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Anticipated and Actual Bequests

Michael D. Hurd and James P. Smith

11.1 Introduction

Important advances have recently been made in documenting the process of wealth accumulation by households. Because of better data our knowledge is rapidly increasing about the facts surrounding the distribution of household wealth and, to a lesser extent, household saving behavior. However, this improved factual base has not yet been translated into a deeper understanding of the theoretical reasons people save. The candidates remain much the same (life-cycle timing, risk aversion, and bequests), but we appear to be no more certain about their relative importance. Advances in our understanding of bequest motives have been particularly difficult, in part due to the inherent difficulties in measuring the bequests that individuals anticipate making and the inheritances that they actually bequeath.

This paper will study the role of inheritances and bequests in shaping household decisions on wealth accumulation. We will learn about bequests by using new methods of measuring anticipated and actual bequests: We will examine actual bequests made by individuals upon their deaths, and compare them with their previously stated bequest intentions. Using panel data with two measurements of subjective bequest probabilities, we will

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explore the reasons individuals might revise their bequest expectations. These reasons may include, among other things, new information on health or economic conditions of household members. Our results are based on wealth, anticipated bequests, and actual bequests from two waves of the Health and Retirement Study (HRS), and the Asset and Health Dynamics among the Oldest Old (AHEAD) study.

Because the paper uses two new types of data, considerable space will be allocated to validation of them. In section 11.2 we outline a model of consumption and saving behavior that will guide our analysis and provide a framework for the validation. Section 11.3 describes the data sets that we will use. Section 11.4 examines the information from exit interviews given by proxy respondents for 774 AHEAD respondents who died after the baseline AHEAD survey. These exit interviews provide, among other things, data about the medical and nonmedical costs associated with illnesses of the respondents and the value and distribution of their estates. We compare average bequests with average wealth in the baseline interview, and we study how bequests covary with observable characteristics. These analyses are consistent with the proxy reports' being valid measures of actual bequests.

In section 11.5 we discuss the theoretical and empirical properties of our measure of bequest expectations. If bequest expectations are valid predictors of actual bequests, they should evolve in a predictable way in a population over time. The actual data conform to the predictions. Based on predictions from the theoretical model of consumption and saving behavior, we then analyze panel data on changes at the individual level in the subjective probability of leaving bequests. According to our results, individuals revise their expectations of bequests appropriately in response to new information. Having found the data on actual and anticipated bequests to be consistent with our expectations and theoretical predictions, we use them in section 11.6 to construct an index of saving intentions. Our results suggest that people plan to dissave before they die. Section 11.7 is the conclusion and summary.

11.2 Model of Consumption and Saving

Our thinking about how to organize the data will be shaped by the life-cycle model of consumption (LCH) as explicated in Yaari (1965) and Hurd (1989) for singles and in Hurd (1999) for couples. The model has these features and restrictions. The only uncertainty is the date of death. Resources are bequeathable wealth and a stream of annuity income such as Social Security, and annuity income cannot be borrowed against. Long-lived individuals may use up their bequeathable wealth and then live solely from annuity income, which would lead to a corner solution in the utility maximization. The model allows for a bequest motive for saving.

We outline the model for singles and discuss the implications for bequest behavior. The model for couples, although substantially more complicated, is in the same spirit, so we will give only some implications of it.

The single's problem is to maximize in the consumption path $\{c_t\}$ expected lifetime utility

$$\int_0^N u(c_t)e^{-\rho t}a_t dt + \int_0^N V(w_t)e^{-\rho t}m_t dt$$

The first term is expected discounted utility from consumption:

$u(\cdot)$ the utility flow from consumption;
ρ = the subjective time rate of discount;
a_t = the probability of being alive at t; and
N = the maximum age to which anyone can live ($a_N = 0$).

The second term is the expected discounted utility of bequests:

$V(\cdot)$ = utility from bequests, which may depend on the economic status of children as in an altruistic model or in a strategic bequest model;
w_t = bequeathable wealth at t; and
m_t = probability of dying at t.

The constraints on the maximization are

w_0 = initial bequeathable wealth that is given, and
$w_t \geq 0 \forall\ t$ is the nonnegativity constraint.

The equation of motion of wealth is

(1) $$\frac{dw_t}{dt} = rw_t - c_t + A_t ,$$

in which

r = real interest rate (constant and known) and
A_t = flow of annuities at time t.

The solution is an equation of motion in marginal utility

(2) $$\frac{du_t}{dt} = u_t(h_t + \rho - r) - h_t V_t \qquad \text{for} \quad w_t > 0$$

$$c_t = A_t \qquad \text{for} \quad w_t = 0$$

and w_0 given. Here,

u_t = marginal utility of consumption at time t,
$h_t = m_t/a_t$ = mortality risk (mortality hazard), and
V_t = marginal utility of bequests at time t.

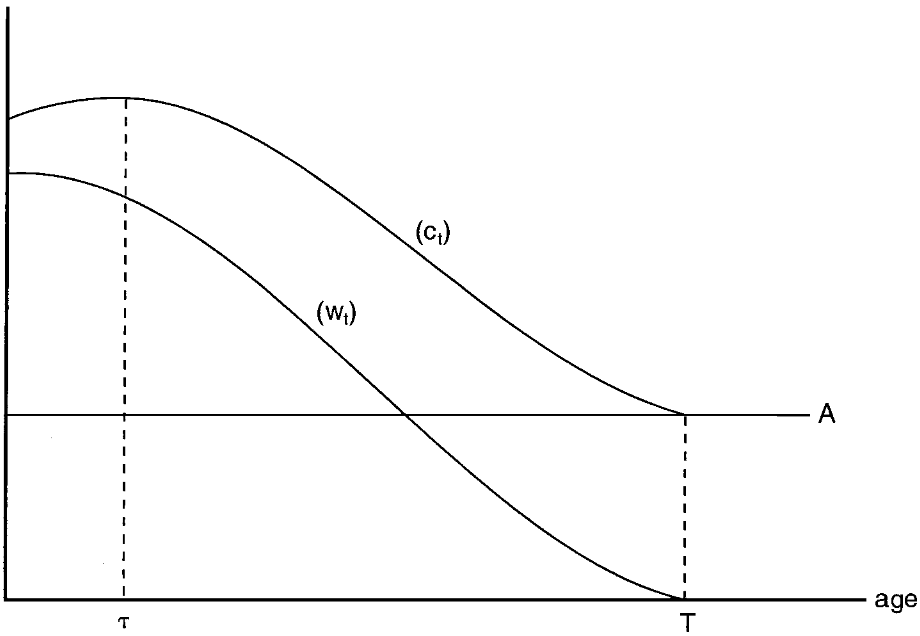

Fig. 11.1 Life-cycle consumption and wealth paths

A typical solution as would be found in data is shown in figure 11.1. At T, bequeathable wealth has been consumed, and consumption equals annuity income after T.

