on the coefficients of the interacted variables and find that they are statistically different from zero. This suggests that the equations should be estimated separately for the two groups of households.

[2]In the specifications, I ignore w_t^K. Children's wages are not available in the data. HRS has a crude measure of children's incomes, but the information is largely missing across years. In 2006, for example, over 70% of children in the child-level data were missing their income information. Also, children's wages are likely to be correlated with the parents' wealth. I attempt to capture children's wages by their education and whether or not they work instead, which albeit still correlated with parental characteristics, are likely to be less problematic.

Table 4.1: Respondent-Level Equations

Dependent Variables	**Explanatory Variables**	
	Endogenous	**Exogenous**
LA_t	$H_t, D_t, A_{t-1}, LA_{t-1}$	$Y_t, X_t^P, X_t^K, P_t^F, P_t^N, P_t^{IL}, P_t^{IC}, \tau_t^{IV}, \overline{Q}_t^{sm}, M_t$
A_t	$H_t, D_t, A_{t-1}, LA_{t-1}$	$Y_t, X_t^P, X_t^K, P_t^F, P_t^N, P_t^{IL}, P_t^{IC}, \tau_t^{IV}, \overline{Q}_t^{sm}, M_t$
IV_t and IVA_t	$H_t, D_t, A_{t-1}, LA_{t-1}$	$Y_t, X_t^P, X_t^K, P_t^F, P_t^N, P_t^{IL}, P_t^{IC}, \tau_t^{IV}, \overline{Q}_t^{sm}, M_t$
B_t	$H_t, D_t, A_{t-1}, LA_{t-1}$	$Y_t, X_t^P, X_t^K, P_t^F, P_t^N, P_t^{IL}, P_t^{IC}, \tau_t^{IV}, \overline{Q}_t^{sm}, M_t$
H_{t+1}	H_t, D_t, A_t, LA_t	Y_t, X_t^P, M_t
D_{t+1}	H_t, D_t, A_t, LA_t	Y_t, X_t^P, M_t
B_{t+1} and BA_{t+1}	H_t, D_t, A_t, LA_t	Y_t, X_t^P

variables act as exclusion restrictions that help identify the system of equations shown below. The timing assumptions dictate that some decision variables enter the right hand side of the equations. Subjective health (H_t) and functional health (D_t) entering the period and living arrangements (LA_{t-1}) and savings or bequeathable wealth (A_{t-1}) in the previous period affect each of the per-period parental behaviors (i.e., living arrangements, savings, inter vivos transfers and bequest intent) as endogenous variables. The period t behaviors, in turn, affect subjective and functional health transitions. Table 4.1 details the explanatory variables for each modeled equation. Note that the first four outcomes are functions of the same variables because these outcomes are modeled as jointly made decisions.

The system of jointly estimated equations are specified below, where $\alpha, \beta, \gamma, \theta, \delta, \zeta, \eta, \varphi$ and κ are the coefficients to be estimated[3] . In addition to the variables in Table 4.1, unobservables explain each outcome. I allow the unobservables (ε_t) to be correlated across equations by decomposing them into three components: a time-invariant component (μ), a time-varying component (ν_t) and an idiosyncratic, independently and identically distributed term (u_t). More formally, $\varepsilon_{ot}^e = \mu_o^e + \nu_{ot}^e + u_{ot}^e$, according to the equation estimated (e) and the outcome of each equation (o).

In log odds, the probability of being in a living arrangement j relative to living independently and receiving no care is given by:

[3] Note that additional moments or interactions of the explanatory variables also enter the specifications.

$$\ln\left[\frac{P(LA_t=j)}{P(LA_t=0)}\right] = \alpha_{0j}+\alpha_{1j}H_t+\alpha_{2j}D_t+\alpha_{3j}A_{t-1}+\alpha_{4j}LA_{t-1}+\alpha_{5j}Y_t+\alpha_{6j}X_t^P+\alpha_{7j}X_t^K+\alpha_{8j}P_t^F+\alpha_{9j}P_t^N+\alpha_{10j}P_t^{IL}+\alpha_{11j}P_t^{IC}+\alpha_{12j}\tau_t^{IVA}+\alpha_{13j}\overline{Q}_t^{sm}+\alpha_{14j}M_t+\mu_j^1+\nu_{jt}^1,\ j=1,...,6.$$

The bequeathable wealth/savings equation is given by:

$$\ln(A_t) = \beta_0+\beta_1H_t+\beta_2D_t+\beta_3A_{t-1}+\beta_4LA_{t-1}+\beta_5Y_t+\beta_6X_t^P+\beta_7X_t^K+\beta_8P_t^F+\beta_9P_t^N+\beta_{10}P_t^{IL}+\beta_{11}P_t^{IC}+\beta_{12}\tau_t^{IVA}+\beta_{13}\overline{Q}_t^{sm}+\beta_{14}M_t+\mu^2+\nu_t^2+u_t^2.$$

The probability of making an inter vivos transfer expressed in log odds and the amount of inter vivos transfers given to the average child are respectively given by:

$$\ln\left[\frac{P(IV_t=1|H_t\neq 0)}{P(IV_t=0|H_t\neq 0)}\right] = \gamma_0+\gamma_1H_t+\gamma_2D_t+\gamma_3A_{t-1}+\gamma_4LA_{t-1}+\gamma_5Y_t+\gamma_6X_t^P+\gamma_7X_t^K+\gamma_8P_t^F+\gamma_9P_t^N+\gamma_{10}P_t^{IL}+\gamma_{11}P_t^{IC}+\gamma_{12}\tau_t^{IVA}+\gamma_{13}\overline{Q}_t^{sm}+\gamma_{14}M_t+\mu^3+\nu_t^3;$$

$$\ln(IVA_t|IV_t=1\ \&\ H_t\neq 0) = \theta_0+\theta_1H_t+\theta_2D_t+\theta_3A_{t-1}+\theta_4LA_{t-1}+\theta_5Y_t+\theta_6X_t^P+\theta_7X_t^K+\theta_8P_t^F+\theta_9P_t^N+\theta_{10}P_t^{IL}+\theta_{11}P_t^{IC}+\theta_{12}\tau_t^{IVA}+\theta_{13}\overline{Q}_t^{sm}+\theta_{14}M_t+\mu^4+\nu_t^4+u_t^4.$$

The probability of reporting the intention to leave a bequest in log odds is given by:

$$\ln\left[\frac{P(B_t=1|H_t\neq 0)}{P(B_t=0|H_t\neq 0)}\right] = \delta_0+\delta_1H_t+\delta_2D_t+\delta_3A_{t-1}+\delta_4LA_{t-1}+\delta_5Y_t+\delta_6X_t^P+\delta_7X_t^K+\delta_8P_t^F+\delta_9P_t^N+\delta_{10}P_t^{IL}+\delta_{11}P_t^{IC}+\delta_{12}\tau_t^{IVA}+\delta_{13}\overline{Q}_t^{sm}+\delta_{14}M_t+\mu^5+\nu_t^5.$$

Health transitions are modeled at the end of the period after the four behavioral outcomes are observed. The probability of being in a subjective health state h in period $t+1$ relative to having excellent or very good health in log odds is given by:

$$\ln\left[\frac{P(H_{t+1}=h)}{P(H_{t+1}=3)}\right] = \zeta_{0h}+\zeta_{1h}H_t+\zeta_{2h}D_t+\zeta_{3h}A_t+\zeta_{4h}LA_t+\zeta_{5h}Y_t+\zeta_{6h}X_t^P+\zeta_{7h}M_t+\mu_h^6+\nu_{ht}^6, h=0,1,2.$$

The probability of being in a functional health state d in period $t+1$ relative to having no disability in log odds is given by:

$$\ln\left[\frac{P(D_{t+1}=d)}{P(D_{t+1}=2)}\right] = \eta_{0d}+\eta_{1d}H_t+\eta_{2d}D_t+\eta_{3d}A_t+\eta_{4d}LA_t+\eta_{5d}Y_t+\eta_{6d}X_t^P+\eta_{7d}M_t+\mu_d^7+\nu_{dt}^7, d=0,1.$$

If an individual dies during period t ($H_{t+1} = 0$), then I observe whether or not a bequest was made and its amount. The probability of making a bequest and the amount of bequests given to the average child conditional on being dead are respectively given by:

$$\ln\left[\frac{P(B_{t+1}=1|H_{t+1}=0)}{P(B_{t+1}=0|H_{t+1}=0)}\right] = \varphi_0 + \varphi_1 H_t + \varphi_2 D_t + \varphi_3 A_t + \varphi_4 LA_t + \varphi_5 Y_t + \varphi_6 X_t^P + \mu^8 + \nu_t^8;$$

$$\ln(BA_{t+1}|B_{t+1}=1 \ \& \ H_{t+1}=0) = \kappa_0 + \kappa_1 H_t + \kappa_2 D_t + \kappa_3 A_t + \kappa_4 LA_t + \kappa_5 Y_t + \kappa_6 X_t^P + \mu^9 + \nu_t^9 + u_t^9.$$

In addition to the above equations, I estimate attrition and the initial conditions for living arrangements, savings as well as subjective and functional health transitions. Details on how these variables are generated in the actual estimation are discussed in the next chapter.

4.3 Estimation Method and Likelihood Function

Despite the rich data available in the HRS, some individual preferences or characteristics are unobserved by the researcher and are correlated across the dependent variables. For example, an individual may have a negative attitude towards a nursing home and will insist on choosing to either live independently or with her children. Because she prefers not being institutionalized, she may take better care of herself resulting in a better health outcome, save more such that she has income to support her extended longevity and transfer money to her children in exchange for a promise that they will not put her in a nursing home when she grows sicker and older. The negative attitude towards institutionalization is not observed in the data nor are other time-invariant or time-varying unobservables that may influence all observed behaviors and health outcomes. If these unobservables are not accounted for, however, they will lead to biased estimates.

I jointly estimate the equations using the nonlinear discrete factor random effects (DFRE) method (Mroz, 1999). The DFRE method approximates the distribution of the error terms by first breaking them up into three components. One of the components (u_t) is independently and identically distributed. The other components, permanent and time-varying heterogeneity (μ and ν_t respectively) are correlated across equations and capture information on the individuals

that is not observed by the researcher. The effects of the heterogeneity terms vary across the outcomes of interest and, much like the coefficients ($\alpha, \beta, \gamma, \theta, \delta, \zeta, \eta, \varphi$ and κ), they are parameters to be estimated. The DFRE method assumes the cumulative distribution of the heterogeneity terms can be approximated by a discrete step function, estimated with points of support whose number is chosen by the researcher.

The likelihood function for a living individual n's observed outcomes conditional on unobserved heterogeneity is given by:

$$\begin{aligned} L_n(\Lambda|\mu,\nu_t) = & \prod_{j=0}^{6} P(LA_t = j|\mu_j^1,\nu_{jt}^1)^{1[LA_{nt}=j]} f(A_t|\mu^2,\nu_t^2) \\ & P(IV_t = 1|\mu^3,\nu_t^3)^{1[IV_{nt}=1]}(1-P(IV_t=1|\mu^3,\nu_t^3))^{1[IV_{nt}\neq 1]} g(IVA_t|\mu^4,\nu_t^4) \\ & P(B_t = 1|\mu^5,\nu_t^5)^{1[B_{nt}=1]}(1-P(B_t=1|\mu^5,\nu_t^5))^{1[B_{nt}\neq 1]} \\ & \prod_{h=0}^{3} P(H_{t+1}=h|\mu_h^6,\nu_{ht}^6)^{1[H_{nt+1}=h]} \prod_{d=0}^{2} P(D_{t+1}=d|\mu_d^7,\nu_{dt}^7)^{1[D_{nt+1}=d]} \\ & P(B_{t+1}=1|\mu^8,\nu_t^8)^{1[B_{nt+1}=1|H_{nt+1}=0]}(1-P(B_{t+1}=1|\mu^8,\nu_t^8))^{1[B_{nt+1}\neq 1|H_{nt+1}=0]} \\ & q(BA_{t+1}|\mu^9,\nu_t^9), \end{aligned}$$

where Λ is the vector of parameters to be estimated including ($\alpha, \beta, \gamma, \theta, \delta, \zeta, \eta, \varphi$ and κ). $f(\bullet), g(\bullet)$ and $q(\bullet)$ are the continuous density functions for savings, the amount of inter vivos transfers and the amount of bequests respectively. $1[\bullet]$ is an indicator function.

The contribution of n to the likelihood function unconditional on the unobserved factors is given by:

$$\begin{aligned} L_n(\Lambda,\Phi,\Psi) = & \sum_{k=1}^{K} \Phi_k \prod_{j=0}^{6} P(LA_{n0}=j|\mu_{jk}^1)^{1[LA_0=j]} f(A_{n0}|\mu_k^2) \\ & \prod_{h=0}^{3} P(H_{n1}=h|\mu_{hk}^6)^{1[H_1=h]} \prod_{d=0}^{2} P(D_{n1}=d|\mu_{dk}^7)^{1[D_1=d]} \\ & \prod_{t=1}^{T_n} \left[\sum_{m=1}^{M} \Psi_m L_n(\Lambda|\mu_k,\nu_{mt}) \right], \end{aligned}$$

where Φ and Ψ are the joint probability vectors for the K and the M points of support of the permanent and the time-varying heterogeneity terms respectively. Juxtaposing the conditional against the unconditional likelihood functions, the DFRE method simply integrates out over the distribution of the heterogeneity terms. Λ, Φ and Ψ are estimated simultaneously.

Entering period $t = 1$, the individual n knows her subjective and functional health state, her savings and her living arrangement from the previous period. These variables affect the decisions she makes in period $t = 1$. However, they cannot be modeled using the dynamic equations specified above because we do not observe behavior prior to $t = 1$ in the data. Therefore reduced-form initial condition equations are needed to explain the initially observed values of these variables.

The DFRE method is preferred to other estimation techniques. In the face of unobserved heterogeneity that may be correlated across equations, the error terms cannot be treated as independently and identically distributed with a known distribution. Outcomes on the left hand side of the equations are correlated with unobserved preferences and characteristics not captured in the data. There is an endogeneity bias when the equations are individually estimated with OLS, logit or multinomial logit with non-iid error terms. Typically, fixed-effect models are used to account for permanent heterogeneity, but they do not account for the time-varying heterogeneity and, with the inclusion of individual fixed effects, require more parameters to be estimated than the DFRE method. Most maximum likelihood estimators assume joint normality; for the DFRE method, the distributional assumption can be easily relaxed. Mroz (1999) illustrates that, in terms of precision and bias, the discrete factor approximations perform at least as well as other efficient estimators including maximum likelihood under normality and non-normality alike.

4.4 Identification

Identification needs to be established. Theoretically justified exogenous variables enter the living arrangement, savings, and transfer equations but do not enter the health equations conditional on the period t behavior. These variables include the average characteristics of the household's children, the gift tax variable, prices of care, cost of living variables and Medicaid eligibility variables. The non-linearities in the functional form of some endogenous variables provide additional sources of identification. More importantly, the model is identified through the inclusion of lagged outcomes of health, savings and living arrangement in every

Table 4.2: Exclusion Restrictions for Initial Conditions

Variables	Exclusion Restrictions
Living arrangement (LA_0)	Medicaid eligibilty variables at $t = 0$
Savings (A_0)	Education levels of the parents of the parents at $t = 0$
Subjective health (H_1)	County-level health facilities variables at $t = 0$ (M_0)
Functional health (D_1)	County-level health facilities variables at $t = 0$ (M_0)

specification according to the theoretical model, which are, in turn, functions of exogenous, time-varying variables. The history of exogenous, time-varying variables differs extensively across individuals over time. I also need variables in the initial condition equations to provide identification. Table 4.2 shows the list of exclusion restrictions that I use in estimating the initial conditions.

Variables included in the RHS of all initial condition equations include a constant, age, a female indicator, a nonwhite indicator and whether the respondent was born outside the US. Variables specific to the health equations include the number of doctors per one elderly individual, the percentage of doctors with medical specialty, the number of hospitals per 1000 elderly individuals, the number of hospital beds per 1000 elderly individuals, the number of full-time equivalent hospital personnel per hospital divided by 1000 and the ratio of nursing home personnel to total personnel in each hospital, all at the county level. Most variables are statistically significant at the 5% level across all categories. When I carry out the overidentification test, adding the variables at $t = 1$ to the per-period ($t > 1$) equations, they become insignificant, which confirm that the exclusion restrictions are valid instruments. I also perform the F tests for the initial health equations and find that the instruments are jointly significant. The F test statistics for the subjective health equation and the functional health equation are 828.50 and 1005.49 respectively.

There are two LA_0 equations and two A_0 equations, separated by whether or not the parent is married. In the living arrangement initial conditions, I include state-specific Medicaid income and asset limits at time $t = 0$ as well as the house price index and the gas price index.

In the savings initial conditions, the explanatory variables include education levels of the father and the mother of the parents and their spouses, when applicable. At least one or more of the variables are statistically significant at the 5% level across all categories and the overidentification tests show that they are valid instruments. Also, the F test statistics on the living arrangement and the savings equations for married and unmarried households are 1497.78, 694.79, 175.20 and 78.51 respectively. Their large values indicate that the exclusion restrictions are jointly significant.

Chapter 5

Data and Sample Selection

In this chapter, I describe the source and the nature of data. I discuss the sample and describe the variables used in estimation and their summary statistics.

5.1 Data Sources

Data used in this study are drawn from the Health and Retirement Study (HRS) and the Asset and Health Dynamics among the Oldest Old Study (AHEAD), collected by the Institute of Social Research at the University of Michigan. HRS and AHEAD studies are longitudinal studies that focus on the economic, health, marital and family status of older Americans, while over-sampling blacks, Hispanics and Florida residents. The first interview for HRS was conducted in 1992 and every two years thereafter. The first interview for AHEAD took place in 1993, then in 1995, 1998 and every two years thereafter. HRS and AHEAD were merged in 1998 and are collectively known as HRS.

This study includes public-use and restricted-use data mainly from the 1995-2006 waves of AHEAD and HRS. The public-use data contain information on demographics, health status, cognition measures, family structure, health, health care utilization, assets, income and expectations of older individuals as well as information on their children and helpers' characteristics. The restricted-use data include state and county identifiers of each survey respondent. I use both core (living respondents) and exit (deceased respondents) interviews. I also use some information from the 2008 wave, namely, subjective and functional health states into which

the respondents transitioned at the end of the last period (including death), whether the respondents made a bequest to any children, conditional on their death in the last period and the bequest values. The Identification Tracker, Master Identification and Longitudinal Other Person Number files are included to uniquely identify each respondent and child across time.

The HRS data contain respondents from five birth cohorts. The HRS cohort, first interviewed in 1992, consists of people who were born between 1931 and 1941. The AHEAD cohort, first interviewed in 1993, consists of individuals born in 1923 or earlier. The War Baby (WB) cohort (born between 1942 and 1947) and the Children of the Depression (CODA) cohort (born between 1924 and 1930) were first interviewed in 1998. The Early Baby Boomers (EBB) cohort (born between 1948 and 1953) was first interviewed in 2004. The term 'cohort' refers to individuals who were born during the respective periods and their younger spouses. A household that is composed of a couple, one born in 1921 and the other in 1932, would find both individuals grouped into the AHEAD cohort; the year in which the older of the couple was born determines the cohort they are in.

Instead of using the entire HRS dataset which includes five cohorts and covers the years 1992-2006, I discard the 1992, 1993 and 1994 waves and the EBB cohort. The 1992 and 1994 waves are discarded because they have no information on the provision of informal care and the receipt of formal home care. Important variables such as the intention to leave a bequest and who are transfer beneficiaries are also missing. The 1993 wave is left out because some of the wealth variables reported in the wave seem to suffer a measurement error bias (Juster and Smith, 1997); their summary statistics are different from those in the subsequent waves for reasons other than inflation. The EBB cohort is too short to meaningfully capture the dynamics of the decisions that I wish to study.

In addition to HRS, I obtain data from other sources to account for differences in the costs of different living arrangement alternatives and to provide identification to the model. Information on the costs of nursing home care and formal home care comes from the 1997-2001 Nursing Facility Sourcebooks and 2000-2006 Metlife Market Surveys. Information on the costs of living alone versus living apart from one's children may be captured by house price indices which are available on the Office of Housing Enterprise Oversight (OFHEO)

website and the price of gasoline per gallon, which can be found in Petroleum Marketing Annual from the US Energy Information Administration. The Area Resource File from the Health Resources and Services Administration (HRSA) provides information on the number of doctors, nurses, hospitals, nursing facilities, hospices, population, personal income and median household income in each county in 1995-2006. The Statistical Abstract on the US Census Bureau website, the 1997-2001 Nursing Facility Sourcebook on the American Health Care Association website, articles from the Urban Institute and Purcell (2009) complement the Area Resource File, filling in some of the missing information albeit at the state (as opposed to county) level.

Medicaid eligibility variables for the years 1995-1996 are from Garrett and Glied (2000), Gardner and Gilleskie (2009) and various articles from Social Security Bulletin. For the years 1998-2000, I obtain these data from Bruen et al. (1999), Schneider et al. (1999), Kassner and Shirley (2000) and Stone (2002). Medicaid eligibility data for the years 2002-2006 are relatively sparse, coming from Bruen et al. (2003), Levy et al. (2005), Stone (2008), the National Long-Term Care Ombudsman Resource Center (NORC), the National Association of Medicaid Directors (NASMD) website, various articles from the Kaiser Family Foundation, the Centers for Medicare and Medicaid Services (CMMS), the US Bureau of the Census, the US Department of Health and Human Services (HHS), the National Conference of State Legislatures and information provided on state Medicaid websites. My direct contact with state Medicaid offices fills in some of the blanks in the missing Medicaid data in 2002-2006[1]. The number of Medicaid beneficiaries and Medicaid expenditures, categorized by eligibility statuses and medical services received (nursing home versus home and community-based services) in 1998-2006

[1]Through telephone conversations and emails to the state Medicaid office of all 50 contiguous states plus the District of Columbia, I received complete responses from 20 states, including Alaska, Colorada, Connecticut, the District of Columbia, Georgia, Idaho, Illinois, Indiana, Kentucky, Louisiana, Mississippi, New Hampshire, North Dakota, Ohio, Oklahoma, South Carolina, Washington, West Virginia, Wisconsin and Wyoming. For states that did not respond to my information request, I imputed their Medicaid information based on other available sources. For example, even though I did not receive information directly from the North Carolina Medicaid Office, Stone (2002) suggests that their asset standards were 2000 for singles and 3000 for couples in 2000 and a report on the Kaiser Family Foundation website states that the standards remained the same in 2009. I would deduce from these two sources that the asset standards for North Carolina were 2000 and 3000 for singles and couples respectively in the years 2002-2006.

come from the National Medicaid Statistical Information System State Summary (MSIS) Tables, Thomson Reuters (previously Medstat), articles on the Kaiser Family Foundation website and Ellis and Smith (2000).

5.2 Sample Selection

I select my sample based on two criteria. First, interviewed respondents included must have information about their children[2] , and states of residence. Respondents who report having living children but do not have child-level information (such that children's characteristics, the provision of informal care and amounts of inter vivos transfers and bequests are missing) are excluded. Second, I include only respondents who have constant household compositions. My sample contains only respondents who are either unmarried the entire time, married to the same spouse the entire time, married to the same spouse who eventually died or those who died themselves. In cases where a respondent was previously married to a deceased respondent and is now married to a different person, HRS would contain information on the living respondent, the deceased respondent and the living respondent's new spouse. I consider only the living respondent's and the deceased respondent's information and do not follow the living spouse thereafter.

My reasoning for the second sample selection criterion is as follows. Given the nature of the data, within a given household, there is a wide variation of household compositions: respondents who were unmarried the entire time; respondents who were married to the same spouse the entire time; respondents who were married to a spouse who died within the period studied and who did not remarry; respondents who were married to a spouse who died within the period studied and remarried; respondents who were married to a spouse, divorced the spouse and then married a new spouse; respondents who divorced the old spouse, married a new spouse, divorced the new spouse and did not remarry thereafter; respondents who divorced the old spouse, remarried and then divorced the new spouse and then married yet another new

[2]Children of the household are observations that could be identified as children, stepchildren, spouses of children and stepchildren and grandchildren who were alive at the time of the interview and older than 18. I do not include professional helpers, parents and siblings of the respondent as household members.

spouse; and respondents who divorced the old spouse, remarried and then divorced the new spouse to be reunited with the old spouse.

The introduction of new spouses at any point in time changes the information of the original respondents from the perspective of the researcher. As an example, consider a household where the male respondent divorced the original wife and remarried while the wife did not remarry. According to HRS, the male respondent would find children of the new spouse added as his children too. At the household level, where wealth and monetary transfer data are contained, his wealth and his monetary transfers would now be combined with the new spouse's. The original wife's information would be changed at the household level, her wealth reduced due to the separation and her monetary transfers no longer made in consultation with her now ex-husband. Living arrangements of the two original respondents will be affected because the composition of children who may coreside with either of the respondents changes due to the stepchildren addition. The information of the two original respondents before and after the divorce is significantly different. It is clear that complications that arise from the inclusion of new spouses have the potential to confound the analysis and take away from the focus of the paper. Therefore, I exclude these households.

To investigate the impact of the exclusion of households with unstable compositions, I compare the data retained with the data discarded. I conduct the pairwise t-tests of the summary statistics for every variable used in estimation. The comparison is shown in Appendix C. Because none of the variables are statistically different across the two sets of data, I conclude that my sample is representative of the population and that the exclusion of households with unstable compositions can be justified.

In summary, the final sample is based on the 1995-2006 waves of HRS and includes four cohorts: AHEAD, HRS, CODA and WB. The first wave in which AHEAD respondents were introduced into the sample is 1995 (which is the period on which the initial conditions for the cohort are modeled). The first wave in which HRS respondents entered the sample is 1996 and it is 1998 for CODA and WB respondents. The respondents included have child-level information and a constant marriage pattern. Table 5.1 describes the evolution of the number of observations contained in each cohort over time. The difference between one year and the

Table 5.1: Progression of Number of Respondents in Sample

Cohort	1998	2000	2002	2004	2006	Total
Attrition	828	813	652	490	318	3101
Attrition Rate	6.51%	5.57%	5.04%	4.28%	3.14%	5.02%
Deceased	838	1012	818	858	813	4339
Observations in Sample	17256	15590	13765	12295	10947	69853

next represents the number of respondents who left the sample by the end of the period or died. Attrition is defined by the number of living respondents who stopped providing information or who had incomplete information on the endogenous variables in the following year[3] . I model attrition jointly with the outcomes of interest to test whether attrition is a random process.

5.3 Data Description and Summary Statistics

The summary statistics are provided in Table 5.2- Table 5.5. The tables show the mean value of each variable and its standard error or the frequency of each category's occurrence, in the case of health and living arrangements. Table 5.2 shows the evolution of the dependent (endogenous) variables across time, starting from 1998. Table 5.3 shows the dependent variables by marital status. Table 5.4 describes independent variables. It shows household characteristics, including those of the respondents, their spouses and average values of their children's characteristics. Table 5.5 shows exogenous factors that may affect the monetary transfer behavior of the elderly, the costs of different living arrangements (including the costs of care), measures of state generosity and the county-level availability of health facilities that could affect health outcomes[4] . The variables explained in this section correspond to the empirical framework.

[3]I know who left the sample by the end of 2006 because I use health information from the 2008 wave. The respondents who did not report their subjective or functional health and who were not reported deceased in 2008 are deemed as having left the sample in 2006.

[4]As a reminder, I do not model the decision to marry, to work, to have a health insurance coverage (including Medicaid) nor the decision to locate in a particular area. The model assumes these decisions to be exogenous.

5.3.1 Endogenous Variables

The living arrangement categories are divided as follows. I assign the nursing home arrangement to parents who reported currently living in a nursing home. If the parents had children, stepchildren, children-in-law or grandchildren over the age of 18 living with them, I assign them the intergenerational coresidence status and the independent living status otherwise. Parents are treated as receiving formal home care if there is an identifiable professional helper in the data or if they reported having had visits or in-home services from professional helpers. Parents who received help with ADLs and/or IADLs from identifiable adult children are treated as receiving informal care[5] . Savings or bequeathable wealth includes non-housing assets and earnings of both the respondent and his/her spouse[6] .

Parents are treated as having made an inter vivos transfer if their adult children (aged over 18) reported having received a financial transfer from them. The amount of inter vivos transfers is the sum of all inter vivos transfers made within the two-year period to all identifiable adult children divided by the number of children in the household. Bequest intent takes the value of 1 if the respondent had adult children whom they identified as potential bequest recipients and 0 otherwise. Also, respondents may have made a bequest arrangement that was realized after their death and would be assigned a 1 in the actual bequest decision if any of their adult children were named beneficiaries. The value of bequests is the total value of bequests given to all identifiable adult children divided by the number of children in the household.

Health is represented by reported subjective health and functional health. Most people in the sample reported having good or fair health and no disability. The percentages of each category are consistent across time. The percentage of the elderly having worse subjective

[5]Note that I do not include spousal care as part of informal care. The information on spousal care in HRS is unavailable in 1995, 1996 and 1998. Instead I assume that, for married households, living with no care involves some spousal care.

