1 Research Problem

The goal of this project is to develop and estimate realistic models of family decision making concerning long-term care of elderly parents. My theoretical and empirical models are rich in the sense that family members face a wide range of options including nursing home care, formal care provided in the elderly individual’s home (home health care), informal care, and no care. Despite the rich set of outcomes, my theoretical models are not mathematically complex. Each family member simply maximizes utility, which may depend on the welfare of the parent, subject to a budget constraint. Once I have estimated my models, I will use my results to address the following questions:

a) How do characteristics of family members affect decisions about long-term care such as time spent caring for the parent and financial transfers to the parent?

b) What secular changes in family structure explain secular changes in long-term care?

c) How do government funding rules associated with home health care and nursing home care such as Medicaid funding and tax credits affect family decisions and social efficiency?

d) How do families share the incidence of costs associated with caring for elderly parents?

e) How much of the variation in informal care provided by children may be attributed to variation in opportunity cost (wages), quality of care variation, variation in burden, and variation in other characteristics?

With a little more work, this project will be put in an NIH R01 grant proposal. The extra work will involve working through most of the details of the second and third waves of the HRS data.

2 Background and Significance

2.1 Demographic Trends

In recent decades, the elderly population has grown substantially. For example, the elderly population increased by 28% between 1980 and 1993. Demographers predict that the elderly population will reach 60 million, or 20% of the total population, by 2025 (Morrison, 1990). Furthermore, as of 1983, the oldest old population, those 85 years and older, was growing faster than any other age-based segment of the American population. People are living longer than ever before and, as they grow older, the elderly experience increasing physical and mental impairments. Although disability rates among the elderly decreased between 1982 and 1994 (Manton, Corder, and Stallard, 1997), the number of disabled elderly individuals has remained approximately constant at 5.5 million (Spector, et al. 1999) because of population aging. Furthermore, the level of disability among those receiving long-term care has increased (Spector, et al. 1999).

Concurrent with population aging has been a marked shift with regard to long-term care arrangements. Children have become less likely to care for elderly parents, while elderly parents have become more likely to remain independent, move to nursing homes (Boersch-Supan et al., 1988; Wolf and Soldo, 1988), or receive formal care in their homes. For example, only 7% of the oldest old lived in institutions in 1940, but in 1990 approximately 25% of the people in this age group were institutionalized (Kotlikoff and Morris, 1990). Between 1978 and 1991, the number of elderly living in institutions such as nursing homes grew from 1.2 million to 1.4 million (U.S., Bureau of the Census, 1980, 1995). Meanwhile the proportion of those who receive long-term care living with relatives other than spouses declined from 16.1% to 12.8% (U.S., Bureau of the Census, 1996).

Population aging and the trends toward institutional and home health care have significant economic, social, and psychological implications. The high cost of institutional care often exhausts the resources of nursing home residents. Thus, many elderly individuals and their families rely on Medicaid to cover their long-term care expenses. At the aggregate level, nursing home care has accounted for an increasing share of health care costs which, in turn, have accounted for an increasing share of the national budget. Between 1960 and 1980, nursing home care’s share
of health care expenditures more than doubled from 3.5% in 1960 to 7.1% in 1980. However, its share of health care expenditures has grown more slowly since then, increasing only to 7.6% in 1994 (U.S. Bureau of the Census, 1982; National Center for Health Statistics, 1996).

Home health care’s share of health care expenditures has also increased dramatically in recent years. For example, it rose from 1% in 1980 to 2.8% in 1994 (U.S. Bureau of the Census, 1982; National Center for Health Statistics, 1996). By 1992, .9 million individuals were receiving home care (National Center for Health Statistics, 1994a, 1994b).

Despite the trends toward institutional and home health care, adult children remain a factor enabling elderly parents to live in the community. Researchers demonstrate that a majority of the elderly who remain in the community do so with the assistance of familial and social networks (Shanas, 1979a, 1979b, 1980; Cantor, 1983, Streib, 1983, Noelker and Wallace, 1985; Matthews and Rosner, 1988).