Suppose there is no bequest motive, which means that $V_t = 0$ in equation (2). If $\rho > r$, $(du_t/dt) > 0$ so that $(dc_t/dt) < 0$ provided $u(\cdot)$ is concave, and consumption will always decline with age. If $r > \rho$ and h_t is small, as would be the case at young ages, $(du_t/dt) < 0$ and consumption will increase with age. At older ages, however, h_t is approximately exponential so that at some age (τ in fig. 11.1), $h_t + \rho - r = 0$, and $(du_t/dt) = 0$ at $t = \tau$. For $t \geq \tau$, $(du_t/dt) > 0$ and $(dc_t/dt) < 0$.

A condition on global utility maximization requires that if consumption declines, wealth must also decline. Therefore a main implication of the LCH is that bequeathable wealth will decline at sufficiently advanced age.

Expected actual bequests will be

$$\int_0^N w_t^* e^{-\rho t} m_t dt ,$$

where w_t^* is the optimal wealth path. Under the assumption that there is no bequest motive, such bequests will be accidental, but if individuals are highly risk averse, bequests could be a large fraction of bequeathable wealth.

If $t > \tau$ so that wealth is declining with age, an increase in life expectancy via an unexpected decrease in mortality risk at all ages will reduce bequests were there no behavioral response to the change in mortality risk: Individuals consume more of their bequeathable wealth before they die. If there is a behavioral response, however, bequests could increase: A decline in mortality risk will flatten the consumption path and reduce initial consumption, causing more wealth to be held against the increased risk of outliving resources. If wealth increases substantially, bequests could increase.

Whether bequests increase or decrease depends on the shape of the new optimal wealth path and the shape of the mortality curve $\{m_t\}$. In simulations based on an estimated model for singles, Hurd (1992) found that in baseline simulations, 20.7 percent of initial bequeathable wealth was (accidentally) bequeathed; with an increase in life expectancy of about three years, 16.5 percent was bequeathed when there was no behavioral response, but 23.0 percent was bequeathed when there was a behavioral response. The simulations were based on the constant relative risk aversion (CRRA) in which $u(c) = (c^{1-\gamma})/(1 - \gamma)$, with a rather low value of risk aversion ($\gamma = 1.12$), which implies a rather large behavioral response to changes in mortality risk. Large values of γ will reduce the behavioral response to a reduction in mortality risk, so that larger values of γ could lead to little change or even a reduction in bequests.

An increase in the annuity stream also has an ambiguous effect. If individuals are highly risk averse, consumption will change little in response to the increase. Therefore, wealth will decline more slowly and, in figure 11.1, T will increase and bequeathable wealth will be greater. If mortality risk is unchanged, bequests will be greater. However, in some circumstances, an increase in annuities could increase consumption enough that the path of bequeathable declines relative to the base situation. This is illustrated in figure 11.2. It can be shown analytically that this obtains under the CRRA utility function (Hurd 1999), and simulations showed that bequests decreased when annuity income was increased (Hurd 1993). From the point of view of public policy it is important to understand whether increases in Social Security benefits are partly bequeathed back to the younger generation, which would offset some of the increase in taxes required to fund the increase.

The effect of age on bequest probabilities is unambiguous in a stationary environment. If the anticipated wealth path from time t onward is declining, leaving a bequest greater than b is the same as dying before age A^* as shown in figure 11.3. If an individual survives until time $t + 1$, he will have followed the wealth path from t to $t + 1$ and he will still anticipate following the same wealth path in future periods. Now, however, the probability of surviving to age A^* is greater because, of course, the conditional probability of surviving to A^* increases from t to $t + 1$. Thus the probability of leaving a bequest greater than b should decline as individuals age.