[6]Savings equal to the sum of values of real estate, businesses, IRA or KEOGH accounts, stocks, bonds, savings or checking accounts or money market funds, CDs and T-bills, vehicles, trust funds, lump sum payments from, for instance, inheritances or insurance settlements and earned incomes of the parent and his or her spouse minus debts and mortgages. Earned income comes from self-employment, wages, professional practice, tips, bonuses or commission, worker's compensation and unemployment compensation. Savings exclude Social Security income, Supplemental Security Income, veteran benefits, pensions and purchased annuities (all of which are part of the household's annuitized income instead).

and functional health increases as the sample grew older. The living arrangement category with the highest frequency is independent living with no care, which accounts for 67% of the sample, consistent with the existing literature. The living arrangement categories with the lowest frequencies are intergenerational coresidence with formal home care and nursing home care. Savings increase over time, partly due to inflation and because those with low savings may have attrited. The bequest and inter vivos transfer variables are consistent across time. They could be considered as low; it could be a result of the way these variables are constructed. If and only if identifiable adult children received any of these transfers would these variables have a value other than zero. Based on the way I create my transfer variables, about 33% of the respondents made a positive inter vivos transfer and about 50% named their adult children as bequest benefiaries.

Table 5.3 shows that there are notable differences between married and unmarried households. About 70% of married households in the sample lived independently, while only about 55% of unmarried households did so. The percentage of unmarried respondents in a nursing home is also almost sixfold the percentage of married respondents with the same mode of living. The comparison implies a heavy reliance on spousal care if/when care is needed. Savings for married households are approximately twice as large as those for unmarried households; it is expected due to the difference in the composition of the two types of households.

Table 5.2: Summary Statistics of Endogenous Variables across Time

Variables	**1998**	**2000**	**2002**	**2004**	**2006**	**Total**
Living arrangement (LA_t)						
- % nursing home ($j = 6$)	2.18	2.08	2.85	2.87	2.69	2.51
- % coresident, formal home care ($j = 5$)	2.38	1.76	1.84	1.90	2.11	1.99
- % coresident, informal care ($j = 4$)	3.61	3.22	2.76	2.63	2.89	3.04
- % coresident, no care ($j = 3$)	17.13	18.09	16.96	14.89	15.15	16.58
- % independent, formal home care ($j = 2$)	5.85	5.21	5.41	5.84	6.60	5.73
- % independent, informal care ($j = 1$)	4.48	3.37	3.09	2.92	3.22	3.43
- % independent, no care ($j = 0$)	64.37	66.27	67.09	68.95	67.36	66.73
Savings$*10^{-4}$(A_t)	25.694	28.775	25.989	30.354	49.699	31.319
(Bequeathable wealth)	(125.55)	(83.977)	(64.928)	(123.08)	(197.93)	(123.03)
Any inter vivos transfer (IV_t)	0.320	0.345	0.326	0.337	0.326	0.331
	(0.466)	(0.475)	(0.468)	(0.473)	(0.469)	(0.471)
Amount of IV transfers per child$*10^{-4}$(IVA_t)	0.207	0.243	0.358	0.275	0.321	0.278
(conditional on any)	(0.483)	(0.695)	(0.846)	(0.815)	(0.109)	(1.088)
Bequest intent (B_t)	0.499	0.477	0.487	0.470	0.501	0.486
	(0.500)	(0.499)	(0.499)	(0.499)	(0.500)	(0.499)

Table 5.2 (Continued)

Variables	**1998**	**2000**	**2002**	**2004**	**2006**	**Total**
Subjective health (H_{t+1})						
- % excellent/very good ($h = 3$)	39.86	36.89	35.22	35.16	33.74	36.48
- % good/fair ($h = 2$)	46.47	48.01	49.98	49.49	50.13	48.62
- % poor ($h = 1$)	8.57	8.25	8.56	8.08	8.49	8.40
- % deceased ($h = 0$)	5.10	6.85	6.24	7.27	7.65	6.50
Functional health (D_{t+1})						
- % no disabilty ($d = 2$)	77.29	76.75	75.90	74.19	73.91	75.87
- % moderate disability ($d = 1$)	16.56	16.88	17.49	18.58	18.83	17.46
- % severe disability ($d = 0$)	6.15	6.37	6.60	7.23	7.26	6.67
Leave bequest ($B_{t+1}\|H_{t+1} = 0$)	0.116	0.077	0.159	0.119	0.091	0.111
(conditional on being deceased)	(0.321)	(0.267)	(0.366)	(0.323)	(0.288)	(0.314)
Value of bequests/child$*10^{-4}$($BA_{t+1}\|H_{t+1} = 0$)	0.942	0.264	0.372	1.122	1.921	0.867
(conditional on any & deceased)	(0.439)	(0.718)	(1.058)	(5.358)	(0.732)	(4.329)

Table 5.3: Summary Statistics of Endogenous Variables by Marital Status

Variables	**Full Sample**	**Married Sample**	**Unmarried Sample**
Living arrangement (LA_t)			
- % nursing home ($j = 6$)	2.51	0.94	5.80
- % coresident, formal home care ($j = 5$)	1.99	1.13	3.77
- % coresident, informal care ($j = 4$)	3.04	1.94	5.33
- % coresident, no care ($j = 3$)	16.58	16.19	17.40
- % independent, formal home care ($j = 2$)	5.73	4.61	8.08
- % independent, informal care ($j = 1$)	3.43	2.54	5.29
- % independent, no care ($j = 0$)	66.73	72.66	54.33
Savings$*10^{-4}$(A_t)	31.319	38.981	15.286
(Bequeathable wealth)	(123.03)	(139.09)	(77.084)
Any inter vivos transfer (IV_t)	0.331	0.369	0.253
	(0.471)	(0.482)	(0.435)
Amount of IV transfers$*10^{-4}$(IVA_t)	0.278	0.262	0.325
(conditional on any)	(1.088)	(0.833)	(1.635)

5.3.2 Household Characteristics

The term 'household' here is used loosely to refer to the elderly parents and their adult children, regardless of whether or not they live together under one roof. The characteristics of the elderly parents, their spouses and mean characteristics of their children are consistent across time. The amount of annuitized income in the table is at the household level, and the amount for each individual (not shown) is quite constant across time. Age increases by an average more than one year as time progresses. Variables that are permanent across time such as gender and whether the respondent was born outside the US stagnate as they should. The variable 'spouse information missing' takes the value of one if the respondent is married yet no one can be identified as her spouse in the data of the same interview wave and zero otherwise. The characteristics of children in the households are averages or percentages. This corresponds to the theoretical framework where one child is assumed and should be contrasted with models such as Hiedemann and Stern (1999), where the focus is on the strategic play among siblings making care decisions about their parents, in which case information on each child individually is necessary.

HRS contains incomplete information on child-level characteristics and I correct for it. In particular, the HRS does not contain information on the children-in-law in 1998 and 2000. I use the available information in 2002, 2004 and 2006 to identify those whose information is missing in 1998 and 2000. If the elderly's children were married in 1998 or in 2000 and were also married in either 2002, 2004 or 2006, I assume they were married to the same spouse and merge the information of the spouse(s) available in the later years to the earlier years[7] .

Table D.3 in Appendix D compares three sets of child-level information that can be used. The first set of summary statistics comes from when I take the information from the HRS as given and do not correct for the missing information on the children-in-law in 1998 and 2000. The second set is when I drop the children-in-law altogether. The final set is when I correct for the missing information on the children-in-law. I estimated the model without

[7]I used the Longitudinal Tracker numbers, which are assigned to each child and child-in-law and remain the same across years, to link children and children-in-law over time.

Table 5.4: Summary Statistics of Household Characteristics across Time

Variables	**1998**	**2000**	**2002**	**2004**	**2006**
Personal characteristics					
Annuitized Income$*10^{-4}$	2.865	3.336	3.835	4.428	3.276
(2-year period)	(3.290)	(4.362)	(5.172)	(7.212)	(1.932)
Age	66.158	67.522	69.002	70.286	71.589
	(10.815)	(10.458)	(10.087)	(9.685)	(9.292)
Female	0.586	0.592	0.597	0.603	0.607
	(0.493)	(0.491)	(0.491)	(0.489)	(0.488)
Nonwhite	0.161	0.161	0.155	0.153	0.153
	(0.367)	(0.367)	(0.362)	(0.360)	(0.359)
Born outside US	0.086	0.085	0.084	0.083	0.084
	(0.280)	(0.278)	(0.277)	(0.276)	(0.277)
Married	0.701	0.685	0.677	0.670	0.659
	(0.457)	(0.465)	(0.468)	(0.471)	(0.474)
Divorced	0.078	0.079	0.075	0.072	0.071
	(0.269)	(0.271)	(0.263)	(0.259)	(0.256)
Widowed	0.209	0.224	0.241	0.249	0.262
	(0.407)	(0.417)	(0.427)	(0.432)	(0.439)
Single	0.012	0.012	0.008	0.009	0.008
	(0.107)	(0.108)	(0.091)	(0.094)	(0.089)
Number of adult children	5.746	5.934	5.745	5.816	5.974
	(3.509)	(3.518)	(3.326)	(3.305)	(3.348)
Education (years)	11.930	12.011	12.101	12.179	12.247
	(3.337)	(3.319)	(3.276)	(3.233)	(3.210)
On Medicaid	0.081	0.089	0.086	0.092	0.090
	(0.273)	(0.285)	(0.281)	(0.289)	(0.286)

Table 5.4 (Continued)

Variables	1998	2000	2002	2004	2006
Spousal characteristics					
Spouse info missing, if married	0.013	0.009	0.007	0.007	0.006
	(0.113)	(0.096)	(0.085)	(0.081)	(0.078)
Spouse age	63.78	65.42	66.88	68.23	69.41
	(9.760)	(9.691)	(9.287)	(8.924)	(8.563)
Spouse nonwhite	0.127	0.125	0.121	0.118	0.114
	(0.332)	(0.330)	(0.326)	(0.322)	(0.318)
Spouse education (years)	12.29	12.34	12.43	12.52	12.59
	(3.118)	(3.118)	(3.088)	(3.076)	(3.039)
Spouse on Medicaid	0.030	0.037	0.036	0.035	0.035
	(0.171)	(0.188)	(0.185)	(0.061)	(0.183)
Child characteristics					
Mean age of children	39.20	40.54	41.99	43.53	44.64
	(9.915)	(9.612)	(9.266)	(9.053)	(8.784)
% female children	0.502	0.503	0.499	0.503	0.502
	(0.173)	(0.157)	(0.155)	(0.147)	(0.142)
% married children	0.680	0.686	0.688	0.691	0.685
	(0.307)	(0.305)	(0.318)	(0.315)	(0.311)
Mean number of grandchildren	1.603	1.604	1.681	1.727	1.798
	(1.106)	(1.098)	(1.043)	(1.041)	(1.023)
% children who are stepchildren	0.074	0.071	0.071	0.069	0.071
	(0.174)	(0.165)	(0.167)	(0.161)	(0.160)
% children who are in-laws	0.359	0.381	0.368	0.388	0.391
	(0.181)	(0.163)	(0.154)	(0.147)	(0.141)
Mean education of children	13.477	13.536	13.579	13.638	13.671
	(2.273)	(2.192)	(2.206)	(2.162)	(2.147)
% children who work	0.803	0.809	0.804	0.804	0.811
	(0.249)	(0.237)	(0.243)	(0.236)	(0.232)
% children who live within 10 miles	0.198	0.177	0.209	0.213	0.197
	(0.263)	(0.254)	(0.277)	(0.275)	(0.259)

unobserved heterogeneity using all possible sets of child-level information and found that, despite the differences in the summary statistics, the coefficient estimates are similar in sign and significance across all three data sets. I choose to use the final set of child-level information in the analysis because it provides a more complete picture of household formation. Data in 2002-2006 clearly suggest that some children-in-law do provide informal care and receive inter vivos transfers from the parents.

5.3.3 Exogenous Variables: Transfer Policy

The tax incentive variable , τ_t^{IVA}, is represented by the tax-exclusion threshold. It refers to the maximum amount of monetary transfers that an individual can give to her adult children and grandchildren within a two-year period without paying transfer taxes according to the annual exclusion threshold. This is obtained by multiplying the annual exclusion threshold by the number of adult children and grandchildren in the family. The amount doubles if the respondent is married[8] . The annual and lifetime exclusion amounts for a single household in 1992-2006 are provided in Appendix B.

5.3.4 Exogenous Variables: Costs of Living

Factors affecting costs of living are denoted as P_t^{IL} and P_t^{IC} in the model. These costs are not readily available (and difficult to measure). But they may be proxied by house price indices and gas prices as well as other factors under personal characteristics that indicate the household make-up e.g., whether or not the parent has a living spouse, the number of children the household has and the number of grandchildren. The house price indices are available across states and in all years. They increase over time with the base quarter being the first quarter in 1980. The gas price is in cents per gallon and excludes excise duties.

[8]I do not incorporate the difference in gift tax rates in different states. Joulfaian (2007) in his extensive review of the gift tax economics-based literature finds no evidence that differing gift tax rates have an impact on the transfer behavior and people do not relocate to lower tax states.

5.3.5 Exogenous Variables: Costs and Availability of Care

There are three types of care in the model: informal care, formal home care and nursing home care. Average characteristics of adult children, X_t^K, account for the cost of informal care, P_t^I, including, for instance, their education (indicative of the opportunity costs of informal care for adult children) and the percentage of children who live within 10 miles (which represents costs of informal care for adult children who do not coreside with their parents). The costs of formal home care and nursing home care, P_t^F and P_t^N respectively, include average daily cost of home care, average daily cost of assisted living facility, hourly wage of home health aides[9] and the cost of living in a private nursing home at the state level. I also include the availability of formal home care providers and nursing home facilities at the county level to measure the ease of receiving such types of care. Some of these variables are per 1000 elderly (i.e., individuals over 65 years of age).

5.3.6 Exogenous Variables: Measures of State Generosity

I include a time-varying, state-specific set of variables that represent the thresholds for means-tested public programs ($\overline{Q}_t^{sm}$). I focus on Medicaid since it has the potential to reduce the costs of care, thus the costs of living arrangements and encourages individuals to choose one living arrangement over the others. Medicare is universally provided and in a sample where most respondents are older than 65, its impact is not likely to be distinct and is left out of the analysis. I extend the meaning of $\overline{Q}_t^{sm}$ to include not just Medicaid eligibility rules but also supply restrictions and Medicaid benefits received by each qualified individual. I denote $\overline{Q}_t^{sm}$ collectively as measures of state generosity.

Measures of state generosity are constructed according to Medicaid rules. An elderly individual can receive Medicaid benefits while living outside of a nursing home (i.e., in a community, receiving home and community-based services (HCBS)) or while in a nursing

[9]Formal home care costs are incomplete in the data. The daily cost of home care is missing in 2002, 2004 and 2006. The daily cost of assisted living facility is missing in 1998 and 2000. The hourly wage of home health aide is missing in 1998. I extrapolate these missing data from the available data in the closest years, weighted by CPIU and COLA.

home (NH). Medicaid sets different income limits depending on where the individual lives. The income limit for those already in a nursing home is typically higher. The asset limits of the two living arrangements are usually the same but they differ by the individual's marital status. If the applying individual is single or if she is married but her spouse does not apply for Medicaid, she is subjected to one resource limit. If the individual is married and the spouse applies for Medicaid too, the household faces another resource limit. In cases where the individual is married and receives Medicaid benefits while institutionalized, the Medicaid-ineligible spouse will have her assets protected by the state's spousal impoverishment rules. If the Medicaid-eligibile person is married but receives benefits at home, the spousal impoverishment rules need not apply. If both individuals in the same household receive Medicaid benefits, one is deemed the community spouse and the spousal impoverishment rules apply. A detailed discussion on Medicaid is provided in Appendix A.

To measure how strict each state is in allowing the spending down of incomes, I create a variable called the income cap/Miller trust existence variable. It takes the value of one if the respondent lived in a state where an Income Cap or a Miller trust existed and zero otherwise. The Miller trust allows individuals who have more income than the Medicaid income limit to transfer their rights to income sources such as pension and social security to the trust in order for them to qualify. The summary statistics of this variable seem to be inconsistent across time. I explain the inconsistencies in Table D.4 in Appendix D.

To account for the two Medicaid income limits facing each individual: one for HCBS and the other for NH benefits, I create two variables representing the percentages of income that the individual would need to dispose of in order to be eligible for Medicaid. The variables differ by the type of benefits received. The percentages equal to one minus the ratio of the maximum income limit for the respective type of Medicaid benefits in each state to the respondent's income. They take the value of zero if the individual is already qualified for Medicaid.

To account for the two potential Medicaid asset limits facing each individual: one for singles and the other for couples, I create two variables that represent the percentages of assets that single or married households would need to lose if they were to qualify for Medicaid. If the individual is single and already qualifies for Medicaid, the 'percentage of assets that would be

lost if on Medicaid (for singles)' is assigned the value of zero. If the individual is single and does not qualify for Medicaid, the percentage equals one minus the resource limit for singles over the assets that she brings in from the last period. If the individual is married and ineligible for Medicaid, the percentage equals to one minus the resource limit for singles over half of the household's previous period assets. The 'percentage of assets that would be lost if on Medicaid for married couples' equals one minus the resource limit for couples over the household's total assets if she is married. The variable takes the value of zero if the individual is not married and if the individual and her spouse are both on Medicaid. These variables represent the ease of receiving Medicaid in each state, felt by each individual according to their incomes, assets and marital status.

Married individuals may care about impoverishing their spouses in events of being eligible for Medicaid. The spousal impoverishment rules apply to all married couples regardless of whether no one receives Medicaid, one receives Medicaid or both do. When neither of the couple is on Medicaid or when one is on Medicaid, the households face the same concern that if/when one receives Medicaid benefits, the ineligible spouse will have an amount of assets taken away by the state to finance the medical costs incurred by the household's Medicaid recipient. When the couple are both on Medicaid, only one but not both will be deemed the ineligible or 'community' spouse and have an amount of assets taken away. The 'percentages of asset loss if spouse qualifies for NH and for HCBS' are equal to one minus the maximum spousal impoverishment asset limit for the respective type of Medicaid benefits over half the couple's previous period assets. The variables take on the value of zero if the respondent is unmarried. The higher these percentages, the less likely an individual wants to become eligible for Medicaid; she needs to dispose of more of her spouse's wealth to receive public benefits[10] .

In addition to eligibility variables, I include indicators representing whether the state had in place any Certificate-of-Needs (CON) laws on home health services, assisted living facilities, long-term care facilities and hospices. The CON programs are used to regulate the number of

[10]Note that in 1998 the CODA and WB cohorts just entered the sample, so they do not have any information on most of the state generosity variables then. The summary statistics of those variables in 1998 are based on the AHEAD and HRS cohorts only.

beds and prevent overbuying of expensive equipment; the need for new facilities or equipment has to be approved based on a genuine need in a community and what are deemed most urgent needs are approved first. The existence of CON laws represents state-implemented supply restrictions. I also include the ratio of total spending on home and community-based services to total spending on nursing homes by the Medicaid program in each state. The variable measures the extent to which each state encourages community living relative to institutionalization, the latter of which is more draining to the state budget.

The last set of variables representing state generosity is relevant only to those already qualified for Medicaid. They take the value of zero for individuals ineligible for Medicaid. 'Expected benefits' equal the probability of receiving a particular type of Medicaid benefits (HCBS or nursing home) multiplied by the private cost of such care. The probability of receiving each type of care is the number of beneficiaries for each type of care divided by the number of total Medicaid recipients in each state at time t. Because it is not possible to calculate the actual private cost of formal home care[11] , I use the average amount of state spending that the average HCBS recipient receives (equal to the total HCBS spending divided by the total number of HCBS beneficiaries in each state at time t). The private cost of nursing home care is the actual private cost of nursing home care for the two-year period. The variables measure expected discounts of different types of living arrangement provided by the state.

5.3.7 Exogenous Variables: Health Related Area Characteristics

Denoted by M_t in the empirical framework, health-related area characteristics include county-level health facility variables: the number of active MDs, the percentage of doctors with medical specialty, the number of hospitals, the number of hospital beds, the number of full-time equivalent (FTE) hospital personnel and the percentage of hospital personnel devoted to nursing home care in each hospital. These variables represent the supply of health services and may impact subjective or functional health. Their summary statistics are relatively constant

[11]Home health care can take many forms, including hiring a medical professional, a home health aide, a homemaker or a licensed practical nurse to provide in-home services or residing in an assisted living community. The frequency of receiving home health care categorized by type of care providers is also unknown in the data.

across years.

5.3.8 Exogenous Variables: Wealth Related Area Characteristics

Measures of community-level wealth include the percentage of unemployed people, the percentage of people below the poverty line and median household income at the county level. These variables provide indirect measures of the costs of living and to a certain extent may represent the number of people who would be eligible for Medicaid benefits in the area.

Table 5.5: Summary Statistics of Exogenous Variables

Variables	Geographic Variation	1998	2000	2002	2004	2006
Transfer policy						
Tax-exclusion threshold$*10^{-4}$		19.887	20.283	21.369	21.601	23.976
(2-year period)		(13.779)	(13.730)	(14.164)	(14.154)	(15.497)
Costs of living						
House price index (1980Q1=100)	state	214.82	243.33	282.61	340.95	405.17
		(41.04)	(55.22)	(75.46)	(112.52)	(145.31)
Gas price (cents per gallon)	state	65.82	111.79	87.51	132.44	212.49
(excluding excise duties)		(3.138)	(5.458)	(5.596)	(11.42)	(6.65)
Costs and availability of formal care						
Average daily cost of home care	state	26.643	32.62	38.89	45.34	52.49
		(19.634)	(24.688)	(30.43)	(36.76)	(44.11)
Average daily cost of assisted living facility	state	61.496	64.237	67.45	80.39	96.82
		(15.879)	(16.596)	(17.391)	(14.77)	(14.97)
Hourly wage of home health aide	state	15.691	15.837	17.17	18.02	18.74
		(1.906)	(2.023)	(2.092)	(2.320)	(2.495)
Number of home health agencies/1000 elderly	county	0.230	0.212	0.207	0.242	0.259
		(0.214)	(0.229)	(0.183)	(0.243)	(0.293)
Cost of private nursing home$*10^{-4}$	state	9.659	10.55	12.01	13.54	14.55
(2-year period)		(2.104)	(2.436)	(2.608)	(2.730)	(3.047)
Number of nursing homes/ 1000 elderly	county	0.472	0.529	0.468	0.452	0.439
		(0.319)	(0.559)	(0.279)	(0.287)	(0.285)
Number of hospices/ 1000 elderly	county	0.078	0.064	0.061	0.073	0.082
		(0.099)	(0.089)	(0.081)	(0.118)	(0.119)

Table 5.5 (Continued)

Variables	Geographic Variation	1998	2000	2002	2004	2006
Measures of state generosity						
Income Cap/Miller Trust existence	state	0.062	0.319	0.302	0.131	0.207
		(0.241)	(0.466)	(0.459)	(0.337)	(0.405)
% income that would be lost if on Medicaid	state	0.270	0.249	0.233	0.237	0.142
(NH benefits)		(0.324)	(0.312)	(0.303)	(0.305)	(0.249)
% income that would be lost if on Medicaid	state	0.260	0.241	0.230	0.221	0.131
(HCBS benefits)		(0.317)	(0.308)	(0.301)	(0.299)	(0.245)
% asset that would be lost if on Medicaid	state	0.683	0.684	0.700	0.712	0.718
(for singles)		(0.400)	(0.399)	(0.397)	(0.392)	(0.391)
% asset that would be lost if on Medicaid	state	0.538	0.534	0.539	0.543	0.537
(for married couples)		(0.459)	(0.461)	(0.463)	(0.464)	(0.467)
% asset loss if spouse qualifies for NH	state	0.132	0.211	0.224	0.224	0.222
		(0.267)	(0.341)	(0.350)	(0.348)	(0.348)
% asset loss if spouse qualifies for HCBS	state	0.301	0.329	0.336	0.338	0.336
		(0.423)	(0.427)	(0.429)	(0.428)	(0.429)
CON laws	state	0.739	0.709	0.705	0.705	0.704
		(0.439)	(0.454)	(0.456)	(0.456)	(0.456)
CON on home health services	state	0.301	0.299	0.294	0.295	0.297
		(0.458)	(0.458)	(0.456)	(0.456)	(0.457)
CON on assisted living facilities	state	0.271	0.268	0.264	0.263	0.262
		(0.445)	(0.443)	(0.441)	(0.440)	(0.439)
CON on long-term care facilities	state	0.713	0.709	0.705	0.705	0.704
		(0.452)	(0.454)	(0.456)	(0.456)	(0.456)
CON on hospice facilities	state	0.400	0.398	0.394	0.393	0.391
		(0.489)	(0.489)	(0.488)	(0.488)	(0.488)
HCBS to NH spending ratio	state	0.389	0.274	0.365	0.471	0.483
		(0.305)	(0.239)	(0.329)	(0.466)	(0.367)
Expected benefits if getting HCBS$*10^{-4}$	state	0.002	0.002	0.003	0.003	0.004
		(0.012)	(0.012)	(0.016)	(0.017)	(0.019)

Table 5.5(Continued)

Variables	Geographic Variation	1998	2000	2002	2004	2006
Expected benefits if spouse gets HCBS$*10^{-4}$	state	0.001	0.001	0.001	0.001	0.001
		(0.009)	(0.008)	(0.010)	(0.012)	(0.012)
Expected benefits if in NH$*10^{-4}$	state	0.029	0.039	0.040	0.041	0.040
		(0.113)	(0.152)	(0.156)	(0.150)	(0.148)
Expected benefits if spouse in NH$*10^{-4}$	state	0.011	0.016	0.016	0.016	0.015
		(0.069)	(0.094)	(0.097)	(0.094)	(0.089)
Area characteristics: health						
Number of active doctors/ elderly	county	0.019	0.020	0.020	0.020	0.020
		(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
% of doctors with medical specialty	county	0.293	0.309	0.316	0.321	0.327
		(0.093)	(0.084)	(0.098)	(0.087)	(0.081)
Number of hospitals/ 1000 elderly	county	0.183	0.177	0.171	0.171	0.178
		(0.154)	(0.139)	(0.136)	(0.139)	(0.146)
Number of hospital beds/ 1000 elderly	county	30.13	29.16	28.09	27.56	27.22
		(21.16)	(19.80)	(19.88)	(19.67)	(19.19)
Number of FTE hospital staff/ hospital$*10^{-3}$	county	0.894	0.932	0.977	0.997	0.983
		(0.629)	(0.597)	(0.631)	(0.741)	(0.686)
% of FTE hospital staff devoted to NH care	county	0.023	0.024	0.023	0.024	0.026
		(0.041)	(0.046)	(0.042)	(0.052)	(0.054)
Area characteristics: wealth						
% of unemployed people	county	4.805	4.306	6.049	5.904	4.840
		(2.942)	(2.419)	(2.303)	(2.281)	(1.449)
% people below the poverty line	county	13.12	11.77	12.53	13.07	13.65
		(5.983)	(5.211)	(5.272)	(4.867)	(5.677)
Median household income$*10^{-4}$	county	3.912	4.215	4.179	4.373	4.759
		(1.059)	(1.068)	(1.103)	(1.099)	(1.268)

Noes: Standard errors are in parentheses. HCBS = home and community based services; NH = nursing home; CON = Certificate of Needs.

Chapter 6

Results

I jointly estimate equations for living arrangements for married and unmarried households, savings (bequeathable wealth) for married and unmarried households, the probability and the amount of inter vivos transfers for married and unmarried households, bequest intent, subjective health, functional health, the probability and the amount of actual bequests conditional on the elderly's death[1] . I also estimate the initial condition equations for subjective health, functional health, living arrangements and savings as well as attrition. Estimation results with unobserved heterogeneity are provided in Appendix E. The number of mass points for permanent unobserved heterogeneity and time-varying unobserved heterogeneity are 3 and 2

[1]I also experimented with variations of the model. In particular, I jointly estimated:
1) all the above equations except functional health;
2) all the above equations but replacing functional health and subjective health with one 'health' variable such that the categories would be excellent health with no disability, excellent health with moderate disability and so on;
3) all the above equations except bequest intent (since it could be superfluous);
4) Model 1 and 2 without bequest intent;
5) all the above equations with lagged transfer and lagged bequest intent in all of the equations except functional health and subjective health, as well as estimating the initial conditions for inter vivos transfers and bequest intent.

The logic behind choosing the model that is presented is as follows. Functional health is clearly statistically significant in all of the equations, which rules out Model 1. Some of the bins in Model 2 are too small to be identifiable and the coefficient estimates of these categories as right hand side variables are not always interpretable.

Bequest intent is important in the theoretical model since it measures the extent to which bequests are valued to the parents who I do not observe dying in the data. Leaving the variable out may affect the estimated distribution of the unobserved heterogeneity. This rules out Model 3 and 4.

The question on whether lagged transfers and bequest intent should be included in the specifications depends on whether transfers affect living arrangements contemporaneously or they have impact that is carried over into the future. I follow the existing literature (as seen in the earlier chapters) and argue that it is the former, which rules out Model 5.

respectively[2] .

To arrive at the optimal number of mass points for the distribution of unobserved heterogeneity, I start with one mass point for both permanent and time-varying unobserved heterogeneity and gradually increase the number of mass points for each unobserved heterogeneity type. I perform a test to see if an increase in the number of mass points statistically improves the log-likelihood value. I also check the probability weights of the unobserved heterogeneity terms. Part of the stopping rule is to see whether the probability weight of the additional mass point is close to zero, in which case adding more mass points no longer improves the model. Table E.8 shows unobserved heterogeneity parameters and the probability weight of each mass point.