The trend away from care provided by family members in favor of institutional care has implications for both the welfare of the elderly and for government budgets. Thus, we need to develop policies that 1) encourage families to make caregiving decisions that promote the welfare of their elderly relatives and 2) provide appropriate financial incentives. In order to inform policy makers, we propose estimating a rich model of family caregiving using a proven econometric methodology. Our model allows us to ask relevant questions concerning the relationships among public policy, environmental factors, caregiving behavior, and the welfare of elderly individuals and their families.

2.2 Literature Review

Although predominantly empirical, the long-term care literature offers several theoretical models. These models vary along several dimensions: which family members participate in the decision-making process, which types of care and/or living arrangements are considered, whether family members have common preferences, and whether other decisions are determined jointly with long-term decisions.


Different papers focus on different aspects of long-term care and living arrangements. Choice variables involve living arrangements (KM, HPS), care arrangements (SPH, HS, ES, CS, and BGHS), or both (Pezzin and Schone 1999). KM present a model where parent and child decide whether to form an intergenerational household or to maintain separate households. In HPS, the family faces a third possible living arrangement for the parent: nursing homes. In HS and ES, the family decides whether the parent will continue to live independently without care, receive care from one of the children, or move to a nursing home. Pezzin and Schone (1999) jointly model living arrangements with the provision of care by the child (in this case, a daughter). In SPH and BGHS, the choice variables are not the type of care or living arrangement but hours of formal care (paid care) and informal care (care provided by the child).

The provision of care by adult children may be determined simultaneously with their labor force behavior. Accordingly, Ettner (1996) and Pezzin and Schone (1997, 1999) model labor force participation of adult children jointly with care and/or living arrangements. Similarly, inter- or intragenerational transfers may be made as part of a family’s long-term care decision. This possibility may be captured by assuming that the family pools its income (e.g., HPS) or by explicitly modeling side payments among family members. Pezzin and Schone (1999) model intergenerational cash transfers jointly with caregiving, intergenerational household formation, and labor force behavior. In one of the models in ES, family members choose the long-term care alternative that maximizes their joint payoff and make any necessary side payments among themselves.

The econometric models in the long-term care literature are as varied as the theoretical models. Most papers present results based on nonstructural models (Boersch-Supan, Kotlikoff, and Morris, 1988; Wolf and Soldo, 1988; Lee, Dwyer, and Coward, 1990; Cutler and Sheiner, 1993; Ettner 1996; HPS; Boaz and Hun 1997; Diwan 1997;
Norgard 1997; SPH; White-Means 1997; Couch, Daly, and Wolf 1999), but several recent papers present results based on structural models (KM; Pezzin and Schone 1997, 1999; HS; ES; CS, and BGHS).

The existing literature generally focuses on the role of a single child in each family as the primary caregiver and ignores the possibility of other children serving as sources of assistance (Frankfather, Smith, and Caro, 1981; Johnson and Catalano, 1981; Cantor, 1983; Johnson, 1983; Stoller and Earl, 1983; Horowitz, 1985; Barber, 1989; KM; Miller and Montgomery, 1990; Pezzin and Schone 1997, 1999; Stern 1994, 1995, 1996; HS; ES). However, data from the 1984 National Long-term Care Survey indicate that siblings often share long-term care responsibilities, especially in large families. Almost 10% of families with three children and 24% of families with seven children contain multiple caregivers. Even if each family uses a single caregiver, one cannot ignore the other children in the family. Children attempt to influence the amount and the method of caregiving provided by their siblings. Not only are there possibilities for intersibling conflict arising as a result of parental long-term care provision, but a large majority of distant children report emotional support received from siblings regarding the situation of their disabled parent (Schoonover, Brody, Hoffman, and Kleban, 1988).

