The Joy of Giving or Assisted Living? Using Strategic Surveys to Separate Bequest and Precautionary Motives.

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Abstract

Strong bequest motives can explain low retirement spending, yet so equally can strong precautionary motives. Separating these motives is vital not only to guide innovations in household finance for retirees, but also for public policy in the areas of health care and estate taxation. Rather than to downplay bequest motives, as has been the recent tradition, we develop a rich model of spending in retirement that allows for both motives. A “Medicaid aversion” parameter plays a key role in determining precautionary savings in the model. We implement a “strategic” survey to resolve the identification problem between bequest and precautionary motives. Our estimates suggest that bequest motives are more prevalent than currently believed, and that they are not the sole province of the very wealthy, but instead spread deep into the middle class. We also find Medicaid aversion to be widespread, and to play a critical role in the low spending of many retirees.
1 Introduction

Many retirees spend far less than predicted by the standard life cycle model of Modigliani and Brumberg [1954]. Even those with high net worth generally dissave little, as a result leaving significant bequests. Noting this, Kotlikoff and Summers [1981] argued that the bequest motive was the primary driver of savings behavior. Yet the research focus recently has moved in a different direction, with bequest motives downplayed in favor of precautionary motives for all but those of highest wealth (Hurd [1987] and Dynan, Skinner, and Zeldes [2002]). The empirical evidence motivating this shift away from bequest motives is thin. Dynan, Skinner, and Zeldes [2002] set bequest motives low based on the observation that more Health and Retirement Study (HRS) respondents cite “emergencies and illness” as motives for saving than did “children and estates.” De Nardi, French, and Jones [2006] use a low consumption floor in bankruptcy to motivate high precautionary savings, corresponding essentially to public long term care being seen as a poor substitute for private care. Empirical confirmation of such “Medicaid aversion” is lacking. In fact it is becoming clear that the identification problem as between bequest and precautionary motives is fundamental:

“A dollar saved today simultaneously serves both a precautionary life-cycle function (guarding against future contingencies such as health shocks or other emergencies) and a bequest function because, in the likely event that the dollar is not absorbed by these contingencies, it will be available to bequeath to children or other worthy causes.” Dynan, Skinner, and Zeldes [2002], p. 274.

Yet, separating the two motives is vital not only to guide innovations in household finance for retirees, but also for public policy in the areas of health care and estate taxation.

In this paper we develop a new model and a novel estimation procedure designed to separately identify the factors motivating retirees to spend at such low levels. We follow a long tradition in finance of structural estimation of preference parameters (Hansen and Singleton [1983], Eichenbaum and Hansen [1990], Yogo [2006], Koijen [2008], and many others). As detailed in section 3, we follow De Nardi, French, and Jones in treating health expenses in later life as a crucial driver of precautionary savings. We separate out costs associated with long term care from other medical expenses, and incorporate “Medicaid aversion” as a free parameter. This enables households

\footnote{Dynan, Skinner, and Zeldes [2004] and De Nardi, French, and Jones [2006] show that assets of the old decrease slowly if at all.}

\footnote{Models that rule out bequest motives altogether have now been shown capable of explaining major patterns in the spending behavior of both retirees (De Nardi, French, and Jones [2006]) and those of working age (Scholz, Seshandri and Khitatrakun [2006]).}

\footnote{The opposite assumption wherein Medicaid is a perfect substitute for private long term care has been invoked by Pauly [1990] to explain low take-up of long-term care insurance.}

\footnote{Technically, the level of Medicaid aversion in our model reflects the agent’s aversion to running out of wealth while in need of long term care. While this may reflect expectations of low quality care, it may also reflect lack of}
to choose whether or not to keep resources for long term care expenses based on personal long term care preferences. In section 4 we show that the indivisibility associated with long term care expenses induces those with low wealth to give up entirely on gaining access to private long term care. At the other end of the spectrum, many of those with high wealth levels will never be at risk of needing to rely on Medicaid, again having no incremental incentive to save for this purpose. Medicaid aversion induces additional precautionary savings only for those in the middle classes.

In section 5 we introduce a customized survey designed for purposes of model estimation, and to pinpoint the identification problem as between bequest and precautionary motives. Having anticipated such problems, we used the survey to pose “strategic” survey questions as part of our identification strategy. Such questions represent natural thought experiments concerning behavior in contingencies selected for their informational complementarity with standard behavioral data. The precise questions that we posed and the procedures by which we incorporate them in the estimation are detailed in section 6. The responses themselves appear highly reasonable both in terms of internal consistency and in terms of external credibility. While our survey was drawn from an Internet panel of a commercial supplier, Greenfield Online, we show in section 6 that it is close to representative in terms of household financial characteristics.

Section 7 outlines results of the estimation procedure with strategic survey responses included. Our estimates suggest that bequest motives are more prevalent than currently believed, and that they are not the sole province of the very wealthy, but instead spread deep into the middle class. The distribution of Medicaid aversion parameters appears to be bimodal, with substantial minorities having both minimal such aversion and very high such aversion. Our estimates imply that Medicaid aversion plays a significant role in explaining the low rate of spending of many middle class retirees. We conduct sensitivity analyses, which reveal the essential findings to be robust not only to alterations in model parameters, but also to reasonable forms of measurement error. Our results suggest that those without children are more Medicaid averse than those with children, yet have somewhat lower bequest motives. Hence it may be that those without children save relatively more for precautionary rather than for bequest related reasons.

When faced with an identification problem, the standard procedure is to search exhaustively for relevant choice-based evidence. As noted above, identification of bequest motives has thus far defeated these procedures, which informs our survey-based agenda. Yet our pursuit of this options should care quality turn out to be low, psychological feelings of stigma, humiliation, lack of control, or the belief that spending a great deal on private care can greatly raise the quality of life.

5Similar shortcomings in purely behavioral data motivated earlier survey research aimed explicitly at parameter identification, such as Holland [1969], Ljungqvist [1993], Barsky, Juster, Kimball, and Shapiro [1997], Kimball and Shapiro [2003], Ameriks, Caplin, and Leahey [2003], and Kimball, Sahn, and Shapiro [2007]. Of these, those by Kimball and Shapiro [2003] and Kimball, Sahn, and Shapiro [2007] are closest in spirit to our approach.

6A logical next step is to pose strategic survey questions of this form on a large-scale survey such as the HRS. In fact we are developing a version of the survey instrument for use on a research project organized by Daniel Benjamin and Bob Willis designed to feed into a future HRS module.
survey-based agenda is in part methodological. When the decision making environment undergoes significant change, inferences concerning future behavior based on past choices may become less reliable, suggesting a possible role for survey evidence. The attempt to use and interpret data going beyond observed choices heightens the need for methodological discipline. In developing the theory of revealed preference, Samuelson [1938] challenged economists to match their models tightly to choice data. Savage [1971] and Aumann [1998] pointed out that hypothetical rather than actual choices are the raw material on which revealed preference theories are built, indirectly opening the door to non-standard survey data. Strategic survey questions embody this approach to revealed preference, and are therefore particularly close in spirit to standard economic theory (Caplin [2008]). Survey techniques may be particularly important in the area of retirement finance given the reluctance of many to plan ahead for future aversive events (Brunnermeier and Parker [2007]).

We see further development of the strategic survey methodology as important from the viewpoint of financial design. Current projections suggest that many elderly Americans will find their resources insufficient to meet the combined weight of normal living expenses and extraordinary medical expenses associated with private long term care. They will thus end up relying on Medicaid, which is likely to be under ever greater financial strain. These developments highlight the need for research into the design of new financial instruments to meet evolving retiree needs. The finance profession has slowly began to address the important issue of household retirement security (e.g., Gomes, Kotlikoff, and Viceira [2007], Farhi and Panageas [2007], Lopes and Michaelides [2007], Koijen, Nijman, and Werker [2007], and Yogo [2008]), mostly using the tools of the optimal portfolio literature (Campbell and Viceira [2002], Cocco, Gomes, Maenhout [2005], Gomes and Michaelides [2005], Polkovnichenko [2006] among others), as part of a broader household finance literature (Campbell [2006]). Even in its current simple form, the results of this paper produce novel insights into the potential interest among retirees in annuities, long-term care insurance, and various financial instruments that remain in the design phase (Ameriks, Caplin, Laufer, and Van Nieuwerburgh [2007]). Developing an appropriate survey methodology is of particular importance in such financial design settings, given that the central questions concern retiree responses to financial instruments with which they have no past experience. The power and the limitations of various survey methodologies will increasingly come under the microscope as the social importance of retiree behavior is internalized by policy makers and researchers alike.
2 Background

2.1 Precautionary Motives and Long Term Care

De Nardi, French, and Jones [2006] use panel data from the Assets and Health Dynamics of the Oldest Old (AHEAD) survey to establish that assets decrease slowly over time if at all. Yet as noted above, the extent to which the low spending rate is driven by bequest motives is much debated. Even simple accounting measures of the aggregate importance of bequests produce somewhat inconsistent results (Kotlikoff and Summers [1981], Menchick and David [1983]; Modigliani [1988]; Gale and Scholz [1994]; Davies and Shorrocks [2000]).

One clear fact concerning bequest motives is their heterogeneity. Whereas many wealthy households fail to pursue such obvious tax avoidance strategies as inter-vivos giving (McGarry [1999] and Poterba [2001]), others take great pains to maximize bequests. In an effort to exploit individual differences of this type for estimation purposes, Hurd [1987] established that otherwise similar retired households with and without children decumulate wealth at roughly the same pace, casting doubt on the power of the bequest motive. Moreover, Laitner and Juster [1996] produced survey evidence indicating that stated bequest motives were only weakly related to the number of children. Yet Kopczuk and Lupton [2007] challenged the assumption that family status is tightly connected with the bequest motive, and introduced an alternative estimation strategy according to which many households have substantial bequest motives.

While the debate on the importance of bequests remains unresolved, there is a consensus emerging on the dominant factor motivating precautionary savings. In contrast with early analyses that stressed longevity risk as the main driver of precautionary savings (Yaari [1965]), recent work has emphasized late in life medical expenses (Palambo [1999]). French and Jones [2004] used the AHEAD data to present the most realistic picture to date of late in life health-related expenses, which turn out to be far higher than earlier estimates had suggested. In their work, De Nardi, French, and Jones [2006] use these data to detail the risks associated with mortality and out of pocket medical expenditures as functions of gender, health, permanent income, and age for single retirees. They incorporate these estimates into a standard life cycle model, and succeed in closely fitting individual spending despite the absence of bequest motives.

Actual and potential long term care (LTC) expenses are the crucial driver of precautionary savings in the work of De Nardi, French, and Jones [2006]. Brown and Finkelstein [2006] apply the medical transition model of Robinson [2002] to suggest that a 65 year-old man has a 27 percent chance of entering a nursing home at some future point, while a 65 year-old woman has a 44 percent chance. Strategies employed apparently include not only using inter-vivos transfers to decrease tax liabilities involved in transferring funds to heirs (Bernheim et al. [2001]; Page [2003]; Bernheim et al. 2004; Jouliyaian [2004]), but also offsetting increased public transfers by purchasing life insurance and selling annuities (Bernheim [1991]), and even delaying (or accelerating) death to take advantage of changes in estate-tax law (Slemrod and Kopczuk [2003]).
percent chance. Men who enter a nursing home spend on average 1.3 years there, while women spend on average 2 years. Moreover the price for obtaining care is potentially massive. Data from the Metlife Market Survey national data (MetLife [2006]) indicate that the national average annual cost of nursing home care in 2006 was $66,800 for a semi-private room and $75,200 for a private room. Under the current Medicare rules, fully $58,000 of the expenses for a semi-private room are paid for out of pocket. In general, the share of out-of-pocket expenses as a fraction of the total in LTC is double the share in the health sector as a whole (Congressional Budget Office [2004], National Center for Health Statistics [2002]).

2.2 Medicaid and Medicaid Aversion

Given their potentially massive scale, the bulk of precautionary savings in the De Nardi, French and Jones [2006] framework are used to guard against high long term care costs. They show that these expenses are significantly impacted by the subject’s level of wealth: a sick 95-year-old woman at the 80th percentile of the permanent income distribution can expect to spend $16,000 p.a. on out-of-pocket medical costs, while a sick 95-year-old woman at the 20th percentile of the permanent income distribution expects to spend only $2,700. Such differences in care expenses by wealth class are accounted for in large part by differences in the way in which long term care is paid for, and are associated with the role of Medicaid as long term care provider of last resort. Hence the implicit assumption underlying the De Nardi, French and Jones estimation procedure is that Medicaid is a very poor substitute for private long term care (the extent to which this relates to the quality of care as opposed to psychological forces such as the need for control is not of the essence). It is precisely the fear of being driven to this low level of consumption that provides the key motivation for precautionary savings.