We have been discussing the situation in which there is no bequest mo-

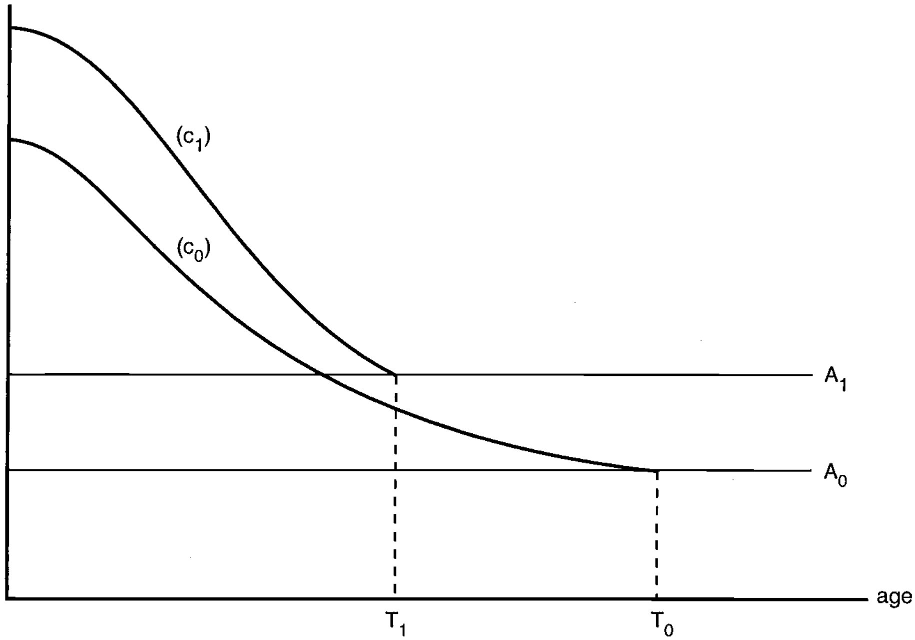

Fig. 11.2 The effect of annuity level on consumption

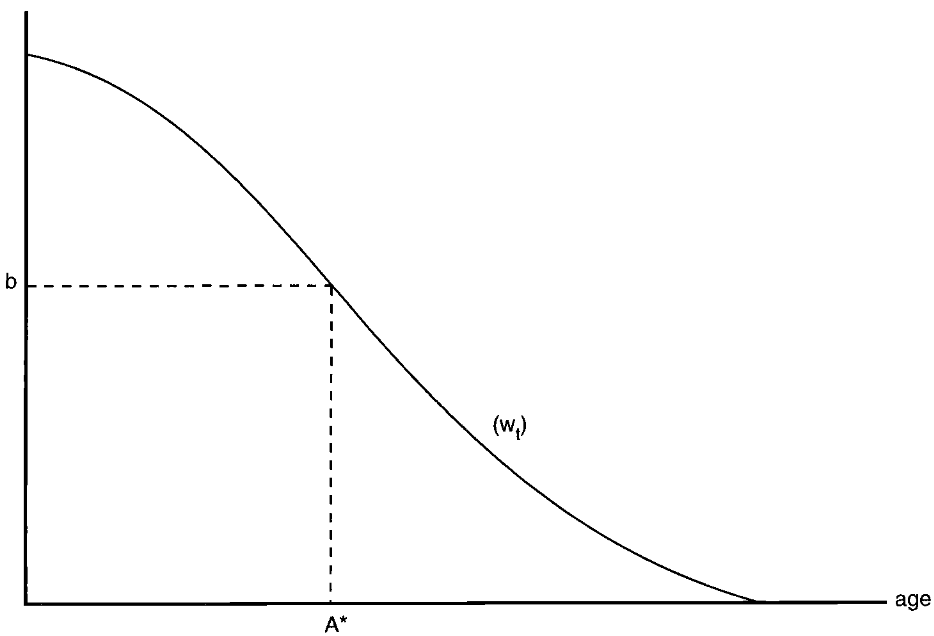

Fig. 11.3 The relationship between wealth and age

tive for saving. A bequest motive means that $V_t > 0$. At any given level of wealth we would expect V_t to depend on the characteristics of the target of the bequest. For example, if the children of an elderly person are well off, V_t will be small because the marginal utility of additional wealth to the children will be small. We would expect that if bequests are altruistic, V_t will depend on the characteristics of all the children of the parent.

A bequest motive flattens the consumption path and reduces initial consumption, causing more wealth to be held. If the probability of dying at any age is unchanged, expected bequests will increase.

Tests of a bequest motive are of two types. The first is based on a main prediction of the life-cycle model: In the absence of a bequest motive, bequeathable wealth should decline at sufficiently advanced ages. Such wealth decline has been found consistently in panel data sets (Hurd 1999). It should be noted, however, that although a wealth increase is not consistent with a life-cycle model that excludes a bequest motive, a wealth decline is consistent with a life-cycle model that includes a bequest motive.

The second type of test is based on variation in the rate of wealth change as a function of covariates that are assumed to be related to the strength of a bequest motive. Because most bequests are made to close relatives, it is reasonable to assume that the number and characteristics of relatives are related to the strength of a bequest motive. This thinking leads to a comparison of the rates of wealth change among those with children to those without children. A consistent finding is that there is little difference, with the implication that any bequest motive for saving is weak on average (Hurd 1987, 1989).

11.2.1 Life-Cycle Model of Consumption by Couples

The model for couples is similar to the model for singles: Couples have a utility function defined over consumption while both spouses are alive, and they get utility from contemplating "bequests." However, there are two types of bequests: wealth to a surviving spouse, and wealth to a third person at the death of the surviving spouse.[1] It is important to distinguish between these two types of bequests because a bequest to a surviving spouse increases only slightly the time horizon for decision making by the couple, whereas a bequest to children can lengthen the planning horizon to many generations. Furthermore, a spouse anticipating widowhood can affect the prior consumption decisions of the couple, but in most cases children cannot.

Analysis similar to that for singles will show that a bequest motive (desiring to bequeath to someone outside the household) will flatten the consumption path and reduce initial consumption, causing more wealth to be

1. In this model, all of the wealth of the couple is transferred to the surviving spouse at the death of one spouse. It is only at the death of the second spouse that wealth is inherited by children or others.

held. Thus, expected bequests will increase. Of course, the effects of changes in life expectancy and changes in the annuity stream are ambiguous, as they are in the case of singles.

The death of a spouse should alter the bequest probabilities of the surviving spouse for a number of reasons. The date at which the last spouse is expected to die is reduced, and in the absence of any behavioral reaction bequests should increase. The surviving spouse has high bequeathable wealth relative to needs: If the couple had contemplated a declining wealth path, the early death will cause bequests to increase. The annuity stream of the household is typically altered because both Social Security and pension benefits typically change at the death of a spouse. The surviving spouse will reoptimize given the new situation, causing the path of bequeathable wealth to differ from what it would have been had the death occurred later. The total effect on bequests is not obvious, and we will leave it to be determined empirically.

11.2.2 Summary of Implications

When there is no bequest motive, at sufficiently advanced old ages individuals will plan to dissave, and, therefore, the population will dissave provided on average the anticipations of individuals are realized. With increasing age wealth will decline and expected bequests will decline. However, an unexpected reduction in survival probabilities causes different effects from an expected reduction in survival chances that accompanies aging: The unexpected reduction should cause a behavioral response, which will make its effect on wealth change ambiguous. Therefore, we should find in panel a reduction in anticipated bequests as the population ages, but not necessarily a reduction in anticipated bequests as survival chances vary at the individual level.

In cross-section, greater wealth should be associated with higher anticipated bequests even where there is no bequest motive. In panel there should be no relationship between wealth change and anticipated bequests as long as the observed wealth change is due to anticipated dissaving.[2] An unanticipated wealth change, however, should change anticipated bequests.

In cross-section, variation in annuity income such as pensions and Social Security could affect anticipated bequests, but the sign of the effect depends on utility function parameters. In panel, anticipated changes in annuity income will not change the wealth path and thus should not affect anticipated bequests. Unanticipated changes in annuity income act in the same way as cross-section variation in annuity income, so the effect on anticipated bequests cannot be signed.