3 Research Design

3.1 Roadmap

This proposal is for work joint with David Byrne (FRB), Michelle Goeree (Claremont-McKenna), and Bridget Hiedemann (Seattle U). It builds on the work in BGHS. In order to aid the presentation, I first present a baseline theoretical model, the model in BGHS. The baseline model is a one period model without nursing home care as an option. We have already succeeded in estimating a restricted version of this model, and we are revising the paper for the International Economic Review. Then I discuss how to adjust the model to allow for nursing home care and for multiple periods. For each adjustment, I discuss the necessary changes to the model, new issues it allows us to address, and new problems to be solved.

3.2 Baseline Theoretical Model

Our goal is to model a multigenerational family with varying preferences making decisions about donating time and money to help members of the older generation. Consider a family with \( M \) adult children and one or two elderly parents. We assume that married couples act as a single player; therefore there are \( M + 1 \) players. Each player makes decisions about consumption, contributions to paid help for the parent (measured in units of time), leisure, time spent caring for each parent. The children also determine their market work time, but the parents no longer participate in the labor market. We abstract from many of the alternatives available to parents including informal care by someone other than a spouse, child, or spouse of a child and the wide diversity of formal alternatives available because they are not very common in the data and therefore not empirically usable. Also, we do not allow for institutional care in the baseline model because the first wave of our data set is limited to people in the community. But we discuss in detail how to allow for institutional care in the subsequent discussion. Market work time is zero for both parents. For the children and their spouses, market work time is residual time after leisure and informal care.

The health quality of each parent is determined by a health production function depending on a linear combination of parent characteristics. The parameters of the production function measure the effects of care provide by family members (informal care) and paid care (formal care) on health quality. Some of the coefficients may depend on observed parent and child characteristics.

The parents’ utility function depends on the parent’s health, her consumption, her leisure, the time she spends providing informal care to her spouse, and an iid random variable. Similarly, each child’s utility function depends on the parents’ health, the child’s consumption, the child’s leisure, the time spent helping the parents, and an iid random variable. The preferences of the family members may depend on observed child and parent characteristics, and unobserved child and parent characteristics captured through “errors.” Each family member maximizes utility over its choices subject to well-specified budget and time constraints taking as given the decisions of the other
family members. For the parent, the budget constraint captures the effects of state laws associated with financing for home health care.

Given the particular mathematical structure of the model, for each child, we can solve for consumption using the budget constraint and then write the first order optimality conditions in terms of the errors that capture unobserved variation in preferences. This allows us to write down a likelihood function and maximize it over parameters. These are maximum likelihood estimates (MLEs) and have all of the nice properties of MLEs. Details are available in BGHS.

Our model allows us to specify and estimate how policy and environmental changes affect behavior through budget constraint effects, through health effects, and through consumption and leisure effects. It is, by far, the most comprehensive and ambitious structural model of family decision making to date.

3.3 Data
3.3.1 Data Description

This project uses the first three waves of the Asset and Health Dynamics Among the Oldest Old (AHEAD) data set. AHEAD is a nationally representative longitudinal data set designed to facilitate study of Americans aged 70 or older. Response rates are over 80%. Blacks, Hispanics, and Florida residents are oversampled. The 1993 wave of AHEAD includes only noninstitutionalized individuals. The emphasis on the joint dynamics of health, family characteristics, income, and wealth makes it a particularly rich source of information on family decisions associated with the care of elderly relatives. AHEAD offers three main advantages over the widely used National Long-Term Care Survey (NLTCS). In addition to more recent data, AHEAD provides a better measure of income and more information about childrens’ economic decisions than the NLTCS. Since Medicaid eligibility depends upon income, we can use the AHEAD data but not the NLTCS data to examine the effects of Medicaid eligibility and financing on a family’s long-term care decisions.