To understand the key role that Medicaid aversion plays in end of life behavior, consider the optimal spending strategy of a wealthy, high income household with no bequest motive and with no Medicaid aversion. Their ideal strategy would be to spend rapidly so as to run down wealth, and thereby to qualify to take advantage of the cost savings deriving from subsidized high quality long term care. Just such a “spend down” strategy features in the model of Hubbard, Skinner, and Zeldes [1994].

One piece of empirical evidence that has been invoked by those who believe there to be low Medicaid aversion is the fact that only 10-15% of the elderly population has an LTC insurance policy (Finkelstein and McGarry [2006]). Yet in practice, there are several potential explanations for the small size of the existing LTC insurance (LTCI) market that are largely independent of the level of Medicaid aversion, such as the significant pricing loads and insurance costs (Brown and Finkelstein [2007]) and broader problems stemming from asymmetric information in the market (Finkelstein and McGarry [2006]). In addition to financial disincentives, contractual problems bedevil the
market. One problem with LTCI is that no one can relish contested claims for reimbursement when in need of care, especially given how hard it is even to define long term care. Yet the possibilities for such disputes are likely to grow ever more significant as the set of available services grows in the face of technological advance in the ability to prolong life. An entirely distinct set of contractual problems are stressed in an article in Consumer Reports which reviewed 47 policies (Consumer Reports [2003]). The main conclusion was that, for most, LTCI was too risky and too expensive given that the company may no longer be around when reimbursement is needed and that continued payment of the premium is needed to keep the policy alive. Overall, the currently small size and apparent failings of the LTCI insurance market is not a sufficient reason to ignore the potential importance of Medicaid aversion.

On the other side of the coin, most of the evidence in favor of high Medicaid aversion is informal. There is anecdotal evidence concerning the relatively limited nature and low perceived quality of Medicaid as opposed to privately provided long term care. There may also be social stigma associated with allowing oneself or a loved one to end life bankrupt as a “Ward of the State.” Additional arguments suggesting that Medicaid is a poor substitute for private care are financial in nature. An individual who qualifies for Medicaid coverage is allowed to keep very little in the way of income and assets to finance non-care consumption or to bequeath. Married households are allowed to retain only their housing wealth, while single households must essentially deplete all assets before qualifying for Medicaid. It is also harder to use Medicaid for home health care than for nursing home care. Yet hard evidence is lacking. The best evidence to date is that of Norton [1995], who finds that many private patients who enter nursing homes end up staying in private care and avoiding use of Medicaid for substantially longer than their assets alone would provide for, suggesting that relatives pay for incremental private care. Presumably, this reflects a discomfort with the results of the change of status from private client to client of public care.

Given its importance as a determinant of spending, and given how little is known about it, we allow in our model for all possibilities, from Medicaid being a perfect substitute for private care to its being the ultimate in punishment. The model opens a new decision making margin by enabling households to choose whether or not to keep resources for long-term care expenses based on personal long term care preferences.

\[\text{References}\]

8For evidence of inadequate protection from fire and other hazards at U.S. nursing home facilities, see U.S. Government Accountability Office [2003].

9State Medicaid programs impose a 3 to 5 year look back period on assets to make it more difficult for individuals to hide assets by transferring them to a spouse or children.

10Note that in limiting attention to only these two options, we are greatly simplifying the actual choice process. In principle, a third possibility would be to rely on children to provide the bulk of care. The nature of the family interactions in long term care situations may be highly complex. Kohara and Ohtake [2006] show that, even in Japan where it is common for children to provide long-term in-home care for their parents, children are far more likely to provide this parental care when their parents are wealthy enough to meet the costs of nursing. We ignore this in the current treatment, largely for the sake of simplicity, but consider this to be an interesting area for future research. We ignore also the possibility of buying long term care insurance (LTCI).
2.3 Accidental Costs of Care?

Bequest motives cannot be inferred directly from the level of realized bequests, since bequests may be largely “accidental”, as the indirect result of wealth kept aside against longevity and health risk. In fact De Nardi, French and Jones [2006] show that health expenses are high enough by themselves to explain the low spending of many retirees. Yet, just as high observed bequests do not necessarily imply a high bequest motive, so high realized medical costs do not necessarily imply high precautionary motives. Instead, these high medical costs may be “accidental” in exactly the same way as may high bequests.

To see how accidental medical costs may arise, note that an individual with a high bequest motive will choose to spend slowly out of wealth even if Medicaid is regarded as a perfect substitute for private care. Yet if there is particular misfortune in regard to care costs, bequests may turn out to be low based on the unexpectedly large diversion of resources that this creates. Since households holding wealth are not allowed by the rules to take advantage of publicly funded long term care costs may absorb resources that were intended to form part of the bequest. The difficulty in determining the extent to which medical costs and bequests are accidental provides another angle on the identification problem that bedevils the literature in this area, and that is the main focus of the current work.

3 The Model

3.1 Utility

For simplicity, the unit of analysis is the household consisting of a single individual who has just retired. The first period of observation occurs when the individual is \( m \) years old and entering retirement. The model consists of a series of one-year periods, starting at the age of retirement and ending at the year of death, which is restricted to occur by maximum age \( M = 100 \). The maximum length of the retirement period is \( T = M - m \). Periods are indexed by \( t \), the number of years into the retirement period, starting at zero at age \( m \), so that overall \( 0 \leq t \leq T \). There is a stochastic death rate \( \delta_t \) in year \( t \) of retirement that evolves in a matter defined below.

The agent maximizes a standard time-separable utility function with exponential discounting. In each period of life, agents receive utility from consumption:

\[
\begin{equation}
    u(c_t) = \frac{c_t^{1-\gamma}}{1-\gamma}.
\end{equation}
\]

Agents also receive end-of-life utility from bequests defined by the function \( v(b) \). Hence the agent
maximizes,
\[ E_0 \sum_{t=0}^{T} \beta^t \left( \prod_{j=0}^{t-1} (1 - \delta_j) \right) \left\{ (1 - \delta_t)u(c_t) + \delta_t v(b_t) \right\}. \] (2)

This method of modeling the utility from the bequest matches the “warm glow” specification of Andreoni [1989] with a CES parameter matching that for consumption rather than the dynastic altruistic formulation implied by concern with children’s utility per se. With respect to functional form, we follow De Nardi [2004] in parameterizing the bequest utility with two parameters, one to control the strength of the bequest motive (\( \varpi \)) and one to measure the degree to which bequests are a luxury good (\( \phi \)). However, we redefine the place of these parameters in the bequest utility function so as to allow for a clear interpretation of their values. An agent leaving a bequest \( b \) receives direct utility:

\[ v(b) = \frac{\varpi}{1 - \gamma} \left( \phi + \frac{b}{\varpi} \right)^{1-\gamma}. \] (3)

If wealth is negative upon death, the agent is credited with having left a bequest of zero. For parsimony, the same curvature parameter governs risk aversion over bequests and over own consumption.

To understand the motivation for this choice of \( v(b) \), consider a simple model in which an agent starts with wealth \( X \) dollars, lives for exactly \( n \) years and then dies. The real rate of return on wealth is zero. In each year of life, the agent consumes \( c \) dollars, deriving annual utility \( u(c) = c^{1-\gamma}/(1 - \gamma) \). Upon death, the agent bequeaths the remaining \( b = X - nc \), receiving the utility specified by equation (3). The agent’s problem is to choose the bequest that maximizes total utility. The solution is to choose an annual consumption \( c^* \) such that bequest satisfies \( b^* = X - nc^* = \varpi(c^* - \phi) \). In other words, the agent leaves an inheritance to cover \( \varpi \) years of spending at an annual expenditure level \( (c^* - \phi) \), the amount by which life time consumption exceeded the threshold \( \phi \). If \( X \) is insufficient to allow the agent to consume more than \( \phi \) dollars each year, no bequest is left. In future research we will explore different formulations of this bequest function, allowing for variations in risk aversion, and also allowing for elements of altruism.

The parameter \( \phi \) plays a role similar to one introduced by Henin and Weitzenblum [2003] who use the form,

\[ v(b) = \varpi_1 \left( \tilde{\phi} + \frac{b - t(b)}{\varpi_2} \right)^{1-\rho}, \] (4)

where \( t(b) \) is the estate tax, which is absent in our model, and \( \tilde{\phi} \) is the expected annual consumption of the heir. Our \( \phi \) parameter mirrors their \( \tilde{\phi} \), but we do not restrict ourselves to this interpretation of the parameter’s value. Our choice to use the same parameter \( \varpi \) where they have two parameters,

\[ ^{11} \text{Kopczuk and Lupton [2007] provide reasons for researchers’ preference for direct utility of bequest models over altruistic models, such as the finding by Altonji, Hayashi and Kotlikoff [1997] that parents do not offset inter-vivos transfers given an increase in their children’s permanent income.} \]
and \( \varpi_2 \), is a simplification suggested by De Nardi [2004] and also motivated by the explanation in the preceding paragraph.\[12\\]

3.2 Technology

Households enter retirement with wealth \( X_0 \geq 0 \), and wealth at the beginning of time \( t \) is denoted \( X_t \). We assume a deterministic stream of annual income \( y_t \) for as long as the retiree lives, and taxes are ignored. There is no income in the year of death. We assume that there is one composite risky asset in which the household can invest and which yields a rate of interest \( r_t \). Households are not allowed to take a negative position in assets (no-borrowing constraint).

3.3 Health Dynamics and Health Costs

Our treatment of health dynamics and death is crucial to the precautionary motive, given the high expenses associated with bad health. There are four health states modeled. State 1 is a state of good health. State 2 is a state in which there are medical problems but no need for long term care. State 3 is a state in which long term care of some form is required, and state 4 is death. In period 0, the individual is in health state \( s_0 \in \{1, 2, 3\} \). The health state follows a Markov chain with age-varying one-period state transition matrix \( \mathcal{P}(t) \). In each year \( t \), this is a \( 4 \times 4 \) matrix. Retirees reaching age \( M - 1 \) die with probability one the following year.

Together the initial health state and the Markov transition matrices \( \mathcal{P}(t) \) enable us to compute future probabilities attached to all health states, including death. Given the initial health state \( s_0 \), the transition matrix is applied repeatedly to derive the probability \( \pi_t(s_t) \) that a retiree is in health state \( s \in \{1, 2, 3, 4\} \) at time \( t \geq 1 \). This means that the death probability \( \delta_t \) can be computed as \( \delta_t = \pi_t(4) \). Note that in principle we could have used only one non-LTC health state rather than two. We introduced two states to enable us to capture survey-revealed differences in current health and the corresponding costs.

Note that we have not included the health state directly in the utility function. Rather, we focus on the costs associated with the various health states. Each live state \( s \in \{1, 2, 3\} \) has associated with it a necessary and deterministic health cost, \( h(s) \). Paying these costs entirely removes any utility penalty that would otherwise be associated with the health state. Death expenses in state 4 are also deterministic, at level \( h(4) \), and are subtracted from the bequest.

\[12\] Another reason for limiting parameters is identification: as noted below, our sensitivity analysis indicates that it is not easy for us to confidently separate the two bequest parameters. On the positive side, this is because they can compensate for one another and generate very similar patterns of behavior in our sample. Further refinements of our procedure are needed for settings in which separate identification of these two bequest parameters is critical.
3.4 Consumption Floor and Medicaid

Given the risk of substantial (non-discretionary) medical expenses which may exceed available wealth, there is need to include a “government welfare” mechanism to guarantee agents a minimal level of consumption. In health states 1 and 2, we model welfare as a “consumption floor” $c^f$. We assume that an agent who cannot afford her health costs plus this amount of consumption receives government transfers that brings her consumption up to $c^f$. End of period wealth is set to zero. In state 3, the long-term-care state, treatment of welfare is related to the institutional reality of Medicaid. An individual going on welfare in the long term care state forfeits all wealth to the government (end of period wealth is zero) and accepts care funded by Medicaid. The government covers the cost of health care and the agent receives in that period the Medicaid level of consumption $c^{MED}$. The Medicaid level of consumption is an important parameter in what follows, since it reflects Medicaid aversion. If the Medicaid consumption level is close to zero, this will produce a strong incentive for households to retain sufficient wealth to retain the private care option. If it is closer to annual consumption in the pre-Medicaid period, then the incentive will be to run down wealth and use the Medicaid subsidy in place of savings. The value of $c^{MED}$ therefore has powerful impact on the strength of the precautionary motive.