I include in every specification time trend, time trend squared divided by 100, time trend cubed divided by 1000, cohort dummies (with the excluded category being AHEAD), and some race and gender interaction terms. In the living arrangements, savings, inter vivos transfers and bequest intent equations, I also include interaction terms between each of the living arrangements and lagged percentage of children living within 10 miles of the parent. These interaction terms are not shown. However, they are generally significant across all specifications. The asterisk in the tables marks a statistical significance at the 10% level and the double asterisk at the 5% level.

The model with unobserved heterogeneity is preferred to one without unobserved heterogeneity because it accounts for correlated errors across the equations. The model without unobserved heterogeneity (not shown) seems to overestimate the impact of endogeneous explanatory variables in the health, living arrangement and savings equations and underestimate them in the inter vivos transfers and bequest equations.

---

[2]The coefficients reported in the tables correspond to estimation with starting values of zero. As an experiment, I also change the starting values to 80% of the coefficients of the model without unobserved heterogeneity and find that the probability weights remain the same, while the coefficients vary only slightly.

6.1 Fit of the Model

To evaluate how well the model fits the observed outcomes, I compare the actual proportions and values of the dependent variables in the data to their corresponding predicted values. To find the predicted values, I categorize the right hand side variables into two broad groups: exogenous explanatory variables and endogenous explanatory variables. Using the coefficient estimates in Appendix E, I simulate outcomes from a model that controls for unobserved heterogeneity. I update the endogenous variables sequentially such that period t realizations of these variables influence period $t+1$ outcomes[3] , integrating over the unobserved heterogeneity. For the purpose of showing the fit of the model, I also allow the simulated sample to attrit from the second period onward like in the observed data[4] . I perform 50 replications of each individual and average the outcomes over all observations in the simulated sample[5] .

Table 6.1 and Table 6.2 show the comparison between the actual and the predicted values

[3]Note that the savings variable in my model is log savings. There are some variables that are based on lagged savings but in levels (as opposed to log values), namely state generosity variables that are related to percentages of wealth that the elderly would need to dispose of if they were to be eligible for Medicaid. In the updating process, I transform log values into levels to recreate these state generosity variables. Since there are a number of ways to retransform log values, I experiment with 1) the assumption of lognormal distribution with homoskedasticity where the smearing factor is $e^{(0.5\sigma^2)}$; 2) a nonparametric smearing factor following Duan (1983) and Buntin and Zaslavsky (2004) where the smearing factor is the average exponentiated residual from the savings regression; and 3) a simple exponentiation with no smearing correction. The first two smearing correction methods produce predicted values that more closely resemble the data than the simple exponentiation, as expected. The simple exponentiation tends to underpredict savings and inter vivos transfers in log values, while the residual-based smearing correction tends to overpredict them. Therefore I use the homoskedastic log normal smearing factor.

[4]Those who in the observed data might have attrited are simulated and retained over time and they are more likely to come from one end of the unobserved heterogeneity distribution that may have certain characteristics, for example, poor health or low savings, etc. Including attrition observations in the simulation could impact the overall fit of the model.

[5]In Table F.1 and Table F.2 in Appendix F, I show how well different simulations fit the data. In the first simulation, I simulate a model without unobserved heterogeneity and do not update the endogenous variables over time. In the second simulation, I simulate a model with unobserved heterogeneity and do not update the endogenous variables over time. In the third simulation, I simulate the model without unobserved heterogeneity and update the endogenous variables based on the predicted outcomes from the previous period. In the fourth simulation, I simulate the model that controls for unobserved heterogeneity and update the endogenous variables sequentially over time. In the final simulation, I simulate the model that controls for unobserved heterogeneity, update the endogenous variables sequentially and also simulate attrition from the second period onward. The results suggest that the inclusion of unobserved heterogeneity has small effects on the predicted outcomes of living arrangements. However, Table E.8 suggests that the impact of unobserved heterogeneity may be more visible in the health, savings and intergenerational transfer outcomes, since the UH terms are statistically significant.

Table 6.1: Fit of the Model by Marital Status

Variables	Married Households		Unmarried Households	
	Actual	Predicted	Actual	Predicted
Living arrangement				
- % nursing home	0.94	0.91	5.80	5.31
- % coresident, formal home care	1.13	1.13	3.77	3.27
- % coresident, informal care	1.94	1.88	5.33	5.21
- % coresident, no care	16.19	15.99	17.40	17.95
- % independent, formal home care	4.61	4.57	8.08	7.65
- % independent, informal care	2.54	2.47	5.29	4.82
- % independent, no care	72.66	73.06	54.33	55.79
ln(savings)	11.363	11.294	8.871	9.742
% Any inter vivos transfer	36.86	36.43	25.33	26.11
ln(amount of inter vivos transfers)	6.730	6.804	6.764	6.700

of the dependent variables based on the simulation. Overall, the model fits the data well. For all of the logit-type endogenous variables (ones with percentages reported in the tables), the simulated values are within two percentage points of the observed values and for the continuous variables, they are within one log value.

To show how well the model explains the dynamics of living arrangements, Table 6.3 - Table 6.6 illustrate the living arrangement transitions of married households and unmarried households based on the actual sample and the simulated sample respectively. I define transitions as a move from a living arrangement in period t to another in period $t + 1$.

The model seems to capture the dynamics of living arrangements quite well. While the percentages of the switches are not the same between the actual and the simulated sample, they are often close and the rankings of the switches are similar in most cases. In both samples, regardless of their marital status, individuals often stick to their living arrangements from the earlier period. Most of the movements in the living arrangements over time are attributed to changes in the need for care. The percentages of individuals living independently regardless of their care requirement and of those living with adult children regardless of their care requirement are relatively constant.

Table 6.2: Fit of the Model: Full Sample

Variables	Actual	Predicted
Subjective health		
- % excellent/very good	36.41	35.77
- % good/fair	49.33	50.94
- % poor	8.86	8.17
- % deceased	5.40	5.12
Functional health		
- % no disabilty	75.87	74.16
- % moderate disability	17.46	18.61
- % severe disability	6.67	7.23
% Bequest intent	48.63	47.67
% Leave bequests upon death	11.11	10.87
ln(value of bequests)	6.207	6.132

The living arrangements that involve no care are most stable across time. Approximately 90% of married individuals and 80% of unmarried individuals who live independently with no care in period t continue to do so in period $t+1$. Regardless of their marital status, over 65% of individuals who live with adult children and receive no care from them stay in the same arrangement over time. The move from intergenerational coresidence with no care to living independently with no care is more frequently observed than the other way round, which indicates that living with adult children is a temporary arrangement for some households, especially when no care is involved. The percentages of individuals who live with no care in period t and move into an institution in period $t+1$ are also the lowest among all living arrangements, as expected. They are less than 1% among married households and around 2% for unmarried households.

There is more movement for the living arrangements that involve care over time. Among married individuals who live independently and receive informal or formal home care in period t, they are likely to either receive the same type of care or receive no care in period $t+1$. Unmarried households that live independently with informal care are most likely to stick with

the same arrangement, and when they receive formal home care in period t, they are most likely to receive no care in $t+1$. However, when households live with adult children and receive informal or formal home care in the earlier period, they are most likely to stick with the same arrangements in general. Institutionalized individuals often stay in the same arrangement. Approximately 50% of married households and 80% of unmarried households continue living in a nursing home over time. When the elderly no longer stay in a nursing home, they either live independently with no care (or spousal care in the case of married households) or receive formal home care.

Some noteworthy observations can be made with regard to living arrangements that involve care. First, the percentages of individuals who receive informal care in period t and choose to receive formal home care in $t+1$ and vice versa are relatively low. The percentages are lower among married than unmarried households and lower among those living independently than those living with adult children. Second, living arrangements that involve formal home care seem to be the least stable, often replaced by arrangements with no care. This is particularly true for married households. These suggest that informal care provided by adult children and formal home care are not strong substitutes in practice, especially among married households living independently. They also suggest that, without informal care by adult children or formal home care by trained professionals, the presence of a spouse allows married households to switch in and out of a living arrangement more frequently than their unmarried counterparts.

Table 6.3: Living Arrangement Transitions of Married Households: Actual Sample

Living Arrangements	**% in Period $t+1$**						
	IL, no care	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
Period $t = 2$							
IL, no care	90.42	1.11	3.44	4.19	0.25	0.19	0.41
IL, informal	33.94	45.85	9.75	2.17	2.89	0.72	4.69
IL, formal	61.17	5.05	24.20	2.13	0.27	1.33	5.85
IC, no care	23.63	0.31	0.67	70.37	2.72	2.20	0.10
IC, informal	4.76	5.71	0.48	22.38	54.29	11.43	0.95
IC, formal	11.61	0	5.36	40.18	14.29	26.79	1.79
NH	22.58	6.45	12.90	0	6.45	3.23	48.39
Period $t = 3$							
IL, no care	90.03	1.20	4.59	3.12	0.20	0.17	0.69
IL, informal	22.53	54.95	13.74	0.55	2.20	0.55	5.49
IL, formal	56.51	5.58	28.62	2.23	1.12	0.74	5.20
IC, no care	20.89	0.32	0.64	73.23	2.11	1.92	0.89
IC, informal	10.39	5.84	0.65	16.23	52.60	11.69	2.60
IC, formal	5.95	3.57	5.95	47.62	17.86	15.48	3.57
NH	33.33	0	10.26	2.56	2.56	0	51.28

Table 6.3 (Continued)

Living Arrangements	**% in Period $t+1$**						
	IL, no care	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
Period $t = 4$							
IL, no care	89.44	1.40	4.38	3.60	0.25	0.17	0.76
IL, informal	41.77	32.91	12.03	4.43	6.96	0.63	1.27
IL, formal	61.88	4.38	25.94	1.56	1.25	1.56	3.44
IC, no care	29.36	0.23	1.61	61.77	3.59	3.36	0.08
IC, informal	14.29	2.68	7.14	33.04	33.93	7.14	1.79
IC, formal	17.24	1.72	10.34	20.69	13.79	31.03	5.17
NH	45.31	1.56	6.25	10.94	0	3.12	32.81
Period $t = 5$							
IL, no care	87.08	2.10	4.93	4.73	0.34	0.46	0.36
IL, informal	35.53	32.89	15.79	5.26	6.58	0	3.95
IL, formal	55.50	6.00	30.00	3.50	2.00	1.00	2.00
IC, no care	22.72	1.05	1.64	65.62	5.23	3.14	0.60
IC, informal	2.63	3.95	1.32	36.84	40.79	12.47	0
IC, formal	17.02	0	8.51	34.04	10.64	27.66	2.13
NH	25.93	0	0	3.70	0	0	70.37

Notes: IL = independent living; IC = intergenerational coresidence; NH = nursing home

Table 6.4: Living Arrangement Transitions of Married Households: Simulated Sample

Living Arrangements	**% in Period $t+1$**						
	IL, no care	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
Period $t = 2$							
IL, no care	89.39	1.47	3.65	4.43	0.36	0.24	0.47
IL, informal	39.93	38.09	10.16	3.73	4.66	0.58	2.85
IL, formal	58.90	4.28	27.26	2.73	0.99	2.08	3.75
IC, no care	28.02	0.37	0.94	65.27	2.90	2.27	0.23
IC, informal	12.66	3.90	1.83	29.30	40.45	10.76	1.10
IC, formal	17.44	0.83	6.73	35.75	10.87	25.10	3.27
NH	33.43	1.34	7.04	4.26	1.63	1.29	51.01
Period $t = 3$							
IL, no care	89.15	1.36	4.19	4.09	0.30	0.22	0.69
IL, informal	44.32	37.85	8.22	1.93	3.47	0.61	3.61
IL, formal	60.81	4.12	27.97	1.92	0.46	1.14	3.59
IC, no care	28.65	0.37	1.23	64.69	2.72	2.03	0.32
IC, informal	12.55	4.12	1.91	29.45	40.41	9.67	1.89
IC, formal	19.76	0.80	6.38	30.64	9.20	27.65	5.57
NH	31.42	0.71	5.83	3.54	0.93	1.37	56.21

Table 6.4 (Continued)

Living Arrangements	**% in Period $t+1$**						
	IL, no care	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
Period $t = 4$							
IL, no care	89.14	1.49	4.25	4.07	0.34	0.22	0.49
IL, informal	44.55	37.93	8.59	1.80	4.10	0.37	2.67
IL, formal	63.46	4.47	25.90	1.72	0.52	1.37	2.56
IC, no care	26.85	0.47	1.38	65.64	3.25	2.18	0.24
IC, informal	12.07	3.27	2.09	27.24	44.90	9.15	1.28
IC, formal	18.99	0.53	6.29	27.83	11.95	30.36	4.05
NH	31.18	1.44	7.76	4.44	1.71	1.55	51.92
Period $t = 5$							
IL, no care	87.05	1.83	5.28	4.40	0.46	0.35	0.64
IL, informal	37.03	43.94	9.40	1.87	4.91	0.49	2.36
IL, formal	57.78	5.13	29.40	1.99	0.80	1.81	3.10
IC, no care	22.98	0.54	1.69	67.38	3.95	3.16	0.30
IC, informal	8.52	4.60	1.93	22.29	48.63	12.69	1.35
IC, formal	15.68	0.74	6.92	25.45	12.17	35.68	3.37
NH	27.82	2.15	8.09	3.90	2.00	1.95	54.10

Notes: IL = independent living; IC = intergenerational coresidence; NH = nursing home

Table 6.5: Living Arrangement Transitions of Unmarried Households: Actual Sample

Living Arrangements	**% in Period $t+1$**						
	IL, no care	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
Period $t = 2$							
IL, no care	82.61	2.47	7.40	4.48	0.70	0.29	2.06
IL, informal	23.57	42.59	18.63	3.04	3.04	0.76	8.37
IL, formal	35.92	12.94	33.98	0.97	0.97	2.91	12.30
IC, no care	15.30	0.61	0.37	72.95	6.24	4.04	0.49
IC, informal	3.17	3.17	2.38	20.24	48.02	16.27	6.75
IC, formal	2.70	2.03	7.43	24.32	22.30	34.46	6.76
NH	6.84	0.85	5.13	1.71	0.85	2.56	82.05
Period $t = 3$							
IL, no care	83.77	2.86	6.62	3.76	0.40	0.36	2.24
IL, informal	17.51	39.17	18.43	2.30	4.15	0.92	17.51
IL, formal	42.24	8.66	34.66	0.36	0.72	1.81	11.55
IC, no care	13.76	1.18	0.52	71.69	7.08	4.98	0.79
IC, informal	5.77	2.40	1.92	16.35	47.12	21.63	4.81
IC, formal	3.42	1.71	4.27	22.22	19.66	40.17	8.55
NH	5.38	2.31	0.77	0.77	2.31	0.77	87.69

Table 6.5 (Continued)

Living Arrangements	**% in Period $t+1$**						
	IL, no care	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
Period $t = 4$							
IL, no care	79.82	3.75	8.05	4.49	0.61	0.80	2.48
IL, informal	28.31	33.13	13.86	3.01	5.42	1.81	14.46
IL, formal	38.27	8.64	33.74	1.23	2.47	4.12	11.52
IC, no care	18.59	1.01	1.73	62.97	8.07	6.05	1.59
IC, informal	4.27	3.66	3.66	16.46	48.17	17.07	6.71
IC, formal	5.36	1.79	4.46	24.11	15.18	41.96	7.14
NH	6.99	1.40	6.29	0	0.70	0.70	83.72
Period $t = 5$							
IL, no care	78.57	4.40	7.17	5.65	1.18	0.79	2.24
IL, informal	15.20	34.40	24.00	0	12.80	4.00	9.60
IL, formal	39.90	8.81	31.61	2.07	2.07	6.22	9.33
IC, no care	16.20	0.93	0.69	67.36	8.56	5.32	0.93
IC, informal	2.52	0	2.52	20.17	51.26	16.81	6.72
IC, formal	3.41	1.14	4.55	22.73	18.18	36.36	13.64
NH	8.73	3.17	9.52	1.59	0.79	0.79	75.40

Notes: IL = independent living; IC = intergenerational coresidence; NH = nursing home

Table 6.6: Living Arrangement Transitions of Unmarried Households: Simulated Sample

Living Arrangements	**% in Period $t+1$**						
	IL, no care	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
Period $t = 2$							
IL, no care	81.64	3.50	6.63	5.04	0.79	0.46	1.93
IL, informal	26.21	34.59	18.49	2.98	5.45	1.47	10.80
IL, formal	39.24	8.21	36.31	1.24	1.30	2.78	10.93
IC, no care	17.85	1.15	0.81	68.96	7.53	3.81	0.78
IC, informal	7.17	2.17	2.53	23.79	45.81	13.59	4.94
IC, formal	4.99	2.14	6.42	25.68	21.76	30.87	8.14
NH	8.89	2.15	5.50	1.17	0.99	0.82	80.47
Period $t = 3$							
IL, no care	82.54	2.87	5.98	4.98	0.74	0.55	2.34
IL, informal	30.14	31.28	15.66	2.26	5.22	2.14	13.30
IL, formal	42.51	8.25	32.87	1.21	1.15	2.98	11.08
IC, no care	17.49	0.81	0.80	68.37	7.22	4.51	0.80
IC, informal	6.77	1.97	2.48	22.71	43.21	17.15	5.70
IC, formal	5.99	1.87	4.68	21.98	18.26	38.43	8.80
NH	10.91	2.05	4.57	0.81	0.90	1.09	79.66

Table 6.6 (Continued)

Living Arrangements	% in Period $t+1$						
	IL, no care	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
Period $t = 4$							
IL, no care	81.48	3.27	6.67	4.72	0.83	0.57	2.46
IL, informal	28.99	32.76	16.36	2.02	5.44	1.91	12.53
IL, formal	41.61	8.59	34.04	1.12	1.21	3.05	10.38
IC, no care	18.11	1.10	1.04	65.60	8.72	4.42	1.01
IC, informal	7.25	2.35	2.77	19.50	47.18	15.05	5.90
IC, formal	5.13	1.79	5.02	21.98	20.38	36.97	8.73
NH	9.76	1.95	4.86	0.98	0.67	0.82	80.97
Period $t = 5$							
IL, no care	79.51	3.55	7.13	5.90	1.21	0.70	2.00
IL, informal	27.19	34.49	17.42	2.24	7.22	2.26	9.19
IL, formal	40.88	8.90	34.14	1.48	1.65	3.69	9.27
IC, no care	14.09	1.01	0.71	68.73	10.01	4.76	0.69
IC, informal	4.76	1.80	1.92	20.27	52.96	14.59	3.70
IC, formal	4.48	1.68	5.02	20.69	24.90	37.35	5.86
NH	11.30	2.44	5.40	1.19	1.49	1.51	76.66

Notes: IL = independent living; IC = intergenerational coresidence; NH = nursing home

6.2 Marginal Effects

To interpret the coefficient estimates in Appendix E more easily, I calculate the marginal effects of the endogenous variables and some policy variables on living arrangements of married and unmarried households[6] . The marginal effects are based on a model that controls for unobserved heterogeneity and they are contemporaneous, one-period effects where the endogenous variables are not updated sequentially over time. Shown in Table 6.7 and Table 6.8 for married and unmarried households respectively, the marginal effects are averaged over all observations in the simulated sample. I draw from the variance-covariance matrix 100 random sets of coefficients and find the marginal effects for each perturbation, the average of which is standard error of the marginal effects.

Based on the contemporaneous, one-period marginal effects, I show that the model with unobserved heterogeneity and one without unobserved heterogeneity differ statistically in Table G.1 in Appendix G. I perform the t tests and report the test statistics in the table. Some test statistics are zero because they are rounded to the nearest three decimal places. The non-zero test statistics are statistically significant at the 5% level. The table suggests that not modeling unobserved heterogeneity leads to biased estimates.

The marginal effects of good (subjective) health and poor (subjective) health are relative to excellent health. Good health and poor health affect the probability of living arrangements in a similar way. As expected, the marginal effects of poor health are stronger than those of good health (in most cases, twice as strong). Having good or poor health decreases the probability of living with no care, especially when the individual lives independently. Relative to excellent subjective health, having good health weakly but significantly induces informal care, but only in the independent living setting. It leads to an increase of a 0.4 percentage point and a 0.5 percentage point in the probability of living independently with informal care for married and unmarried households respectively. Poor health does not have a significant effect on the provision of informal care. Both good and poor health increase the probability of

[6]I also calculate the marginal effects of the tax transfer policy but do not report them here since the variable does not show up significantly in the regressions and does not have statistically significant marginal effects either.

receiving formal home care and, in the case of unmarried households, poor health also increases the likelihood of institutionalization for the elderly.

The marginal effects of moderate disability and severe disability are relative to having no disability. Moderate and severe disability also affect living arrangements in the same manner. The signs of the marginal effects are as expected and consistent with those of the subjective health variables. The marginal effects of severe disability are much stronger than those of moderate disability except for the arrangements that involve informal care for unmarried households.

Putting the effects of subjective health and functional health together suggests the following. First, living independently with no care and living with adult children with no care are associated with better subjective health and no disability. Second, the probability of receiving professionally provided formal home care and nursing home care increases as health deteriorates. Finally, the provision of informal care is conditional on the extent to which health worsens. At least for unmarried households, informal care is more likely to be provided when the burden of care (proxied by health) on the adult children is not too high.

The marginal effects of savings are based on a 10% increase in the level (as opposed to the log value) of savings. They pertain not only to the amount of savings, but also the interactions between savings and the percentages of assets that the elderly would need to lose if they were to qualify for Medicaid. Savings increase the probability of living independently with no care and decrease the probability of every other living arrangement, notably intergenerational coresidence with no care. This suggests that savings matter only insofar as no care is involved.

The marginal effects of the Medicaid-related variables are based on a 10% increase in the level of the variables. A rise in the ratio of Home and Community-Based Services (HCBS) spending to nursing home (NH) spending by the Medicaid program at the state level represents the state's further commitment to keeping the elderly in the community. The effect of the increase in the ratio is felt by everyone in the sample, regardless of whether or not they receive Medicaid benefits. It is weakly but positively correlated with living independently with no care (leading to an 0.1% point increase). It also has a negative and small effect on receiving formal home care and seems to decrease institutionalization. I conduct sub-group analyses

later in the chapter to explain the results. Further investigation into how the state allocates their budget, with regard to HCBS services, may also be needed.

Expected HCBS and expected NH benefits represent the average amount of state subsidies that would be given to Medicaid eligibles who receive those respective services, weighted by the probabilities of receiving those services. Both types of expected benefits rise if 1) the state allows a higher percentage of Medicaid eligibles to have access to the services or 2) the costs of the services that would otherwise be paid out of pocket increase. The marginal effects of both types of expected benefits are similar in sign and significance. They are also very small. They decrease the probabilities of living independently with no care and intergenerational coresidence with no care. They also reduce the probability of receiving informal care and increase the probability if receiving formal home care and nursing home care. The results are clear evidence of substitution effects, consistent with the fact that Medicaid changes the relative prices of living arrangement options in favor of formal home care and nursing home care, dampening down the costs of professional care for its beneficiaries.

Overall, Table 6.7 and Table 6.8 show that living arrangements are statistically significantly impacted by the endogenous variables. Functional health has the strongest impact and is the only variable that has a statistically significant marginal effect across all living arrangements. It is the most predominant predictor of living arrangements. Savings affect living arrangements but only insofar as no care is involved.

Table 6.7: One-Period Marginal Effects on Living Arrangements: Married Households

Variables	IL, no care	IL, informal	IL, formal	IC, no care	IC, informal	IC, formal	NH
Good health	-0.031**	0.004**	0.024**	-0.001	0.001	0.005**	-0.001
	(0.004)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.001)
Poor health	-0.077**	0.006	0.062**	-0.009	0.003	0.014**	0.001
	(0.012)	(0.005)	(0.012)	(0.008)	(0.005)	(0.004)	(0.006)
Moderate disability	-0.062**	0.026**	0.035**	-0.028**	0.017**	0.008**	0.003*
	(0.006)	(0.003)	(0.003)	(0.004)	(0.002)	(0.002)	(0.002)
Severe disability	-0.155**	0.028**	0.096**	-0.063**	0.028**	0.026**	0.039**
	(0.013)	(0.005)	(0.009)	(0.007)	(0.004)	(0.004)	(0.006)
Savings	0.0005**	-0.0002**	-0.00008**	-0.0002**	-0.00009**	0.00002	$1.24*10^{-6}$
	(0.00001)	(0.00004)	(0.00005)	(0.00008)	(0.00002)	(0.00003)	(0.00002)
HCBS/NH ratio	0.0009**	0.00003	-0.0002**	-0.0006**	0.00005	-0.0001	-0.00002
	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Expected HCBS benefits	-0.000004	-0.00004**	0.00001	-0.000006	-0.00002**	0.00002**	0.00003**
	(0.00001)	(0.000007)	(0.00001)	(0.00001)	(0.000009)	(0.000006)	(0.00001)
Expected NH benefits	-0.00009*	-0.00002	0.0002**	-0.0001**	-0.0001**	0.0001**	0.00006**
	(0.00007)	(0.00004)	(0.00007)	(0.00004)	(0.00003)	(0.00004)	(0.00004)

Notes: ** = 5% level of significance; * = 10% level of significance

Table 6.8: One-Period Marginal Effects on Living Arrangements: Unmarried Households

Variables	IL, no care	IL, informal	IL, formal	IC, no care	IC, informal	IC, formal	NH
Good health	-0.046**	0.005*	0.034**	0.003	0.0003	0.005*	-0.0007
	(0.006)	(0.003)	(0.005)	(0.003)	(0.003)	(0.003)	(0.004)
Poor health	-0.094**	0.001	0.078**	-0.014**	0.002	0.017**	0.009**
	(0.011)	(0.004)	(0.010)	(0.007)	(0.005)	(0.005)	(0.005)
Moderate disability	-0.159**	0.084**	0.047**	-0.097**	0.075**	0.023**	0.027**
	(0.007)	(0.006)	(0.005)	(0.005)	(0.005)	(0.003)	(0.004)
Severe disability	-0.276**	0.081**	0.098**	-0.147**	0.073**	0.066**	0.105**
	(0.012)	(0.009)	(0.009)	(0.007)	(0.008)	(0.007)	(0.009)
Savings	0.0002**	-0.00005	-0.00005	-0.0001**	$-6.18*10^{-7}$	-0.00002	-0.00001
	(0.00008)	(0.00004)	(0.00005)	(0.00006)	(0.00003)	(0.00003)	(0.00003)
HCBS/NH ratio	0.0007**	-0.0001	-0.00004	0.0001	0.0002	-0.0007**	-0.0002
	(0.0003)	(0.0002)	(0.0003)	(0.0003)	(0.0002)	(0.0002)	(0.0002)
Expected HCBS benefits	-0.0001**	-0.00001	0.0001**	-0.0001	0.00002	0.00004	0.00005
	(0.00003)	(0.00003)	(0.00006)	(0.00004)	(0.00003)	(0.00003)	(0.00004)
Expected NH benefits	-0.0002**	-0.0001	0.0002**	-0.0002**	-0.0002**	0.00003	0.0005**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)

Notes: ** = 5% level of significance; * = 10% level of significance

6.3 Policy Experiments

To evaluate the impacts of policy variables across time, I conduct several simulations in a dynamic setting. I use the coefficient estimates of the model with unobserved heterogeneity and update the endogenous variables sequentially over the years to obtain the baseline results. Then I conduct the following three experiments. First, I increase the ratio of HCBS to nursing home care spending by 50% and by 100% (or twofold) every year. Second, I increase the probability of receiving HCBS benefits for Medicaid eligibles by 50% and by 100% every year. Finally, I increase the probability of receiving nursing home benefits for Medicaid eligibles by 50% and 100% every year. Note that an increase in the probability of receiving HCBS or NH benefits is equivalent to an increase in the expected benefits of those services. I call them differently in the policy experiments to be specific in what I increase, avoiding the confusion that I increase the out of pocket costs of home health services and nursing home care.

I show the marginal effects of the policy experiments in Table 6.9 and Table 6.10 for married and unmarried households respectively. These marginal effects are long-run marginal effects that are accumulated for eight years for individuals in the AHEAD and HRS cohorts and six years for individuals in the CODA and WB cohorts.

In comparison to the one-period marginal effects, the long-run marginal effects mostly have the same signs and significance. The effects are stronger as expected because I repeatedly increase the policy variables by a higher percentage (10% versus 50% versus 100%). Even so, the effects are still small. I concentrate on the twofold increase of the policy variables from this point on. Note that a twofold increase in the policy variables is not too far reaching as an experiment, considering that the HCBS to nursing home ratio averages 0.324, the probability of receiving HCBS benefits 0.014 and the probability of receiving nursing home benefits 0.032 in the sample.

In the analysis that follows, I compare the baseline probability levels with policy simulation results for married and unmarried households. To see how policy changes impact living arrangements for different groups of people, I categorize the sample based on the jointly made

outcomes in the model, namely health, wealth, inter vivos transfers and bequest intent[7] . The results are shown in Table 6.11 - Table 6.20.

One way to read the tables is to think that I draw from the simulated sample different groups of individuals with certain health, wealth and intergenerational transfer characteristics. The baseline results are the average probability levels of the living arrangement categories for individuals who have the same characteristics and the results from the policy experiments represent what happens to the average probability levels of the same group of individuals given that exogenous variables shift.