So far, we have used 3,583 households out of 6,047 in the first wave of AHEAD data. Households were included in the first wave only if they were residing in the community. We excluded households for a variety of reasons. In most cases (1,116), records were missing data on the respondent, the respondent’s spouse, or her children. The existence of missing variables is likely to be correlated with a lack of connection between parents and children and the mental status of the parent; this is the case in the NLTCS as documented in Stern (1995). Such correlation could lead to selection bias. However, all empirical analysis using large secondary data sources suffer from the same problem, and AHEAD and NLTCS are the best data sources available. Thus, there is no alternative but to recognize the problem and interpret results with the problem in mind. Households with more than 5 children (625), working respondents (270), and those where each respondent provided care for the other (25) were dropped to reduce the complexity of the model. Only the black and white non-Hispanic groups remained large enough for our analysis.

Households included in AHEAD contain at least one respondent 70 years old or older. Many households also include spouses, some of whom are less than 70 years old. Spouses of respondents are also respondents. As a consequence of the exclusion of nursing home residents from the 1993 wave and the inclusion of spouses regardless of age, the characteristics of our sample deviate from that of a representative person, 70 years old or older. On average, the male respondents (35% of the sample) are 77.1 years old with 11.5 years of education and 2.1 living children. Seventy-five percent are married, and 92% are white. On average, the female respondents are 77.0 years old with 11.4 years of education and 2.0 living children. Forty-one percent are married, and 89% are white.

Nineteen percent of men and 24% of women reported difficulty with an activity of daily living (ADL). The most common difficulty was walking across a room, reported by 15% of male respondents and 18% of female respondents. All other problems with ADLs had prevalence rates of less than 10%. Twenty-two percent of men and 21% of women reported difficulty with an instrumental activity of daily living, most frequently difficulty with walking several blocks, pulling and lifting heavy objects, climbing stairs, or driving. Among the 4% of households reporting receipt of paid help in their home, the average payment was $132 per week. Nine percent of households reported receiving some care provide by their children with an average of 6.7 hours per week.

The average income of households in our sample is $445 per week. Most respondents are covered by Medicare,
while few receive assistance from the Supplemental Security Income program and/or from Medicaid (about 5% and 8% respectively).

Forty-nine percent of the children are male, and 70% are married. The average child is 47.7 years old with 14 years of education and 2 children. To model the decision-making process of the adult children of the elderly individuals, we need information on the market wages of the children, which is not part of the AHEAD survey. We impute wages using the CPS by regressing log-wages on demographic characteristics of the children available in AHEAD. The average imputed wage is $452 per week. We also construct a measure of the leisure time consumed by the children and the respondents by treating time not spent working or helping the parents as leisure.

Finally, we construct a number of state-specific variables including a price level of the gross state product (BEA, 1999), the cost of home health care, the average home health care state subsidy (HCFA, 1992), and variation in Medicaid eligibility rules for SSP, medically needy programs and home health care programs. All of these variables affect the budget constraints of the parents and their children in appropriate ways: the price level is used as a price of consumption, the cost of home health care is used as a measure of home health care prices, and the average home health care state subsidy is added to the budget constraint of the parent if the parent is eligible for home health care and has formal care. We ignore eligibility rules associated with assets because the asset data in AHEAD is not good enough to determine eligibility and because a family need only spend down assets to meet the asset eligibility requirement.

3.4 Using Waves II and III

3.4.1 Modeling Issues

There are a number of modeling issues we need to address with the second wave. These are listed below, and potential resolutions are suggested:

1) We need to model nursing homes as a potentially attractive choice. We plan to do this by allowing nursing home use to affect the health production function and the utility function. In particular, we can adjust the health production function to allow the health to depend on residence and to allow the marginal effect of informal care to depend on residence. Next, we can adjust the utility function to allow the marginal utility of consumption and receipt of informal care to depend on residence. Stern (1994, 1995, 1996), HS, and ES used similar mechanisms. To implement the suggested changes, we need only allow some of the coefficients affecting health and utility to vary with residence.

We can allow the terms that vary with residence to depend upon average state characteristics of nursing homes. In particular, we propose to use daily direct care staff hours per nursing home resident and average ADL problems per resident as measures of average quality of nursing home care. The second variable is a control for severity of need. These variables are available from the American Health Care Association at http://www.ahca.org.