3.5 The Optimization Problem

The household enters the period $t$ with health state $s_t$ and wealth $X_t$. The timing of events is as follows:

1. If $s_t = 4$ so that the individual is deceased, no income is received, health costs $h(4)$ are paid and the bequest $b_t$ equals the remaining net resources, down to a minimum of zero,

$$b_t = \max[X_t - h(4), 0]. \tag{5}$$

2. If $s_t < 4$, period $t$ income of $y_t$ is accrued, and the health costs $h(s_t)$ are incurred. A consumption decision is made. The agent may choose any level of consumption $c_t$ that exceeds the consumption floor $c^f$ and satisfies the budget constraint,

$$X_t + y_t - h(s_t) - c_t > 0 \tag{6}$$

If no consumption level $c_t > c^f$ satisfies Equation $6$, the agent must get help from the government. If $s_t = 1$ or 2, welfare means consuming $c_t = c^f$. If $s_t = 3$, the agent must receive care under Medicaid and $c_t = c^{MED}$.

3. At the end of the period, the agent is left with the unspent portion of assets, which earn a
risky return \( r_t \). If the agent received government help in the current period, wealth in the next period is zero. Letting \( I_t^G \) be the indicator variable for government help in period \( t \), the following period's wealth level obeys:

\[
X_{t+1} = \begin{cases} 
(X_t + y_t - h(s_t) - c_t)r_{t+1} & \text{if } I_t^G = 0; \\
0 & \text{if } I_t^G = 1. 
\end{cases}
\] (7)

4. Finally, the new health state \( s_{t+1} \) is drawn according to the state transition probabilities \( P(s_{t+1}|s_t) \). If \( t + 1 = T \), the final period, \( s_{t+1} = 4 \).

The household maximizes expected utility of the remaining life time consumption (2) subject to the budget constraint (6) and the government-provided consumption floor. The Bellman equation is

\[
V_t(s_t, X_t) = \begin{cases} 
\max_{c_t} \left\{ u(c_t) + \beta E_t V_{t+1}(s_{t+1}, X_{t+1}) \right\} & \text{if } s_t \neq 4 \\
v(b_t) & \text{if } s_t = 4
\end{cases}
\] (8)

subject to equations (3), (5), (6), and (7).

To compute optimal strategies, we first discretize the state space and the control space. The model is then solved by backwards induction. At time \( T \) (age 100), the household dies with probability one. Its value function is the instantaneous utility over bequests, \( v(b_T) \). In every prior period \( t \), the Bellman equation (8) is used to solve for \( V_t(s_t, X_t) \). We use a fine grid for \( X \) and for consumption, and linear interpolation to compute continuation values for points that are not on the grid. The choice variables ruled out by the budget constraint (6) are given large negative values.

### 3.6 Calibration

The central issue of this paper is how separately to identify the \( c^{MED} \) parameter which impacts precautionary savings, and the bequest motive, \( \varpi \). To this end, we fix all remaining preference parameters at conventional values, while wealth and income numbers are individual specific and derived from survey responses. This does not reflect a belief that all agents are identical in all of these respects, but rather reflects the desire to focus on the central trade-off of interest. Rather than allowing for additional heterogeneity, we conduct various sensitivity analyses showing that our results are generally insensitive to the particular values that we have chosen for other parameters.

**Preference Parameters** Standard values for the coefficient of relative risk aversion parameter in life-cycle models are between 2-6.\(^{13}\) We follow Brown and Finkelstein [2006] who cite a number

\(^{13}\)Based on the life-cycle of risky asset positions, some research has argued that older investors are more risk averse (Morin and Suarez [1983]), but there is debate about their findings (Wang and Hanna [1997] and Bajtelsmit
of papers that rely on “a long line of simulation literature” that use $\gamma = 3$ as a baseline value. The subjective time discount factor is $\beta = 1/1.03 = .971$. The hardest parameter to pin down is $\phi$, which measures the consumption level, above which one considers bequests. We set it equal to 5, measuring dollar amounts in thousands. A choice for $\phi$ strictly above zero avoids a zero bequest generating a utility of minus infinity. We are sensitive to the possibility that this value may be too low, especially under the interpretation of Henin and Weitzenblum [2003] that this parameter corresponds to the expected annual consumption of one’s heirs. Therefore, we do sensitivity to values of 10 and 3. We also study alternative risk aversion parameter values $\gamma = 2, 5$.

**Technology Parameters**  The agent can invest in a single risky asset, which we take to be a portfolio consisting of 30% stocks and 70% bonds. We assume the return is normally distributed with a mean of 3% and a standard deviation of 6.8%. These numbers are based on historical real returns on the CRSP value-weighted stock market portfolio and the real three-month Treasury-bill rate. The 70-30 mix approximates the average share of equity in the portfolios of retirees in the Survey of Consumer Finance (SCF) and also agrees with common recommendations of financial planners. We use three-point Gaussian quadrature for numerical integration. For a consumption floor, we choose $c^f = 3$, in agreement with the estimate of De Nardi, French, and Jones [2006]. We also study alternative consumption floor values $c^f = 6, 12$.

**Health and Longevity Dynamics**  The role of health costs is central to our analysis, especially the possibility of high costs associated with long-term care. The distribution of these costs in our model is controlled by the medical costs associated with each health state and by the one-period $4 \times 4$ state transition matrix $P(t)$. This matrix is parameterized by twelve parameters, nine that determine the value of $P(0)$ (of the sixteen elements, four are fixed by the death state being absorbing and there are three further restrictions so that each row sums to one) and three that control the flow of probability from greater health to poorer health as age $(t)$ increases. We select values for these parameters to match four age-dependent mortality rates and eight statistics on long-term-care utilization from Brown and Finkelstein [2006]. We do this exercise once for men and once for women. The latter not only live longer, they also face much higher long-term care risk. This calibration is described in detail in the appendix and the longevity and long-term care moments that are matched are listed in rows 1-12 in Table 1.

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and Bernasek [2001]).

14 Equivalently, $\phi$ controls the marginal utility of the first dollar of bequest. We attempted to identify $\phi$ by matching the fraction of agents leaving a zero bequest. While a larger value of $\phi$ does increase the fraction of zero-valued bequests, a smaller value of $\phi$ does as well. Unreported Monte Carlo simulations from the model confirm, more generally, that $\phi$ does not control any distinct features of the cross-sectional distribution of realized bequests.
Health Costs  Each health state is associated with a (deterministic) medical expense. To calibrate the medical costs associated with non-LTC states, we identify the mean annual out-of-pocket medical costs for non-institutionalized individuals over 65. French and Jones [2004] find mean household medical costs of $2,800 in the AHEAD survey and DeNardi, French, and Jones [2006] use $2,000 as an estimate for medical expenses in early retirement. Using our calibrated health-transition matrix, we find that among the periods our simulated retirees spend out of long term care (health states 1 and 2), they spend 10.5% in state 2 so that $h(1) = 1$ and $h(2) = 10$ reproduces this average of $2000. For the long-term-care state 3, we use Brown and Finkelstein’s estimation that a semi-private room in a private LTC facility costs $143 per day. In 2004, Medicare covered the full cost of LTC for 20 days each year and the daily costs in excess of $109.50 for an additional 80 days. This leaves an annual out-of-pocket expense of $46.7K for a full year of LTC for an individual without LTCI. By 2006, this expense had increased to $57.2K. We take a value in the middle $h(3) = 50$. We ignore costs associated with death by setting $h(4) = 0$.

With these values, and the health and longevity dynamics described above, the median value for life-time medical expenses is $47K for men ($92K for women), while the mean is $102.3K ($164.5K). See rows 13 and 14 of Table 1 Long-term care costs dominate our model, making up 67% (74%) of all medical expenses. For the 61% of males (47% of females) who do not enter long term care, the mean health cost in retirement is $29K ($37K). Men (women) face a 33% (48%) chance of facing health costs greater than $100K and a 12% (24%) chance of costs greater than $250K.

4 Model Properties

The estimation strategy that we adopt below is based on individual data, and hence a critical issue concerns how informative are the behavioral data on spending levels out of wealth and income in terms of separating out Medicaid aversion and the bequest motive. In this section we summarize the identification problem associated with the simplest possible statistic, consumption in the first year out of a given wealth and income. We have repeated the exercise for several other observables, such as expected consumption growth over the next five years, the variability of consumption, and bequest levels. None of these alternatives fundamentally alters the inference problem.

The pictures that follow show iso-consumption lines. On the horizontal axis, we plot the intentional bequest parameter $\varpi$. The bequest motive strengthens reading from the left to the right.

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15While several simulations results suggest that behavior may be somewhat sensitive to the exact probabilities of realizing these unlikely but expensive scenarios, the key to all simulations is the dominance of LTC expenses that occur late in life. We note that the health transition probabilities are determined only by the agent’s age and current health state, so that expected future costs do not depend on prior medical history.
no returns on assets, and no uncertainty (hence no precautionary motive). In such a deterministic world, consider a single retiree of age 65 with $200K in wealth and $30K in annual income, who will live a known 18 years, and face $100K in long term care expenses at the end of life. If this retiree has a bequest motive of $\varpi = 5$, the final bequest is $120K, which corresponds to roughly 4 years of optimal retirement consumption. As $\varpi$ increases, so correspondingly does the bequest: with $\varpi = 10$, the bequest is $196K, which is roughly 8 years of (lower) optimal retirement consumption; with $\varpi = 30$, the bequest is $344K which is 21 years of retirement consumption; and with $\varpi = 50$, the bequest is $404K, roughly 31 years of (lower) optimal retirement consumption.

On the vertical axis of all figures, we plot $\log(u'(c^{MED}))$, a decreasing function of $c^{MED}$. To interpret this axis, note that a value of zero corresponds to a low value for $c^{MED}$ of only $1K; a value of -5 indicates a value for $c^{MED}$ of just over $5K; and a value of -10 indicates a value for $c^{MED}$ of some $28K. We have chosen a wide range for both parameters, having no strong priors on the bounds of the ranges. We chose this function of $c^{MED}$ not only because it is increasing in the precautionary motive, but also because consumption responds to $c^{MED}$ itself in a highly non-linear fashion. Using $\log(u'(c^{MED}))$ rather than $c^{MED}$ results in graphs that are easier to read (once one has become familiar with the axes), that are more suitable for linear interpolation, and that better capture variations in the level of Medicaid Aversion that we estimate empirically.

[Figure 1 about here.]

4.1 Iso-Expenditure: Medium Wealth

Figure 1 illustrates iso-expenditure contours for the median respondent in the survey we describe below: a woman of age 65, in good health, with disposable income of $25K, and with wealth of $80K. The left panel is for a wide set of parameters, while the right panel focuses on the bottom left part of the left panel where consumption is highest. The identification problem is obvious: a consumption level of $10K, is consistent either with a strong bequest motive (high $\varpi$ on the horizontal axis) and a weak precautionary motive (low $u'(c^{MED})$ on the vertical axis) or with a strong precautionary motive (high on the vertical axis) and a weak bequest motive (to the left on the horizontal axis).

With lower consumption profiles consistent with high levels of Medicaid aversion, the iso-consumption line becomes close to horizontal (e.g., the $c = 5$ locus). In such cases the inference problem in terms of bequests is particularly severe, since the bequest motive is infra-marginal. On the other hand, we see that the model can explain no more than $30K annual consumption (right panel). Consumption at this level pins down the bequest motive to zero, yet does not fully determine Medicaid aversion, which is infra-marginal. Note also the rapid decrease in consumption as either the bequest motive or the precautionary motive strengthens. This sudden increase in
savings incentives associated with increasing the bequest motive or Medicaid aversion may be important in understanding the highly unequal distribution of wealth among retirees (Castaneda et al. [2003]).

4.2 Iso-Expenditure: High Wealth

Figure 2 shows optimal current consumption for a woman at age 62, in good health, with disposable income of $50K, and with higher wealth of $475K. This person roughly corresponds to the 90th percentile of the income- and wealth distribution. The novel feature for such a high wealth individual is illustrated in the left panel of the figure: a very high lower bound on the bequest motive for many levels of consumption. In our model it is simply not possible to explain low spending (e.g., $30K) by a very wealthy person based on Medicaid aversion, since they are not at risk.

[Figure 2 about here.]

4.3 Middle Class Precautionary Savings

A key feature of the model is that the incentive to save is particularly high for those in the middle classes. Figure 3 illustrates this in a stark fashion for a 62 year old woman in good health. The horizontal axis represents this individual’s economic status, as reflected both by the recorded level of income, and by variations in wealth consistent with the observed joint wealth-income distribution (not shown). The vertical axis illustrates the savings rate out of income. Note that the model-implied saving rate is hump-shaped in income (and wealth). The saving rate is highest for the middle class. The reason is that both the precautionary and the bequest motives are operative in full force for this group. Note that the different lines in the figure indicate different precautionary savings motives. The stronger the precautionary motive (top line, low $c^{MED}$), the larger the saving rate.

[Figure 3 about here.]

5 The Survey

5.1 The Sample

Our survey was conducted in September 2006 by Greenfield Online, a major provider of web-based surveys. Any respondent living without a partner was ruled out if: born before 1917 and after 1951; working full-time or looking for work; having total household income from work in 2005 of
more than $25,000; being in need of long-term care; having children at home. For respondents living with partners, we added the condition that the partner could not be working full time or looking for work, born before 1917 or after 1966, or in long term care.