[7]I also divide the sample into groups based on their education levels and initial annuitization, where I find the median amount of annuities for each birth cohort in the sample to account for the fact that the elderly enter the data at different ages and some age groups may have more annuitized wealth than others. The results are not reported here. The categorization based on education shows roughly the same results as wealth, as expected. The categorization based on initial annuitization reveals that, regardless of their marital status, individuals with more than the median amount of annuities have a higher probability of living with adult children with no care and a lower probability of living independently with no care and living independently with formal home care.

Table 6.9: Long Run Marginal Effects of Policy Simulations: Married Households

Policy Simulations	**IL, no care**	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
1.5∗HCBS/NH ratio	0.006**	0.0002	-0.0009	-0.005**	0.0002	-0.0006*	-0.0002
	(0.002)	(0.0007)	(0.0006)	(0.001)	(0.0006)	(0.0004)	(0.0003)
2∗HCBS/NH ratio	0.013**	0.0004	-0.002**	-0.010**	0.0003	-0.001**	-0.0005
	(0.003)	(0.001)	(0.001)	(0.003)	(0.001)	(0.0008)	(0.0006)
1.5∗HCBS probability	0.00005	-0.0001**	-0.00004	-0.0001	$9.61{*}10^{-6}$	0.00009*	0.0001**
	(0.0001)	(0.00006)	(0.00008)	(0.0001)	(0.00008)	(0.00006)	(0.00005)
2∗HCBS probability	-0.00006	-0.0002**	-0.0001	-0.0002	0.00005	0.0002**	0.0003**
	(0.0002)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0001)
1.5∗NH probability	-0.0007**	0.00004	0.0006**	-0.0005*	-0.0001	0.0002	0.0004**
	(0.0004)	(0.0002)	(0.0003)	(0.0003)	(0.0002)	(0.0002)	(0.0002)
2∗NH probability	-0.002**	0.0002	0.001**	-0.001**	-0.0002	0.0005	0.0009**
	(0.0009)	(0.0003)	(0.0006)	(0.0005)	(0.0003)	(0.0004)	(0.0005)

Notes: IL = independent living; IC = intergenerational coresidence; NH = nursing home. * denotes 10 % level of significance and ** denotes 5% level of significance

Table 6.10: Long Run Marginal Effects of Policy Simulations: Unmarried Households

Policy Simulations	IL, no care	IL, informal	IL, formal	IC, no care	IC, informal	IC, formal	NH
1.5∗HCBS/NH ratio	0.005**	-0.0008	-0.0003	-0.0005	0.001	-0.002**	-0.001
	(0.003)	(0.001)	(0.002)	(0.002)	(0.001)	(0.0009)	(0.001)
2∗HCBS/NH ratio	0.010**	-0.001	-0.0006	-0.0009	0.002	-0.006**	-0.003
	(0.005)	(0.002)	(0.003)	(0.004)	(0.003)	(0.002)	(0.002)
1.5∗HCBS probability	-0.0006**	-0.00007	0.0007**	-0.0008**	0.00005	0.0002**	0.0006**
	(0.0003)	(0.0002)	(0.0003)	(0.0003)	(0.0002)	(0.0001)	(0.0002)
2∗HCBS probability	-0.001*	-0.00005	0.001**	-0.002**	0.00006	0.0004	0.001**
	(0.0005)	(0.0003)	(0.0007)	(0.0006)	(0.0004)	(0.0003)	(0.0005)
1.5∗NH probability	-0.002**	-0.0006*	0.0009	-0.001	-0.001**	0.0002	0.003**
	(0.001)	(0.0004)	(0.0007)	(0.0008)	(0.0005)	(0.0005)	(0.0007)
2∗NH probability	-0.003*	-0.001*	0.002**	-0.003**	-0.002**	0.0003	0.007**
	(0.002)	(0.0007)	(0.001)	(0.001)	(0.0008)	(0.0009)	(0.002)

Notes: IL = independent living; IC = intergenerational coresidence; NH = nursing home. * denotes 10 % level of significance and ** denotes 5% level of significance

6.3.1 Effects of Policy Experiments Based on Initial Health

First, I group the simulated sample based on their initial subjective and functional health (i.e., the subjective and functional health states that they enter the sample with). I show the comparison between baseline probability levels and those from the policy experiments based on the sample's initial subjective health in Table 6.11 - Table 6.12 and based on the sample's initial functional health in Table 6.13 - Table 6.14.

The same pattern emerges between subjective health and functional health. As health worsens, the elderly are less likely to live independently with no care, more likely to receive informal care and formal home care and more likely to be institutionalized. In the case of unmarried households, less healthy elders are also less likely to live with adult children with no care but for married households, they are more likely to live with adult children with no care only when health does not worsen to the extent that care needs to be put in place.

Among married households, an increase in the ratio of HCBS to nursing home spending has similar impacts across all health groups. It increases living independently with no care, decreases intergenerational coresidence with no care, the receipt of formal home care and institutionalization. An increase in the probability of receiving HCBS benefits has a pronounced impact only among those with poor subjective health or severe disability but not among other health groups. An increase in the probability of receiving nursing home benefits, however, has an impact on most health groups except those with excellent subjective health. It witnesses the elders substituting away from independent living with no care toward formal home care and nursing home arrangements. In the case of households with severe disability, there is an approximately eight percentage point difference in the categories of intergenerational coresidence with formal home care and nursing home.

Among unmarried households, the effects of policy changes are not the same across health groups. The twofold increase in the spending ratio increases the probability of living independently with no care but decreases the probability levels of all other living arrangements for individuals with no disability and excellent health. For the other health groups, the policy change decreases living independently with informal care but increases intergenerational

coresidence with informal care. It decreases the probability of living independently with formal home care and nursing home care. The main distinction lies with living independently with formal home care whose probability increases in the poor subjective health and severe disability groups. The effects of the increase in the probabilities of receiving HCBS benefits and nursing home benefits for unmarried households are similar to those of married households.

The results unveil that different health groups benefit from Medicaid differently and that the care arrangements for married and unmarried households are different. Those coming into the sample with poorer health benefit more from the policy changes, moving towards arrangements that become relatively cheaper. The policy changes have less pronounced effects on those with better initial health. With regard to the increase in the HCBS to nursing home spending ratio, married households tend to move towards living independently with no care only while unmarried households with poor initial health either choose to live independently with no care or live with adult children with informal care.

The fact that the probability of formal home care does not increase across all households when the HCBS spending increases seems surprising at first. However, so long as the increase in the ratio of HCBS to nursing home spending decreases institutionalization, the results are not inconsistent with the services provided by HCBS. Those services include medical services, such as skilled nursing services and subsidies to informal care providers (excluding spouses), as well as non-medical services, such as respite, environmental modifications (which refer to physical adaptations to the home), assistive technology, transportation and meal services. In light of the above results, it is possible that an increase in HCBS spending allows the elderly parents, particularly those with a spouse, to live independently more easily and become less reliant on care by adult children and professionals. It is also possible that since the only source of informal care for unmarried households is adult children, unmarried elders choose informal care at the expense of formal home care, so their children can be paid by the state (although not every state provides subsidies for informal care providers).

Table 6.11: Policy Simulation Results by Initial Subjective Health: Married Households

Policy Simulations	Probability Levels						
	IL, no care	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
Excellent health							
Baseline	0.773	0.016	0.035	0.152	0.012	0.007	0.006
2∗HCBS/NH ratio	0.785	0.016	0.033	0.142	0.012	0.006	0.005
2∗HCBS probability	0.772	0.016	0.035	0.152	0.012	0.008	0.006
2∗NH probability	0.772	0.016	0.035	0.151	0.012	0.008	0.006
Good health							
Baseline	0.699	0.030	0.054	0.170	0.023	0.013	0.012
2∗HCBS/NH ratio	0.712	0.030	0.052	0.160	0.023	0.011	0.011
2∗HCBS probability	0.699	0.030	0.054	0.170	0.023	0.012	0.012
2∗NH probability	0.697	0.030	0.056	0.168	0.022	0.013	0.013
Poor health							
Baseline	0.559	0.061	0.097	0.157	0.064	0.033	0.028
2∗HCBS/NH ratio	0.569	0.063	0.095	0.150	0.065	0.030	0.028
2∗HCBS probability	0.559	0.061	0.097	0.156	0.065	0.034	0.029
2∗NH probability	0.553	0.061	0.104	0.152	0.061	0.036	0.032

Notes: IL = independent living; IC = intergenerational coresidence; NH = nursing home.

Table 6.12: Policy Simulation Results by Initial Subjective Health: Unmarried Households

Policy Simulations	Probability Levels						
	IL, no care	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
Excellent health							
Baseline	0.627	0.035	0.059	0.186	0.035	0.019	0.040
2∗HCBS/NH ratio	0.636	0.033	0.057	0.185	0.036	0.015	0.036
2∗HCBS probability	0.629	0.035	0.059	0.186	0.035	0.020	0.040
2∗NH probability	0.625	0.034	0.059	0.185	0.034	0.020	0.043
Good health							
Baseline	0.529	0.054	0.083	0.184	0.055	0.034	0.060
2∗HCBS/NH ratio	0.541	0.052	0.082	0.183	0.057	0.027	0.057
2∗HCBS probability	0.528	0.054	0.085	0.182	0.055	0.035	0.062
2∗NH probability	0.525	0.052	0.085	0.181	0.053	0.035	0.069
Poor health							
Baseline	0.399	0.075	0.126	0.143	0.087	0.073	0.096
2∗HCBS/NH ratio	0.414	0.072	0.127	0.143	0.093	0.059	0.093
2∗HCBS probability	0.397	0.075	0.131	0.137	0.087	0.073	0.099
2∗NH probability	0.389	0.070	0.132	0.132	0.080	0.073	0.122

Notes: IL = independent living; IC = intergenerational coresidence; NH = nursing home.

Table 6.13: Policy Simulation Results by Initial Functional Health: Married Households

Policy Simulations	Probability Levels						
	IL, no care	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
No disability							
Baseline	0.751	0.019	0.040	0.160	0.014	0.009	0.007
2∗HCBS/NH ratio	0.764	0.020	0.039	0.150	0.014	0.008	0.007
2∗HCBS probability	0.751	0.019	0.040	0.160	0.014	0.009	0.007
2∗NH probability	0.749	0.020	0.041	0.159	0.014	0.009	0.008
Moderate disability							
Baseline	0.622	0.050	0.075	0.167	0.044	0.022	0.019
2∗HCBS/NH ratio	0.634	0.051	0.073	0.159	0.044	0.020	0.019
2∗HCBS probability	0.623	0.049	0.075	0.167	0.044	0.023	0.020
2∗NH probability	0.619	0.050	0.078	0.164	0.043	0.023	0.022
Severe disability							
Baseline	0.492	0.075	0.122	0.132	0.083	0.043	0.053
2∗HCBS/NH ratio	0.505	0.077	0.119	0.123	0.085	0.039	0.051
2∗HCBS probability	0.492	0.073	0.122	0.131	0.084	0.043	0.055
2∗NH probability	0.483	0.075	0.131	0.128	0.078	0.131	0.128

Notes: IL = independent living; IC = intergenerational coresidence; NH = nursing home.

Table 6.14: Policy Simulation Results by Initial Functional Health: Unmarried Households

Policy Simulations	Probability Levels						
	IL, no care	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
No disability							
Baseline	0.611	0.036	0.063	0.196	0.036	0.021	0.037
2∗HCBS/NH ratio	0.622	0.034	0.062	0.195	0.036	0.017	0.034
2∗HCBS probability	0.610	0.036	0.064	0.195	0.036	0.022	0.038
2∗NH probability	0.609	0.035	0.064	0.194	0.035	0.022	0.042
Moderate disability							
Baseline	0.409	0.085	0.116	0.142	0.093	0.055	0.100
2∗HCBS/NH ratio	0.422	0.084	0.116	0.144	0.095	0.043	0.096
2∗HCBS probability	0.407	0.085	0.118	0.139	0.092	0.056	0.103
2∗NH probability	0.401	0.082	0.118	0.139	0.088	0.056	0.117
Severe disability							
Baseline	0.306	0.088	0.145	0.106	0.103	0.095	0.157
2∗HCBS/NH ratio	0.318	0.087	0.148	0.104	0.111	0.080	0.152
2∗HCBS probability	0.304	0.086	0.149	0.102	0.103	0.097	0.158
2∗NH probability	0.298	0.081	0.149	0.098	0.094	0.096	0.183

Notes: IL = independent living; IC = intergenerational coresidence; NH = nursing home.

6.3.2 Effects of Policy Experiments Based on Initial Wealth

Table 6.15 - Table 6.16 show the comparison between baseline results and policy experiments based on the sample's initial wealth (i.e., wealth that the elderly enter the sample with). I divide the married and the unmarried samples into four initial wealth quartiles.

A 100% increase in the HCBS to nursing home spending ratio has some effects across all initial wealth groups. Regardless of the household's initial wealth and marital status, the policy change increases the probability of living independently with no care by roughly one percentage point. In the case of married households, it also decreases intergenerational coresidence with no care by roughly one percentage point across all wealth quartiles. Living arrangements with formal home care have lower probabilities in general. Unmarried households with lower than median initial wealth, where the twofold increase in the spending ratio increases intergenerational coresidence with informal care. This is consistent with the earlier results by health groups, especially if people with low wealth also have poor health. The policy change has the expected effects on nursing home use. It decreases the probability of institutionalization by an average of 0.3 percentage point for unmarried households.

The effects of the change in the probabilities of receiving HCBS benefits and nursing home benefits are as expected. They are pronounced only among households with low initial wealth (the first quartile for married households and lower than median wealth for unmarried households). These individuals are more likely to be eligible for Medicaid, which is a means-tested program.

Table 6.15: Policy Simulation Results by Initial Wealth: Married Households

Policy Simulations	Probability Levels						
	IL, no care	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
Wealth: First Quartile							
Baseline	0.602	0.043	0.057	0.217	0.047	0.019	0.014
2∗HCBS/NH ratio	0.617	0.044	0.056	0.206	0.047	0.017	0.014
2∗HCBS probability	0.603	0.042	0.057	0.216	0.047	0.020	0.015
2∗NH probability	0.598	0.044	0.062	0.213	0.046	0.021	0.017
Wealth: Second Quartile							
Baseline	0.731	0.021	0.043	0.175	0.014	0.010	0.007
2∗HCBS/NH ratio	0.744	0.021	0.041	0.165	0.014	0.009	0.006
2∗HCBS probability	0.731	0.021	0.043	0.175	0.014	0.010	0.007
2∗NH probability	0.730	0.021	0.043	0.175	0.014	0.010	0.007
Wealth: Third Quartile							
Baseline	0.769	0.019	0.043	0.142	0.011	0.009	0.008
2∗HCBS/NH ratio	0.783	0.019	0.041	0.132	0.011	0.008	0.007
2∗HCBS probability	0.770	0.019	0043	0.142	0.011	0.009	0.008
2∗NH probability	0.769	0.019	0.043	0.141	0.011	0.009	0.008
Wealth: Fourth Quartile							
Baseline	0.801	0.017	0.044	0.112	0.008	0.008	0.010
2∗HCBS/NH ratio	0.812	0.017	0.042	0.104	0.008	0.007	0.010
2∗HCBS probability	0.801	0.017	0.044	0.112	0.008	0.008	0.011
2∗NH probability	0.800	0.017	0.044	0.112	0.008	0.008	0.011

Notes: IL = independent living; IC = intergenerational coresidence; NH = nursing home.

Table 6.16: Policy Simulation Results by Initial Wealth: Unmarried Households

Policy Simulations	Probability Levels						
	IL, no care	IL, informal	IL, formal	IC, no care	IC, informal	IC, formal	NH
Wealth: First Quartile							
Baseline	0.390	0.067	0.101	0.206	0.095	0.064	0.076
2∗HCBS/NH ratio	0.402	0.066	0.101	0.207	0.099	0.051	0.074
2∗HCBS probability	0.388	0.067	0.106	0.201	0.095	0.065	0.079
2∗NH probability	0.381	0.063	0.108	0.197	0.088	0.066	0.097
Wealth: Second Quartile							
Baseline	0.527	0.049	0.078	0.205	0.053	0.032	0.055
2∗HCBS/NH ratio	0.539	0.048	0.077	0.204	0.055	0.026	0.051
2∗HCBS probability	0.526	0.050	0.079	0.203	0.053	0.033	0.057
2∗NH probability	0.522	0.048	0.079	0.202	0.051	0.033	0.066
Wealth: Third Quartile							
Baseline	0.610	0.040	0.065	0.181	0.037	0.022	0.045
2∗HCBS/NH ratio	0.620	0.039	0.064	0.180	0.038	0.018	0.042
2∗HCBS probability	0.609	0.040	0.065	0.181	0.037	0.022	0.045
2∗NH probability	0.609	0.040	0.065	0.181	0.037	0.022	0.047
Wealth: Fourth Quartile							
Baseline	0.649	0.040	0.071	0.144	0.028	0.017	0.050
2∗HCBS/NH ratio	0.661	0.038	0.069	0.143	0.028	0.013	0.047
2∗HCBS probability	0.648	0.040	0.071	0.144	0.029	0.017	0.051
2∗NH probability	0.648	0.040	0.071	0.144	0.028	0.017	0.052

Notes: IL = independent living; IC = intergenerational coresidence; NH = nursing home.

6.3.3 Effects of Policy Experiments Based on Intergenerational Transfers

I divide the sample into groups based on the simulated outcomes of intergenerational transfers in each period. If the elderly are simulated to not make an inter vivos transfer in period t, I put them in the no transfer group in period t. If the elderly are simulated to make an inter vivos transfer in period t, I categorize them based on whether they make more than the median amount of inter vivos transfers in period t. I repeat the process for every period. Also, since bequest intent represents a promise of future transfers, I group individuals based on their simulated outcomes of bequest intent in every period. The comparisons between the baseline results and policy experiments for groups of inter vivos transfers are shown in Table 6.17 - Table 6.18 and for groups of bequest intent in Table 6.19 - Table 6.20.

The results show no clear patterns and the results by inter vivos transfers and by bequest intent are not always consistent. For example, at the baseline, the probability of living independently with informal care decreases as the amount of inter vivos transfers increases, but it increases as the household intends bequests.

What the results do suggest is that the exchange hypothesis, which argues that informal care can be manipulated by intergenerational transfers, does not seem to hold in the living arrangement outcomes. If it did hold, one would expect to see an increase in the probability of informal care arrangements (or at least intergenerational coresidence) as the amount of inter vivos transfers increases and as the household promises bequests in the future. However, considering the amount of inter vivos transfers that an adult child receives on average (a small 2780 USD for two years), it is understandable that the impact of intergenerational transfers on living arrangements is not detectable at the household level. It would seem that adult children provide informal care not because they receive compensation from the parents but for reasons that are beyond the scope of this dissertation (possibly altruistically motivated).

My results on the impact of intergenerational transfers are not sensitive to the assumption on the timing in which intergenerational transfers influence living arrangement outcomes through the provision of informal care. In this research, I follow the literature in making the assumption that intergenerational transfers impact informal care only contemporaneously. No

lagged intergenerational transfers enter the model specifications. In an alternative empirical model that I estimate, I explore a different assumption. I include lagged inter vivos transfer amount and lagged bequest intent in the per-period equations, essentially allowing past intergenerational transfers to have a direct impact on living arrangements. The regression results are as follows. For married households, lagged inter vivos transfer amount and lagged bequest intent seem to induce informal care in the independent living setting but not when the parent lives with her children. They significantly predict intergenerational coresidence with no care, relative to living independently with no care but do not have the same sign. For unmarried households, lagged intergenerational transfers statistically significantly increase the use of formal home care but have no impact on the receipt of informal care. The results of the alternative model with and without unobserved heterogeneity are available upon request. They reinforce the earlier conclusion that intergenerational transfers do not enter living arrangements through the channel suggested by the exchange hypothesis.

The above sections show that living arrangements are affected by health, particularly functional health, and wealth and they can be manipulated by public policies, although the effects are small. Also, while affecting the distribution of unobserved heterogeneity (since the unobserved heterogeneity parameters for these equations are significant according to Table E.8), inter vivos transfers and bequest intent do not seem to have an impact on living arrangements.

Table 6.17: Policy Simulation Results by Inter Vivos Transfers: Married Households

Policy Simulations	Probability Levels						
	IL, no care	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
No inter vivos transfers							
Baseline	0.735	0.028	0.050	0.145	0.020	0.011	0.011
2∗HCBS/NH ratio	0.746	0.028	0.048	0.136	0.021	0.010	0.010
2∗HCBS probability	0.734	0.028	0.050	0.145	0.021	0.012	0.011
2∗NH probability	0.731	0.028	0.052	0.144	0.021	0.012	0.012
Less than median inter vivos transfers							
Baseline	0.719	0.022	0.041	0.182	0.019	0.011	0.006
2∗HCBS/NH ratio	0.737	0.022	0.039	0.169	0.018	0.010	0.005
2∗HCBS probability	0.724	0.021	0.040	0.179	0.018	0.011	0.006
2∗NH probability	0.727	0.022	0.041	0.175	0.018	0.011	0.006
More than median inter vivos transfers							
Baseline	0.718	0.015	0.040	0.192	0.015	0.011	0.009
2∗HCBS/NH ratio	0.733	0.015	0.037	0.182	0.015	0.010	0.008
2∗HCBS probability	0.718	0.015	0.038	0.193	0.015	0.011	0.010
2∗NH probability	0.716	0.015	0.039	0.195	0.014	0.011	0.009

Notes: IL = independent living; IC = intergenerational coresidence; NH = nursing home.

Table 6.18: Policy Simulation Results by Inter Vivos Transfers: Unmarried Households

Policy Simulations	Probability Levels						
	IL, no care	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
No inter vivos transfers							
Baseline	0.544	0.052	0.083	0.171	0.053	0.034	0.064
2∗HCBS/NH ratio	0.555	0.050	0.081	0173	0.055	0.027	0.059
2∗HCBS probability	0.542	0.052	0.084	0.171	0.052	0.034	0.064
2∗NH probability	0.539	0.050	0.085	0.169	0.050	0.034	0.072
Less than median inter vivos transfers							
Baseline	0.580	0.037	0.049	0.245	0.046	0.025	0.018
2∗HCBS/NH ratio	0.591	0.036	0.049	0.239	0.048	0.020	0.016
2∗HCBS probability	0.581	0.037	0.049	0.239	0.049	0.028	0.018
2∗NH probability	0.586	0.038	0.049	0.240	0.044	0.025	0.018
More than median inter vivos transfers							
Baseline	0.612	0.036	0.072	0.175	0.037	0.024	0.044
2∗HCBS/NH ratio	0.622	0.034	0.074	0.167	0.038	0.019	0.047
2∗HCBS probability	0.609	0.036	0.075	0.166	0.037	0.025	0.053
2∗NH probability	0.603	0.035	0.072	0.172	0.038	0.025	0.055

Notes: IL = independent living; IC = intergenerational coresidence; NH = nursing home.

Table 6.19: Policy Simulation Results by Bequest Intent: Married Households

Policy Simulations	Probability Levels						
	IL, no care	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
No bequest intended							
Baseline	0.704	0.023	0.040	0.191	0.022	0.012	0.008
2∗HCBS/NH ratio	0.720	0.022	0.038	0.179	0.022	0.010	0.007
2∗HCBS probability	0.703	0.022	0.040	0.192	0.022	0.012	0.008
2∗NH probability	0.702	0.023	0.042	0.189	0.021	0.012	0.009
Bequest intended							
Baseline	0.757	0.026	0.053	0.126	0.016	0.010	0.011
2∗HCBS/NH ratio	0.767	0.027	0.052	0.117	0.016	0.009	0.012
2∗HCBS probability	0.758	0.026	0.053	0.124	0.016	0.011	0.012
2∗NH probability	0.755	0.027	0.054	0.125	0.017	0.011	0.012

Notes: IL = independent living; IC = intergenerational coresidence; NH = nursing home.

Table 6.20: Policy Simulation Results by Bequest Intent: Unmarried Households

Policy Simulations	Probability Levels						
	IL, no care	**IL, informal**	**IL, formal**	**IC, no care**	**IC, informal**	**IC, formal**	**NH**
No bequest intended							
Baseline	0.554	0.044	0.065	0.211	0.052	0.031	0.044
2∗HCBS/NH ratio	0.568	0.041	0.063	0.209	0.053	0.024	0.041
2∗HCBS probability	0.555	0.043	0.065	0.211	0.053	0.031	0.042
2∗NH probability	0.553	0.041	0.066	0.207	0.049	0.032	0.051
Bequest intended							
Baseline	0.561	0.053	0.092	0.146	0.047	0.033	0.068
2∗HCBS/NH ratio	0.569	0.053	0.092	0.145	0.049	0.026	0.065
2∗HCBS probability	0.558	0.053	0.094	0.143	0.047	0.033	0.073
2∗NH probability	0.554	0.052	0.093	0.145	0.046	0.032	0.078

Notes: IL = independent living; IC = intergenerational coresidence; NH = nursing home.

Chapter 7

Conclusions

In this dissertation, I uncover the dynamics of living arrangements among the elderly, separating households by their marital status and identifying important predictors of living arrangements. I assess the impact of intergenerational transfers on living arrangements and quantify the extent to which public policies, particularly Medicaid, affect living arrangements.

I use the nonlinear discrete factor random effects estimation method and jointly estimate outcomes of living arrangements, savings, inter vivos transfers, bequest intent, subjective health, functional health and actual bequests. I account for unobserved heterogeneity that is correlated across equations and across time. I use the data from the 1995-2006 waves of the Health and Retirement Study (HRS) and supplement them with data on public policies, particularly Medicaid, and costs of care.

The results suggest that, among the joint decisions that the elderly make, living arrangements are strongly influenced by subjective and functional health and by savings. The most predominant predictor of living arrangements is functional health. Elderly individuals with better health and more bequeathable wealth are more likely to live independently with no care. When health deteriorates, some care is put in place. The main difference between informal care, on one hand, and formal home care and nursing home care, on the other, is that the former is likely provided only when the burden on the adult children is relatively low. That is, at least for unmarried households, informal care is more likely when the elderly have moderate disability relative to no disability and relative to severe disability and when the elderly have good health relative to excellent health and relative to poor health. Savings significantly

affect living arrangements but only as far as no care is involved. When care is required, health dominates.

Inter vivos transfers and bequest intent impact living arrangements only to the extent that they affect the distribution of unobserved heterogeneity, evidenced by the statistical significance of the unobserved heterogeneity parameters in these equations. The unobserved heterogeneity parameters for the intergenerational transfer equations also have the same signs across the mass points, implying that individuals who make intergenerational transfers and those who do not are of different types. However, the directions in which intergenerational transfers impact the behavior of different 'types' of individuals such that they ultimately influence living arrangements are unclear. Nevertheless, the results offer no support for the exchange theory as far as living arrangements are concerned.

It should be noted that the lack of evidence for the exchange theory is not proof against its validity. To test if the hypothesis is valid is better done at the child level, where the behavior of each child in the same household is observed. In this research, I consider only the average characteristics and the average behavior of children in the family and do not distinguish between adult children who receive intergenerational transfers and those who do not, nor do I consider if intergenerational transfers motivate the recipient to provide informal care.

Public policies have a role in the determination of living arrangements. Transfer tax policies do not have a significant effect on living arrangements. I focus on Medicaid. In particular, I study the impact of an increase in the ratio of home- and community-based services (HCBS) to nursing home spending, an increase in the expected benefits of HCBS among Medicaid eligibles and an increase in the expected benefits of nursing home care among Medicaid eligibles. The expected benefits refer to the probability of receiving such services multiplied by the costs of such services that would otherwise be paid out of pocket, so I use the term interchangeably with the probability of receiving HCBS or of receiving nursing home benefits.

The policy changes have small but significant effects on living arrangements. A twofold increase in the ratio of HCBS to nursing home spending is associated with an increase of about one percentage point in the probability of living independently with no care and a

small decrease in the use of formal home care (by about a 0.1 percentage point for married households and a 0.6 percentage point for unmarried households). In the case of married households, the policy change is also associated with a decrease of about one percentage point in the probability of intergenerational coresidence with no care. A decrease in the probability of any living arrangement seems to be fully absorbed by the increase in the probability of living independently with no care. In the case of unmarried households, with poor subjective and functional health and lower than median wealth entering the sample, the policy change shows a decrease in the use of formal home care, an increase in the probability of living independently with no care and an increase in the probability of living in an intergenerational household with informal care. There is also a small decrease in the use of nursing home care among unmarried households with poor initial health and poor initial wealth too.

Note that so long as the increase in the ratio of HCBS to nursing home spending decreases institutionalization, the results are not inconsistent with the services provided by HCBS. Along with home-based nursing services, HCBS also includes services that are amenable to living independently such as environmental modifications, transportation and meal services and to receiving informal care such as subsidies to informal care providers (excluding spouses) and respite. However, the results beg the questions of 1) the extent to which HCBS services are widespread and accessible to people on Medicaid, 2) the target population of HCBS services in each state, 3) the area of care or services that the spending on HCBS services goes to and 4) the ease at which informal caregivers (adult children) can become eligible for subsidies. These pieces of information are largely missing in the literature (Muramatsu et al., 2007). With an increase in the government's commitment to keeping the elderly in the community, research in these directions could shed some light on, for example, whether or not the elderly replace formal home care with non-medical services that make living independently easier or with informal care. We may also need to evaluate the effectiveness of the HCBS services in keeping the elderly in the community.