2. This statement assumes that there is no change in survival chances or that they are adequately controlled.

A bequest motive for saving requires only one substantive change to the preceding summary: Wealth can increase with age (but does not have to), even at advanced old age. The other analyses of the difference between anticipated and unanticipated changes in survival, wealth, and income remain the same.

We will use two types of panel data to test implications of this model of consumption and saving. The first type will be information about actual bequests, and the second will be about anticipated bequests.

11.3 Data

Our data come from the Asset and Health Dynamics among the Oldest Old (AHEAD) study and from the Health and Retirement Study (HRS). These studies are large panel surveys of individuals. They obtain extensive information about the domains of health, economic status, family relations, and labor market activity. AHEAD is representative of the population born in 1923 or earlier and their spouses (Soldo et al. 1997). At baseline in 1993 it obtained interviews from 8,222 persons who were approximately aged seventy or over. We will use information from the baseline interview and from wave 2, which was fielded in 1995. The HRS is representative of the population born in the years 1931 through 1941 and their spouses (Juster and Suzman 1995). At baseline in 1992 it interviewed 12,654 persons. We will use information from waves 2 and 3, which were fielded in 1994 and 1996.[3]

These surveys obtained extensive information about the economic situation of the households that were interviewed. Of particular importance for this paper are the data on income and assets. The surveys asked for a complete accounting of income and assets, and they used bracketing methods to reduce the rate of item nonresponse, resulting in economic data of high quality. The surveys used innovative questions about subjective probabilities to query individuals about their perceptions of their survival chances and of leaving bequests. Respondents were asked about their health in a number of ways. Here we use self-reports about health events such as heart attack, cancer, diabetes, arthritis, stroke, high blood pressure, and lung disease to find the incidence of these conditions between waves of AHEAD and HRS.

11.4 Actual Bequests

Actual bequests are inherently difficult to measure in the population and frequently escape detection in traditional household surveys. Household

3. We cannot use wave 1 because the questions about anticipated bequests were not asked in that wave.

surveys typically do not include any post-death interviews with relatives, which is probably the only feasible way to obtain information about bequests in the population. Therefore, most applied research on inheritances has relied instead on estate records (David and Menchik 1985). While valuable, estate data can provide only a limited picture. Many inheritances are below the estate tax thresholds and so do not appear in official estate records. Even when available, estate records provide very limited information about the deceased person or about the actual and potential heirs.[4]

The AHEAD survey measured bequests by conducting an exit interview following the death of a respondent. These exit interviews are given to proxies, often relatives of the deceased, and represent a condensed version of the normal AHEAD interview. In addition, detailed questions were asked about the nature and costs associated with any illnesses and other death-related expenses, and about the distribution and values of estates and inheritances. Exit interviews are available for 774 persons who were respondents in wave 1 but who died between wave 1 and wave 2.[5] In this section, we summarize data from these AHEAD exit interviews. Our analysis focuses on what happened to wealth as measured in wave 1, and how prior-wave household wealth corresponds to the values of estates.

11.4.1 The Cost of Illness Associated with Death

Decedents in the AHEAD age range may leave no bequests because of large expenses associated with their deaths. Many of the AHEAD respondents who died between the waves died as a result of frequent and severe illnesses. For example, according to the exit interviews, 82 percent of the decedents were hospitalized at least once between their wave 1 interviews and the time of death. Many of these hospitalizations involved multiple visits. Even if the hospitalization associated with the death of the respondent is excluded, more than 40 percent of respondents had three or more hospital visits during this time interval. The median number of nights spent in the hospital was thirteen days, but one in twenty respondents spent seventy days or more in a hospital. The intensity and expense of the medical care provided during these visits was dramatic. Half of those hospitalized received intensive care, and 30 percent were on life support.

The total costs of providing such care were substantial. As reported in the exit interviews, median total costs were about $25 thousand, and one in nine of the deceased had medical expenses in excess of $100,000. For the purposes of relating wave 1 wealth to bequests, however, out-of-pocket

4. For example, Mulligan (1995) reports that estate tax returns are filed for only 5–10 percent of those who died after the age of forty-five. At the time of the AHEAD survey, the threshold at which estate taxes start was $600,000 for an individual and as high as $1,200,000 for a married couple.

5. AHEAD staff estimate that they were able to conduct exit interviews with more than 90 percent of respondents who died between the first and second waves.

Table 11.1 **Distribution of Estates (thousands of dollars): AHEAD Decedents**

Percentile	Single	Married	All
5	0.0	0.0	0.0
10	0.0	0.0	0.0
20	0.0	2.0	0.0
30	2.0	20.0	10.0
40	20.0	35.0	30.8
50	33.3	50.0	50.0
60	50.0	100.0	54.4
70	77.0	150.0	100.0
80	125.1	150.0	150.0
90	180.0	200.0	188.5
95	250.0	400.0	322.7
98	600.0	600.0	600.0

Note: $N = 774$.

costs, not total costs, are relevant. The exit interviews aimed to measure all out-of-pocket expenses associated with these illnesses. Out-of-pocket costs were queried separately for hospital and nursing home visits, hospice, doctor and dental payments, drugs, in-home need care or special facilities or services, and other health care expenses. In each case, the lead-in question asks whether the care was fully or partially insured with follow-up questions about the sum of out-of-pocket cost involved.[6]

The proxy respondents report that 68 percent of AHEAD decedents had fully insured hospital costs and that another 30 percent had partially insured costs. Fifty-two percent of nursing home costs were fully insured while another 30 percent were partially paid for through insurance. Most doctor visits were also reimbursed (61 percent totally reimbursed and 38 percent partially covered), leaving drugs as the principal personal financial exposure. One-third of the AHEAD decedents had to pay their full drug costs and another 39 percent paid at least part of these expenses. The magnitude of these out-of-pocket expenses and their implication for the value of estates is discussed in the next section.

11.4.2 Estates

Table 11.1 shows the distribution of values of estates as reported by the proxy respondents. Because the interpretation of what is labeled inheritances depends on whether there remains a surviving spouse, these distributions are provided separately for married and nonmarried families. One in five of the deceased AHEAD respondents had estates of no value. Mir-

6. Following the normal procedures used in HRS and AHEAD, if respondents initially did not provide an exact dollar amount, they were allowed (encouraged) to answer using a sequence of bracketed categories. We used within-bracket values for exact-amount respondents to impute values within these brackets.