We imposed sampling restrictions on various demographic and wealth groups to obtain a somewhat representative sample. We obtained 1085 responses that passed the sample selection stage. We screened out 147 for first order response errors: 23 reported having no financial wealth whatever and total income of less than $200 a month; 13 reported total spending of $1; 13 reported spending more than the sum of assets and thirty years worth of income; 38 reported living expenses less than $500 per year; 6 reported spending the same amount on all six spending categories; 32 reported owning a home value worse than $10K; 9 had mortgage debt more than twice the home value (this was prior to the housing crash!); 57 did not own homes but reported spending nothing on rent; 5 switched to diametrically opposite allocations between the $100K LTC box and the $250K LTC box questions; and 17 completed the survey in less than nine minutes (the median respondent took more than 20 minutes). This left us with a sample of 938 respondents. The mean and median age of respondents was 64, with 90% in the 56-76 range. Nearly two-thirds of respondents were female. More than 80% were retired. Given that the current state of health is a state variable in our model, we asked questions directly to identify which of the three model-permitted states of health characterized each respondent. Almost 70% of respondents were in good health. With respect to household status, almost 55% comprise single households and 45% are couples. There is wide dispersion in the number of children and of grandchildren, with a substantial minority in each case having none, and another substantial group having four or more. Finally, 76% of respondents were homeowners. The left column of table lists some summary statistics for our sample.

Table 2 about here.

A key premise of the model is that many face high private costs of LTC, and we set the costs of private care at $50K as a fixed parameter in the model. In fitting with the low level of use in the general population, in only 14.3% of the households in our sample is there a member that has taken out a long-term care insurance policy that would provide benefits or reimbursement for LTC expenses. When we explicitly ask respondents to think of the costs of one year of private LTC absent any LTC insurance coverage, the median estimate is $35K, and 10% of respondents think the one-year stay will cost $100K or more. The claim that private LTC is seen by many as involving high private costs appears warranted.

We allowed no more than 40% of our sample in each of the 1947-51, 1941-46, 1936-40, and 1930-35 cohorts. We allowed no more than 35% to be couples whose children left the home (*) - indicating a binding constraint) or to be couples with no children in order to end up with sufficient singles. We allowed no more than 40% of respondents to have retirement wealth below $25K (*) and no more than 90% to have such wealth below $75K. Finally, we allowed no more than 40% of respondents to have financial non-retirement wealth below $25K (*) and no more than 90% to have such wealth below $100K. (*)
5.2 Wealth

We asked respondents for measures of assets and debts in 2005, and as with all other numerical dollar values, we asked respondents to first answer questions concerning the range of values in which the corresponding variable lay, and then asked them to make a precise estimate within this range.\(^{17}\)

With respect to wealth categories in 2005, median retirement assets held in tax-favored dedicated retirement accounts (such as 401(k), IRA, 403(b), or other accounts) are $13.8K, with an inter-quartile range of 0-$115K. Median financial wealth (bank accounts, money market accounts, stocks and shares, bonds, etc. excluding any assets held in dedicated retirement accounts) is $15K, with an inter-quartile range of $0.5K-$125K. The median self-reported home value among homeowners is $160K, with inter-quartile range $85K-$289K. For 63% of homeowners, the primary mortgage is fully paid off. Median mortgage debt among home owners is $48K; median home equity is $137K. Table 2 reports home values, mortgage debt, and home equity for the entire population, including renters. The median level of “other assets” (e.g. secondary home, cars, boats, art, private business assets) is $20K, with an inter-quartile range of $4K-$70K, and ten percent own more than $270K. On the debt side, more than half of the respondents have no credit card debt and the same is true for “other debt beside primary mortgage and credit card”. Among the credit card debt holders, the median debt is $2K, while among those with other debt, the median debt is $1K.

To estimate our model, we need a total wealth measure for all respondents, taking care to keep the number of state variables to a minimum. While liquid wealth, retirement wealth, and free standing debt categories largely speak for themselves, there are trickier issues associated with housing and durable assets. With respect to housing, the historical real price appreciation (ex-dividend return) is approximately zero per annum (Shiller [2006]). Our model calls for the cum-dividend return on housing, which includes the rent-price ratio. We use a rent-price ratio of 4%.\(^{18}\) Thus, the cum-dividend return on housing is 4%, somewhat above the 3% average return we assume on the portfolio of stocks and bonds. Because of the difference in returns, aggregation at current value would understate the contribution of housing to net worth. To account for its higher return, we increase the contribution of housing wealth to total wealth to the degree appropriate given the longevity of each respondent. Note that implicitly this is treating the house as an asset than will be used late in life, which is empirically accurate (Venti and Wise [1990] show that there is little run down in housing assets except at the very end of life, while Walker [2004] has shown that there is

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\(^{17}\)We used this procedure to mimic as best we could the procedures employed by the Michigan Survey Research Center. However we accept that there are likely still to be inaccuracies in the measures that follow.

\(^{18}\)The rent-price ratio in 2005 was equal to 4% nationwide, where rents are measured based on the rental price index of the BLS and house prices based on the repeat-sales index of the OFHEO. Since we do not have geographic information on our respondents, we use the nationwide number.
quite often rapid run-down at the end of life often associated with declining health). Similarly, we
discount the value of durable wealth to a degree consistent with zero growth. Finally, we asked
those with partners to specify life insurance receipts due to each partner in event of the other’s
death. We do not include these life insurance pay-outs in our wealth measure, given our focus on
singles.

5.3 Income, Spending, and Current Health

We asked respondents for total spending in 2005, and also for a breakdown into six categories: (a)
all mortgage and debt payments except credit card payments; (b) maintenance, improvement and
taxes on owned real estate or rent; (c) purchases of major durable goods such as cars, boats, etc;
(d) out-of-pocket health care expenses; (e) income or other taxes other than real estate taxes; (f)
all other living expenses.

Table 2 reports the distribution of these expenses in our sample.

We are interested in constructing a value for total consumption that excludes health care
spending to be consistent with the model, yet includes consumption of housing and durable services.
For renters, housing consumption is given by their rent. For home-owners, we set the housing
consumption equal to the “imputed rent”, the self-reported home value times the 4% rent-price
ratio, which we also used in the housing return. Non-durable and services (NDS) consumption
is then defined as the sum of all other living expenses and housing services consumption: the
median is approximately $11K and the average approximately $15K per year. We measure durable
consumption as 25% of durable assets (a typical depreciation rate for vehicles and electronics).
We define total consumption as the sum of NDS consumption, durable consumption, and housing
services from any secondary home. When so defined, consumption has a median of $15.0K and
mean of $19.2K. We use this measure of consumption in the model.

The survey also gathered income in 2005 from Social Security, government pensions, and regular
19 More precisely, we use a simple procedure in which we associate with each individual an expected longevity, and
compute the value of the house (durable assets) at that date assuming that it grows at 4% (0%) p.a. The increased
housing wealth (decreased durable wealth) we obtain is such that, when it grows at 3%, it results in the same future
value as the observed housing (durable) wealth under a 4% (0%) growth rate.
20 Because we did not ask for details about assets in the “other assets” category, we are forced to make assumptions
about their composition. We look at respondents in the 2004 SCF above age 55 and compute the total value of
their assets that would have fallen into this category in our survey. A logit estimation reveals that for other assets
above $82,000, a household is more likely than not to own real estate beyond the primary home. For households
above this threshold, 95% of such assets are in the form of additional real estate or business wealth, both of which
we assume return 4% p.a. Based on this, we assume that if other assets total less than $82,000, they are entirely
durable assets. If the total is larger, we treat 95% of these assets as housing wealth and the remaining 5% as durable
wealth.
21 A check was instituted to ensure that category responses added up to within 10% of total expenses.
22 We computed also an alternative “user cost” of housing as the sum of the mortgage payment, maintenance and
home improvement, and property taxes (sum of consumption categories a and b). The user cost and the imputed
rent have a 40% correlation (measured precisely).
23 See Footnote 20.
employer pensions. The median respondent has $16K and the mean is $24K. The distribution of total income, defined as the sum of labor income and pension income, has a median of $26K, and an inter-quartile range of $16-39K. We also asked for expected income in 2010 in the labor income and pension income categories. Our model calls for a measure of permanent income, since it assumes that income is constant during the retirement period. Therefore, we use 2010 income, and apply the 2005 income tax rate to get an after-tax measure. Finally, to avoid the possibility that respondents report pension income both as income from work and as retirement income, we set labor income to zero for individuals that report that they are retired.

5.4 Comparison with Survey of Consumer Finance Data

We compare our data with the 2004 Survey of Consumer Finance (SCF) data. To make this comparison legitimate, we exclude respondents below the age of 54, where either spouse works full-time or expects to work full-time, with combined household income from work above $25K, and with children at home. This guarantees we are comparing mostly retirees to a sample of mostly retirees. The resulting sample consists of 3,018 individuals. Half are married; 81.3% of the sample are homeowners, compared to 76% in our sample. The right column of Table 2 reports summary statistics that are defined in a parallel fashion to those on the same row in the left column (our sample). They use the SCF weighting scheme.

The SCF has a slightly older age distribution. To our surprise, the income and wealth distribution looks remarkably similar to ours. While SCF spending data are limited, they still allow for a few important sanity checks on our data: (i) SCF food spending is lower than our living expenses, (ii) SCF spending on rent and real estate taxes is lower than our category of maintenance, rent, and real estate taxes, and (iii) mortgage payments are on the same order. We conclude that our sample seems broadly representative of the retiree group in terms of income and wealth.

6 Strategic Survey Questions

There were two distinct types of strategic survey questions posed, differing in when the proposed contingency would play out. Our first question was to play out “immediately following survey completion”, as in Barsky, Juster, Kimball, and Shapiro [1997] and Kimball and Shapiro [2003]. The interpretation of the response to this question depends on wealth, income, health status, age,

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24 The reported annual income changes between 2005-2010 are modest: $1K is the median and $2K is the mean.
25 The SCF weighting scheme means that the number of replicates we use is five times the 3,018 observations (15090).
26 By comparing our sample to the weighted and the non-weighted SCF sample, we are able to conclude that our respondents are somewhat wealthier than the US population as a whole. The SCF is known to over-sample the wealthy, relative to other surveys such as the PSID or the AHEAD.
and gender. A fixed survey response will have entirely different interpretation in terms of model parameters depending on the other data that describe this respondent. Our second question placed respondents close to the end of life when the motives come into play. The interpretation of these answers in terms of model parameters is the same for all respondents, since they were placed in the same hypothetical situation. The differences between the questions allow each question to generate information of independent value in the final estimation.

### 6.1 The Immediate Prize

Our immediate prize scenario involved the respondent winning a prize (either $100K or $250K) that had to be divided up between a bequest locked box and a long term care locked box, where the idea of using the locked box was precisely to provide an appropriate commitment device. More precisely, we specified that money placed in the bequest box could not be accessed during the lifetime, but would be passed on in whole to beneficiaries (who could not be told of this) upon death. Money in the long term care box could be accessed only to pay for private long term care (stated as costing $50K a year) for the respondent (and partner if applicable), and would not be available to bequeath. The point of this question was to overcome the identification problem associated with wealth that is fungible between these uses.

Figure 4 shows that the single largest group of respondents would split the money 50-50. If the prize is $100K (two years of LTC), then 32% would split it evenly; if the prize is $250K (five years of LTC) only 17% percent would split it evenly. The second most common answer is a polar answer: 0 or 100%. This is the first evidence suggestive of our basic finding, which is that both bequest motives and Medicaid aversion are important for a significant set of retirees. The second question with a $250K prize has a more even distribution across answers than the first; it is more discriminating. There is a large positive correlation between the two questions: the correlation between the $100K answer and the $250K answer is 0.8. 126 respondents answer 0 to both questions (13.4%), 124 answer 50% to both, and 120 answer 100% to both questions.

![Figure 4 about here.]

Note that in as much as systematic bias is to be expected in this question, one might expect respondents to have wanted to look loving to others by asserting their selflessness and locking up the money for future generations. The distribution of answers above shows that this was far from

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27 Lillard and Willis developed the “modal response hypothesis” to explain the common tendency of survey respondents to give focal answers of 0%, 50%, and 100% to probabilistic questions in many domains (Lillard and Willis [2001]). At an individual level, the propensity to give focal answers appears to be systematically related to cognitive ability.

28 We experimented with randomizing the order of the answers to the survey questions to detect anchoring effects. We found that the answers from the group that was presented the “100% in LTC” answer first were no different from the answers given by the group that was presented the “0% in LTC” answer first.
uniformly the case. Note that an obvious next step is to add more parameters to capture this and other forms of systematic survey bias.