An increase in the probabilities of receiving HCBS services and NH services shows clear substitution effects. Medicaid eligibles who have better access to those services at a low cost subsitute away from the living arrangements with no care and informal care towards

the arrangements with formal home care and nursing home care. The effects are small (less than 0.1% for the entire sample). However, they are much more pronounced among those with poor initial health and low initial wealth, as these individuals are more likely to receive Medicaid benefits. For example, a twofold increase in the probability of receiving nursing home benefits among Medicaid eligibles is associated with an increase of a 7.5 percentage point in the probability of living in a nursing home among married individuals with severe disability.

Overall, the policy experiments suggest public policies have behavioral effects on elderly individuals in that they induce changes towards living arrangements that are most beneficial to the elderly. There is also evidence of crowding out of private efforts; informal care is replaced by formal home care and nursing home care when the probabilities of receiving Medicaid benefits among Medicaid eligibles increase.

In light of the above results, in addition to gathering more data on public policies, future research should take into account the fact that health is the most predominant factor of living arrangements. Models that involve more complex interactions of health with intergenerational transfers and/or Medicaid could give a more detailed insight into how the elderly switch into and out of a living arrangement.

An assessment of different services offered by the Medicaid program will also be useful. That a 100% increase in various Medicaid benefits yields small changes in living arrangements makes obvious the fact that the government needs to increase spending on Medicaid services on a regular basis, if they wish to keep people in the community. What is less obvious is which Medicaid services being offered provide the best results. For example, it is possible that respite counteracts the crowding out effects of Medicaid and states that provide such service experience a higher success rate than states that do not.

Another direction in which future research could go into is whether Medicaid has spillover effects. The externalities could be on family caregiving resources or the use of professionally provided care by the elderly, given their Medicaid status. The effects will likely be different among individuals who are fully covered by Medicaid, those who are only partially covered by Medicaid and those who do not benefit directly from Medicaid. Considering that there are services that overlap between Medicaid and other public programs, such as temporary hospice

and home health services by Medicare Part A or care subsidies by the Older Americans Act, it is likely that an increase in Medicaid spending in one publicly provided service has unanticipated benefits in other services and to individuals not covered by the program.

Appendix A

Medicaid for the Elderly

One way in which the Medicaid health care program can be understood is to consider it in conjunction with Medicare. Enacted in 1965, the Medicare health care program covers almost all of the United States' elderly, defined as 65 years of age or older. The program is provided by the federal government. Medicare covers and guarantees hospital care and physician services. The program's coverage does not vary by state of residence and Medicare beneficiaries can choose their medical care providers (Rowland and Lyons, 1996). However, Medicare does not cover a number of medical services deemed necessary for the elderly and it is not free.

Medicare coverage can be categorized into Medicare Part A, Part B, Part C and Part D. Medicare Part A is also called the "Original Medicare Plan", provided by the federal government. Medicare beneficiaries upon being eligible can choose to add Part B and Part D. The combination of Medicare Part A and Part B constitutes Medicare Part C otherwise known as a "Medicare Advantage Plan" and it is provided by a private insurance company that is approved by the federal government. Part D is a stand-alone prescription drug coverage insurance that is provided by private insurance companies. I discuss Medicare Part A and Part B (thereby indirectly referring to Part C) to illustrate the fact that Medicare is not all-inclusive and not free.

Medicare Part A provides coverage of short-term hospital care, hospice and inpatient care at a skilled nursing facility as well as home health services. Medicare Part B covers outpatient care, physician and ambulatory services as well as home health care visits. Among a list of medical services not covered by Medicare are outpatient prescription drugs, vision care, long term care and nursing home care.

Medicare beneficiaries pay a deductible for Medicare Part A. They pay a premium, a deductible and some percentage of coinsurance (typically 20%) for Medicare Part B. The

nation's out of pocket spending on premiums and deductibles for Medicare Part A and Part B alone averaged at 913 USD for the poor elderly in 1994, accounting for roughly one-third of their wealth (Rowland and Lyons, 1996).

The Medicaid health care program fills the gap for poor elderly Medicare beneficiaries; around six million Medicare beneficiaries (roughly 12%) in 1999 were also Medicaid-eligible (Schneider et al., 1999). Its coverage includes (1) medical services not covered by Medicare, most notably long term care and outpatient prescription drugs and (2) payment of the costs of Medicare (Part B) premiums and coinsurance. Unlike federally-managed Medicare, Medicaid is funded and administered by both the federal and the state governments. The federal government provides guidelines on Medicaid eligibility rules, benefits and payment rates but the state governments are given flexibility in implementing these guidelines.

States determine the list of medical services included in the Medicaid coverage. Federal law requires that the following services be included as part of Medicaid coverage: inpatient and outpatient hospital services, physician services, lab and x-ray, services provided by federally-qualified health centers (FQHCs) and rural health clinics (RHCs), home health care, nursing home and transportation for medical services. They can opt (but are not required by the federal law) to cover prescription drugs, physical therapy services, dental services and home and community-based care services for persons with impairments (also known as section 1915(c) waivers or HCBS waivers). Particularly relevant to this paper is the provision of nursing home, home health care and HCBS.

Some states also exercise program waivers, determining the care delivery systems for Medicaid beneficiaries. The most common program waiver is under Section 1915 (b) which allows states to implement a managed care system, thereby limiting Medicaid recipients to a specific set of care providers. Managed care often entails enrollment with health maintenance organizations (HMOs), managed care organizations (MCOs) and Primary Care Case Management (PCCM) system. Medicaid beneficiaries needing care are to seek providers within these networks only.

Medicaid eligibility rules are complicated. They differ from one state to another and the extent of coverage received by each Medicaid beneficiary varies depending on the pathway in

which they become eligible. Some Medicaid beneficiaries are entitled to full Medicaid coverage, receiving medical services not covered by Medicare at little or no cost, while others are entitled to partial Medicaid coverage. Partial Medicaid coverage refers to assistance with Medicare Part B premium and coinsurance requirements and excludes medical services outside of the Medicare coverage that would otherwise be paid for under full Medicaid coverage (e.g., long term care and nursing home stay).

Regardless of the extent of coverage received, federal law requires that an individual meet non-financial and financial requirements in order to qualify for Medicaid. The non-financial requirements include 1) being in a qualifying category (e.g., being of a certain age or having disabilities); 2) being an U.S. citizen or legal immigrants (–please refer to the 1996 Welfare law for more details) and 3) being a resident of the state whose Medicaid coverage the individual is applying for. The financial requirements include meeting the income and the asset ('resource') criteria. Income and asset eligibility rules refer to the standard (the amount of income or assets the individual possesses) and the methodology (the way in which income and assets are counted for the purpose of Medicaid eligibility). Income and asset eligibility rules are state-specific and they are different for different Medicaid eligibility pathways.

Depending on their state of residency, there is more than one pathway in which an elderly individual can become entitled to full Medicaid coverage. The first pathway, mandatory according to the federal law, is through the 'categorically needy' program. Individuals qualify for Medicaid if they are eligible for Supplemental Security Income (SSI) or have an income less than 74% of the Federal Poverty Level (FPL). In some states, persons are eligible for Medicaid through receiving state assistance according to the 209(b) option in the 1972 Social Security Act Amendments. The 209(b) states implement more restrictive income and resource requirements than SSI and allow individuals to spend down their incomes but not their resources for Medicaid eligibility unlike states with the SSI pathway which do not allow spending down at all.

The SSI states vary in terms of what counts as countable income and what counts as countable resources when determining SSI eligibility. However, typically Social Security does not count the following sources of income and resources: -

1) the first 20 USD a month of most incomes;

2) the first 65 USD a month of earned incomes and half the amount over 65 USD;

3) food stamps;

4) shelter received from non-profit organizations;

5) most home energy assistance;

6) part of the spouse's income and resources;

7) the home the SSI applicant lives in and the land it is on;

8) life insurance policies with a face value of $1500 or less;

9) the applicant's car (usually);

10) burial plots for the applicant and her immediate family members; and

11) up to 1500 USD in burial funds for the applicant and/or her spouse.

Full Medicaid coverage is possible through other pathways at state option. One of the optional pathways is for elderly persons who receive State Supplementation Payments (SSP) but not SSI payments. In 1998, all but seven states provided some amount of SSP payment for the elderly poor but only 28 states made available Medicaid coverage to SSP recipients.

Another pathway is when the Medicaid benefits are extended to elderly persons with incomes up to 100% of the FPL. Many elderly persons who receive SSI also receive Social Security benefits and Social Security benefits increase with the costs of living. When the costs of living are higher, Social Security benefits increase and may tip the amount of income the individual has over the SSI threshold. However, these individuals would still qualify for Medicaid under the so-called 'Pickle Amendment'.

Another pathway to become eligible for full Medicaid coverage is through elderly individuals being 'medically needy'. Individuals are allowed to spend down their incomes (but not their resources) to qualify for Medicaid by deducting incurred medical expenses from their excess income. In 1998, 35 states had a Medically Needy program.

The final pathway is when states increase the income limit for already institutionalized individuals with too much income to qualify for Medicaid through the categorically needy channel but not enough to cover the costs of nursing home. The increased limit can be as high as 300% of the SSI standard. Eligible individuals are required to spend all of their incomes

on the costs of nursing home except for a small personal needs allowance. The special income rule has an upper income threshold but the medically needy program does not. In 1998, 33 states had the 300% rule in effect.

States under the section 1915(c) waiver authority can choose to provide home and community-based services (HCBS) for elderly individuals at risk of institutionalization, in addition to nursing home and home health care. The HCBS waiver essentially provides subsidies to the use of formal home care and informal care providers to encourage keeping the elderly in the community and to reduce the costs of nursing home care paid for by the state governments. The HCBS waiver is offered to specific populations and its eligibility rules again vary depending on the state of residency. Some states use the 300% rule while others employ the 'medically needy' spend-down rules (Bruen et al., 1999).

Complication in establishing eligibility for an individual arises when he/she is married, receives Medicaid benefits while the spouse does not, yet the couple shares income and resources. A special set of income and resource methodologies, known as the spousal impoverishment methodologies, applies to married couples separated by the institutionalization of one spouse. The same methodologies may or may not apply to couples separated by the HCBS waiver. The purpose of spousal impoverishment rules is to accommodate the institutionalized spouse to receive Medicaid benefits while allowing the community spouse to retain sufficient wealth.

The spousal impoverishment rules are different for income and assets. With respect to income, when one member of the married couple applies for Medicaid, the income of the couple is divided to each member according to individual ownership. Shared income is split equally. Income of the community spouse is protected after Medicaid eligibility has been established for the institutionalized spouse, subject to a maximum and minimum income standard. For example, in 1999, the minimum amount of income the community spouse was allowed to keep was 1382.50 USD per month and the maximum was 2049 USD per month. With regard to assets, the countable resources are calculated and the community spouse is allowed to keep half of the resources, again subject to a maximum and a minimum amount. The institutionalized spouse must spend down the remaining resources to the SSI level before qualifying for Medicaid.

Federal law requires that states provide partial Medicaid coverage to a number of Medicare

beneficiaries who are not poor enough to qualify for full Medicaid coverage yet are poor enough to be in need of assistance for Medicare premiums and coinsurance. Individuals eligible for partial Medicaid coverage can be grouped into the following categories.

1. Qualified Medicare Beneficiaries (QMBs) are persons with income up to 100% of the FPL. Medicaid pays the Medicare Part A and B premiums, deductibles and cost sharing related to Medicare covered benefits.

2. Specified Low-Income Medicare Beneficiaries (SLIMBs) are those with incomes between 100% and 120% of the FPL. Medicaid pays the Medicare Part B premium.

3. Qualified Individuals (QIs) are those whose incomes are between 120% and 135% or up to 175% of the FPL depending on their state of residency. Medicaid pays the Medicare Part B premium.

4. Qualified Disabled and Working Individuals (QDWIs) are persons with incomes between 100% and 200% of the FPL or disabled persons who lost their Medicare Part A benefits because their earnings had increased. Medicaid pays Medicare Part A deductibles.

Despite a broad range of pathways in which an elderly person may qualify for Medicaid, relatively recent developments have made it more difficult for eligible individuals to take advantage of Medicaid benefits. The supply restrictions imposed by some states include the Certificate of Need (CON) or construction moratorium restrictions and the Medicaid reimbursement rate that is lower than the private-pay and Medicare rates. The CON restriction regulates growth of nursing home beds and the conversion of hospital beds into nursing home beds. The low reimbursement rate may induce nursing homes to accept higher-paying residents and then fill up the remaining beds with Medicaid beneficiaries (Grabowski, 2001).

In light of the analysis of living arrangements chosen by the elderly, state variations in Medicaid eligibility rules, benefits and supply restrictions will have to be taken into account. While the original Medicaid plan clearly reduces the costs of institutionalization for eligible individuals and makes nursing home a more attractive living mode for the elderly, the introduction of HCBS gives the elderly an added incentive to live independently or with their children, especially when the nursing home bed restrictions are in place.

Table A.1: Medicaid Eligibility by Marital Status and Living Arrangement: 1998*

States	Income Limits: Community Living		Income Limits: Nursing Home	Asset Limits: Community Living	
	Singles	Couples	Residents	Singles	Couples
AL	494	741	1482	2000	3000
AK	856	1269	1482	2000	3000
AZ	494	741	1482	2000	3000
CA	650	1156	650	2000	3000
CO	533	1086	1482	2000	3000
CT[a]	747	1094	1482	1600	2400
DC	494	741	512	2000	3000
FL	494	741	1482	2000	3000
ID	542	758	1482	2000	3000
IL[a]	283	375	283	2000	3000
IN[a]	494	741	494	1500	2250
IA	516	763	1482	2000	3000
KS	494	741	494	2000	3000
ME	504	756	1482	2000	3000
MA	623	943	623	2000	3000
MI	508	769	1482	2000	2000
MN[a]	575	852	575	3000	6000
MO[a]	494	741	494	999.99	2000
NE	502	839	502	2000	3000
NV	530	815	1482	2000	3000
NH[a]	521	762	1482	1500	1500
NJ	525	766	1482	2000	3000
NY	580	844	580	2000	3000
NC	494	741	494	2000	3000
ND[a]	494	741	494	3000	6000
OH[a]	427	741	1482	1500	2250
OK[a]	547	847	1482	2000	3000
OR	496	741	1482	2000	3000
PA	521	785	1482	2000	3000
RI	558	862	1482	2000	3000
SD	509	756	1482	2000	3000
TX	494	741	1482	2000	3000
VT	549	844	549	2000	3000
VA[a]	494	741	1482	2000	3000
WA	521	762	1482	2000	3000
WI	578	873	578	2000	3000
WY	494	741	1482	2000	3000

Sources: Schneider et al. (1999); Bruen et al. (1999); Gardner and Gilleskie (2009)
Notes: (1) The figures refer to the maximum limits for the categorically needy pathway.(2) [a] represents 209(b) states.

Appendix B

Estate and Gift Tax

Appendix B discusses the transfer tax system. The umbrella term 'transfer tax' nests three types of tax that interact in a complex manner. First, gift tax is applied to a transfer of property for less than its full value, direct gifts such as cash, stocks, bonds, businesses or real estate, and indirect gifts such as a cancellation of debt or loaning 10,000 USD or more at less than the market interest rate. It applies to transfers to related or unrelated persons but does not apply to inter-spousal transfers. Gift tax that applies to related persons who are more than one generation younger than the donor is known as 'generation-skipping transfer tax' (GST). The nature of the GST tax is largely similar to the regular gift tax and therefore will not be discussed in detail. The gift tax is computed annually and gifts are liable to tax only when their values are above the annual exclusion amount. The difference between the total value of gifts given to a recipient in one year and the annual exclusion amount is cumulated over lifetime. Second, the estate tax applies to taxable estate upon death of the donor as well as the cumulated taxable gifts. Finally, capital gains tax, which is part of the income tax, applies to a transfer of an investment with unrealized capital gains. The basis on which capital gains tax is computed depends on whether the investment is given to the recipient as a gift or a bequest. The donor is usually responsible for the gift tax (although an agreement could be made otherwise) while the recipient is responsible for the estate and the capital gains tax. Table B.1 shows a brief historical evolution of transfer tax incentives and gives an insight into how the transfer tax system is shaped to its current form today. More details can be found in Luckey (2003).

Donors can exploit different avenues of tax avoidance in order to maximize the amount of wealth passed on to their children. The first feature of the gift tax that allows wealth to be transferred tax-free is the provision of annual exclusion amount and lifetime exclusion amount

Table B.1: Brief Overview of Historical Evolution of Transfer Tax Laws

Legislations	Contributions to the System
Tax Reform Act 1976 (effective 1997)	Unification of estate and gift taxes. Introduction of GSTT, applied to direct transfers to grandchildren. Gifts made within 3 years of death included in estate tax.
ERTA 1981 (effective 1982)	Unlimited marital deduction/ inter-spousal transfers. Tuition payment and medical expenses exempted from gift tax. Gift taxes made within 3 years of death included in estate tax.
Tax Reform Act 1984 (effective 1985)	Below-market rate loans considered taxable gifts.
Tax Reform Act 1986 (effective 1986)	GSTT extended to apply to trust provided for grandchildren.
Tax Relief Act 1997 (effective 1998)	Expansion of tax exclusion amounts, making it inflation-indexed.
EGTRRA 2001 (effective 2002)	Temporary changes to transfer tax rates made, effective until 2010.

Sources: Luckey (2003); Joulfaian (2007)
Notes: EGRTA = Economic Recovery Tax Act; EGTRRA = Economic Growth and Tax Relief Reconciliation Act

(or lifetime taxable gift limit). The annual exclusion amount determines the value of transfers that a donor can make tax-free in a particular year. The amount is per recipient and currently inflation-indexed using CPI-U for the year before the transfer. The lifetime exclusion amount determines the value of transfers that a donor can make tax-free in addition to the annual exclusion amount. The amount is per donor and should be thought of as a lifetime credit of gift tax allowance. Under the gift-splitting principle where married couples are treated as two individuals making gifts separately, the exclusion amounts (lifetime and annual) double for the household. Gifts are liable to the gift tax only when their total value for one recipient exceeds the annual exclusion amount. The donor may or may not have to pay the gift tax in that year, depending on whether she has used up her lifetime exclusion amount. Table B.2 shows the annual and lifetime exclusion amounts for the years 1992-2006.

The second feature of the gift tax that can be exploited to increase wealth transmitted to children is the fact that it operates on a tax exclusive basis. The gift tax is calculated based on the amount received by the recipient and not the total amount (including tax) given by the donor. The basis of the gift tax is therefore the post-tax value of transfer. This is in

Table B.2: Transfer Tax Exclusion Amounts 1992-2006

Year	Lifetime Exclusion*	Annual Exclusion*
1992	600,000	10,000
1993	600,000	10,000
1994	600,000	10,000
1995	600,000	10,000
1996	600,000	10,000
1998	625,000	10,000
2000	675,000	10,000
2002	1,000,000	11,000
2004	1,500,000	11,000
2006	2,000,000	12,000

Sources: IRS online publication 950; "History, Present Law, and Analysis of the Federal Wealth Transfer Tax System" (Staff of the Joint Committee on Taxation, 2007); Jacobson et al. (2007); Joulfaian (2007).
Notes: * denotes exclusion amount for single households. The amount doubles for married households.

stark contrast with the estate tax where the total amount relinquished by the donor is taxable, known as the tax inclusive basis. The implication is that, given that the gift and estate taxes have been unified, the effective rate of tax on gifts is typically lower than that on bequests or the statutory tax rate (as shown in Table B.3). It should also be noted that gifts surrendered within three years of the date of the donor's death are considered part of the estate tax. In other words, transfers that are made closer to the date of the donor's death lose their tax exclusive advantage.

The timing of the transfer of an investment matters. Under the current tax system, a transferred asset with unrealized capital gains is liable to the capital gains tax, which is computed based on the sale value of the asset minus the asset's basis (or costs of the seller). The basis is different if the asset is transferred as a gift than if it is part of the recipient's bequest. As a gift, the basis is known as carryover or that the basis of the donor is carried over to the recipient, with adjustments for the appreciation of the asset and a share of taxes already paid prior to the transfer. As part of the bequest, the asset is subject to what is known as the stepped up basis or the fair market value of the asset at the date of the donor's death (Luckey, 2003). If an investment has large unrealized capital gains, the stepped up basis will

Table B.3: Gift Tax Rate Schedule 1992-2006

Taxable gift/estate (USD)	Tax Rates					
	1992-2001	**2002**	**2003**	**2004**	**2005**	**2006**
0-10000	18	18	18	18	18	18
10-20000	20	20	20	20	20	20
20-40000	22	22	22	22	22	22
40-60000	24	24	24	24	24	24
60-80000	26	26	26	26	26	26
80-100000	28	28	28	28	28	28
100-150000	30	30	30	30	30	30
150-250000	32	32	32	32	32	32
250-500000	34	34	34	34	34	34
500-750000	37	37	37	37	37	37
750-1000000	39	39	39	39	39	39
1000-1250000	41	41	41	41	41	41
1250-1500000	43	43	43	43	43	43
1500-2000000	45	45	45	45	45	45
2000-2500000	49	49	49	48	47	46
2500-3000000	53	50	49	48	47	46
More than 3000000	55	50	49	48	47	46

Sources: Joulfaian (2007)

be greater than the carryover basis and the transfer of the investment is liable to less tax if it constitutes part of the bequest.

Elderly parents who understand the interactions among gift, estate and capital gains taxes can maximize the amount of wealth transferred to their children. It is clear that transfer-maximizing parents should give gifts equal to the value of the annual exclusion amount to each of their children every year. If the parents know their date of death with certainty, they should deplete the lifetime taxable limit 3 years before their death to take advantage of the tax exclusive basis. They should also leave an investment with large unrealized gains as part of the bequest because the asset's basis will be larger than if the investment is given as a gift. Careful estate planning should entail making gifts at an increasing rate as the elderly grow older. The literature review discusses evidence of whether the elderly fully exploit the transfer tax system.

Appendix C

Comparison Between Retained and Discarded Data

Table C.1: Comparison Between Samples: Dependent Variables

Variables	**Retained Data**	**Discarded Data**
Living arrangement (LA_t)		
- % nursing home ($j = 6$)	2.51	2.61
- % coresident, formal home care ($j = 5$)	1.99	2.35
- % coresident, informal care ($j = 4$)	3.04	3.12
- % coresident, no care ($j = 3$)	16.58	30.30
- % independent, formal home care ($j = 2$)	5.73	4.67
- % independent, informal care ($j = 1$)	3.43	2.45
- % independent, no care ($j = 0$)	66.73	54.49
Savings$*10^{-4}$(A_t)	31.319	30.061
	(123.03)	(151.07)
Any inter vivos transfer (IV_t)	0.331	0.231
	(0.471)	(0.421)
Amount of IV transfers/ child$*10^{-4}$(IVA_t)	0.278	0.313
(conditional on any)	(1.088)	(1.504)
Bequest intent (B_t)	0.486	0.315
	(0.499)	(0.465)

Table C.1 (Continued)

Variables	**Retained Data**	**Discarded Data**
Subjective health (H_{t+1})		
- % excellent/very good ($h = 3$)	36.41	38.14
- % good/fair ($h = 2$)	49.33	43.29
- % poor ($h = 1$)	8.86	8.75
- % deceased ($h = 0$)	6.88	9.82
Functional health (D_{t+1})		
- % no disabilty ($d = 2$)	75.87	76.66
- % moderate disability ($d = 1$)	17.46	13.56
- % severe disability ($d = 0$)	6.67	9.78
Leave bequest ($B_{t+1}|H_{t+1} = 0$)	0.111	0.239
(conditional on being deceased)	(0.314)	(0.427)
Value of bequests/ child$*10^{-4}$($BA_{t+1}|H_{t+1} = 0$)	0.867	0.776
(conditional on any & deceased)	(4.329)	(5.936)

Table C.2: Comparison Between Samples: Dependent Variables by Marital Status

Variables	**Retained Data**		**Discarded Data**	
	Married	**Unmarried**	**Married**	**Unmarried**
Living arrangement				
- % nursing home	0.94	5.80	1.82	3.75
- % coresident, formal home care	1.13	3.77	1.87	3.05
- % coresident, informal care	1.94	5.33	2.70	3.73
- % coresident, no care	16.19	17.40	33.61	25.52
- % independent, formal home care	4.61	8.08	4.17	5.40
- % independent, informal care	2.54	5.29	1.99	3.12
- % independent, no care	72.66	54.33	53.83	55.43
Savings$*10^{-4}$	38.981	15.286	40.818	19.208
	(139.09)	(77.084)	(190.76)	(94.346)
Any inter vivos transfer	0.369	0.253	0.288	0.177
	(0.482)	(0.435)	(0.453)	(0.381)
Amount of IV transfers/ child$*10^{-4}$	0.262	0.325	0.275	0.381
(conditional on any)	(0.833)	(1.635)	(1.212)	(1.731)

Table C.3: Comparison Between Samples: Independent Variables

Variables	Included	Discarded	T-Statistics
Personal Characteristics			
Annuitized Income$*10^{-4}$	3.285	3.348	0.014
(2-year period)	(4.566)	(3.941)	
Age	68.101	63.668	0.401
	(10.431)	(13.152)	
Female	0.595	0.562	0.067
	(0.491)	(0.496)	
Nonwhite	0.158	0.233	0.199
	(0.364)	(0.423)	
Born outside US	0.086	0.126	0.138
	(0.279)	(0.331)	
Married	0.685	0.592	0.197
	(0.464)	(0.499)	
Divorced	0.075	0.196	0.407
	(0.264)	(0.397)	
Widowed	0.227	0.157	0.172
	(0.418)	(0.364)	
Single	0.013	0.023	0.143
	(0.013)	(0.149)	
Number of adult children	5.825	5.829	0.415
	(3.440)	(4.993)	
Education (years)	12.022	12.336	0.093
	(3.304)	(3.583)	
On Medicaid	0.085	0.115	0.104
	(0.279)	(0.319)	
Spousal Characteristics			
Spouse info missing, if married	0.009	0.049	0.309
	(0.092)	(0.217)	
Spouse age	65.943	60.576	0.548
	(9.637)	(11.506)	
Spouse nonwhite	0.088	0.074	0.050
	(0.283)	(0.261)	
Spouse education (years)	12.370	12.845	0.153
	(3.086)	(3.363)	
Spouse on Medicaid	0.034	0.022	0.068
	(0.181)	(0.146)	

Table C.3 (Continued)

Variables	Included	Discarded	T-Statistics
Child Characteristics			
Mean age of children	41.092	32.578	0.880
	(9.651)	(9.234)	
% female children	0.502	0.486	0.047
	(0.161)	(0.245)	
% married children	0.685	0.467	0.522
	(0.308)	(0.359)	
Mean number of grandchildren	1.661	1.195	0.642
	(1.077)	(1.057)	
% children who are stepchildren	0.073	0.131	0.689
	(0.169)	(0.223)	
% children who are in-laws	0.370	0.214	0.211
	(0.166)	(0.204)	
Mean children's education	13.51	13.173	0.172
	(2.186)	(1.968)	
% children who work	0.805	0.798	0.054
	(0.241)	(0.261)	
% children who live within 10 miles	0.217	0.213	0.153
	(0.275)	(0.299)	
Transfer Policy			
Tax-exclusion threshold$*10^{-4}$	21.027	22.98	0.273
(2-year period)	(14.21)	(11.27)	
Factors affecting costs of living			
House price index (1980Q1=100)	271.28	302.397	0.277
(state-level)	(107.89)	(126.85)	
Gas price (cents per gallon)	108.46	127.46	0.392
(state-level, excluding excise duties)	(46.898)	(54.172)	
Factors affecting costs of formal care			
Average daily cost of home care	27.197	26.971	0.012
(state-level)	(19.137)	(21.895)	
Average daily cost of assisted living facility	64.997	85.094	0.756
(state-level)	(27.591)	(19.03)	
Hourly wage of home health aide	15.476	17.811	0.510
(state-level)	(4.888)	(2.347)	

Table C.3 (Continued)

Variables	Included	Discarded	T-Statistics
Number of home health agencies/ 1000 elderly	0.189	0.426	0.122
(county-level)	(0.228)	(4.168)	
Cost of private nursing home$*10^{-4}$	11.132	12.018	0.264
(2-year period, state-level)	(3.301)	(3.529)	
Number of nursing homes/ 1000 elderly	0.397	1.248	0.091
(county-level)	(0.383)	(20.097)	
Number of hospices/ 1000 elderly	0.070	0.148	0.089
(county-level)	(0.099)	(1.897)	
Measures of state generosity			
Income Cap/Miller Trust existence	0.181	0.179	0.005
(state-level)	(0.385)	(0.382)	
% income that would be lost if on Medicaid	0.238	0.274	0.114
(NH benefits)	(0.310)	(0.338)	
% income that would be lost if on Medicaid	0.231	0.268	0.118
(HCBS benefits)	(0.305)	(0.334)	
% asset that would be lost if on Medicaid	0.548	0.589	0.288
(for singles)	(0.454)	(0.448)	
% asset that would be lost if on Medicaid	0.423	0.340	0.458
(for married couples)	(0.466)	(0.452)	
% asset loss if spouse qualifies for NH	0.159	0.132	0.247
	(0.307)	(0.287)	
% asset loss if spouse qualifies for HCBS	0.257	0.205	0.329
	(0.402)	(0.371)	
CON laws	0.708	0.701	0.016
	(0.447)	(0.458)	
CON on home health services	0.298	0.294	0.009
	(0.457)	(0.455)	
CON on assisted living facilities	0.267	0.262	0.011
	(0.442)	(0.439)	
CON on long-term care facilities	0.708	0.689	0.042
	(0.455)	(0.463)	
CON on hospice facilities	0.397	0.385	0.025
	(0.489)	(0.486)	
HCBS to NH spending ratio	0.323	0.340	0.049
	(0.350)	(0.349)	

Table C.3 (Continued)

Variables	Included	Discarded	T-Statistics
Expected benefits if getting HCBS$*10^{-4}$	0.002	0.003	0.071
	(0.014)	(0.014)	
Expected benefits if spouse gets HCBS$*10^{-4}$	0.0009	0.0004	0.059
	(0.009)	(0.006)	
Expected benefits if in NH$*10^{-4}$	0.031	0.041	0.073
	(0.132)	(0.154)	
Expected benefits if spouse in NH$*10^{-4}$	0.012	0.006	0.077
	(0.081)	(0.065)	
Factors affecting health			
Number of active doctors/ elderly	0.019	0.058	0.085
(county-level)	(0.015)	(0.997)	
% of doctors with medical specialty	0.305	0.311	0.062
(county-level)	(0.096)	(0.099)	
Number of hospitals/ 1000 elderly	0.179	0.139	0.188
(county-level)	(0.145)	(0.368)	
Number of hospital beds/ 1000 elderly	29.294	26.247	0.142
(county-level)	(20.504)	(24.61)	
Number of FTE hospital staff/ hospital$*10^{-3}$	0.882	0.939	0.083
(county-level)	(0.672)	(0.746)	
% of FTE hospital staff devoted to NH care	0.024	0.026	0.046
(county-level)	(0.049)	(0.038)	

Notes: Standard errors are in parentheses. HCBS = home and community based services; NH = nursing home; CON = Certificate of Needs; FTE= full-time equivalent.