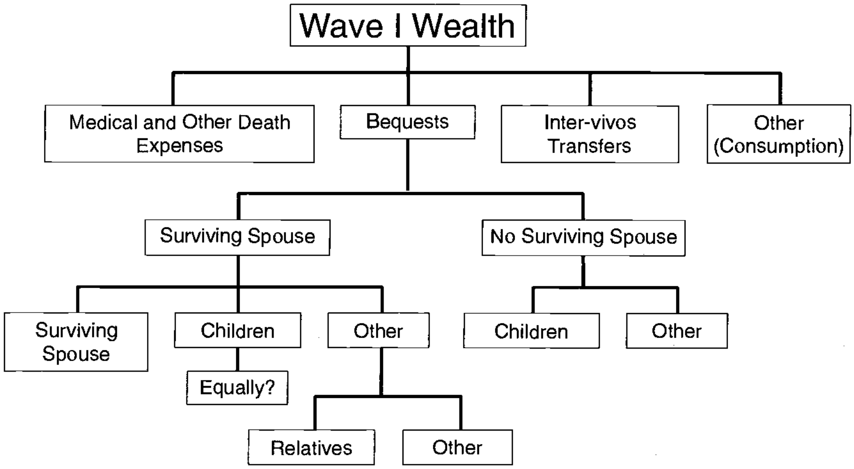

Fig. 11.4 The flow of wealth

roring the distribution of wealth among these households, the distribution of estate values are similarly quite dispersed and highly skewed. The mean estate value is $94,469, but the median is half as much, $50,000. Some respondents leave relatively large estates: Thirty percent are $100,000 or more and 7 percent are in excess of $200,000. Only 3 percent of the estates were valued at $600,000 or more, which is the lower limit for estates to be subject to the estate tax. Consequently, estate tax records are extremely incomplete and they give a very distorted picture of bequests and the attributes of households who bequeath. For example, the 774 AHEAD deceased respondents left bequests worth more than $73 million, but only one-fourth of that value would appear in estate tax files.

In addition to estate records, some analyses of bequests rely on information from wills that pass through probate. While the selectivity of such cases is not as extreme as those that use estate tax record data, probated wills also represent a selective sample. Only one-third of AHEAD decedents had probated wills and the average value of those estates was $130.4 thousand; yet those estates that were not probated averaged just $51.9 thousand. Therefore, analyses based on probated wills cannot describe average bequest behavior in the population.

Because the maximum time span between wave 1 and the death of the decedent was two years, the value of the estate should be closely related to household wealth as measured in wave 1. If it were not, at least on average, we would be skeptical of the validity of the reports on the estate in the exit interview. Of course, there could be expenditures between wave 1 and the death that would reduce the correspondence. Figure 11.4 has a schematic of the leakages that may occur. Some wealth may be used to pay for medical and other expenses associated with the death; some to give inter vivos transfers, perhaps to compensate for help received or to escape taxation; some to finance household consumption of the deceased and other family members. Only the remainder is available for the estate.

Table 11.2 compares estate values and wave 1 household wealth of the deceased AHEAD respondents. On average, wave 1 wealth was $130.2 thousand, and the estates averaged $94.5 thousand. However, in married households, the estate is quite close to nonhousing wealth, suggesting that when there is a surviving spouse, the house (presumably jointly owned) is often not included in the estate. When there is no surviving spouse, mean estate values are virtually identical to prior-wave total household wealth. We consider the close correspondence of wave 1 wealth to estate value as good evidence of the validity of the estate reports by the proxy respondents.

The second part of the table shows costs associated with the death of the AHEAD wave 1 respondent. Although substantial on an absolute scale, these costs are not particularly large relative to average wave 1 wealth. For all households, death costs are about 5 percent of wave 1 household wealth and about 10 percent of the estate. On average, death expenses by themselves did not lead to a significant depletion of household wealth; nor can these death expenses account for much of the difference between wave 1 wealth and estate values.

Another source of leakage is that during this time period, households may have been engaging in higher amounts of inter vivos transfers than usual to avoid estate taxation. The exit interviews inquired about the extent and amount of such transfers. There is a legitimate question about the ability of proxy interviews to answer accurately questions about these before-death transfers; nonetheless, the fraction of cases in which these transfers occurred was relatively small. Transfers to children were made in roughly 10 percent of all these households with a median transfer of about $900 (not shown), and few households appear to have given transfers that

Table 11.2 Wealth, Estate Value, and Expenses Associated with Death (thousands of dollars): AHEAD Decedents

	Single	Married	All
Wave 1 wealth	80.7	184.7	130.2
Wave 1 wealth excluding housing	42.4	104.8	72.1
Value of estate at death	80.6	109.8	94.5
Total out-of-pocket costs	9.3	9.4	9.4
Medical	3.7	4.6	4.2
Death expenses	4.4	4.1	4.3
Other	1.2	0.6	0.9

Note: $N = 774$.

were influenced by the tax-exempt limit of $10,000 per recipient. We conclude that although there is some inter vivos giving before death for the average household, it is minor relative to the size of the estate.

Table 11.2 suggests that estate values as reported by proxy respondents are reasonably accurate on average. We can informally validate them further by investigating whether estate values vary in an appropriate way with covariates known to be related to wealth. Because many households leave no estate at all, we estimate the effects of covariates in two stages. The first is a probit specification for the probability that an estate is positive, and the second is an ordinary least squares (OLS) estimation for the log value of the estate conditional on its being positive.

The results in table 11.3 are similar to estimates of the determinants of wealth. Higher education is associated with a greater probability of a positive estate and with a higher value of the estate. Similarly, income has an important positive impact both on the probability of leaving any estate and on the value of the estate, although the elasticity is less than unity. African American and Hispanic households have lower probabilities of leaving an estate, but do not appear to differ from white households in the amount of money that is left in an estate. Since household income is controlled for in both models, any remaining race- and ethnicity-specific behavioral differentials associated with bequest-leaving behavior appear to rest largely in whether a bequest is left at all.