6.2 The End of Life

In posing the end of life question, we asked all respondents to place themselves in a hypothetical situation in which they were: of age 85 and the sole surviving member of their household; in need of long term care yet had absolutely no LTC insurance; knew that they had exactly one year left to live and would need to spend it in a long term care facility; and had sold their home and had total available wealth that is worth $200K at today’s prices and final year income net of taxes worth $25K in terms of current prices. They were then offered the choice between LTC that was privately financed and government provided LTC that is financed through Medicaid. This choice was described as impacting their LTC options and the bequest that they would leave as follows:

1. Option A: Use Medicaid funded LTC. The government will pay for your LTC, allowing you to leave all $200,000 as a bequest. However, using Medicaid restricts your choice of facility, on average results in inferior care, and requires you to surrender all income to the government.

2. Option B: Use private LTC. Pay $50,000 for private LTC. You would only leave $150,000 as a bequest but would have your choice of facility and would have your income available for spending as you wish during that year (unspent income would be forfeited).

Note that our question asserts directly that Medicaid on average results in inferior care, which we see as uncontroversial “folk wisdom” designed to frame the question appropriately. There is no evidence suggesting that this framing had any effect. First, respondents had all answered the locked box question (which made no comments on Medicaid quality) before seeing this second question. Second, we show below that the answers to this question suggest a lower aversion to Medicaid than do the responses to the earlier locked-box questions.

The response to the qualitative question was clear-cut. An overwhelming majority (83%) of respondents preferred to go to a private facility if the cost is a reduction in bequest of $50K. This is strong evidence for Medicaid aversion, the key driver of the precautionary savings motive in our model. Yet there is also evidence that many attach great importance to bequests. Following the above yes/no question, we followed up with a quantitative question designed to pin down how much of the $200,000 that would be willingly foregone to stay in a private LTC facility rather than use Medicaid funded LTC. The median response was $50K, with an IQR of $20-100K. As an indication of coherence in responses, the median willingness to pay was only $10K for the 17% respondents who chose Medicaid funding in the first part of the question, while it was $50K for the other remaining respondents. Figure 5 plots the distribution of willingness to pay for a private facility for those who prefer to avoid Medicaid.
6.3 Modeling the Response

Figure 6 illustrates the informational content of the two strategic survey questions for the two parameters of interest. It plots iso-response lines for the end-of-life survey question (left panel) and the lock box question (right panel) for a hypothetical 65 year old woman in good health with annual income of $40K and wealth of $230K in our model. These iso-response lines are upward sloping. A given response can be reconciled either with a strong bequest and strong precautionary motive, or with a weak bequest and weak precautionary motive. Just like the iso-consumption lines, the iso-response lines alone do not allow us to separately identify precautionary and bequest motives. Higher-valued responses to either question indicate a weaker bequest and/or a stronger precautionary motive. For example, if a respondent answers with a given bequest motive reports that she would be willing to forgo only 10% of $200K to avoid Medicaid funding, then she has weaker Medicaid aversion than a respondent who is willing to forgo 90%. The same is true for the lock box questions, though the contours have a somewhat different shape. For example, if the respondent answers that she would put all the money in the LTC box (the 99% line), then we can bound the bequest motive from above (at 20 in this example).

Figure 7 shows how to combine the iso-consumption lines with the iso-response lines from the end of life question to pin down both parameters for the same 65 year old woman. At their intersection (the full circle at the intersection of the $22K iso-consumption line and the 30% iso-response line), we find the bequest parameter $\varpi$ and the precautionary savings parameter $c^{MED}$ for this individual. Below, we repeat this exercise for the respondents to our survey for each question separately, and pooling information across responses.

6.4 Preliminary Response Analysis

While our ultimate estimation relates only to 297 singles, we provide in this section an analysis of all 938 respondents. In this respect, what stands out is that the strategic survey responses provide a unique and rich source of insight into the extent of the motives that drive wealth accumulation at the end of life. We define the survey variables $pctltc1$ and $pctltc2$ as the fraction of the $100K
and $250K locked boxes respectively dedicated to long term care, and \( pctltc3 \) as the fraction of $200K dedicated to avoid Medicaid at the end-of-life.

**Children** In confirmation of the generally sensible nature of the survey responses, we find that respondents with children (80% of the sample) uniformly display a greater concern with bequests. The average fraction of the $100K lock box (250K box) allocated to LTC, \( pctltc1 \) (\( pctltc2 \)), is 68.5% (64%) for respondents without children, while it is 51.5% (47%) for those with children. The same comparison but for the median instead of the average fraction is 80% (70%) versus 50% (50%).

Likewise, for the end-of-life question, the fraction allocated towards (private) LTC is 42.5% for those without children and 31.5% for those with children. The null hypotheses that the sample means are the same in the group with and without children are strongly rejected for all three variables. Figure 8 shows that there are not only different means and medians for the survey answer distributions, but that the entire distribution looks different. The top panel plots \( pctltc2 \), the bottom panel \( pctltc3 \). For example, there is a much higher propensity to allocate nothing to bequests for those without children. Vice versa, there is a much higher propensity to allocate everything to bequests for those with children.

Wealth and Income Table 3 shows the pairwise correlation matrix between the strategic survey answers, net worth, permanent income, and the number of children. Note that while the two types of survey answers have a positive correlation of 0.27 (\( pctltc1 \) and \( pctltc3 \)) and 0.28 (\( pctltc2 \) and \( pctltc3 \)), there is independent information in each question. The most striking finding in this regard is that assets, net worth, and permanent income are positively correlated with the answer to the lock box questions, but negatively with the end-of-life question. It appears that wealthier households allocate more of the locked box to bequests, but they dislike Medicaid LTC more as well. This is intuitively reasonable. Consider a high wealth individual with dominant Medicaid aversion. In answer to the former question on the marginal allocation of a lottery win, such a respondent may elect to use all or most for a bequest. Indeed, the wealthy respondent is not at risk of needing the LTC money, and allocating the money to the bequest box assures that the heirs will receive the money. However, if pushed to the wall with little wealth left, as in the end of life question, they would elect private LTC. It is a measure of the seriousness with which these questions were taken that responses difference precisely along these lines.

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30 The number of children is also negatively related with the \( pctltc \) variables. However, what matters is whether the respondent has children or not. In a regression of the \( pctltc \) variables on both the \( withkids \) dummy and the discrete \( numkid \) variable, the dummy \( withkids \) drives out \( numkid \).
While there are no formal findings to this effect, the “folk wisdom” in the area of bequest motives is that they are minimal for all but the wealthiest households. Our survey results provide no support for this view. If one aggregates across the sample as a whole, there is no systematic relationship whatever between economic variables and survey responses. Yet such a relationship can be identified if one conditions on whether or not there are children. We ran both OLS regressions and Tobit regressions which take into account that the dependent variable (pctltc) is bounded between zero and one. The right-hand side variables are net worth and net worth interacted with the withkids dummy. The coefficient on the first regressand is the effect of net worth on the fraction allocated to LTC for those without children; the coefficient on the second regressand is the same effect but for those with children. The main message from Table 4 is that respondents without children allocate more money towards LTC (and less towards bequests) the wealthier they are. The exact opposite is true for respondents with children. The wealthier they are, the more they allocate towards a bequest. Each $10K in income or $100K in net worth increases the fraction allocated to the bequest by 2-4% for those with children and reduces that same fraction by about 1% for those without children. The difference between these groups is highly statistically significant.

[Table 4 about here.]

Planning-Type Questions Further support for the plausibility of the strategic survey questions derives from the relationship between the answers and those to planning-type questions. We asked the respondents whether they own a long-term care insurance policy (LTCI); 14.3% of our respondents do. Those with LTCI have a lower propensity to allocate money to the LTC locked box than those without a policy. At the same time, when faced with a contingency without LTC at the end-of-life, they are more likely to pay to avoid Medicaid funding. We asked the remaining 85.7% of the sample whether they had seriously considered taking out LTCI. The 27% of those that had considered it allocate a significantly larger fraction of the lock box to LTC and do the same at the end-of-life. Next, we asked all respondents how much they think a year in LTC would cost out-of-pocket given all the insurance they have in place. We find that the more they think it will cost, the more they allocate to LTC in the strategic survey questions. Again, these results are highly significant. We also asked the respondents whether they had (i) a written will, (ii) established a trust, or (iii) consulted with a financial planner. All three variables are significantly negatively correlated with pctltc1 and pctltc2 (at the 1% level), and negatively but insignificantly related to pctltc3.

31We also asked our respondents for their willingness to pay for perfect LTC insurance. We regress the survey answers pctltc1, pctltc2, and pctltc3 on net worth, net worth interacted with the withkids dummy, and the willingness to pay for perfect LTCI. We find that the results from Table 4 remain unaffected, and that in addition, the willingness to pay enters significantly positively. An extra $1000 willingness to pay increases pctltc by an additional 1.17-1.64%.
to *pctltc3*. Again, this finding makes considerable sense. Those with demonstrated intentional bequest motives end up allocating more towards bequests. However, when faced with a potentially very different wealth level at the end-of-life, they still care more about their heirs, but Medicaid remains an unpleasant prospect.

**Singles** The results above are for the full sample of singles and couples. To close the section, we focus on the 498 singles in the sample. As for the larger sample, singles with children allocate less to the LTC box (and more to the bequest box) than those without children. Figure 9 also shows that the percent allocated to LTC (vertical axis) has no strong pattern across wealth deciles (horizontal axis). In particular, there does not seem to be a strong relationship between wealth and the fraction allocated to the bequest. These same results hold up in our estimation sample of 306 singles (see below).

![Figure 9 about here.]

## 7 Estimation

### 7.1 Computational Strategy

The model identifies each potential respondent “type” by gender, age, health, wealth and income, and by two preference parameters, $\varpi$ and $c^{MED}$. For each type, the model predicts current-period consumption and answers to each of the strategic survey questions. For each respondent of a given type, our approach is to identify the values of $\varpi$ and $c^{MED}$ that best explain the reported consumption and answers to the strategic survey questions, holding constant gender, age, health, wealth and income.$^{32}$

For each single respondent in the sample, we identify the demographic variables from the survey data, using definitions of income and wealth described in section 5. With all other model parameters fixed, we identify the values of $\varpi$ and $c^{MED}$ for which the model’s prediction of consumption match the 2005 consumption calculated from the data. These values define a curve in the $(\varpi, c^{MED})$ plane. For each candidate parameter pair $(\varpi, c^{MED})$ on this curve, the model also predicts a theoretical answer to the strategic survey question.$^{33}$ We select the parameter pair for which the model’s prediction most closely matches the respondent’s actual answer. (Recall Figure 7 for a graphical description.) This procedure thus associates to each respondent an estimated bequest motive and

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32In the context of a model of spending over the pre-retirement period, the initial conditions themselves would provide information on the underlying preference parameters. Extensions of this form are beyond our current scope.

33In advance of the estimation, we calculate optimal policies for consumption and the lock-box question response for demographics and values of the preference parameters lying on a grid. During the estimation routine, predicted answers are calculated by linear interpolation from this grid. The optimal response to the end-of-life survey question has a simple closed-form solution and is calculated for each parameter pair.
Medicaid aversion. Note that our main estimation makes use of all data: the spending data from the standard part of the survey, and the two types of strategic survey questions ($250K lock-box and end-of-life).

7.2 The Estimation Sample

In our estimation, we follow De Nardi, French and Jones [2006] and focus on single respondents due to the many additional intricacies involved in simulating end of life spending of those with partners. Of the 498 single respondents in our sample, we are forced to exclude 192 from the estimation. There are 81 respondents with negative wealth, in violation of the model’s no net borrowing assumption. Four respondents report zero income but significant taxes so that we calculate a negative after-tax income. In two cases, we calculate a consumption measure that is lower than our consumption floor. Six respondents report consumption that is lower than the model predicts even under the maximal values of both savings motives. Finally, 97 have consumption that is larger than the model predicts even with both savings motives removed. There are several possible explanations for the fact that many are spending at a higher rate than the model predicts: they may have shorter life expectancies than assumed; they may have responded to income and/or spending questions with error; they may have lower medical expenses than assumed; they may be less risk averse; and they may be more impatient and/or have problems of self control. Since we do not have enough information to separate out the causes, we set them aside for purposes of formal estimation. Most importantly, this group of over-spenders is not the main concern for those interested in retirement spending, since the primary puzzle relate to those many who spend far less than income. We proceed with the estimation for the remaining 306 respondents and reintroduce these excluded observations into the analysis of Section 7.5 to build a profile of the entire set of sampled singles.