Appendix D

Explanation of Selected Variables

Appendix D explains some variables. First, the savings variable is represented by log values. I explain how I transform levels of wealth into log values. Second, the variables related to child characteristics used in estimation are a result of some extrapolation. I compare the summary statistics of different sets of child-level information that a HRS data user can use and explain which one I use. Finally, the Miller trust/income cap existence indicator appears inconsistent across years. I show the breakdown of how the indicator is created.

Table D.1 shows the distibution of savings or bequeathable wealth of the sample by decile. The second column shows the amount of bequeathable wealth in levels ($*10^{-4}$) and the third column in log values. The minimum and maximum amounts in the third and the fourth column are in levels. My definition of bequeathable wealth includes debt. Therefore, bequeathable wealth for a given household can be negative, when their total assets are worth less than the amount they owe as shown by wealth in the first decile. Instead of using wealth in levels, with large standard errors, I use log bequeathable wealth and ignore negative wealth, treating those observations as having zero wealth. The interpretation of my coefficient estimates will be regarding nonnegative wealth only.

Table D.2 illustrates that the impact of ignoring negative wealth is negligible. It represents the number of observations with extreme wealth over time. Out of 66159 person-year observations relevant to the wealth equation, only 1931 observations (2.92%) are being converted to zero, which I argue to be a small enough percentage to disregard.

Table D.1: Wealth by Decile

Decile	Wealth Level ($*10^{-4}$)	Log wealth	Minimum Level	Maximum Level
1st	-0.482	1.578	-99.2	0.096
2nd	0.515	8.314	0.0968	1.175
3rd	2.127	9.926	1.18	3.15
4rd	4.509	10.699	3.151	6
5th	7.978	11.276	6.0004	10.036
6th	12.664	11.741	10.04	15.65
7th	19.574	12.177	15.66	24.1
8th	30.577	12.622	24.12	38.2
9th	51.671	13.141	38.22	70
10th	184.51	14.113	70.04	8622.5
Median	**10.036**	**11.516**		

Table D.2: Number of Observations with Extreme Wealth Level $*10^{-4}$ by Year

Wealth	1998	2000	2002	2004	2006	Total
Wealth$\leq$ 0	1068	1144	1000	920	573	4705
Wealth<0	405	472	407	402	245	1931
Wealth>1000	10	37	5	14	51	117
Wealth>500	45	73	33	44	90	285
Wealth>100	613	880	722	743	1077	4035
Wealth>50	1592	2130	1868	1909	2559	10058
Wealth>25	3200	4157	3721	3459	4756	19293
Number of observations	13562	15590	13765	12295	10947	66159

The HRS contains incomplete information on child-level characteristics and I correct for it. The HRS does not contain information on children-in-law in 1998 and 2000. I use the available information in 2002, 2004 and 2006 to identify children-in-law whose information is missing in 1998 and 2000. In particular, if the elderly's children were married in 1998 or in 2000 and were also married in either 2002, 2004 or 2006, I assume they were married to the same spouse and merge the information of the spouse(s) that is available in the later years to the earlier years.

Table D.3 compares the summary statistics of child-related variables that are derived from three possible sets of child-level information. The first set of summary statistics comes from when I take the information from the HRS as given and do not correct for the missing information on the children-in-law in 1998 and 2000. The second set is when I drop the children-in-law altogether. The final set is when I correct for (i.e., extrapolate) the missing information on the children-in-law.

I estimated the model without unobserved heterogeneity using all possible sets of child-level information and found that, despite the differences in their summary statistics, the coefficient estimates are similar in sign and significance across all three data sets. I choose to use the final set of child-level information in the analysis because it provides a more complete picture of household formation. Data in 2002-2006 clearly suggest that some children-in-law provide informal care and receive inter vivos transfers from the parents.

Finally, I show in Table D.4 how I arrive at the summary statistics of the Miller trust/income cap existence indicator across years. The number of observations in each state in each year is shown with states in italics (and with asterisks) being Miller states. As an example, consider Florida. The state did not have a Miller trust in place in 1998, had one in 2000-2002 and abandoned it in 2004-2006. Changes in Florida laws have an impact on the summary statistics of the sample overall.

Table D.3: Summary Statistics of Different Sets of Child-level Information

Variables	1998	2000	2002	2004	2006
Number of adult children					
- HRS as given	3.402	3.461	5.745	5.816	5.974
	(1.998)	(2.006)	(3.326)	(3.305)	(3.348)
- Children-in-law dropped	3.395	3.450	3.477	3.425	3.519
	(1.994)	(1.998)	(1.975)	(1.916)	(1.961)
- Children-in-law extrapolated*	5.746	5.934	5.745	5.816	5.974
	(3.509)	(3.518)	(3.326)	(3.305)	(3.348)
Mean age of children					
- HRS as given	39.21	40.51	41.98	43.53	44.64
	(10.067)	(9.779)	(9.266)	(9.053)	(8.784)
- Children-in-law dropped	39.21	40.50	41.83	43.53	44.60
	(10.066)	(9.776)	(9.453)	(9.235)	(8.957)
- Children-in-law extrapolated*	39.20	40.54	41.99	43.53	44.64
	(9.915)	(9.612)	(9.266)	(9.053)	(8.784)
% female children					
- HRS as given	0.494	0.495	0.499	0.503	0.502
	(0.317)	(0.313)	(0.155)	(0.147)	(0.142)
- Children-in-law dropped	0.494	0.494	0.494	0.496	0.494
	(0.318)	(0.314)	(0.311)	(0.310)	(0.306)
- Children-in-law extrapolated*	0.502	0.503	0.499	0.503	0.502
	(0.173)	(0.157)	(0.155)	(0.147)	(0.142)
% married children					
- HRS as given	0.600	0.609	0.688	0.691	0.685
	(0.343)	(0.338)	(0.318)	(0.315)	(0.311)
- Children-in-law dropped	0.601	0.610	0.621	0.632	0.624
	(0.343)	(0.339)	(0.332)	(0.329)	(0.325)
- Children-in-law extrapolated*	0.680	0.686	0.688	0.691	0.685
	(0.307)	(0.305)	(0.318)	(0.315)	(0.311)
Mean number of grandchildren					
- HRS as given	1.532	1.544	1.681	1.727	1.798
	(1.122)	(1.107)	(1.043)	(1.041)	(1.023)
- Children-in-law dropped	1.533	1.543	1.680	1.728	1.798
	(1.124)	(1.107)	(1.045)	(1.043)	(1.026)
- Children-in-law extrapolated*	1.603	1.604	1.681	1.727	1.798
	(1.106)	(1.098)	(1.043)	(1.041)	(1.023)

Table D.3 (Continued)

Variables	1998	2000	2002	2004	2006
% children who are stepchildren					
- HRS as given	0.105	0.105	0.071	0.069	0.071
	(0.248)	(0.245)	(0.167)	(0.161)	(0.160)
- Children-in-law dropped	0.105	0.105	0.108	0.109	0.113
	(0.249)	(0.245)	(0.246)	(0.244)	(0.246)
- Children-in-law extrapolated*	0.074	0.071	0.071	0.069	0.071
	(0.174)	(0.165)	(0.167)	(0.161)	(0.160)
% children who are children-in-law					
- HRS as given	0.001	0.002	0.368	0.388	0.391
	(0.022)	(0.029)	(0.154)	(0.147)	(0.141)
- Children-in-law dropped	0	0	0	0	0
- Children-in-law extrapolated*	0.359	0.381	0.368	0.388	0.391
	(0.181)	(0.163)	(0.154)	(0.147)	(0.141)
Mean education of children					
- HRS as given	13.485	13.514	13.579	13.638	13.671
	(2.133)	(2.227)	(2.206)	(2.162)	(2.147)
- Children-in-law dropped	13.484	13.514	13.572	13.625	13.654
	(2.137)	(2.233)	(2.246)	(2.224)	(2.228)
- Children-in-law extrapolated*	13.477	13.536	13.579	13.638	13.671
	(2.273)	(2.192)	(2.206)	(2.162)	(2.147)
% children who work					
- HRS as given	0.819	0.823	0.804	0.804	0.811
	(0.276)	(0.272)	(0.243)	(0.236)	(0.232)
- Children-in-law dropped	0.820	0.824	0.810	0.810	0.817
	(0.276)	(0.272)	(0.279)	(0.275)	(0.269)
- Children-in-law extrapolated*	0.803	0.809	0.804	0.804	0.811
	(0.249)	(0.237)	(0.243)	(0.236)	(0.232)
% children who live within 10 miles					
- HRS as given	0.264	0.224	0.209	0.213	0.197
	(0.316)	(0.306)	(0.277)	(0.275)	(0.259)
- Children-in-law dropped	0.265	0.224	0.297	0.310	0.293
	(0.317)	(0.306)	(0.331)	(0.335)	(0.325)
- Children-in-law extrapolated*	0.198	0.177	0.209	0.213	0.197
	(0.263)	(0.254)	(0.277)	(0.275)	(0.259)

Table D.4: Miller Trust Observations by State

State	Number of Observations				
	1998	**2000**	**2002**	**2004**	**2006**
AK	*1**	*1**	*0**	*1**	*1**
AL	*234**	*222**	*198*	*186**	*173**
AR	*368*	*334**	*289**	*266*	*240*
AZ	*286*	*272**	*263**	*234**	*213**
CA	1407	1267	1152	1024	899
CO	*341**	*312**	*283**	*266**	*244**
CT	204	180	157	139	120
DC	26	22	22	18	16
DE	*6*	*7**	*7*	*7**	*4**
FL	*1784*	*1571**	*1371**	*1210*	*1081*
GA	*652*	*572*	*495*	*450**	*415**
HI	1	1	2	2	2
IA	*182*	*164**	*153**	*138*	*123*
ID	*5*	*7**	*5**	*7**	*11**
IL	526	453	418	382	342
IN	438	402	355	316	279
KS	77	73	67	63	57
KY	*17*	*22*	*21*	*15**	*18**
LA	256	229	200	174	149
MA	290	258	240	223	190
MD	303	264	233	207	189
ME	6	5	5	4	3
MI	1058	972	860	768	683
MN	441	409	368	326	295
MO	411	384	346	316	294
MS	*251**	*227**	*198**	*178**	*169**
MT	1	2	2	3	5
NC	400	363	328	302	280
ND	79	71	68	61	61
NE	218	201	177	169	161

Table D.4 (Continued)

State	Number of Observations				
	1998	**2000**	**2002**	**2004**	**2006**
NH	153	142	131	114	101
NJ	497	431	364	317	281
NM	*16**	*16**	*17**	*17**	*17**
NV	*26*	*32**	*33**	*32**	*33**
NY	1055	929	799	691	589
OH	426	389	335	298	257
OK	*71*	*67**	*62**	*59**	*57**
OR	*348*	*319**	*288**	*262*	*236*
PA	484	439	406	365	328
RI	0	0	0	0	2
SC	*159**	*137**	*116**	*115*	*114**
SD	*1**	*1**	*0**	*1**	*2**
TN	422	389	349	333	303
TX	*981*	*904**	*787**	*714*	*655**
UT	3	3	4	5	6
VA	510	417	351	315	285
VT	5	5	4	4	3
WA	244	231	208	186	176
WI	300	275	251	224	203
WV	306	262	228	209	186
WY	*152*	*122**	*97**	*89**	*78**
Total states with Miller	7	18	16	14	16

Notes: * = Miller state

Appendix E

Coefficient Estimates with Unobserved Heterogeneity

Appendix E contains the coefficient estimates of the equations that are estimated jointly. Note that, in the same system of equations, I also estimate attrition at the end of the period and the initial condition equations for living arrangements (separately for married and unmarried households), savings (separately for married and unmarried households), subjective health status and functional health status. Only permanent unobserved heterogeneity is accounted for in the initial condition equations. The coefficient estimates for the attrition and the initial condition equations are not reported as they are irrelevant to the research questions. They are available upon request nevertheless.

Table E.1-Table E.4 tabulate the coefficient estimates of the per-period outcomes. Table E.1 and Table E.2 represent the results of interest, showing the coefficient estimates of the living arrangements for married and unmarried households respectively. Table E.3 shows the regression results from the savings equations and Table E.4 shows the inter vivos transfer and bequest intent equations. Note that the independent variables are the same for every per-period equation, conditional on the marital status.

Table E.5-Table E.7 contain the coefficient estimates of the end-of-period outcomes. They show the results from the subjective health (which includes death), functional health and actual bequest equations respectively.

Table E.1: Multinomial Logit on Living Arrangements: Married Households

Variables	IL, informal	IL, formal	IC, no care	IC, informal	IC, formal	NH
Endogenous Variables						
Good health entering t	0.293**	0.769**	0.063	0.217*	0.724**	0.078
	(0.091)	(0.068)	(0.041)	(0.113)	(0.152)	(0.177)
Poor health entering t	0.552**	1.503**	0.091	0.517**	1.536**	0.580**
	(0.123)	(0.090)	(0.087)	(0.151)	(0.186)	(0.217)
Moderate disability entering t	1.235**	0.920**	-0.123**	1.192**	0.991**	0.813**
	(0.080)	(0.061)	(0.059)	(0.101)	(0.127)	(0.175)
Severe disability entering t	1.546**	1.828**	-0.327**	1.755**	2.022**	3.058**
	(0.124)	(0.085)	(0.127)	(0.148)	(0.163)	(0.173)
IL, informal care at $t-1$	3.174**	1.187**	0.655**	2.503**	0.559	1.539**
	(0.156)	(0.236)	(0.266)	(0.289)	(0.668)	(0.333)
IL, formal care at $t-1$	1.049**	1.453**	-0.133	0.623*	1.886**	1.069**
	(0.203)	(0.095)	(0.218)	(0.332)	(0.249)	(0.228)
IC, no care at $t-1$	0.016	0.082	3.515**	3.208**	3.253**	1.249**
	(0.306)	(0.200)	(0.052)	(0.162)	(0.188)	(0.290)
IC, informal care at $t-1$	2.388**	0.696	3.532**	5.878**	5.081**	2.972**
	(0.354)	(0.443)	(0.235)	(0.329)	(0.291)	(0.532)
IC, formal care at $t-1$	-0.209	1.689**	3.559**	4.595**	5.240**	2.304**
	(0.741)	(0.354)	(0.255)	(0.312)	(0.306)	(0.557)
Nursing home at $t-1$	0.159	0.946**	0.945	1.947**	2.508**	3.909**
	(0.799)	(0.436)	(0.622)	(0.698)	(0.731)	(0.356)
ln(savings) at $t-1$	-0.019	-0.043**	-0.006	-0.072**	-0.068**	0.028
	(0.019)	(0.017)	(0.013)	(0.020)	(0.026)	(0.031)

Table E.1 (Continued)

Variables	IL, informal	IL, formal	IC, no care	IC, informal	IC, formal	NH
Personal Characteristics						
Annuities$*10^{-6}$	1.296**	0.445	0.123	-1.435	-1.475	0.357
	(0.555)	(0.595)	(0.697)	(1.029)	(1.071)	(0.998)
Age (years)	-0.028	0.679**	-0.470**	-0.903**	0.377	-1.017**
	(0.096)	(0.116)	(0.075)	(0.217)	(0.524)	(0.304)
Female	-0.190**	-0.085	-0.012	-0.110	-0.179	-0.201
	(0.088)	(0.068)	(0.050)	(0.111)	(0.134)	(0.147)
Nonwhite	0.011	-0.105	-0.043	-0.079	0.017	-0.199
	(0.258)	(0.165)	(0.104)	(0.235)	(0.337)	(0.501)
Born outside US	0.284**	-0.185	0.074	-0.059	-0.010	-0.287
	(0.140)	(0.113)	(0.076)	(0.167)	(0.219)	(0.313)
Education (years)	-0.020	0.029**	-0.014*	-0.019	0.002	0.023
	(0.013)	(0.011)	(0.008)	(0.015)	(0.018)	(0.022)
Number of adult children	-0.131	-0.047	0.183**	0.399**	0.164	0.038
	(0.143)	(0.098)	(0.071)	(0.156)	(0.186)	(0.270)
Spousal Charactertistics						
Spouse information missing	1.387*	0.879	-0.137	1.828**	0.887	3.297**
	(0.839)	(0.738)	(0.485)	(0.829)	(0.994)	(0.989)
Spouse age	0.036**	0.013*	0.003	0.036**	0.025**	0.043**
	(0.009)	(0.008)	(0.006)	(0.009)	(0.011)	(0.011)
Spouse nonwhite	-0.169	0.126	0.027	0.097	-0.287	0.028
	(0.241)	(0.162)	(0.099)	(0.213)	(0.304)	(0.483)
Spouse education	-0.047**	0.008	-0.023**	-0.055**	-0.008	0.027
	(0.014)	(0.012)	(0.009)	(0.016)	(0.020)	(0.023)
Child Charactertics						
Mean age of children	-0.018**	-0.012*	-0.048**	-0.051**	-0.057**	0.009
	(0.008)	(0.007)	(0.005)	(0.009)	(0.011)	(0.013)
% female children	0.728**	-0.043	-0.361**	0.031	-0.277	0.217
	(0.269)	(0.189)	(0.122)	(0.289)	(0.464)	(0.534)

Table E.1 (Continued)

Variables	IL, informal	IL, formal	IC, no care	IC, informal	IC, formal	NH
% married children	-0.235	0.035	-1.022**	-1.502**	-0.796**	0.111
	(0.168)	(0.124)	(0.090)	(0.214)	(0.313)	(0.378)
Mean number of grandchildren	0.029	0.039	-0.064**	-0.075	-0.020	0.052
	(0.037)	(0.028)	(0.024)	(0.048)	(0.061)	(0.060)
% children who are stepchildren	-0.729**	0.048	-1.385**	-1.697**	-1.221**	-0.375
	(0.283)	(0.168)	(0.132)	(0.438)	(0.540)	(0.568)
% children who are children-in-law	1.173	-0.084	-5.364**	-5.969**	-5.893**	-1.882**
	(0.755)	(0.668)	(0.446)	(0.713)	(0.782)	(0.886)
Mean education of children	0.007	-0.011	-0.077**	-0.020	-0.029	0.048
	(0.019)	(0.014)	(0.010)	(0.021)	(0.026)	(0.033)
% children who work	-0.768**	-0.162	-0.710**	-1.318**	-0.458*	-0.738**
	(0.157)	(0.119)	(0.094)	(0.185)	(0.244)	(0.255)
% children who live within 10 miles	0.991**	0.001	-1.026**	-0.241	-1.286**	-0.035
	(0.149)	(0.124)	(0.142)	(0.414)	(0.499)	(0.327)
Transfer Policy						
Transfer tax exclusion$*10^{-4}$	0.041	0.013	-0.022	-0.075**	-0.019	-0.008
	(0.033)	(0.023)	(0.017)	(0.037)	(0.043)	(0.063)
Costs of Living						
House price index$*10^{-2}$	-0.071	0.063	-0.054	0.124	-0.014	0.134
	(0.066)	(0.047)	(0.035)	(0.087)	(0.106)	(0.118)
Gas price$*10^{-2}$	-0.088	-0.691**	-0.132	-0.044	-0.579	-1.682**
	(0.317)	(0.178)	(0.128)	(0.364)	(0.461)	(0.627)
Costs and Availability of Care						
Daily home care cost$*10^{-2}$	0.103	-0.106	0.026	0.107	-0.663	-0.798
	(0.110)	(0.104)	(0.059)	(0.158)	(0.936)	(0.991)
Daily assisted living cost$*10^{-2}$	0.307	0.139	0.365**	0.873	0.668	0.401
	(0.431)	(0.229)	(0.174)	(0.634)	(0.737)	(0.750)
Hourly home aide wage$*10^{-2}$	1.443	1.372	0.997	-2.877**	3.779**	5.813**
	(1.034)	(1.009)	(1.008)	(0.105)	(1.205)	(1.203)

Table E.1 (Continued)

Variables	IL, informal	IL, formal	IC, no care	IC, informal	IC, formal	NH
Home care agencies/elderly$*10^{-3}$	-0.246	0.278**	-0.221*	-0.118	-0.305	-0.599
	(0.204)	(0.139)	(0.122)	(0.271)	(0.385)	(0.432)
2-year private NH cost$*10^{-4}$	-0.008	-0.025	0.022	-0.046	-0.024	-0.048
	(0.026)	(0.019)	(0.013)	(0.036)	(0.044)	(0.047)
Nursing homes/1000 elderly	0.098	-0.096	0.028	-0.135	-0.656**	0.244
	(0.144)	(0.108)	(0.074)	(0.221)	(0.296)	(0.230)
Hospices/1000 elderly	0.392	-0.256	-0.297	-0.574	-0.806	0.279
	(0.476)	(0.354)	(0.237)	(0.837)	(0.915)	(0.939)
Measures of State Generosity						
Miller trust existence	-0.273**	0.085	-0.075	-0.054	-0.072	0.161
	(0.116)	(0.076)	(0.057)	(0.148)	(0.168)	(0.186)
% income loss, NH benefits	-0.143	-0.039	-0.155	0.089	-1.368**	-0.146
	(0.637)	(0.398)	(0.218)	(0.602)	(0.696)	(0.718)
% income loss, HCBS benefits	-0.164	-0.148	0.023	-0.386	1.169*	0.424
	(0.648)	(0.402)	(0.218)	(0.611)	(0.692)	(0.723)
% asset loss, singles	-0.099	0.118	-0.293	-0.209	0.107	-1.397**
	(0.460)	(0.363)	(0.253)	(0.612)	(0.575)	(0.453)
% asset loss, couples	-0.188	0.156	0.259	0.077	0.066	0.462
	(0.482)	(0.402)	(0.268)	(0.627)	(0.609)	(0.493)
% asset loss if spouse gets NH	-0.293*	-0.107	-0.126	-0.184	0.251	0.574*
	(0.171)	(0.112)	(0.085)	(0.226)	(0.257)	(0.312)
% asset loss if spouse gets HCBS	-0.049	0.012	-0.086	0.075	0.091	-0.516**
	(0.119)	(0.083)	(0.063)	(0.145)	(0.179)	(0.233)
CON laws	-0.386	-0.473	-0.064	1.174**	-0.161	-0.977
	(0.582)	(0.659)	(0.419)	(0.589)	(0.702)	(0.731)
CON, home health services	0.157	-0.251**	0.098	0.156	-0.002	0.039
	(0.131)	(0.089)	(0.066)	(0.157)	(0.194)	(0.220)
CON, assisted living facilities	0.239**	0.091	-0.041	-0.130	0.023	-0.105
	(0.121)	(0.088)	(0.062)	(0.147)	(0.183)	(0.219)

Table E.1 (Continued)

Variables	IL, informal	IL, formal	IC, no care	IC, informal	IC, formal	NH
CON, long-term care facilities	0.194	0.566	-0.067	-1.116*	0.018	0.949
	(0.584)	(0.659)	(0.417)	(0.592)	(0.702)	(0.731)
CON, hospices	-0.058	0.137	0.043	0.185	0.126	0.319
	(0.116)	(0.080)	(0.059)	(0.144)	(0.168)	(0.203)
HCBS to NH spending ratio	-0.022	-0.159*	-0.264**	-0.083	-0.438**	-0.165
	(0.126)	(0.086)	(0.067)	(0.177)	(0.228)	(0.209)
Expected HCBS benefits, own	-6.037**	1.088	-0.269	2.945**	-3.185**	4.698**
	(1.038)	(1.018)	(1.018)	(1.190)	(1.106)	(1.072)
Expected HCBS benefits, spouse	1.891*	-1.387	-1.103	-2.432**	6.696**	-4.031**
	(1.024)	(1.024)	(1.017)	(1.143)	(1.101)	(1.061)
Expected NH benefits, own	0.004	1.022**	-0.360	-0.910*	0.965*	1.173**
	(0.043)	(0.349)	(0.277)	(0.491)	(0.537)	(0.459)
Expected NH benefits, spouse	0.347	-0.171	0.080	0.690	-0.441	0.339
	(0.376)	(0.392)	(0.273)	(0.471)	(0.645)	(0.549)
Area Characteristics: Health						
MDs/elderly	3.074**	6.225**	1.731	-5.031**	-9.272**	2.831
	(1.109)	(1.054)	(1.119)	(1.482)	(1.985)	(2.626)
% MDs with specialty	0.035	0.808	0.187	0.330	0.396	-0.605
	(0.773)	(0.502)	(0.282)	(0.849)	(0.916)	(0.939)
Hospitals/1000 elderly	0.296	0.254	-0.242	-1.059	0.606	-0.992
	(0.630)	(0.578)	(0.260)	(0.871)	(0.889)	(0.863)
Hospital beds/100000 elderly	-0.017	-0.471	0.089	1.001**	0.298	0.902
	(0.380)	(0.324)	(0.142)	(0.401)	(0.525)	(0.546)
Hospital staff/hospital $*10^{-3}$	-0.118	-0.047	-0.008	-0.217*	-0.019	-0.371**
	(0.117)	(0.071)	(0.042)	(0.125)	(0.138)	(0.161)
% NH personnel/hospital	-0.598	0.555	-0.884	-4.186**	-0.348	0.055
	(0.988)	(0.802)	(0.941)	(1.039)	(1.023)	(1.050)

Table E.1 (Continued)

Variables	IL, informal	IL, formal	IC, no care	IC, informal	IC, formal	NH
Area Characteristics: Wealth						
% Unemployed people	0.019	-0.0001	-0.006	0.024	-0.018	-0.064**
	(0.018)	(0.015)	(0.012)	(0.020)	(0.025)	(0.032)
% People below poverty line	-1.524	0.321	2.011**	1.584	4.376**	4.289**
	(1.029)	(0.996)	(0.911)	(1.076)	(1.031)	(1.234)
Median HH income$*10^{-4}$	-0.069	0.023	0.080**	0.145**	0.328**	0.203**
	(0.053)	(0.041)	(0.032)	(0.059)	(0.067)	(0.082)
Constant	-2.745	-22.743**	10.393**	18.202**	-19.165	8.435
	(1.927)	(2.647)	(1.443)	(4.741)	(11.825)	(7.041)

Notes: ** denotes 5%, * denotes 10% significance. Standard errors are in parentheses.
IL = independent living. IC = intergenerational coresidence. NH = nursing home.
Reported coefficients are relative to the base category: independent living with no care.
The equation includes age squared/100, age cubed/1000, interaction terms of some personal characteristics, cohort dummies and trend variables.
The equation is estimated with 3 permanent heterogeneity mass points and 2 time-varying hetereogeneity mass points.