Inheritances are smaller in families in which there is a surviving spouse, an indication that some fraction of family wealth is simply kept by the surviving spouse without passing through the estate or being labeled an inheritance. In the theory outlined in the previous section, we suggested that one way of evaluating whether a bequest motive existed was to examine whether bequests are related to the existence and number of close relatives. None of the family-structure variables (the number of living children, grandchildren, or great-grandchildren; the number of living siblings) has any significant relation to the size of the inheritance. This finding is consistent with what is found in studies based on wealth data: At older ages, changes in wealth as individuals age are unrelated to the number of children (Hurd 1987, 1989). The only significant effect is on the probability of having an estate: Increasing the number of children reduces the probability, which is not a result that would be predicated by a bequest motive for saving.

11.5 Anticipated Bequests

Information about the relative importance of bequests and the reasons for making them can be obtained either by studying the value of inheritances received by the current generation or by studying what that generation plans to bequeath. Studying anticipated bequests has many advan-

Table 11.3 Determinants of Estate

	Probability of a Positive Estate	Logarithm of Estate among Positive Estates
Education		
Less than high school	—	—
	—	—
High school	0.517	0.564
	(3.24)	(2.72)
College	0.365	0.995
	(1.35)	(3.08)
Black	−0.995	−0.009
	(5.87)	(0.02)
Hispanic	−1.268	−0.496
	(4.97)	(0.88)
Female	−0.225	−0.362
	(1.54)	(1.77)
Household income (log, thousands)	0.220	0.596
	(2.23)	(4.23)
Surviving spouse	0.231	−0.931
	(0.92)	(2.47)
Death expenses (thousands)	0.012	0.009
	(1.93)	(0.11)
Number of living children	−0.050	−0.063
	(1.52)	(1.13)
Number of grandchildren	−0.003	0.008
	(0.24)	(0.30)
Number of great-grandchildren	0.006	−0.018
	(0.42)	(0.60)
Number of living siblings	0.041	−0.022
	(1.38)	(0.57)
Parents dead	0.245	0.311
	(1.53)	(1.19)
Spouse's parents dead	−0.208	1.273
	(0.88)	(3.80)
Intercept	−1.574	4.487
	(1.64)	(3.28)
N	594	451

Notes: Absolute *t*-statistics in parentheses. Probability coefficients are from probit estimation.

tages because it relates directly to the motives for current saving decisions of households. However, it is difficult to infer bequest intentions from current household decisions about wealth accumulation, because other saving motives coexist and actual bequest realizations may take place far in the future. Many subsequent events may break the link between current intentions and future reality.

A promising new way of obtaining insight into the existence and

Table 11.4 Average Subjective Probability of a Bequest (percent)

Wealth Decile	Target Amount: $10,000 AHEAD	$10,000 HRS	$100,000 AHEAD	$100,000 HRS
10	90	92	75	78
9	83	87	56	66
8	77	85	44	57
7	71	81	34	49
6	65	78	18	41
5	56	72	10	30
4	40	67	7	22
3	30	56	5	14
2	13	46	2	11
1	4	25	1	7

Source: Smith (2001).

strength of bequest motives relies on the subjective probability of leaving a bequest, which was ascertained in HRS waves 2 and 3 and in AHEAD waves 1 and 2. Although there is some difference in the wording, as between HRS and AHEAD, the substance is illustrated by the question from AHEAD wave 2:

> Using a number between 0 and 100 what are the chances that you (or your husband/wife/partner) will leave an inheritance of at least $10,000?

The respondent had previously been instructed to interpret zero as absolutely no chance and 100 as absolutely certain. If the answer was 31 or higher, the question was repeated but with a target of $100,000. In the case of couples, each spouse was asked these questions independently so that within-family comparisons can be made.

We will use the subjective probability of leaving a bequest as our measure of anticipated bequests. In prior work, Smith (1999a) established some of the properties in cross-section of the subjective probabilities by relating them to wealth and other characteristics. As an example of his findings, table 11.4 has the average subjective bequest probabilities in AHEAD wave 1 and HRS wave 1 for each decile of wealth. The average subjective bequest probabilities are sharply lower when the target is $100,000 rather than $10,000, and the differences are not proportionate. For example, in the top decile the difference in probabilities is 15 percentage points (AHEAD), whereas the difference in the 5th decile is 46 percentage points. In the lowest decile the probabilities are both essentially zero.

At both target levels and in both surveys the average bequest probability increases monotonically and sharply with wealth. Although in the very top deciles there are no large differences between HRS and AHEAD, the differences are substantial in the lower part of the distribution. For example, the average over the bottom half of the wealth distribution is 29 percent for the target of $10,000 for AHEAD but 53 percent for HRS. For a target of $100,000 the averages are 5 percent and 17 percent, respectively. This is reasonable because the HRS cohort has more wealth than the AHEAD cohort, and many in the HRS cohort are still working—and at the ages at which their saving rates will be at a maximum. The implication of this difference between the AHEAD and HRS cohorts is that we can expect bequests to rise over time.

11.5.1 Predictive Validity of the Subjective Bequest Probabilities

Because observations on subjective bequest probabilities have not previously been available, they have not been subject to scrutiny about their properties and their predictive power. Therefore, it is reasonable to wonder about their validity. We will say that the subjective bequest probabilities are valid if they are accurate predictors of the probabilities of actual bequests. Once the cohort has died, the associated validity can be evaluated by comparing the subjective bequest probabilities with actual bequests; but because the AHEAD population is aged seventy or over, it will be many years before such a comparison is possible. However, we can derive a test based on the estates of the part of the population that died between the waves, and on the change in the subjective bequest probabilities of the part of the population that survived, providing a test that can be carried out with just two waves of the data.

In panel, the subjective probabilities of bequests will change in response to new information. Some individuals will have unanticipated health changes that will affect their survival chances; some will have unexpected wealth changes, such as capital gains or losses. These kinds of events should change the subjective bequest probabilities of the affected individuals. However, to the extent that these events occur at the average ex ante or anticipated rate, they do not constitute new information in the population and, therefore, should not lead to changes in the average subjective bequest probabilities. At the population level, unanticipated changes in the survival chances of the population or macro-events that systematically lead to windfall gains or losses will change average subjective bequest probabilities.

If we assume that there are no such macro-shocks, we can derive an equation of motion for the average subjective bequest probability. Suppose that the environment is stationary, so that individual anticipated wealth paths do not change as each survivor ages. The assumption of stationarity can be used to derive a test of the validity of the subjective probabilities of bequests. The test will be based on the relationship between the bequest probabilities at time t, actual bequests among those who die between t and $t + 1$, and bequest probabilities at time $t + 1$.