7.3 The Estimates

Figure 10 plots the parameter estimates for the bequest motive and Medicaid aversion in three different ways. The top left hand panel combines consumption data with the end-of-life strategic survey question. The top right panel combines consumption data with the $250K lock box question, and the bottom left panel uses consumption data and both survey questions. In each of the three panels, most respondents have iso-response and iso-consumption curves that intersect in one location and we are able to obtain precise estimates of both parameters (indicated by circles). For other respondents, the survey response was at an extreme (corresponding to full two dimensional iso-response sets). Hence, even in combination with consumption data, a range of parameter

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34 There are also cases in which they do not intersect within the range of parameters we allow for, in which case the estimate is the point on the iso-consumption curve closest to the iso-response curve.
estimates is left open, so that we can only place upper or lower bounds on the bequest motive (indicated by triangles pointing to the left or right). In the third panel which uses both questions, the estimate is the point on the iso-consumption line that minimizes the sum of the squared differences between the predicted and actual answers to the two survey questions. This is equivalent to a maximum likelihood estimation where we assume that survey responses represent the truth plus a zero-mean, normally distributed error, as in Kimball, Sahm, and Shapiro [2007]. There is a range of estimates for the pooled questions only if both questions produce consistent bounds, in which case the intersection of the bounds is applied.

To understand how the information content of the unified estimate differs from those of the two questions individually, Figure 11 compares estimates from the two survey questions. The left panel contrasts the estimate for $\varphi$ from the left and the right panels of Figure 10. The right panel does the same for the estimate of $c^{MED}$. While many of the estimates are identical, some respondents for which the end-of-life questions implies a zero bequest motive give answers to the lock-box question that imply a positive bequest motive (along the vertical axis of the left panel). There are also cases in which the end-of-life questions implies a maximal bequest motive and the lock-box question does not. Finally, there are a number of observations for which the lock-box question implies no bequest motive and the end-of-life question does not. Observations in this group are all cases in which all the lock-box money is allocated to LTC, but the end-of-life question indicates a strong interest in leaving a bequest. Where they differ, responses to the end-of-life question tend to indicate a higher bequest motive and lower Medicaid aversion than the do responses to the lock-box question. Overall, we regard the two survey questions as having not only differences in response error, but also differences in meaning that make them to some extent complementary. For this reason, it is the combined estimate in the lower panel of Figure 10 that we treat as definitive.

The lower left panel in figure 10 shows that the survey questions are very useful in separating motives. In the vast majority of cases, we are able to pin down the two motives or bound them in a narrow range. With respect to the bequest motive in particular, the strategic survey data has, in most cases, changed the estimates of $\varphi$ from a wide range to a point estimate and, in all cases, narrowed the range. Of the 306 respondents in the estimation, we obtain point estimates for 276 (90%). For another 16, we identify that the bequest motive exceeds the highest value we consider. These are households with low consumption and who reveal in their survey questions that leaving a bequest is very important. For the remaining 14 observations, we can assign only upper bounds to the bequest motive. For five, this bound is very close to zero. For the final nine, this bound reduces the average size of the allowed range for $\varphi$ from 44.3 down to 14.6.
Before discussing the results in more detail, we report some preliminary checks on the estimation. When we perform the estimation using the end-of-life question, we find that on average, for every additional $10K of bequest the respondent would forgo to avoid Medicaid funding, the estimated bequest motive decreases by 2.1 and the estimated Medicaid aversion increases by 0.49. When we use the lock-box question, each additional $25K less in the LTC lock box increases the estimated bequest motive by 2.6 and decreases the estimated Medicaid aversion by 0.37. This suggests that the parameter estimates are reasonably capturing the preferences revealed by these answers.

7.4 Estimated Bequest Motives

The first main finding is that there is tremendous heterogeneity in bequest motives, and for many they are too strong to ignore. To highlight this point, we plot in Figure 12 the cumulative distribution function of the minimum value of the bequest motive consistent with the behavioral data alone, as opposed to that consistent with the combination of behavioral and strategic survey data. The striking observation is that one could explain the behavioral data perfectly well in principle with a bequest motive set at or close to zero for more than 75% of respondents. Moreover one would necessarily infer a high bequest motive ($\omega > 40$) for only 17 respondents. Yet once we include the strategic survey responses, only 10% are assigned a non-existent bequest motive and it is weak ($\omega < 10$) for less than 40% of the population. High bequest motives ($\omega > 40$) are estimated for more than 20% of the population, with very strong bequest motives ($\omega > 90$) estimated for some 6% of the sample.

[Figure 12 about here.]

With respect to identifying characteristics that are correlated with inferred bequest motives, we consider a regression of the form

$$\omega_i = \Gamma X_i + \epsilon_i$$

where $\omega_i$ is the estimated value for respondent $i$ and $X_i$ is a vector of demographic variables. The first column of Table 5 reports the maximum likelihood estimates for $\Gamma$, based on consumption alone.\footnote{Using only the consumption data, the observation of $\omega_i$ typically consists of an interval $[\omega_1, \omega_i]$. We estimate $\Gamma$ using interval regression, which is designed to deal with dependent variables for which only a range is measured.} We repeat the estimation using the updated estimates of $\omega_i$ from combining consumption with the two strategic survey questions (Column 2). Having children significantly reduces the fraction respondents allocate to the LTC box ($t$-stat = -4, not shown). Once this answer is combined with the consumption data to form a bequest estimate, this relationship with children disappears. Only income and age and generate statistically significant relationships, and these results are already suggested by the consumption data.
The fact that wealth does not relate in any significant way to the estimated bequest motive again emphasizes that bequest motives extend well into the middle class. As one measure of this, we calculate the “net worth-weighted” and an “equal-weighted” bequest motive $\hat{\omega}$ for the 306 singles. Their difference turns out to be relatively small: a wealth-weighted average of 36.8 and an equally-weighted average of 25.5.

### 7.5 Estimated Medicaid Aversion

As with bequest motives, there is great heterogeneity in our estimates of the Medicaid aversion parameter. Figure 13 shows the cumulative distribution function (CDF) of estimated Medicaid aversion scaled back in the original consumption measure. The distribution appears bimodal. More than 10% of respondents regard Medicaid as so bad that its consumption equivalent is less than $1K, and more than 50% of respondents assign Medicaid a consumption equivalent below $5K. On the other hand, some 24% or so of respondents display little or no such aversion, treating a year of Medicaid funded care as equivalent to an annual consumption of $15K or above.

Results of regressing these estimates on a number of demographics are shown in the right-most column of Table 5. Older respondents are estimated to be less Medicaid averse. This not because older respondents differ in their responses to the survey questions. Rather, it is driven by the fact that the consumption data alone indicates weaker savings motives among older respondents. The findings open up some intriguing questions. Hurd [1987] identified a close parallel between spending patterns of otherwise similar retired households with and without children. In prior work, this has generally been interpreted as evidence against bequest motives. While we find a similar pattern of spending in our respondents, our estimates suggest possible differences in motivation. Those without children appear more motivated to save for precautionary reasons than those with children, possibly due to the lack of the safety net that family provides.

### 7.6 Adding Back Excluded Singles

While making no claim as to representativeness of our sample, we want to get a broader picture of the distribution of parameters across all surveyed singles, since those who were excluded from the estimation are systematically different than those who were included. Table 6 describes some

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36 Higher Medicaid aversion for those without than for those with children may reflect the lack of implicit insurance from the family. The broader question of how family relations interact with the power of bequest and precautionary motives is an interesting avenue for future research.
of the differences between the included and excluded subsamples of singles. The main difference is that the included sample has higher after-tax permanent income and especially higher wealth. The wealth difference are present in all wealth subcategories. For example, the home ownership rate is 84% for the included and 29% for the excluded sample. Yet there is little difference in terms of family status or in terms of the answers to the strategic survey questions. Those included in the estimation have a slightly higher average fraction allocated to the LTC lock box, but that difference is not statistically significant. The average answer to the end-of-life question is about the same.

[Table 6 about here.]

We now create a ball-park “population average” bequest parameter for all 498 single respondents. The 306 for which we proceeded with formal estimation account for 81.9% of aggregate wealth; to derive a wealth-weighted bequest motive for the entire sample, the question is how we treat those who have been excluded from the estimation. For the two wealthy outliers and the eight low spenders, a high bequest motive is at least plausible, even though it cannot be estimated. For the 81 with negative wealth, we cannot say whether they would exhibit a bequest motive if given the opportunity, though one could possibly use their lack of asset accumulation as evidence against a bequest motive. We consider a low scenario where we assign the wealthy and low spenders a bequest motive of 14.7 (the median bequest motive estimated from the 306) and those with negative assets a zero bequest motive. Alternatively, we consider a high scenario where we assign a bequest motive of 36.2 (the 75th percentile of the bequest motive distribution estimated from the 306) to the wealthy and low spenders and the median value to respondents with negative wealth. The four with negative income are given the median value in both cases. With respect to the 97 over-spenders, we can safely assign them a zero bequest parameter.

The population-average bequest motives are reported in the bottom panel of Table 6. In the low scenario, we end up with an equally-weighted average of 16.1 and a wealth-weighted average of 23.9 for the entire sample of 498 singles. In the high scenario, the equally-weighted average bequest motive is 18.9 and the wealth-weighted average is 25.5. Our estimated wealth-weighted and equally-weighted average bequest motives of 25.5 and 36.8 for the sample of 306 are higher than for the entire sample, reflecting the fact that most of the excluded observations were excluded because of high spending or negative wealth. However, the relatively small differences reinforce our finding that bequest motives are substantial on average, and not confined to those with high wealth.
7.7 Sensitivity Analysis

To explore the sensitivity of our findings, we repeated the estimation with different values for risk aversion $\gamma = 2, 5$ (benchmark is $\gamma = 3$), the bequest luxury parameter $\phi = 3, 10$ (benchmark is $\phi = 5$), and the consumption floor $c^f = 6, 12$ (benchmark is $c^f = 3$). The upper panel of Table reports the median, mean, and standard deviation of the bequest and Medicaid aversion parameters. Each row is based on a separate estimation that keeps all parameters at their benchmark value, except for the parameter listed in the first column. In the last row, we consider the fact that consumption in our survey may be measured imprecisely. To address this problem, we perform an experiment where we ignore the reported value of consumption and treat after-tax income data as our measure of consumption in the estimation.

Interpreting the results of this sensitivity analysis is somewhat complicated by a selection effect. As we change parameters of the model, we change the sample which is included in the estimation. For example, consider respondents with low savings rates who were identified in the baseline estimation as having low bequest motives and Medicaid aversion. Increasing risk aversion increases precautionary savings and the same respondent may now be saving too little even when both motives are removed. This respondent would be excluded from the high-$\gamma$ estimation exercise. Conversely, agents who are excluded from the baseline estimation because they are consuming too little, may now be included. The first column of the table reports the sample size for each experiment. To understand the effects of varying model parameters for a fixed sample, we also study the 144 respondents who are included in the estimation for all of the eight specifications. Results for this sub-sample are shown in the bottom panel of Table.

When we raise the coefficient of risk aversion ($\gamma = 5$), we estimate both a lower bequest motive and lower Medicaid aversion. The reason for this is that a smaller bequest (Medicaid aversion) parameter is needed to generate the same intended bequest (intended precautionary savings) if the agent is more averse to the risk of leaving a very small bequest (being left with insufficient wealth to avoid Medicaid). A higher consumption floor ($c^f = 12$) plays a similar role to an increase in risk aversion, but its quantitative effects are less pronounced. Finally, we noted above that it is hard to separately identify whether a respondent who indicates a stronger desire to leave a bequest who indicates a stronger desire to leave a bequest does so because of a stronger bequest motive (a larger value of $\varpi$) or because bequests are less of a luxury good (a smaller value of $\phi$). Correspondingly, for a given total bequest motive, a higher assumed value of $\phi$ ($\phi = 10$) leads to a higher estimates of $\varpi$. Yet the value of $\phi$ does not substantially impact our estimates of Medicaid aversion, leaving our conclusions concerning the (overall) bequest motive and the precautionary savings motives unchanged in essentials.

Finally, because respondents tend to report consumption that is lower than their income, replacing reported consumption with reported income ($C = Y$) naturally reduces the estimates of both savings motives. Yet even under this extreme assumption on mismeasurement, we still iden-
tify substantial and heterogeneous bequest motives, with an estimated mean bequest motive of 18 (as opposed to 21) and a standard deviation of 23 (as opposed to 19) in the common group of 144 respondents.

[Table 7 about here.]

8 Concluding Remarks

We have outlined a strategic survey methodology designed to shed new light on the relative importance of bequest and precautionary motives for wealth accumulation in retirement. We have argued that strategic survey questions that place respondents in informative contingencies can be useful complements to behavioral data. We have formulated such contingent questions in the context of the trade-off between saving for bequests versus precautionary motives. When combined with standard behavioral data, these strategic survey questions greatly improved our understanding of the strength of the bequest and precautionary motives.