Table E.2: Multinomial Logit on Living Arrangements: Unmarried Households

Variables	IL, informal	IL, formal	IC, no care	IC, informal	IC, formal	NH
Endogenous Variables						
Good health entering t	0.339**	0.732**	0.166**	0.252**	0.417**	0.274**
	(0.101)	(0.084)	(0.063)	(0.116)	(0.141)	(0.129)
Poor health entering t	0.542**	1.428**	0.125	0.578**	1.056**	0.952**
	(0.133)	(0.109)	(0.117)	(0.150)	(0.171)	(0.156)
Moderate disability entering t	2.322**	1.189**	-0.276**	2.263**	1.513**	1.826**
	(0.089)	(0.069)	(0.079)	(0.107)	(0.123)	(0.125)
Severe disability entering t	2.772**	2.108**	-0.559**	2.677**	2.746**	3.674**
	(0.131)	(0.103)	(0.167)	(0.154)	(0.159)	(0.144)
IL, informal care at $t-1$	2.624**	1.313**	1.098**	2.061**	1.372**	1.887**
	(0.164)	(0.169)	(0.229)	(0.244)	(0.345)	(0.228)
IL, formal care at $t-1$	0.764**	1.442**	-0.828**	0.383	1.327**	1.103**
	(0.182)	(0.107)	(0.325)	(0.276)	(0.249)	(0.185)
IC, no care at $t-1$	0.765**	-0.472*	4.003**	3.725**	3.770**	1.095**
	(0.245)	(0.264)	(0.084)	(0.160)	(0.187)	(0.269)
IC, informal care at $t-1$	1.865**	0.777**	4.164**	5.627**	5.046**	2.729**
	(0.323)	(0.339)	(0.224)	(0.232)	(0.265)	(0.294)
IC, formal care at $t-1$	1.345**	1.736**	4.396**	5.033**	5.913**	3.397**
	(0.492)	(0.381)	(0.299)	(0.314)	(0.311)	(0.341)
Nursing home at $t-1$	1.025**	1.170**	0.244	1.776**	2.288**	4.319**
	(0.489)	(0.352)	(0.597)	(0.653)	(0.539)	(0.298)
ln(savings) at $t-1$	-0.010	-0.003	-0.002	-0.016	0.003	0.027
	(0.016)	(0.013)	(0.013)	(0.018)	(0.019)	(0.018)
Personal Characteristics						
Annuities$*10^{-6}$	-2.341**	-0.063	-0.263	-4.486**	-2.362**	1.595
	(1.031)	(1.032)	(1.000)	(1.031)	(1.099)	(1.050)
Age (years)	-0.384**	0.558*	-0.019	-0.129	0.057	-0.888**
	(0.105)	(0.302)	(0.068)	(0.232)	(0.314)	(0.319)
Female	0.184*	0.186**	0.478**	0.586**	0.324**	-0.004
	(0.099)	(0.079)	(0.075)	(0.124)	(0.133)	(0.114)

Table E.2 (Continued)

Variables	IL, informal	IL, formal	IC, no care	IC, informal	IC, formal	NH
Nonwhite	0.066	-0.250**	0.087	-0.139	-0.231	-0.606**
	(0.117)	(0.097)	(0.079)	(0.124)	(0.141)	(0.159)
Born outside US	0.050	-0.122	0.144	-0.420*	-0.165	-0.315
	(0.181)	(0.139)	(0.130)	(0.223)	(0.242)	(0.213)
Education (years)	-0.013	0.019*	-0.002	-0.051**	0.009	0.022
	(0.013)	(0.011)	(0.011)	(0.016)	(0.016)	(0.016)
Number of adult children	0.112	-0.088	0.028	0.194	0.181	-0.407*
	(0.158)	(0.149)	(0.108)	(0.159)	(0.177)	(0.238)
Spousal Charactertistics						
Spouse died in $t-1$	0.149	-0.105	0.396**	0.719**	0.471	-0.357
	(0.183)	(0.160)	(0.126)	(0.211)	(0.289)	(0.369)
Child Charactertics						
Mean age of children	0.018**	-0.001	-0.034**	-0.035**	-0.032**	-0.002
	(0.008)	(0.006)	(0.006)	(0.009)	(0.009)	(0.008)
% female children	0.389*	0.137	0.012	0.194	0.034	-0.242
	(0.218)	(0.160)	(0.144)	(0.220)	(0.227)	(0.211)
% married children	0.094	0.151	-0.813**	-0.683**	-1.025**	0.498**
	(0.166)	(0.128)	(0.127)	(0.201)	(0.224)	(0.186)
Mean number of grandchildren	-0.076**	0.0008	-0.106**	-0.112**	0.005	-0.056
	(0.035)	(0.027)	(0.029)	(0.041)	(0.042)	(0.037)
% children who are stepchildren	-0.623	0.162	-1.438**	-1.356**	-1.171**	0.329
	(0.465)	(0.237)	(0.236)	(0.542)	(0.541)	(0.402)
% children who are children-in-law	-0.195	-0.778	-3.822**	-3.636**	-3.601**	-3.529**
	(0.718)	(0.545)	(0.442)	(0.615)	(0.633)	(0.720)
Mean education of children	-0.004	-0.003	-0.056**	-0.017	-0.021	0.061**
	(0.018)	(0.015)	(0.014)	(0.021)	(0.022)	(0.022)
% children who work	0.162	-0.036	-0.281**	-0.435**	-0.547**	0.036
	(0.144)	(0.115)	(0.116)	(0.164)	(0.181)	(0.160)
% children who live within 10 miles	1.174**	0.227	-0.825**	-1.377**	-1.119*	0.727**
	(0.178)	(0.143)	(0.186)	(0.439)	(0.440)	(0.262)

Table E.2 (Continued)

Variables	IL, informal	IL, formal	IC, no care	IC, informal	IC, formal	NH
Transfer Policy						
Transfer tax exclusion$*10^{-4}$	-0.019	0.042	0.029	-0.045	-0.042	0.185*
	(0.074)	(0.069)	(0.050)	(0.074)	(0.082)	(0.109)
Costs of Living						
House price index$*10^{-2}$	0.007	-0.010	0.041	-0.097	-0.063	-0.035
	(0.072)	(0.055)	(0.052)	(0.085)	(0.099)	(0.088)
Gas price$*10^{-2}$	0.351	0.413	-0.168	-0.218	-1.031**	0.367
	(0.369)	(0.296)	(0.208)	(0.409)	(0.488)	(0.488)
Costs and Availability of Care						
Daily home care cost$*10^{-2}$	-0.041	-0.033	0.015	-0.059	-0.095	0.177
	(0.185)	(0.116)	(0.098)	(0.171)	(0.239)	(0.165)
Daily assisted living cost$*10^{-2}$	-0.204	0.285	-0.157	-0.102	0.053	0.315
	(0.487)	(0.315)	(0.290)	(0.680)	(0.745)	(0.648)
Hourly home aide wage$*10^{-2}$	2.815**	0.129	-0.259	-3.546**	3.265**	1.323
	(1.048)	(1.069)	(1.034)	(1.093)	(1.055)	(1.206)
Home care agencies/elderly$*10^{-3}$	-0.129	0.038	0.121	0.109	0.428	-0.271
	(0.254)	(0.189)	(0.191)	(0.306)	(0.322)	(0.328)
2-year private NH cost$*10^{-4}$	-0.028	-0.018	-0.003	0.049	0.015	-0.078**
	(0.031)	(0.023)	(0.021)	(0.038)	(0.045)	(0.037)
Nursing homes/1000 elderly	0.192	-0.153	-0.113	-0.196	-0.513**	-0.010
	(0.152)	(0.147)	(0.126)	(0.205)	(0.234)	(0.219)
Hospices/1000 elderly	-0.395	0.399	-0.209	-0.726	0.470	-0.106
	(0.684)	(0.509)	(0.518)	(0.718)	(0.661)	(0.795)
Measures of State Generosity						
Miller trust existence	-0.356**	-0.165*	-0.204**	-0.205	-0.045	-0.245*
	(0.121)	(0.097)	(0.087)	(0.143)	(0.152)	(0.146)
% income loss, NH benefits	-0.037	-0.571	0.148	0.778	-0.946	-0.152
	(0.492)	(0.606)	(0.471)	(0.539)	(0.673)	(0.650)
% income loss, HCBS benefits	-0.241	0.366	-0.166	-0.908*	0.751	-0.051
	(0.507)	(0.614)	(0.480)	(0.549)	(0.657)	(0.663)

Table E.2 (Continued)

Variables	IL, informal	IL, formal	IC, no care	IC, informal	IC, formal	NH
% asset loss, singles	-0.148**	-0.168	-0.236**	-0.062	-0.314*	-0.536**
	(0.150)	(0.122)	(0.106)	(0.171)	(0.189)	(0.178)
CON laws	-0.855	0.073	0.114	0.185	0.564	-0.631
	(0.679)	(0.589)	(0.657)	(0.688)	(0.684)	(0.694)
CON, home health services	0.349**	-0.137	0.014	0.402**	0.154	0.143
	(0.138)	(0.113)	(0.098)	(0.161)	(0.185)	(0.176)
CON, assisted living facilities	-0.056	0.307**	-0.116	-0.295*	-0.097	-0.119
	(0.131)	(0.109)	(0.096)	(0.153)	(0.174)	(0.166)
CON, long-term care facilities	0.822	-0.074	-0.057	-0.137	-0.433	0.579
	(0.679)	(0.592)	(0.657)	(0.688)	(0.682)	(0.693)
CON, hospices	-0.177	-0.019	0.068	-0.304**	-0.053	-0.053
	(0.122)	(0.097)	(0.087)	(0.144)	(0.167)	(0.157)
HCBS to NH spending ratio	-0.194	-0.137	-0.077	-0.084	-0.919**	-0.342**
	(0.143)	(0.119)	(0.110)	(0.168)	(0.242)	(0.166)
Expected HCBS benefits, own	1.537	3.373**	-1.866*	1.782*	2.756**	3.468**
	(1.073)	(1.023)	(1.018)	(1.013)	(1.047)	(1.093)
Expected NH benefits, own	-0.025	0.572**	-0.252	-0.288	0.259	1.393**
	(0.259)	(0.199)	(0.216)	(0.304)	(0.307)	(0.281)
Area Characteristics: Health						
MDs/elderly	-3.217**	-0.489	-0.021	1.251	1.571	-4.317**
	(1.077)	(1.033)	(1.125)	(1.068)	(1.102)	(1.059)
% MDs with specialty	-0.157	-0.435	-0.119	0.308	-0.113	-0.219
	(0.705)	(0.609)	(0.452)	(0.695)	(0.755)	(0.769)
Hospitals/1000 elderly	0.078	-0.398	-0.275	-0.147	0.509	-0.222
	(0.627)	(0.558)	(0.478)	(0.795)	(0.801)	(0.729)
Hospital beds/100000 elderly	0.178	-0.056	0.384	0.096	-0.534	0.212
	(0.366)	(0.314)	(0.260)	(0.465)	(0.506)	(0.467)

Table E.2 (Continued)

Variables	IL, informal	IL, formal	IC, no care	IC, informal	IC, formal	NH
Hospital staff/hospital $*10^{-3}$	0.015	-0.066	-0.127*	-0.037	0.076	0.012
	(0.088)	(0.075)	(0.071)	(0.107)	(0.107)	(0.096)
% NH personnel/hospital	0.307	1.460	0.934	0.471	-0.616	2.681**
	(0.995)	(0.951)	(0.964)	(1.003)	(1.013)	(0.997)
Area Characteristics: Wealth						
% Unemployed people	-0.034	-0.028	0.008	0.001	-0.055**	-0.031
	(0.021)	(0.018)	(0.017)	(0.025)	(0.026)	(0.026)
% People below poverty line	0.988	3.732**	2.365**	-2.101*	2.469**	-0.435
	(1.031)	(1.019)	(1.008)	(1.079)	(1.119)	(1.109)
Median HH income$*10^{-4}$	0.067	0.169**	0.198**	-0.042	0.066	0.127**
	(0.055)	(0.048)	(0.043)	(0.059)	(0.066)	(0.063)
Constant	4.369**	-21.359**	-1.983	-0.363	-6.464	13.713*
	(2.033)	(7.349)	(1.446)	(5.593)	(8.076)	(8.044)

Notes: ** denotes 5%, * denotes 10% significance. Standard errors are in parentheses.

IL = independent living. IC = intergenerational coresidence. NH = nursing home.

Reported coefficients are relative to the base category: independent living with no care.

The equation includes age squared/100, age cubed/1000, interaction terms of some personal characteristics, cohort dummies and trend variables.

The equation is estimated with 3 permanent heterogeneity mass points and 2 time-varying hetereogeneity mass points.

Table E.3: OLS on Savings

Variables	**Married Households** ln(**savings**)	**Unmarried Households** ln(**savings**)
Endogenous Variables		
Good health entering t	-0.051**	-0.093**
	(0.012)	(0.025)
Poor health entering t	-0.150**	-0.174**
	(0.027)	(0.042)
Moderate disability entering t	-0.036**	-0.049*
	(0.017)	(0.030)
Severe disability entering t	-0.082**	-0.035
	(0.032)	(0.045)
IL, informal care at $t-1$	-0.013	0.042
	(0.053)	(0.069)
IL, formal care at $t-1$	-0.031	-0.026
	(0.038)	(0.057)
IC, no care at $t-1$	-0.074**	-0.038
	(0.019)	(0.037)
IC, informal care at $t-1$	-0.046	-0.165**
	(0.053)	(0.065)
IC, formal care at $t-1$	-0.087	-0.099
	(0.076)	(0.078)
Nursing home at $t-1$	0.048	-0.099
	(0.104)	(0.089)
ln (savings) at $t-1$	0.161**	0.128**
	(0.004)	(0.005)
Personal Characteristics		
Annuities$*10^{-6}$	-0.479**	0.507
	(0.099)	(0.479)
Age (years)	0.109**	-0.008
	(0.045)	(0.067)
Female	0.101**	-0.212**
	(0.014)	(0.030)
Nonwhite	-0.164**	-0.283**
	(0.032)	(0.033)
Born outside US	0.003	-0.012
	(0.025)	(0.048)
Education (years)	0.031**	0.055**
	(0.002)	(0.005)
Number of adult children	-0.161**	-0.060
	(0.024)	(0.042)
Spousal Charactertistics		
Spouse died in $t-1$		0.157**
		(0.049)

Table E.3 (Continued)

Variables	**Married Households** ln(**savings**)	**Unmarried Households** ln(**savings**)
Spouse information missing	-0.605**	
	(0.099)	
Spouse age	-0.008**	
	(0.001)	
Spouse nonwhite	-0.073**	
	(0.032)	
Spouse education	0.047**	
	(0.002)	
Child Charactertics		
Mean age of children	0.001	0.0002
	(0.001)	(0.003)
% female children	-0.078**	0.003
	(0.038)	(0.056)
% married children	0.039	0.022
	(0.027)	(0.046)
Mean number of grandchildren	-0.014**	-0.002
	(0.007)	(0.011)
% children who are stepchildren	-0.043	0.271**
	(0.037)	(0.076)
% children who are children-in-law	-0.049	-0.231
	(0.103)	(0.151)
Mean education of children	0.030**	0.047**
	(0.003)	(0.006)
% working children	-0.007	0.042
	(0.031)	(0.044)
% children within 10 miles	-0.025	0.036
	(0.025)	(0.051)
Transfer Policy		
Transfer tax exclusion$*10^{-4}$	0.036**	0.029
	(0.006)	(0.019)
Costs of Living		
House price index$*10^{-2}$	0.161**	0.046**
	(0.010)	(0.019)
Gas price$*10^{-2}$	0.029	-0.251**
	(0.044)	(0.070)
Costs and Availability of Care		
Daily home care cost$*10^{-2}$	-0.045**	-0.076**
	(0.019)	(0.039)
Daily assisted living cost$*10^{-2}$	-0.418**	-0.016
	(0.049)	(0.093)

Table E.3 (Continued)

Variables	**Married Households** ln(**savings**)	**Unmarried Households** ln(**savings**)
Hourly home aide wage$*10^{-2}$	-0.338	-0.542
	(0.846)	(0.898)
Home care agencies/elderly$*10^{-3}$	0.094**	0.169**
	(0.033)	(0.063)
2-year private NH cost$*10^{-4}$	-0.013**	-0.013
	(0.004)	(0.008)
Nursing homes/1000 elderly	-0.028	-0.249**
	(0.020)	(0.043)
Hospices/1000 elderly	0.064	0.102
	(0.056)	(0.122)
Measures of State Generosity		
Miller trust existence	0.032*	0.044
	(0.017)	(0.033)
% income loss, NH benefits	0.299**	0.357**
	(0.059)	(0.106)
% income loss, HCBS benefits	0.205**	0.499**
	(0.059)	(0.107)
% asset loss, singles	0.694**	1.209**
	(0.055)	(0.044)
% asset loss, couples	0.113*	
	(0.058)	
% asset loss if spouse gets NH	1.272**	
	(0.025)	
% asset loss if spouse gets HCBS	-0.008	
	(0.019)	
CON laws	0.242**	-0.212
	(0.068)	(0.151)
CON, home health services	-0.007	0.001
	(0.023)	(0.040)
CON, assisted living facilities	-0.122**	-0.139**
	(0.020)	(0.038)
CON, long-term care facilities	-0.094	0.245
	(0.069)	(0.151)
CON, hospices	0.018	-0.089**
	(0.019)	(0.034)
HCBS to NH spending ratio	-0.005	0.076*
	(0.021)	(0.042)
Expected HCBS benefits, own	2.236**	-1.625*
	(0.764)	(0.872)
Expected HCBS benefits, spouse	0.573	
	(0.784)	

Table E.3 (Continued)

Variables	**Married Households** ln(**savings**)	**Unmarried Households** ln(**savings**)
Expected NH benefits, own	-0.059	-0.062
	(0.083)	(0.086)
Expected NH benefits, spouse	-0.661**	
	(0.086)	
Area Characteristics: Health		
MDs/elderly	1.407**	3.234**
	(0.593)	(0.999)
% MDs with specialty	-0.049	-0.302**
	(0.069)	(0.152)
Hospitals/1000 elderly	0.228**	0.044
	(0.062)	(0.155)
Hospital beds/100000 elderly	-0.217**	-0.325**
	(0.043)	(0.089)
Hospital staff/hospital $*10^{-3}$	0.005	0.009
	(0.013)	(0.024)
% NH personnel/hospital	0.083	0.310
	(0.128)	(0.628)
Area Characteristics: Wealth		
% Unemployed people	-0.019**	-0.019**
	(0.003)	(0.008)
% People below poverty line	1.009**	0.951*
	(0.225)	(0.530)
Median HH income$*10^{-4}$	0.071**	0.037*
	(0.009)	(0.020)
Constant	-3.562**	-1.375
	(0.982)	(1.551)

Notes: ** denotes 5%, * denotes 10% significance. Standard errors are in parentheses.
The equation includes age squared/100, age cubed/1000, interaction terms of some personal characteristics, cohort dummies and trend variables.
The equation is estimated with 3 permanent heterogeneity mass points and 2 time-varying hetereogeneity mass points.

Table E.4: Two-Part Models on Inter Vivos Transfers and Logit on Bequest Intent

Variables	**Married Households**		**Unmarried Households**		**Bequest intent**
	Any transfer	ln(**transfer**)	**Any transfer**	ln(**transfer**)	
Endogenous Variables					
Good health entering t	0.056**	0.023	0.028	0.008	0.185**
	(0.024)	(0.022)	(0.039)	(0.041)	(0.026)
Poor health entering t	0.098*	0.156**	0.022	0.239**	0.467**
	(0.052)	(0.050)	(0.073)	(0.078)	(0.049)
Moderate disability entering t	0.127**	0.095**	0.236**	0.079	0.309**
	(0.035)	(0.032)	(0.048)	(0.051)	(0.033)
Severe disability entering t	0.059	0.042	0.331**	0.241**	0.576**
	(0.065)	(0.063)	(0.079)	(0.085)	(0.055)
IL, informal care at $t-1$	0.374**	0.054	-0.020	0.367*	0.136
	(0.154)	(0.121)	(0.153)	(0.214)	(0.097)
IL, formal care at $t-1$	0.115	-0.007	0.101	-0.004	0.288**
	(0.077)	(0.074)	(0.097)	(0.103)	(0.067)
IC, no care at $t-1$	0.236**	0.042	0.209	-0.027	-0.071*
	(0.037)	(0.032)	(0.059)	(0.062)	(0.039)
IC, informal care at $t-1$	0.145	0.251	0.259*	0.152	0.231
	(0.149)	(0.188)	(0.143)	(0.151)	(0.161)
IC, formal care at $t-1$	0.511**	-0.015	0.011	-0.066	0.179
	(0.147)	(0.131)	(0.211)	(0.179)	(0.117)
Nursing home at $t-1$	-0.015	-0.017	-0.425	-0.001	-0.219
	(0.276)	(0.273)	(0.276)	(0.250)	(0.157)
ln(savings) at $t-1$	0.114**	0.080**	0.064**	0.076**	-0.033**
	(0.009)	(0.009)	(0.009)	(0.009)	(0.006)

Table E.4 (Continued)

Variables	**Married Households**		**Unmarried Households**		**Bequest intent**
	Any transfer	ln(**transfer**)	**Any transfer**	ln(**transfer**)	
Personal Characteristics					
Annuities$*10^{-6}$	1.289**	0.326**	2.358**	2.582**	3.262**
	(0.281)	(0.154)	(0.866)	(0.721)	(0.444)
Age (years)	-0.064	0.051	-0.482**	-0.153**	-0.356**
	(0.050)	(0.054)	(0.052)	(0.073)	(0.058)
Female	0.096**	0.043*	-0.379**	-0.090**	0.074**
	(0.029)	(0.026)	(0.044)	(0.045)	(0.031)
Nonwhite	-0.024	-0.155**	-0.109**	-0.401**	-0.932**
	(0.069)	(0.067)	(0.055)	(0.058)	(0.051)
Born outside US	0.012	0.214**	0.099	0.133	-0.389**
	(0.048)	(0.045)	(0.081)	(0.084)	(0.051)
Divorced					0.056
					(0.125)
Widowed					0.647**
					(0.117)
Single					-0.129
					(0.595)
Education (years)	0.062**	0.029**	0.096**	0.037**	0.068**
	(0.005)	(0.004)	(0.007)	(0.007)	(0.004)
Number of adult children	0.052	-0.152**	0.048	-0.160**	-0.051**
	(0.045)	(0.045)	(0.072)	(0.075)	(0.012)
Spousal Charactertistics					
Spouse died in $t-1$			0.287**	0.316**	-0.163
			(0.073)	(0.073)	(0.102)
Spouse information missing	0.089	0.174			-0.263
	(0.318)	(0.229)			(0.161)
Spouse age	-0.001	0.002			0.0001
	(0.004)	(0.002)			(0.001)

Table E.4 (Continued)

Variables	**Married Households**		**Unmarried Households**		**Bequest intent**
	Any transfer	ln(**transfer**)	**Any transfer**	ln(**transfer**)	
Spouse nonwhite	0.056	-0.074			-0.337**
	(0.066)	(0.065)			(0.061)
Spouse education	0.068**	0.032**			0.047**
	(0.005)	(0.004)			(0.005)
Child Charactertics					
Mean age of children	-0.041**	-0.015**	-0.030**	-0.010**	0.025**
	(0.003)	(0.002)	(0.004)	(0.004)	(0.002)
% female children	0.111	0.058	0.256**	0.245**	0.054
	(0.075)	(0.065)	(0.095)	(0.101)	(0.076)
% married children	-0.899**	-0.112**	-0.639**	0.018	0.010
	(0.052)	(0.046)	(0.079)	(0.084)	(0.051)
Mean number of grandchildren	0.074**	-0.007	0.107**	-0.026	-0.038**
	(0.014)	(0.012)	(0.019)	(0.019)	(0.011)
% children who are stepchildren	-0.606**	-0.428**	-0.391**	-0.186	0.009
	(0.071)	(0.067)	(0.129)	(0.143)	(0.081)
% children who are children-in-law	-0.269	-1.152**	0.840*	-0.676	0.134
	(0.254)	(0.228)	(0.475)	(0.533)	(0.273)
Mean education of children	-0.009	0.031**	-0.016*	0.039**	0.050**
	(0.006)	(0.005)	(0.009)	(0.008)	(0.005)
% children who work	-0.412**	-0.239**	-0.142**	-0.290**	0.075
	(0.056)	(0.051)	(0.072)	(0.077)	(0.054)
% children who live within 10 miles	0.196**	-0.037	0.171*	0.008	-0.085
	(0.049)	(0.047)	(0.089)	(0.091)	(0.055)
Transfer Policy					
Transfer tax exclusion$*10^{-4}$	-0.009	0.003	-0.023	0.002	0.004
	(0.010)	(0.010)	(0.033)	(0.035)	(0.003)
Costs of Living					
House price index$*10^{-2}$	-0.037*	0.037*	0.001	0.007	-0.103**
	(0.021)	(0.019)	(0.032)	(0.034)	(0.018)

Table E.4 (Continued)

Variables	**Married Households**		**Unmarried Households**		**Bequest intent**
	Any transfer	ln(**transfer**)	**Any transfer**	ln(**transfer**)	
Gas price$*10^{-2}$	0.322**	-0.023	-0.064	-0.423**	-0.379**
	(0.070)	(0.067)	(0.115)	(0.113)	(0.072)
Costs and Availability of Care					
Daily home care cost$*10^{-2}$	0.115**	-0.086**	-0.014	0.008	0.044
	(0.033)	(0.028)	(0.058)	(0.062)	(0.032)
Daily assisted living cost$*10^{-2}$	-0.048	0.113	-0.068	-0.125	0.526**
	(0.094)	(0.086)	(0.148)	(0.155)	(0.100)
Hourly home aide wage$*10^{-2}$	-0.045	-0.901	1.285	-1.452	3.536**
	(0.938)	(0.816)	(1.0004)	(1.005)	(0.888)
Home care agencies/elderly$*10^{-3}$	0.060	-0.186**	0.155	0.044	0.035
	(0.064)	(0.061)	(0.107)	(0.107)	(0.072)
2-year private NH cost$*10^{-4}$	-0.0005	0.004	-0.001	0.033**	0.043**
	(0.008)	(0.007)	(0.012)	(0.013)	(0.007)
Nursing homes/1000 elderly	-0.055	-0.043	-0.074	-0.061	-0.026
	(0.040)	(0.038)	(0.075)	(0.078)	(0.038)
Hospices/1000 elderly	-0.037	0.232**	-0.108	0.447**	-0.162
	(0.119)	(0.116)	(0.213)	(0.222)	(0.135)
Measures of State Generosity					
Miller trust existence	-0.042	0.063**	0.089**	0.035	0.117**
	(0.032)	(0.029)	(0.053)	(0.055)	(0.029)
% income loss, NH benefits	0.195	0.010	0.527**	0.144	0.118
	(0.121)	(0.115)	(0.168)	(0.169)	(0.119)
% income loss, HCBS benefits	0.171	0.119	-0.018	0.084	-0.093
	(0.122)	(0.115)	(0.168)	(0.171)	(0.121)
% asset loss, singles	0.146	0.452**	0.367**	0.175**	0.092
	(0.124)	(0.129)	(0.073)	(0.079)	(0.060)
% asset loss, couples	-0.058	-0.451**			0.256**
	(0.132)	(0.137)			(0.071)
% asset loss if spouse gets NH	0.129**	0.471**			-0.165**
	(0.048)	(0.045)			(0.055)

Table E.4 (Continued)

Variables	**Married Households**		**Unmarried Households**		**Bequest intent**
	Any transfer	ln(**transfer**)	**Any transfer**	ln(**transfer**)	
% asset loss if spouse gets HCBS	-0.016	-0.039			0.151**
	(0.037)	(0.036)			(0.045)
CON laws	0.086	0.118	0.123	-0.205	-0.251*
	(0.143)	(0.134)	(0.669)	(0.285)	(0.150)
CON, home health services	-0.002	-0.104**	0.113*	0.123**	0.139**
	(0.039)	(0.036)	(0.060)	(0.062)	(0.041)
CON, assisted living facilities	-0.059	0.019	-0.138**	-0.161**	-0.047
	(0.037)	(0.034)	(0.060)	(0.061)	(0.038)
CON, long-term care facilities	0.020	-0.143	0.051	0.141	0.269*
	(0.144)	(0.135)	(0.672)	(0.286)	(0.151)
CON, hospices	0.094**	0.071**	-0.022	-0.002	-0.128*
	(0.034)	(0.031)	(0.053)	(0.054)	(0.035)
HCBS to NH spending ratio	-0.028	-0.092**	0.009	-0.029	-0.172**
	(0.036)	(0.032)	(0.061)	(0.062)	(0.035)
Expected HCBS benefits, own	-0.424	1.583	-3.519**	-1.225	-0.832
	(1.003)	(1.029)	(1.022)	(1.013)	(0.999)
Expected HCBS benefits, spouse	-0.901	0.681			1.876*
	(1.004)	(1.025)			(1.021)
Expected NH benefits, own	-0.181	0.209	-0.174	0.293*	-0.242**
	(0.178)	(0.185)	(0.159)	(0.169)	(0.117)
Expected NH benefits, spouse	-0.353**	-0.246			-0.246
	(0.170)	(0.171)			(0.163)
Area Characteristics: Health					
MDs/elderly	3.443**	1.634*	4.243**	-0.319	-4.152**
	(0.997)	(0.991)	(1.085)	(1.254)	(1.010)
% MDs with specialty	-0.368**	0.097	0.174	0.201	-0.409**
	(0.147)	(0.138)	(0.273)	(0.282)	(0.171)
Hospitals/1000 elderly	-0.051	0.272**	-0.126	0.190	-1.255**
	(0.132)	(0.123)	(0.276)	(0.287)	(0.172)

Table E.4 (Continued)

Variables	**Married Households**		**Unmarried Households**		**Bequest intent**
	Any transfer	ln(**transfer**)	**Any transfer**	ln(**transfer**)	
Hospital beds/100000 elderly	-0.125	-0.035	-0.247*	-0.194	0.903**
	(0.085)	(0.078)	(0.148)	(0.153)	(0.104)
Hospital staff/hospital $*10^{-3}$	0.036	-0.017	-0.017	0.121**	-0.036
	(0.025)	(0.023)	(0.039)	(0.042)	(0.025)
% NH personnel/hospital	-0.476*	0.183	-0.362	-0.493	-0.093
	(0.275)	(0.261)	(0.934)	(0.906)	(0.646)
Area Characteristics: Wealth					
% Unemployed people	0.027**	0.007	-0.004	-0.004	0.017**
	(0.007)	(0.006)	(0.013)	(0.012)	(0.007)
% People below poverty line	-0.389	-0.561	-1.124	-0.024	-2.563**
	(0.479)	(0.477)	(0.961)	(0.899)	(0.549)
Median HH income$*10^{-4}$	0.012	0.014	-0.011	0.035	-0.022
	(0.019)	(0.018)	(0.034)	(0.032)	(0.019)
Constant	-0.014	5.304**	9.259**	9.792**	0.682
	(1.043)	(1.158)	(1.097)	(1.606)	(1.268)

Notes: ** denotes 5%, * denotes 10% significance. Standard errors are in parentheses.
The equation includes age squared/100, age cubed/1000, interaction terms of some personal characteristics, cohort dummies and trend variables.
The equation is estimated with 3 permanent heterogeneity mass points and 2 time-varying hetereogeneity mass points.