Once we use a model like this, we need to respecify how decisions are made and how equilibrium occurs. We consider three possibilities:

1. Each child and the spouse make decisions for each possible residence choice, and then the parent chooses whether to live in the community or a nursing home conditional on the children’s and spouse’s behavior. This is the most straightforward possibility. However, it still requires simulating what each family member would have done had the parent chosen the other alternative. This significantly complicates the first order conditions. But some monotonicity results with respect to choices will help. We have already written a program to simulate equilibrium and can easily make it much more efficient. ES provide some detail how to solve such equilibrium problems efficiently using derivative based optimization algorithms.

2. The family maximizes the sum of utilities across family members in deciding (jointly) whether the parent should live in the community or a nursing home. The binding problem with this approach is that its implementation requires adding unobserved and nonlinear sidepayment rules. We propose to work out in more detail the implications of such an assumption but expect not to be able to implement it.

3. The children (and possibly the spouse) make credible threats to influence the decision of the parent. Such a threat would be of the form, “I refuse to help you if you stay in the community.” Issues associated with
such threats are that a) we must determine what constitutes a credible threat; b) there are probably multiple
equilibria issues; and c) it is much harder to evaluate the likelihood function. We propose to work out in
more detail the implications of such an assumption but expect not to be able to implement it.

2) We need to model the dynamic nature of long-term care decisions to the extent that they can be identified
modeling only the transition from the parent living independently in 1982 to the long-term care arrangement in
1984. Here we propose a series of dynamic models:

1. The simplest model allows for person-specific effects in the health and utility functions. In particular,
we can allow each of the errors to have a person specific component, constant across time and allow for a
person specific unobserved component in baseline health. Such a specification allows for decisions within a
family across time to be correlated. CS find that allowing for such effects is empirically important. It is
straightforward to implement such an assumption econometrically. It involves writing the likelihood function
conditional on the person specific effects and then using simulation to integrate over the joint density of the
effects. This specification really ignores dynamic issues, but it probably captures the most important serial
correlation in decision-making in the data. See CS.

2. Probably, the most important true dynamic effect is caregiver burnout. We can allow for caregiver burnout
by modelling the marginal utility of providing informal care as function of the number of years providing
such care. This specification allows the burden one experiences by providing informal care to increase (or
potentially decrease) as one provides more care.

3. There are a number of papers following the lead of Bernheim, Schleifer, and Summers (1985) that suggest
that children provide informal care for parents as a way to compete for the inheritance of their parents, and
parents encourage the competition. CS provide evidence that such an effect is not empirically important.
However, it is still worthwhile and straightforward to test the bequest competition argument. In the context
of this work, we can test the bequest competition hypothesis using Lagrange multiplier test statistics. In
particular, we can test the null hypotheses that informal caregiving decisions are independent of the assets
of the parents and that informal caregiving decision residuals are independent of the number of siblings.
If the bequest competition hypothesis is true, then we should reject both null hypotheses and find that
children of parents with more assets provide more informal care and children in larger families provide more
care than predicted by the model. The beauty of the Lagrange multiplier test statistic is that it requires
only estimating the model under the null hypothesis and then evaluating the derivative of the log likelihood
function with respect to the interaction being tested.

4. Other relevant dynamics here are associated with wages of the children, the health of the parent, and
migration of family members. The data provide very little information about the dynamics associated
with any of these dynamics. For example, while there is information about how the parent’s health is
changing over time, there is not enough information to identify whether those changes are due to informal
care decisions of children or whether children make informal care decisions anticipating future changes in
the parent’s health. So it seems very unlikely that we can provide any convincing evidence relevant to these
issues.

References


of Political Economy. 93(6): 1045-76.


4 Budget Justification

<table>
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<th>Description</th>
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<td>Summer Support, 1 month</td>
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<tr>
<td>Fringe Benefits @4.2%</td>
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</tr>
<tr>
<td>Total</td>
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Summer support will be used to devote at least one full month of the summer to this project.