We find many households to have significant bequest motives. Similarly, many households are very Medicaid averse, and this plays a significant role in explaining the low rate of spending of many middle class retirees. Ameriks, Caplin, Laufer, and Van Nieuwerburgh [2007] show the importance of our findings for potential interest among retirees in annuities, long-term care insurance, and various new financial products.
Appendix 1: Health Transition Calibration

The distribution of medical costs in our model is controlled by the medical costs associated to each health state and by the one-period $4 \times 4$ state transition matrix $\mathcal{P}(a)$, where $a$ denotes age in excess of 62. This matrix is parameterized by twelve parameters, nine that determine the value of $\mathcal{P}(0)$ (of the sixteen elements, four are fixed by the death state being absorbing and there are three further restrictions so that each row sums to one) and three that control the flow of probability from greater health to poorer health as age increases. We calibrate these 12 parameters to match 8 moments related to long-term care utilization (Brown and Finkelstein [2006], Table 1, males), and 4 moments related to longevity (National Center for Health Statistics, Vital Statistics [1999], Table 2 for males). Table 1 in the main text shows the moments we match, their target value, and our best fit. The last 4 rows show some features of the distribution of medical costs. More precisely, the 1-period ahead transition matrix at age $62 + a$ is given by $\mathcal{P}(a) =$

$$
\begin{bmatrix}
p_{11} & p_{12} & p_{13} & 1 - p_{11} - p_{12} - p_{13} \\
p_{21} & p_{22} & p_{23} & 1 - p_{21} - p_{22} - p_{23} \\
p_{31} & p_{32} & p_{33} & 1 - p_{31} - p_{32} - p_{33} \\
0 & 0 & 0 & 1
\end{bmatrix}
\times
\begin{bmatrix}
1 - c_1 a^e & c_1 a^e \left( \frac{c_2 c_3}{1 + c_2 + c_3} \right) & c_1 a^e \left( \frac{c_1}{1 + c_2 + c_3} \right) & c_1 a^e \left( \frac{1}{1 + c_2 + c_3} \right) \\
0 & 1 - c_1 a^e & c_1 a^e \left( \frac{c_2}{1 + c_2} \right) & c_1 a^e \left( \frac{1}{1 + c_2} \right) \\
0 & 0 & 1 - c_1 a^e & c_1 a^e \frac{1}{1 + c_2} \\
0 & 0 & 0 & 1
\end{bmatrix}
$$

The second matrix is the age-adjustment. It shifts probability mass from the left (better health states) towards the right (worse health states and death), relative to the transition matrix at age 62, $\mathcal{P}(0)$. The 3 parameters $c_1$, $c_2$, and $c_3$ control how fast this shifting occurs. Loosely speaking, the parameter $c_1$ controls the transition from LTC to death as age increases; $c_2$ determines how much more likely death is relative to LTC when in health state 1 or 2, and $c_3$ determines how much likely state 2 is when in good health. The exponent $e$ allows for faster than linear shifting as the agent becomes older. It is held fixed at $e = 1.5$. We note that there is no unique solution to the system of 12 equation and 12 parameters because the system is highly non-linear. Using a non-linear least squares procedure, the best fit is obtained for $p_{11} = .9600$, $p_{12} = .0308$, $p_{13} = .0013$, $p_{21} = .3855$, $p_{22} = .6435$, $p_{23} = .0695$, $p_{31} = .0246$, $p_{32} = .1335$, $p_{33} = .7468$, $c_1 = .0016$, $c_2 = .8887$, and $c_3 = .5570$. To scale the moments to the same units, and to attach more importance to matching some moments than others, we use the following weights on the 12 moments: 100, 5, 100, 100, 100, 1, 4, 5, 6, and 7. Finally, since the data on LTC usage pertain to individuals 62 or older, we assume that the health status stays constant for individuals aged 55-62.
References


Table 1: Calibration of Health Transition Probability Matrix

The first column shows the moment, the second column the target from the data, and the last column shows our calibrated value at the chosen parameters. The first 8 moments capture aspects related to long-term care (LTC); the data are from Brown and Finkelstein [2006] Table 1 for males and females. The next 4 moments relate to longevity; the data are from the National Center for Health Statistics, Vital Statistics (2006), Table 2 for males and Table 3 for females (2003 Life Tables). The last 4 moments show features of the distribution of medical costs. These are not used in the calibration. Details of the calibration exercise are in the appendix. The small discrepancies between the simulation and the data in row 3 arises from the fact that our model is cast in years. The data on the other hand were compiled on a monthly basis. We interpret more than one year as at least two years, and that leads to an upward bias in the average.

<table>
<thead>
<tr>
<th>Moment</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Long-Term Care</strong></td>
<td>Data</td>
<td>Calibration</td>
</tr>
<tr>
<td>1 Probability ever use LTC</td>
<td>.40</td>
<td>.39</td>
</tr>
<tr>
<td>2 Average age of first use (among users)</td>
<td>80</td>
<td>78.1</td>
</tr>
<tr>
<td>3 Cond. Avg. years spent in care</td>
<td>2.9</td>
<td>3.4</td>
</tr>
<tr>
<td>4 Cond. Prob. use more than 1 year</td>
<td>.77</td>
<td>.73</td>
</tr>
<tr>
<td>5 Cond. Prob. use more than 3 year</td>
<td>.37</td>
<td>.37</td>
</tr>
<tr>
<td>6 Cond. Prob. use more than 5 year</td>
<td>.17</td>
<td>.18</td>
</tr>
<tr>
<td>7 Cond. Prob. ever exit to non-death state</td>
<td>.33</td>
<td>.36</td>
</tr>
<tr>
<td>8 Cond. Avg. number of spells</td>
<td>1.20</td>
<td>1.20</td>
</tr>
<tr>
<td><strong>Longevity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Life expectancy at age 62</td>
<td>18.9</td>
<td>18.2</td>
</tr>
<tr>
<td>10 Life expectancy at age 75</td>
<td>10.5</td>
<td>9.8</td>
</tr>
<tr>
<td>11 Life expectancy at age 85</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>12 Life expectancy at age 95</td>
<td>3.2</td>
<td>3.2</td>
</tr>
<tr>
<td><strong>Total Medical Expenses during Retirement</strong></td>
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</tr>
<tr>
<td>13 Avg. lifetime medical expenses ($k)</td>
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<td></td>
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<td>14 Median lifetime medical expenses ($k)</td>
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<td>15 Prob lifetime medical expenses &gt; $100k</td>
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<td>16 Prob lifetime medical expenses &gt; $250k</td>
<td>.12</td>
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Table 2: Summary Statistics Sample

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<th>SCF 2004</th>
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<tr>
<td></td>
<td>Percentile:</td>
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<td></td>
<td>5</td>
<td>25</td>
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<tr>
<td>Demographics</td>
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<tr>
<td>Age</td>
<td>55</td>
<td>59</td>
</tr>
<tr>
<td>Age Spouse</td>
<td>54</td>
<td>62</td>
</tr>
<tr>
<td>Number of children</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Number of grandchildren</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Income</td>
<td>(× $1000)</td>
<td></td>
</tr>
<tr>
<td>Labor income</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Retirement income</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Total income</td>
<td>6.5</td>
<td>16</td>
</tr>
<tr>
<td>After-tax income</td>
<td>5</td>
<td>15.3</td>
</tr>
<tr>
<td>Spending</td>
<td>(× $1000)</td>
<td></td>
</tr>
<tr>
<td>Total spending</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Mortgage Debt</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Maintenance and Rent</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Durables</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Health</td>
<td>0</td>
<td>0.2</td>
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<tr>
<td>Income Taxes</td>
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<td>0</td>
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<tr>
<td>Living expenses</td>
<td>1</td>
<td>4.1</td>
</tr>
<tr>
<td>Housing consumption</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>NDS consumption</td>
<td>4.0</td>
<td>7.6</td>
</tr>
<tr>
<td>Total consumption</td>
<td>4.8</td>
<td>9.5</td>
</tr>
<tr>
<td>Wealth</td>
<td>(× $1000)</td>
<td></td>
</tr>
<tr>
<td>Retirement assets</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Liquid financial assets</td>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>Primary home</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Other assets</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Total assets</td>
<td>0.1</td>
<td>54.4</td>
</tr>
<tr>
<td>Debt</td>
<td>(× $1000)</td>
<td></td>
</tr>
<tr>
<td>Primary mortgage</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Credit card</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other debt</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total liabilities</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Net Worth</td>
<td>(× $1000)</td>
<td></td>
</tr>
<tr>
<td>Home equity</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Total net worth</td>
<td>-3.3</td>
<td>35.5</td>
</tr>
</tbody>
</table>

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Table 3: Correlation Matrix

This table presents the correlation between the answers to the strategic survey questions, the net worth, assets, permanent income (inc10), and number of children (numkid) for the 938 respondents in our survey. The survey answers indicate the fraction of the $100K lock box that the respondent would allocate to long-term care (pctltc1), that same fraction but for the $250K lock box pctltc2, and the fraction of $200K the respondent would be willing to spend to avoid a Medicaid facility at the end-of-life at the expense of the bequest (pctltc3).

<table>
<thead>
<tr>
<th></th>
<th>pctltc1</th>
<th>pctltc2</th>
<th>pctltc3</th>
<th>networth</th>
<th>assets</th>
<th>inc10</th>
<th>numkid</th>
</tr>
</thead>
<tbody>
<tr>
<td>pctltc1</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pctltc2</td>
<td>0.8018</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pctltc3</td>
<td>0.2672</td>
<td>0.2841</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>networth</td>
<td>-0.0706</td>
<td>-0.1027</td>
<td>0.0834</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>assets</td>
<td>-0.0720</td>
<td>-0.1003</td>
<td>0.0817</td>
<td>0.9942</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>inc10</td>
<td>-0.1379</td>
<td>-0.1509</td>
<td>0.0605</td>
<td>0.6057</td>
<td>0.6091</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>numkid</td>
<td>-0.1386</td>
<td>-0.1438</td>
<td>-0.1199</td>
<td>-0.0187</td>
<td>-0.0156</td>
<td>0.0664</td>
<td>1.0000</td>
</tr>
</tbody>
</table>
Table 4: Tobit Estimates

This table presents OLS and Tobit regressions of the survey answers (pctltc1, pctltc2, pctltc3) on net worth or income and their interaction with a dummy measuring whether the respondent has children. The top panel uses net worth, the bottom panel uses permanent income (measured as after tax income in 2010). The left panel reports OLS regression results. *** denotes significance at the 1% level according to robust standard errors. The right panel reports Tobit regressions. Net worth is expressed in units of $100,000. Permanent income is expressed in units of $10,000. Each regression contains 938 observations.

<table>
<thead>
<tr>
<th></th>
<th>OLS Regressions</th>
<th>Tobit Regressions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pctltc1</td>
<td>pctltc2</td>
</tr>
<tr>
<td>constant</td>
<td>0.567***</td>
<td>0.532***</td>
</tr>
<tr>
<td>networth</td>
<td>0.012***</td>
<td>0.011***</td>
</tr>
<tr>
<td>networth x withkids</td>
<td>-0.020***</td>
<td>-0.021***</td>
</tr>
<tr>
<td>$R^2$</td>
<td>2.91%</td>
<td>4.03%</td>
</tr>
<tr>
<td>constant</td>
<td>0.604***</td>
<td>0.562***</td>
</tr>
<tr>
<td>income</td>
<td>0.011</td>
<td>0.012</td>
</tr>
<tr>
<td>inc x withkids</td>
<td>-0.038***</td>
<td>-0.037***</td>
</tr>
<tr>
<td>$R^2$</td>
<td>3.68%</td>
<td>4.23%</td>
</tr>
</tbody>
</table>
Table 5: Regressions of Parameter Estimates on Demographics

This table reports regressions of estimated bequest motives (first four columns) or estimated Medicaid aversion (last two columns) on demographics. In the first column, we perform maximum likelihood estimation using individual-specific estimates $\hat{s}_i$ that are based on the restrictions imposed by the consumption data alone. In the other two columns, the regressands are parameter estimates, obtained from combining both survey questions with consumption data. Using only a single question produces similar results. Respondents who choose the most extreme answers on both questions have chosen corner solutions and are treated as censored observations. The t-statistics are shown in parentheses and statistical significance is denoted by *10%, **5%, ***1%.