Let $P_t(B > b)$ be the probability at time t that bequests will be greater than b. Then

$$P_t(B > b) = P_t(B > b \mid D_t)P_t(D_t) + P_t(B > b \mid D > t)P_t(D > t) \tag{3}$$

where $P_t(D_t)$ is the probability of death at t, and $P_t(D > t)$ is the probability of death at a time greater than t.

Under stationarity,

$$P_t(B > b \mid D > t) = P_{t+1}(B > b)$$

because the anticipated wealth path is unchanging.

In a population of n individuals of age t, let $D_{it} = 1$ if the ith person dies at t and zero otherwise. Then $(1/n)\Sigma\ P_{it}(B_i > b|D_t)P_{it}(D_t)$ is the population average of the first term on the right-hand side of equation (3), and it can be estimated by $(1/n)\Sigma\ P_{it}(B_i > b|D_t)D_{it}$ because

$$E\left[\sum P_{it}(B_i > b \mid D_t)D_{it}\right] = \sum P_{it}(B_i > b \mid D_t)P_{it}(D_t).$$

We can write that

$$\sum P_{it}(B_i > b \mid D_t)D_{it} = \sum_{i \in d} P_{it}(B_i > b)$$

where d is the set of individuals who died between t and $t + 1$. We note that

$$P_t(B > b \mid D_t) = \begin{cases} 1 \text{ if } w_t > b \\ 0 \text{ otherwise} \end{cases},$$

provided the time interval between t and $t + 1$ is short. Therefore, in large samples

$$\frac{1}{n}\sum P_{it}(B_i > b) \approx \frac{1}{n}\sum_{i \in d} I(w_{it} - b) + \frac{1}{n}\sum_{i \in s} P_{i,t+1}(B_i > b) \tag{4}$$

where $I(x) = 1$ if $x > 0$ and 0 otherwise, and s is the set of persons who survived from t to $t + 1$. Thus, we can approximately estimate in the panel all of the elements of equation (4). The right-hand side is the sum of the fraction of those who died having baseline wealth greater than b weighted by the population mortality rate and of the average probability in wave 2 that bequests will be greater than b weighted by the population survival rate.

This relationship should hold approximately in the panel. It requires that the anticipated wealth path be unchanging among survivors, on the validity of the subjective bequest probabilities as stated by decedents in wave 1, and on the time consistency in the statements of the bequest prob-

Table 11.5 Comparison of Wave 1 Bequest Probabilities with Actual Estates and Wave 2 Bequest Probabilities (percentages)

	Target Amount	
	$10,000	$100,000
Wave 1		
Average subjective probability, survivors to wave 2	58.30	28.87
Average subjective probability, decedents before wave 2	47.83	19.60
Overall average	57.38	28.05
Wave 2		
Average subjective probability, survivors to wave 2	56.33	27.97
Percent of estates with wealth ≥ target, decedents before wave 2	73.68	36.00
Weighted average[a]	57.82	28.68
Difference, wave 1 − wave 2	−0.44	−0.63
Standard error	0.56	0.48
N	5,204	5,073

[a]Weights are survival rate (0.912) and mortality rate (0.088).

abilities by survivors in wave 2. In particular, it does not require that people consume according to the life-cycle model.

We can perform a test of the validity of the subjective bequest probabilities based on the estimated elements of equation (4). Table 11.5 shows the average wave 1 subjective bequest probabilities among those who survived to wave 2 and among those who died between the waves. We note that the deceased had lower bequest probabilities, reflecting their lower wealth holdings. The overall average is the left-hand side of equation (4). The table shows the right-hand side of equation (4) as the weighted average of bequest probabilities among survivors and the average percent of estates as large as the target. The difference between wave 1 and wave 2 is the difference between the left-hand and right-hand sides of equation (4). For both targets they are small, and comparisons with the standard errors of the difference show that we cannot reject the null hypothesis that the left-hand and right-hand sides of equation (4) are equal. We interpret this result as evidence for the validity of the subjective bequest probabilities.

11.5.2 Changes in the Subjective Probabilities of Leaving Bequests

During the two years between waves, new information should affect the subjective bequest probabilities. Among survivors, an important piece of information is simply that they survived. As discussed earlier, in steady-state under the assumption of planned dissaving there should be a decrease with age in the average subjective bequest probability: The survivors will die at a greater age when wealth is lower. Other types of new information would include health events that could affect both current expenditures on health care and future expenditures; unanticipated wealth change, such as

Table 11.6 Distribution of Bequest Probabilities (percent): AHEAD Waves 1 and 2

	Wave 2					
Wave 1	0.00	0.01–0.49	0.50	0.51–0.99	1.00	All
	Probability bequest ≥ $10,000 (N = 4,748)					
0.00	21.6	2.0	1.7	1.3	4.1	30.7
0.01–0.49	2.0	1.3	0.8	0.9	1.0	6.0
0.50	1.7	1.1	1.5	1.1	2.3	7.6
0.51–0.99	1.2	0.9	1.9	3.9	4.2	12.2
1.00	4.4	1.3	3.2	7.1	27.5	43.5
All	30.9	6.6	9.1	14.3	39.1	100.0
	Probability bequest ≥ $100,000 (N = 4,623)					
0.00	52.1	3.3	2.2	1.6	2.3	61.4
0.01–0.49	2.4	1.5	0.9	0.8	0.4	6.0
0.50	2.0	0.8	1.4	1.3	1.2	6.7
0.51–0.99	1.1	0.9	1.1	2.4	1.9	7.4
1.00	2.9	1.0	1.6	2.5	10.5	18.5
All	60.6	7.5	7.2	8.5	16.2	100.1

capital gains from holdings of stocks and bonds; and events that would change the anticipated consumption path, such as a change in the utility from a bequest due to a change in the economic status of children.

Table 11.6 shows the joint distributions of the subjective probabilities of leaving bequests for those AHEAD respondents who were interviewed in the first and second waves of AHEAD. The distribution of responses in wave 1, which is shown in the right-most (All) column, has large percentages at zero and at 1.0. Between waves 1 and 2, the distribution shifted slightly toward lower probabilities of bequests; for example, 43.5 percent in wave 1 reported a probability of 1.0 but in wave 2 just 39.1 percent reported a probability of 1.0. The percentage at 0.5 or less shifted from 44.3 to 46.6. These are not large changes but they are consistent with a life-cycle model in which individuals anticipate dissaving and when there are no population-wide shocks that affect all or most expectations or that cause unexpected wealth change.