Table E.5: Multinomial Logit on Health at End of t

Variables	Good Health	Poor Health	Death
Endogenous Variables			
Good health entering t	1.998**	2.591**	1.858**
	(0.019)	(0.053)	(0.052)
Poor health entering t	2.753**	5.373**	4.202**
	(0.077)	(0.091)	(0.094)
Moderate disability entering t	0.551**	1.135**	0.989**
	(0.033)	(0.045)	(0.052)
Severe disability entering t	0.759**	1.704**	1.746**
	(0.079)	(0.089)	(0.093)
IL, informal care at t	0.063	0.553**	0.412**
	(0.069)	(0.086)	(0.098)
IL, formal care at t	0.231**	0.547**	1.074**
	(0.055)	(0.071)	(0.074)
IC, no care at t	0.037	0.109**	0.181**
	(0.025)	(0.047)	(0.065)
IC, informal care at t	0.059	0.397**	0.584**
	(0.076)	(0.094)	(0.106)
IC, formal care at t	0.243**	0.443**	1.154**
	(0.102)	(0.122)	(0.125)
Nursing home at t	0.117	0.342**	1.417**
	(0.115)	(0.136)	(0.127)
ln(savings) at t	-0.028**	-0.055**	-0.059**
	(0.005)	(0.009)	(0.011)
Personal Characteristics			
Annuities$*10^{-6}$	-0.473**	-0.419	-0.037
	(0.224)	(0.455)	(0.419)
Age (years)	-0.088*	-0.286**	0.299**
	(0.048)	(0.067)	(0.085)
Female	-0.121**	-0.259**	-0.847**
	(0.023)	(0.046)	(0.059)
Nonwhite	0.202**	0.025	0.036
	(0.041)	(0.063)	(0.077)
Born outside US	0.242**	-0.069	-0.136*
	(0.042)	(0.069)	(0.084)
Education (years)	-0.048**	-0.083**	-0.036**
	(0.004)	(0.006)	(0.007)
Divorced	-0.078	-0.0005	0.198
	(0.077)	(0.135)	(0.166)
Widowed	-0.248**	-0.409**	-0.248*
	(0.068)	(0.117)	(0.135)
Single	0.034	-0.276	-0.089
	(0.238)	(0.572)	(0.556)

Table E.5 (Continued)

Variables	Good Health	Poor Health	Death
Number of adult children	-0.009**	-0.018**	-0.065**
	(0.003)	(0.005)	(0.006)
Spousal Characteristics			
Spouse info missing	0.019	-0.075	-0.103
	(0.146)	(0.229)	(0.346)
Spouse age	0.005**	0.004**	0.006**
	(0.0009)	(0.001)	(0.002)
Spouse nonwhite	0.086*	0.155**	0.081
	(0.048)	(0.075)	(0.101)
Spouse education (years)	-0.042**	-0.050**	-0.062**
	(0.004)	(0.007)	(0.009)
Medicaid Eligibility			
Medicaid covered	0.049	0.162**	0.202**
	(0.050)	(0.066)	(0.075)
Spouse Medicaid covered	-0.044	-0.019	-0.182
	(0.065)	(0.091)	(0.116)
Area Characteristics			
MDs/ elderly	-3.244**	-5.226**	-4.473**
	(0.977)	(1.021)	(1.033)
% MDs with specialty	0.074	-0.236	0.022
	(0.123)	(0.211)	(0.275)
Hospitals/1000 elderly	0.328**	0.334*	0.221
	(0.100)	(0.185)	(0.244)
Hospital beds/1000 elderly	-0.095	-0.004	-0.013
	(0.069)	(0.119)	(0.156)
Hospital staff/hospital $*10^{-3}$	0.065**	0.053	0.053
	(0.021)	(0.036)	(0.042)
% NH personnel/hospital	-0.307	-0.791	-0.954
	(0.264)	(0.778)	(0.712)
Constant	1.544	3.498**	-16.667**
	(1.038)	(1.498)	(2.058)

Note: ** denotes 5%, * denotes 10% significance. Standard errors are in parentheses.
Reported coefficients are relative to the base category: excellent health.
The equation includes age squared/100, age cubed/1000, interaction terms of some personal characteristics, cohort dummies and trend variables.
The equation is estimated with 3 permanent heterogeneity mass points and 2 time-varying hetereogeneity mass points.

Table E.6: Multinomial Logit on Disability at End of t

Variables	Moderate Disability	Severe Disability
Endogenous Variables		
Good health entering t	0.718**	0.921**
	(0.028)	(0.058)
Poor health entering t	1.341**	1.869**
	(0.047)	(0.073)
Moderate disability entering t	1.947**	2.413**
	(0.027)	(0.048)
Severe disability entering t	2.710**	4.841**
	(0.074)	(0.081)
IL, informal care at t	0.607**	0.914**
	(0.061)	(0.080)
IL, formal care at t	0.349**	0.901**
	(0.050)	(0.067)
IC, no care at t	0.031	0.009
	(0.032)	(0.064)
IC, informal care at t	0.578**	0.983**
	(0.067)	(0.085)
IC, formal care at t	0.452**	0.998**
	(0.089)	(0.109)
Nursing home at t	0.529**	1.926**
	(0.131)	(0.137)
ln(savings) at t	-0.030**	-0.043**
	(0.006)	(0.008)
Personal Characteristics		
Annuities$*10^{-6}$	0.533*	0.358
	(0.288)	(0.914)
Age (years)	-0.016	-0.005
	(0.055)	(0.094)
Female	0.012	0.121**
	(0.031)	(0.058)
Nonwhite	-0.050	-0.007
	(0.045)	(0.069)
Born outside US	-0.215**	-0.312**
	(0.049)	(0.082)
Education (years)	-0.018**	-0.005
	(0.005)	(0.007)
Divorced	0.067	-0.153
	(0.091)	(0.165)
Widowed	-0.002	-0.068
	(0.075)	(0.125)
Single	0.099	-0.217
	(0.211)	(0.609)

Table E.6 (Continued)

Variables	Moderate Disability	Severe Disability
Number of adult children	-0.002	-0.006
	(0.004)	(0.005)
Spousal Characteristics		
Spouse info missing	0.172	-0.161
	(0.126)	(0.206)
Spouse age	0.001	0.001
	(0.001)	(0.002)
Spouse nonwhite	0.056	0.057
	(0.054)	(0.088)
Spouse education (years)	-0.006	-0.022**
	(0.005)	(0.008)
Medicaid Eligibility		
Medicaid covered	0.200**	0.292**
	(0.047)	(0.067)
Spouse Medicaid covered	-0.036	-0.141
	(0.065)	(0.101)
Area Characteristics		
MDs/elderly	-1.622	-0.074
	(0.997)	(1.024)
% MDs with specialty	-0.050	-0.308
	(0.137)	(0.229)
Hospitals/1000 elderly	0.187	0.015
	(0.117)	(0.212)
Hospital beds/1000 elderly	0.069	0.022
	(0.084)	(0.140)
Hospital staff/hospital $*10^{-3}$	0.041	0.030
	(0.025)	(0.041)
% NH personnel/hospital	-0.420	-0.439
	(0.358)	(0.928)
Constant	-1.625	-3.905*
	(1.209)	(2.105)

Note: ** denotes 5%, * denotes 10% significance. Standard errors are in parentheses.
Reported coefficients are relative to the base category: no disability.
The equation includes age squared/100, age cubed/1000, interaction terms of some personal characteristics, cohort dummies and trend variables.
The equation is estimated with 3 permanent heterogeneity mass points and 2 time-varying hetereogeneity mass points.

Table E.7: Two-Part Model on Actual Bequest

Variables	**Leave Bequest**	ln(**Bequest Amount**)
Endogenous Variables		
Good health entering t	0.072	-0.122
	(0.154)	(0.568)
Poor health entering t	-0.052	0.585
	(0.177)	(0.659)
Moderate disability entering t	0.154	-0.335
	(0.136)	(0.458)
Severe disability entering t	0.401**	0.534
	(0.166)	(0.578)
IL, informal care at t	-0.277	0.165
	(0.241)	(0.820)
IL, formal care at t	0.050	0.228
	(0.158)	(0.687)
IC, no care at t	-0.193	0.744
	(0.204)	(0.797)
IC, informal care at t	-0.045	-0.049
	(0.232)	(0.786)
IC, formal care at t	0.174	-0.739
	(0.218)	(0.642)
Nursing home at t	-0.717**	0.190
	(0.211)	(0.657)
ln(savings) at t	0.029	0.005
	(0.027)	(0.098)

Table E.7 (Continued)

Variables	**Leave Bequest**	ln(**Bequest Amount**)
Personal Characteristics		
Annuities$*10^{-6}$	-2.058*	8.540*
	(1.116)	(4.506)
Age (years)	0.184	-2.259
	(0.242)	(2.455)
Female	0.532**	0.444
	(0.193)	(0.585)
Nonwhite	-0.049	0.055
	(0.226)	(0.621)
Born outside US	-0.117	-0.151
	(0.219)	(0.828)
Education (years)	0.025	0.105*
	(0.018)	(0.056)
Divorced	0.833*	0.885
	(0.438)	(0.935)
Widowed	0.672**	1.298
	(0.324)	(0.846)
Single	1.346*	1.908
	(0.786)	(1.174)
Number of adult children	0.037**	-0.108**
	(0.015)	(0.054)
Spousal Characteristics		
Spouse info missing	0.272	0.337
	(0.848)	(1.042)
Spouse age	0.002	-0.012
	(0.004)	(0.014)
Spouse nonwhite	0.089	-0.515
	(0.410)	(0.956)
Spouse education (years)	0.005	0.138*
	(0.025)	(0.078)
Constant	-7.463	79.758
	(5.859)	(64.330)

Note: ** denotes 5%, * denotes 10% significance. Standard errors are in parentheses.
The equation includes age squared/100, age cubed/1000, interaction terms of some personal characteristics, cohort dummies and trend variables.
The equation is estimated with 3 permanent heterogeneity mass points and 2 time-varying hetereogeneity mass points.

Table E.8: Unobserved Heterogeneity Parameters

Estimated Equations	**Points of Support**				
	Permanent UH			**Time-varying UH**	
	1	**2**	**3**	**1**	**2**
Probability weight	0.073	0.493	0.434	0.076	0.924
Living arrangement, married households (N = 44769)					
- IL, informal care	0	0.404**	0.536**	0	-0.644**
		(0.201)	(0.174)		(0.133)
- IL, formal care	0	0.068	0.102	0	-0.324**
		(0.163)	(0.151)		(0.120)
- IC, no care	0	-0.102	0.068	0	-0.018
		(0.119)	(0.114)		(0.095)
- IC, informal care	0	0.506**	0.774**	0	-0.525**
		(0.216)	(0.181)		(0.141)
- IC, formal care	0	0.255	0.606**	0	-0.117
		(0.293)	(0.247)		(0.193)
- Nursing home	0	0.048	0.376	0	-0.831**
		(0.316)	(0.271)		(0.202)
Living arrangement, unmarried households (N = 21390)					
- IL, informal care	0	-0.059	0.094	0	-0.396**
		(0.167)	(0.137)		(0.106)
- IL, formal care	0	0.063	0.013	0	-0.260**
		(0.137)	(0.116)		(0.091)
- IC, no care	0	0.039	0.219*	0	-0.157*
		(0.130)	(0.116)		(0.091)
- IC, informal care	0	-0.199	0.067	0	-0.336**
		(0.188)	(0.148)		(0.117)
- IC, formal care	0	-0.076	-0.049	0	-0.393**
		(0.207)	(0.163)		(0.126)
- Nursing home	0	0.319	0.419**	0	-1.201**
		(0.201)	(0.158)		(0.118)

Table E.8 (Continued)

Estimated Equations	**Points of Support**				
	Permanent UH			**Time-varying UH**	
	1	**2**	**3**	**1**	**2**
Log savings, married	0	-0.115**	-0.460**	0	9.060**
(N = 44769)		(0.036)	(0.035)		(0.029)
Log savings, unmarried	0	0.551**	-0.460**	0	7.971**
(N = 21390)		(0.050)	(0.041)		(0.032)
Any inter vivos transfer, married	0	0.185**	-0.149*	0	0.293**
(N = 44769)		(0.082)	(0.082)		(0.059)
Any inter vivos transfer, unmarried	0	0.592**	0.022	0	0.414**
(N = 21390)		(0.096)	(0.087)		(0.073)
Inter vivos transfer amount, married	0	0.091	-0.239**	0	0.043
(N = 44769)		(0.082)	(0.079)		(0.057)
Inter vivos transfer amount, unmarried	0	0.054	-0.436**	0	-0.014
(N = 21390)		(0.100)	(0.095)		(0.083)
Bequest intent	0	2.416**	-0.250**	0	0.381**
(N = 66159)		(0.066)	(0.062)		(0.048)

Table E.8 (Continued)

Estimated Equations	**Points of Support**				
	Permanent UH			**Time-varying UH**	
	1	**2**	**3**	**1**	**2**
Health					
(N = 80314)					
- Good health	0	-0.096*	0.253**	0	0.187**
		(0.056)	(0.054)		(0.061)
- Poor health	0	-0.489**	0.234**	0	0.295**
		(0.086)	(0.072)		(0.093)
- Death	0	-0.287**	0.235**	0	0.433**
		(0.091)	(0.081)		(0.113)
Disability					
(N = 75975)					
- Moderate disability	0	-0.123**	0.222**	0	0.041
		(0.059)	(0.052)		(0.064)
- Severe disability	0	-0.549**	0.148**	0	0.214**
		(0.087)	(0.069)		(0.076)
Leave bequest	0	-0.021	-0.053	0	-0.199
(N = 4339)		(0.225)	(0.189)		(0.272)
Actual bequest amount	0	1.361*	0.516	0	-0.322
(N = 346)		(0.779)	(0.642)		(0.975)

Notes: Standard errors are in parentheses. The first points of support are normalized to zero. IL = independent living; IC = intergenerational coresidence; N = sample size.

Appendix F

Additional Tables: Fit of the Model

Table F.1: Fit of the Model: Living Arrangements of Married Households

Variables	Actual	No UH No Update	UH No Update	No UH Update	UH Update	UH Attrition
LA_t						
- % NH	0.94	0.91	0.90	0.79	0.94	0.91
- % IC, formal	1.13	1.20	1.09	1.02	1.13	1.13
- % IC, informal	1.94	1.85	1.93	1.94	1.89	1.88
- % IC, no care	16.19	16.01	16.23	15.42	15.98	15.99
- % IL, formal	4.61	4.58	4.73	4.40	4.60	4.57
- % IL, informal	2.54	2.56	2.65	2.24	2.45	2.47
- % IL, no care	72.66	72.88	72.48	74.19	73.01	73.06

Notes: UH = unobserved heterogeneity; NH = nursing home; IC = intergenerational coresidence; IL = independent living. I also simulate attrition from the second period onward in the last simulation.

Table F.2: Fit of the Model: Living Arrangements of Unmarried Households

Variables	Actual	No UH No Update	UH No Update	No UH Update	UH Update	UH Attrition
LA_t						
- % NH	5.80	5.79	5.51	6.02	5.48	5.31
- % IC, formal	3.77	3.62	3.81	3.53	3.24	3.27
- % IC, informal	5.33	5.64	5.05	5.43	5.19	5.21
- % IC, no care	17.40	17.31	17.71	17.31	17.84	17.95
- % IL, formal	8.08	8.17	8.35	7.20	7.61	7.65
- % IL, informal	5.29	5.31	5.06	4.80	4.76	4.82
- % IL, no care	54.33	54.15	54.50	55.72	55.87	55.79

Notes: UH = unobserved heterogeneity; NH = nursing home; IC = intergenerational coresidence; IL = independent living. I also simulate attrition from the second period onward in the last simulation.

Appendix G

T Tests on Marginal Effects

Table G.1: Test Statistics on the Difference between Marginal Effects Test

Variables	**LA = 0**	**LA = 1**	**LA = 2**	**LA = 3**	**LA = 4**	**LA = 5**	**LA = 6**
Married Households							
Good health	74.81	0	0	-49.87	0	0	-44.88
Poor health	42.31	-36.29	0	-42.31	0	0	0
Moderate disability	27.09	-58.68	0	0	-74.81	-74.81	0
Severe disability	24.85	-29.92	0	0	-37.40	-37.40	-22.95
Savings	-347.85	0	36.29	236.56	94.62	0	157.09
HCBS/NH ratio	0	29.92	0	0	14.96	0	0
HCBS benefits	-134.65	0	0	0	0	0	0
NH benefits	21.37	0	0	0	0	0	0
Unmarried Households							
Good health	17.24	0	20.68	-34.47	-13.79	0	-15.51
Poor health	8.99	0	18.73	-27.52	-20.68	0	-37.45
Moderate disability	29.55	-18.73	41.37	0	-45.68	29.25	-25.85
Severe disability	17.24	-10.29	45.96	14.77	-12.93	14.77	-76.09
Savings	-292.51	87.75	-22.84	0	119.26	46.24	206.83
HCBS/NH ratio	0	0	-3.447	3.447	93.07	51.71	0
HCBS benefits	0	0	0	0	34.47	34.47	-45.68
NH benefits	103.42	103.42	0	0	0	-10.34	-103.42

Notes: I test whether the marginal effects from a model with unobserved heterogeneity are statistically different from those from a model without unobserved heterogeneity. The marginal effects used are one-period contemporaneous marginal effects where the endogenous variables are not updated sequentially. LA-j = living arrangement j

Bibliography

Altonji, J. G., F. Hayashi, and L. J. Kotlikoff (1997). Parental Altruism and Inter Vivos Transfers: Theory and Evidence. *The Journal of Political Economy 105*(6), 1121–1166.

Bernheim, B. D., A. Shleifer, and L. H. Summers (1986). The Strategic Bequest Motive. *Journal of Labor Economics 4*(3), 151–182.

Boersch-Supan, A., V. Hajivassiliou, L. J. Kotlikoff, and J. N. Morris (1990). Health, Children and Elderly Living Arrangements: a Multiperiod-Multinomial Probit Model with Unobserved Heterogeneity and Autocorrelated Errors. *NBER Working Paper Series (Working Paper No.3343)*.

Bowers, B. J. (1988). Family Perceptions of Care in a Nursing Home. *The Gerontologist 28*(3), 361–368.

Brown, M. (2004). Informal Care and the Division of End-of-life Transfers (Working Paper). *University of Wisconsin-Madison*.

Brown, M. (2007). End-of-Life Transfers and the Decision to Care for a Parent. *International Economic Review (Forthcoming)*.

Bruen, B. K., J. M. Weiner, and S. Thomas (1999). Medicaid Eligibility for Aged, Blind, and Disabled Beneficiaries. *The Urban Institute Article*.

Bruen, B. K., J. M. Weiner, and S. Thomas (2003). Medicaid Eligibility for Aged, Blind and Disabled Beneficiaries. *The Urban Institute Article*.

Buntin, M. B. and A. M. Zaslavsky (2004). Too Much Ado about Two-part Models and Transformation?: Comparing Methods of Modeling Medicare Expenditures. *Journal of Health Economics 23*(3), 525 – 542.

Butrica, B. A. and G. B. Mermin (2006). Annuitized Wealth and Consumption at Older Ages. *The Retirement Project Discussion Paper Series (The Urban Institute)*.

Castle, N. G. (2001). Relocation of the Elderly. *Medical Care Research and Review 58*(3), 291–333.

Charles, K. K. and P. Sevak (2005). Can Family Caregiving Subsitute for Nursing Home Care? *Journal of Health Economics 24*, 1174–1190.

Choi, N. G. (2003). Coresidence between Unmarried Aging Parents and their Adult Children: Who Moved in with Whom and Why? *Research on Aging 25*(4), 384–404.

Coe, N. B. and C. H. Van Houtven (2009). Caring for Mom and Neglecting Yourself? The Health Effects of Caring for an Elderly Parent. *Health Economics 18*(9), 991–1010.

Costa, D. L. (1997). Displacing the Family: Union Army Pensions and Elderly Living Arrangements. *Journal of Political Economy 105*(6), 1269–1292.

Cox, D. and M. R. Rank (1992). Inter-Vivos Transfers and Intergenerational Exchange. *Review of Economics and Statistics 74*(2), 305–314.

Duan, N. (1983). Smearing Estimate: A Nonparametric Retransformation Method. *Journal of the American Statistical Association 78*(383), pp. 605–610.

Dushi, I. and A. Webb (2004). Household Annuitization Decisions: Simulations and Empirical Analyses. *Journal of Pension Economics and Finance 3*(2), 109–143.

Ellis, E. and V. Smith (2000). Medicaid Enrollment in 50 States. *The Kaiser Commission on Medicaid and the Uninsured Paper*.

Gardner, L. and D. Gilleskie (2009). The Effects of State Medicaid Policies on the Dynamic Savings Patterns of the Elderly (Working Paper). *NBER Working Paper Series*.

Garrett, B. and S. Glied (2000). Does State AFDC Generosity Affect Child SSI Participation? *Journal of Policy Analysis and Management 19*(2), 275–295.

Gaugler, J. E., A. B. Edwards, E. E. Femia, S. H. Zarit, M.-A. P. Stephens, A. Townsend, and R. Greene (2000). Predictors of Institutionalization of Cognitively Impaired Elders: Family Help and the Timing of Placement. *Journal of Gerontology 55B*(4), 247–255.

Grabowski, D. C. (2001). Medicaid Reimbursement and the Quality of Nursing Home Care. *Journal of Health Economics 20*(4), 549–569.

Grabowski, D. C. and J. Gruber (2007). Moral Hazard in Nursing Home Use. *Journal of Health Economics 26*(3), 560 – 577.

Heiss, F., M. Hurd, and A. Borsch-Supan (2003). Healthy, Wealthy and Knowing Where to Live: Predicted Trajectories of Health, Wealth and Living Arrangements Among the Oldest Old. *NBER Working Paper Series (No. 9897)*.

Hiedemann, B. and S. Stern (1999). Strategic Play among Family Members when Making Long-term Care Decisions. *Journal of Economic Behavior and Organization 40*, 29–57.

Hoerger, T. J., G. A. Picone, and F. A. Sloan (1996). Public Subsidies, Private Provision of Care and Living Arrangements of the Elderly. *The Review of Economics and Statistics 78*(3), 428–440.

Hurd, M., J. P. Smith, and J. Zissimopoulos (2007). Inter-Vivos Giving over the Life Cycle (Working Paper). *RAND Labor and Population*.

Hurd, M. D. (1990). Research on the Elderly: Economic Status, Retirement, and Consumption and Saving. *Journal of Economic Literature 28*(2), 565–637.

Jacobson, D. B., B. G. Raub, and B. W. Johnson (2007). The Estate Tax: Ninety Years and Counting. *IRS Publication*.

Jones, L. D. (1996). Housing Tenure Transition and Dissaving by the Elderly. *The Canadian Journal of Economics 29*(Special Issue), 505–509.

Joulfaian, D. (2007). The Federal Gift Tax: History, Law, and Economics. *OTA Papers (Office of Tax Analysis, Department of the Treasury)*.

Joulfaian, D. and K. McGarry (2004). Estate and Gift Tax Incentives and Inter Vivos Giving. *National Tax Journal 57*(2), 429–444.

Juster, F. T. and J. P. Smith (1997). Improving the Quality of Economic Data: Lessons from the HRS and AHEAD. *Journal of the American Statistical Association 92*(440), pp. 1268–1278.

Kassner, E. and L. Shirley (2000). Medicaid Financial Eligibility for Older People: State Variations in Access to Home and Community-Based Waiver and Nursing Home Services. *Washington DC: AARP Public Policy Institute*.

Levy, R., W. Riley, and M. Gabay (2005). Analysis of the Use of Annuities to Shelter Assets in State Medicaid Programs. *The CNA Corporation Paper*.

Light, A. and K. McGarry (2004). Why Parents Play Favorites: Explanations for Unequal Bequests. *American Economic Review 94*(5), 1669–1681.

Luckey, J. R. (2003). A History of Federal Estate, Gift and Generation-Skipping Taxes. *Report for Congress*.

McGarry, K. (1999). Inter Vivos Transfers and Intended Bequests. *Journal of Public Economics 73*, 321–351.

Mellor, J. M. (2001). Long-term Care and Nursing Home Coverage: Are Adult Children Substitutes for Insurance Policies? *Journal of Health Economics 20*, 527–547.

Michael, Y. L., L. F. Berkman, G. A. Colditz, and I. Kawachi (2001). Living Arrangements, Social Integration and Change in Functional Health Status. *American Journal of Epidemiology 153*(2), 123–131.

Mroz, T. A. (1999). Discrete Factor Approximations in Simultaneous Equation Models: Estimating the Impact of a Dummy Endogenous Variable on a Continuous Outcome. *Journal of Econometrics 92*(2), 233–274.

Muramatsu, N., H. Yin, R. T. Campbell, R. L. Hoyen, M. A. Jacob, and C. O. Ross (2007). Risk of Nursing Home Admission among Older Americans: Does States' Spending on Home- and Community-Based Services Matter? *Journal of Gerontology: Psychological Sciences 62*(3).

Mutchler, J. E. and J. A. Burr (1991). A Longitudinal Analysis of Household and Nonhousehold Living Arrangements in Later Life. *Demography 28*(3), 375–390.

Nihtila, E. and P. Martikainen (2008). Institutionalization of Older Adults After the Death of a Spouse. *American Journal of Public health 98*(7), 1228–1234.

Nishiyama, S. (2002). Bequests, Inter Vivos Transfers and Wealth Distribution. *Review of Economic Dynamics 5*, 892–931.

Norton, E. C. and C. H. Van Houtven (2006). Inter-Vivos Transfers and Exchange. *Southern Economic Journal 73*(1), 157–172.

Pal, S. (2006). Elderly Health, Wealth and Co-Residence with Adult Children in Rural India. *CEDI Discussion Paper Series (Working Paper No. 06-09)*.

Pezzin, L. E. and B. S. Schone (1999). Intergenerational Household Formation, Female Labor Supply and Informal Caregiving: A Bargaining Approach. *The Journal of Human Resources 34*(3), pp. 475–503.

Philipson, T. J. and G. S. Becker (1998). Old-Age Longevity and Mortality-Contingent Claims. *The Journal of Political Economy 106*(3), 551–573.

Poterba, J. (1998). Estate and Gift Taxes and Incentives for Inter Vivos Giving in the United States. *Journal of Public Economics 79*(1), 237–264.

Purcell, P. (2009). Income of Americans Aged 65 and Older, 1968 to 2008. *CRS Report for Congress*.

Rosenzweig, M. R. and K. I. Wolpin (1993). Intergenerational Support and the Life-Cycle Incomes of Young Men and Their Parents: Human Capital Investments, Coresidence, and Intergenerational Financial Transfers. *Journal of Labor Economics 11*(1), 84–112.

Rowland, D. and B. Lyons (1996). Medicare, Medicaid and the Elderly Poor. *Health Care Financing Review 18*(2), 61–85.

Schneider, A., K. Fennel, and P. Keenan (1999). Medicaid Eligibility for the Elderly. *Kaiser Commission Issue Paper*.

Schoeni, R. F. (1998). Reassessing the Decline in Parent-Child Old-Age Coresidence during the Twentieth Century. *Demography 35*(3), 307–313.

Sloan, F. A. and E. C. Norton (1997). Adverse Selection, Bequests, Crowding Out and Private Demand for Insurance: Evidence from the Long-term Care Insurance Market. *Journal of Risk and Uncertainty 15*, 201–219.

Sloan, F. A. and H. H. Zhang (2002). Upstream Intergenerational Transfers. *Southern Economic Journal 15*, 201–219.

Stern, S. (1995). Estimating Family Long-Term Care Decisions in the Presence of Endogenous Child Characteristics. *Journal of Human Resources 30*(3), 551–580.

Stone, J. (2002). Medicaid: Eligibility for the Aged and Disabled. *CRS Report for Congress*.

Stone, J. (2008). Medicaid Coverage for Long-Term Care: Eligibility, Asset Transfers and Estate Recovery. *CRS Report for Congress*.

Walliser, J. (2000). Regulation of Withdrawals in Individual Account Systems. *Social Protection Discussion Paper Series* (8).

Wilhelm, M. O. (1996). Bequest Behavior and the Effect of Heirs' Earnings: Testing the Altruistic Model of Bequests. *American Economic Review 86*(4), 874–892.