<table>
<thead>
<tr>
<th></th>
<th>Bequest Motive (consumption only)</th>
<th>Bequest Motive (with Survey)</th>
<th>Medicaid Aversion (with Survey)</th>
</tr>
</thead>
<tbody>
<tr>
<td>const</td>
<td>26.76 (3.76***)</td>
<td>72.90 (5.10***</td>
<td>3.26 (1.66*)</td>
</tr>
<tr>
<td>wealth</td>
<td>.00837 (4.24***)</td>
<td>-.0018 (-0.43)</td>
<td>.00039 (0.70)</td>
</tr>
<tr>
<td>income</td>
<td>.616 (9.94***)</td>
<td>.322 (2.54**)</td>
<td>.0244 (1.36)</td>
</tr>
<tr>
<td>kids</td>
<td>-2.70 (-1.45)</td>
<td>-4.52 (-1.25)</td>
<td>-1.46 (-2.93***</td>
</tr>
<tr>
<td>male</td>
<td>5.33 (2.80***)</td>
<td>6.28 (1.68*)</td>
<td>.659 (1.38)</td>
</tr>
<tr>
<td>age</td>
<td>-.462 (-4.22***)</td>
<td>-.83 (-3.80***</td>
<td>-.112 (-3.64***</td>
</tr>
<tr>
<td>$R^2$</td>
<td>.009</td>
<td>.086</td>
<td>.886</td>
</tr>
</tbody>
</table>


Table 6: Comparison of Singles: Included vs. Excluded in Estimation

This table presents demographics of two groups of singles: the ones we use in estimation and the ones we do not. Together they make up the entire population of singles in our survey (498 respondents). The numbers in brackets are the 25<sup>th</sup>, 50<sup>th</sup>, and 75<sup>th</sup> percentile of the distributions. The last two lines denote the average number of children, and the fraction of the subsamples with children. The survey answer variables \( pctlc1 \), \( pctlc2 \), and \( pctlc3 \) are defined in the main text. The last panel pertains to the parameter \( \hat{\pi} \), which measures the strength of the (intentional) bequest motive. The first row displays the 25<sup>th</sup>, 50<sup>th</sup>, and 75<sup>th</sup> percentile of the distribution of estimated \( \hat{\pi} \) for the 306. The second and third rows give the equally-weighted average of \( \hat{\pi} \) across respondents under two scenarios (low and high, described in the main text). The fourth and fifth rows are the corresponding wealth-weighted averages.

<table>
<thead>
<tr>
<th></th>
<th>included</th>
<th>excluded</th>
<th>all</th>
</tr>
</thead>
<tbody>
<tr>
<td>number</td>
<td>306</td>
<td>192</td>
<td>498</td>
</tr>
<tr>
<td>income 10</td>
<td>[14,20,30]</td>
<td>[8,12,16]</td>
<td>[11,16,25]</td>
</tr>
<tr>
<td>net worth</td>
<td>[56,187,492]</td>
<td>[-2,1,55]</td>
<td>[5,88,290]</td>
</tr>
<tr>
<td>withkids</td>
<td>0.690</td>
<td>0.708</td>
<td>0.697</td>
</tr>
<tr>
<td>numkid</td>
<td>1.85</td>
<td>2.10</td>
<td>1.95</td>
</tr>
<tr>
<td>pctlc1</td>
<td>.608</td>
<td>.570</td>
<td>.593</td>
</tr>
<tr>
<td>pctlc2</td>
<td>.557</td>
<td>.533</td>
<td>.547</td>
</tr>
<tr>
<td>pctlc3</td>
<td>.351</td>
<td>.357</td>
<td>.353</td>
</tr>
<tr>
<td>( \hat{\pi} )</td>
<td>[5.3,14.7,36.2]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>equal-weighted avg. - low</td>
<td>25.51</td>
<td>1.07</td>
<td>16.09</td>
</tr>
<tr>
<td>equal-weighted avg. - high</td>
<td>25.51</td>
<td>8.39</td>
<td>18.91</td>
</tr>
<tr>
<td>wealth-weighted avg. - low</td>
<td>36.79</td>
<td>3.46</td>
<td>23.94</td>
</tr>
<tr>
<td>wealth-weighted avg. - high</td>
<td>36.79</td>
<td>7.40</td>
<td>25.46</td>
</tr>
</tbody>
</table>
Table 7: Sensitivity Analysis

This table presents estimates for the bequest parameter \( w \) and the Medicaid aversion parameter \( MA \equiv \log u'(C^{MEDI}) \). More precisely, it reports the cross-sectional median, (equally weighted) mean and standard deviation. The first row repeats the estimation results for the benchmark parametrization. The next six rows each change one parameter; the parameter and its alternative value are listed in the first column. The last row uses the benchmark parametrization, but uses after-tax income as a proxy for consumption. Each row in the upper panel includes all observations that can be included in that estimation. The lower panel includes only the sub-sample that is common to all eight estimations.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>median ( w )</th>
<th>mean ( w )</th>
<th>Std Dev ( w )</th>
<th>median MA</th>
<th>mean MA</th>
<th>Std Dev MA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>benchmark</strong></td>
<td>306</td>
<td>14.71</td>
<td>25.51</td>
<td>27.34</td>
<td>-4.36</td>
<td>-4.09</td>
<td>4.04</td>
</tr>
<tr>
<td>( \gamma = 2 )</td>
<td>314</td>
<td>14.74</td>
<td>25.58</td>
<td>26.29</td>
<td>-1.73</td>
<td>-1.31</td>
<td>3.29</td>
</tr>
<tr>
<td>( \gamma = 5 )</td>
<td>257</td>
<td>10.44</td>
<td>23.77</td>
<td>29.02</td>
<td>-9.60</td>
<td>-9.19</td>
<td>5.84</td>
</tr>
<tr>
<td>( \phi = 3 )</td>
<td>306</td>
<td>8.98</td>
<td>18.94</td>
<td>22.86</td>
<td>-9.11</td>
<td>-4.54</td>
<td>4.19</td>
</tr>
<tr>
<td>( \phi = 10 )</td>
<td>302</td>
<td>25.23</td>
<td>37.72</td>
<td>32.64</td>
<td>-4.40</td>
<td>-3.50</td>
<td>4.23</td>
</tr>
<tr>
<td>( c^f = 6 )</td>
<td>296</td>
<td>13.23</td>
<td>22.96</td>
<td>24.32</td>
<td>-4.60</td>
<td>-4.34</td>
<td>3.92</td>
</tr>
<tr>
<td>( c^f = 12 )</td>
<td>242</td>
<td>9.88</td>
<td>17.46</td>
<td>20.17</td>
<td>-5.57</td>
<td>-5.07</td>
<td>3.74</td>
</tr>
<tr>
<td>( C = Y )</td>
<td>280</td>
<td>10.59</td>
<td>22.11</td>
<td>27.36</td>
<td>-5.72</td>
<td>-4.56</td>
<td>4.87</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>median ( w )</th>
<th>mean ( w )</th>
<th>Std Dev ( w )</th>
<th>median MA</th>
<th>mean MA</th>
<th>Std Dev MA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>benchmark</strong></td>
<td>144</td>
<td>14.20</td>
<td>21.00</td>
<td>19.12</td>
<td>-4.79</td>
<td>-4.53</td>
<td>3.71</td>
</tr>
<tr>
<td>( \gamma = 2 )</td>
<td>144</td>
<td>16.58</td>
<td>23.97</td>
<td>20.21</td>
<td>-1.77</td>
<td>-1.51</td>
<td>2.99</td>
</tr>
<tr>
<td>( \gamma = 5 )</td>
<td>144</td>
<td>4.53</td>
<td>12.89</td>
<td>17.03</td>
<td>-14.15</td>
<td>-11.40</td>
<td>4.59</td>
</tr>
<tr>
<td>( \phi = 3 )</td>
<td>144</td>
<td>8.98</td>
<td>16.23</td>
<td>16.78</td>
<td>-5.46</td>
<td>-4.78</td>
<td>4.06</td>
</tr>
<tr>
<td>( \phi = 10 )</td>
<td>144</td>
<td>25.23</td>
<td>34.28</td>
<td>26.73</td>
<td>-4.91</td>
<td>-4.14</td>
<td>4.08</td>
</tr>
<tr>
<td>( c^f = 6 )</td>
<td>144</td>
<td>13.69</td>
<td>21.01</td>
<td>19.07</td>
<td>-4.70</td>
<td>-4.44</td>
<td>3.77</td>
</tr>
<tr>
<td>( c^f = 12 )</td>
<td>144</td>
<td>13.34</td>
<td>20.26</td>
<td>18.64</td>
<td>-4.76</td>
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<td>( C = Y )</td>
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<td>8.92</td>
<td>18.32</td>
<td>23.02</td>
<td>-5.95</td>
<td>-4.88</td>
<td>4.88</td>
</tr>
</tbody>
</table>
Figure 1: Iso-Expenditure Lines: Medium Wealth

The figure describes iso-consumption lines in $(\varphi, u'(c^{MED}))$ space for a hypothetical single woman, aged 65, in good health, with total wealth equal to $80K, and annual income of $25K. This hypothetical person corresponds to the 50th wealth and income percentile of our sample, to be defined below.
Figure 2: Iso-Expenditure Lines: High Wealth

The figure describes iso-consumption lines in \((\pi, u'(c^{MED}))\) space for a hypothetical single woman, aged 65, in good health, with total wealth equal to $475K, and annual income of $50K. This hypothetical person corresponds to the 90\textsuperscript{th} wealth and income percentile of our sample, to be defined below.
Figure 3: Middle Class Precautionary Savings

The figure plots the savings rate, defined as consumption over income (on the vertical axis) against income (on the horizontal axis). The figure is for a hypothetical single female, age 62, in good health. As we vary income, we simultaneously vary wealth, to capture the positive cross-sectional correlation between income and wealth. The various lines are for different precautionary savings parameters $\log(u'(c^{MED}))$, with the strongest precautionary motive being the highest line.
Figure 4: Trading off Long-Term Care and Bequests at the Current Moment

The figure shows a histogram of responses to survey question 18b. The question asks what fraction of $250K prize the respondent would devote to a lock LTC box. The complementary fraction would go to the bequest box. The sample consists of 938 respondents.
Figure 5: Trading off Long-Term Care and Bequests at the End-of-Life

This graph shows a histogram of responses to survey question 20b. The question asks what fraction of $200K in remaining wealth the respondent would forgo to avoid government-funded LTC when LTC in his/her last year of life were unavoidable. The sample consists of 938 respondents.
Figure 6: Iso-Response Lines to Strategic Survey Questions

The figure describes iso-response lines for the two strategic survey questions. The left panel plots the iso-response lines in $(\pi, \log(u'(c^{MED})))$ space; the responses vary from 1% of the $200K that respondents would be willing to forgo to avoid LTC in a Medicaid facility to 99% of $200k. This end-of-life question is the same for all demographics. The right panel plots iso-response lines to the lock box question. It plots what fraction of the $250K prize the respondent is willing to allocate to the LTC lock box. The figure plots responses ranging from 1% to 99% for a hypothetical single female, aged 65, in good health, with total wealth of $230K, and annual income of $40K.
Figure 7: Identifying Bequest and Precautionary Motives

The figure illustrates our identification strategy. It compares iso-consumption and iso-response lines to the end-of-life strategic survey question in \((\pi, c^{MED})\) space. This figure is for a hypothetical single female, aged 65, in good health, with total wealth of $230K, and annual income of $40K.
Figure 8: Strategic Survey Questions for Respondents With and Without Children

The top panel plots the distribution of survey answers to the $250K lock box question (pctltc2). The answers range from 0% to 100% allocated to the LTC lock box. The bottom panel plots the answer to the end-of-life survey question (pctltc3). Both panels are based on the entire sample of 938 respondents.
Figure 9: Survey Questions for Single Respondents

This figure plots the survey answers by net worth decile. The net worth deciles are the same in all three panels and the decile cutoffs are based on all 498 singles. The first panel is for those with children (347), the second panel for those without children (151), and the last panel for all singles (498). The singles without children tend to be wealthier on average, so that relatively more of them are present in the higher wealth deciles.
Figure 10: Estimating Motives in the Cross-Section of Respondents

The distribution of individual specific parameter estimates based on responses to the two survey questions and the combination. The top left panel combines data on consumption with the end-of-life question. The top right panel combines data on consumption with the $250K lock box question. The bottom left panel combines data on consumption with both strategic survey questions. The legend is explained in the bottom right panel. Circles represent point estimates of the parameters for respondents who did not choose either of the two extreme responses. Arrows indicate that respondent did choose one of the extreme responses. These are corner solutions from which we can only conclude that the parameters lie to the right or left of the point along the iso-consumption curve. The estimates are for 306 single respondents.
The convention of circles and arrows is the same as in the previous figure. When arrows that point towards the 45 degree line, the two estimates are consistent. If the arrow points away, they are not. The estimates are for 306 single respondents.
This figure shows two empirical cumulative distribution functions for $\varpi$. The dashed line refers to the lowest values of the bequest motive consistent with the consumption data alone. The solid line shows the distribution of estimates from combining consumption data with both strategic survey responses. The estimates are for 306 single respondents.
Figure 13: Cumulative Distribution Function of Medicaid Aversion Estimates

This figure shows the empirical cumulative distribution functions for $c_{MED}^*$. The solid line shows the distribution of estimates from combining consumption data with both strategic survey responses. The estimates are for 306 single respondents.