Even so, there are examples of large changes. About 4 percent reported probabilities of 0.0 in wave 1 and 1.0 in wave 2 for the target of $10,000, implying a transition probability from 0.0 to 1.0 of 13 percent. The probability of reporting 0.0 in wave 2 conditional on a report of 1.0 in wave 1 was about 10 percent. Such changes could, of course, be the result of large unexpected wealth changes or of measurement error. We will investigate later in this paper the correlates of these changes.

When the target is $100,000 we find a modest reduction in the bequest probabilities between the waves. For example, the percentage reporting a probability of 1.0 declined from 18.5 to 16.2. Compared with the distribu-

Table 11.7 Distribution of Bequest Probabilities (percent): HRS Waves 2 and 3

	Wave 3					
Wave 2	0.00	0.01–0.49	0.50	0.51–0.99	1.00	All
	Probability bequest ≥ $10,000 (N = 9,084)					
0.00	10.9	1.6	1.4	1.1	3.2	18.1
0.01–0.49	2.1	1.4	1.1	1.4	1.4	7.3
0.50	1.3	1.0	2.1	2.3	3.2	9.9
0.51–0.99	1.0	1.2	2.0	7.5	7.9	19.7
1.00	2.5	1.1	2.5	6.5	32.3	44.9
All	17.8	6.3	9.2	18.6	48.0	100.0
	Probability bequest ≥ $100,000 (N = 8,964)					
0.00	35.4	3.5	2.1	1.6	2.6	45.2
0.01–0.49	5.3	4.0	2.0	2.1	1.4	14.7
0.50	1.6	1.5	1.9	2.1	2.0	9.1
0.51–0.99	1.4	1.2	1.6	4.2	4.1	12.5
1.00	1.7	0.9	1.5	2.6	11.9	18.5
All	45.4	11.0	9.0	12.6	22.0	100.2

tion for a target of $10,000, there is a much greater percentage that report a probability of 0.0, reflecting the large difference between the target and the wealth of many households.

Table 11.7 has similar results for HRS waves 2 and 3. A noticeable difference when compared with AHEAD results is that the HRS distribution shifts toward higher subjective bequest probabilities between the waves. For example, in wave 1, 44.9 percent were certain to leave a bequest at the $10,000 target, but in wave 2, 48.0 percent were certain. At the $100,000 target these percentages changed from 18.5 to 22.0. There are several reasons for the differences between AHEAD and HRS results. The two-year mortality rate for AHEAD was about 0.11, whereas it was only 0.02 for HRS. Therefore, the increase in the chances of dying at advanced old age, and therefore, of dying with less wealth, were much greater in the AHEAD population than in the HRS population. Also, many in the HRS cohort are still working, and in the robust economic times between waves 2 and 3 (approximately 1994 to 1996) many likely had greater earnings than expected. Furthermore, the stock and bond markets had large capital gains, and the HRS cohort are more heavily invested in such assets than the AHEAD cohort.

11.5.3 Determinants of Change in Bequest Probabilities

We will study the determinants of changes in the subjective bequest probabilities by relating them to new information—specifically, changes in the subjective survival probabilities and in out-of-pocket medical expenditures; the onset of a new health condition; changes in household income and wealth; widowing; and retirement. Each of these may reflect new information and therefore cause a change in the subjective bequest probabilities. We will present results from several types of estimation and discuss them together, in that all the results pertain to the same underlying process.

Because tables 11.6 and 11.7 show substantial fractions of respondents to be at the extreme of 0.0, we will study the probability of reporting a positive probability in wave 2 conditional on reporting a probability of zero in wave 1. That is, we will estimate β in the probit function

$$P(p_2 > 0 | p_1 = 0) = f(X\beta),$$

where f is the normal distribution function, p_2 is the probability in wave 2 of a bequest at least as large as the target, and p_1 is the probability in wave 1. This probit is estimated over the 1,222 observations in AHEAD wave 1 that reported $p_1 = 0$ when the target was $10,000. Similar probits are estimated for the AHEAD target of $100,000 and for both targets in HRS. Table 11.8 lists these estimated probit coefficients.

Because tables 11.6 and 11.7 also show considerable bunching of responses at 1.0, we estimated probit functions for the probability of reducing bequest chances from 1.0 to chances less than 1. 0. That is, we estimated β in

$$P(p_2 < 1 | p_1 = 1) = f(X\beta)$$

over the 1,939 observations in AHEAD wave 1 that reported bequest chances of 1.0 for the target of $10,000. Similar probit coefficients were estimated for a target of $100,000, and among HRS respondents for both targets. The results are presented in table 11.9.

Our final type of estimation is regression in which the left-hand variable is the change in the subjective bequest probabilities and the right-hand variables are measures of new information. Because the left-hand variable is limited to the range of −100 to 100, both OLS estimates and tobit estimates are presented. Table 11.10 has the results for AHEAD and table 11.11 for HRS.

Several consistent patterns are revealed in these tables. First, it is rather remarkable that the overall pattern of coefficients in table 11.9 is the same as in table 11.8 but with reversed signs. For example, in table 11.8 an increase in the subjective survival probability is associated with an increase in bequest chances; in table 11.9 it is associated with a decrease in the probability of reducing bequest chances, or an increase in the chances of bequests. Because the estimations are based on different samples, the estimates are independent. Second, this positive relationship between survival chances and bequest chances is found both for the two target levels in AHEAD and HRS and for the several types of estimation. In tables

Table 11.8 Probits for Positive Probability of a Bequest Given Prior-Wave Probability of Zero

	Target Amounts			
	AHEAD		HRS	
	$10,000	$100,000	$10,000	$100,000
Change in subjective survival probability	0.002	0.003	0.002	0.002
	(1.82)	(3.11)	(1.69)	(2.40)
Change in subjective survival probability of spouse	−0.001	−0.001	0.003	0.002
	(0.32)	(0.75)	(1.78)	(1.37)
Out-of-pocket medical costs ($100)	0.027	0.004	0.006	−0.002
	(0.55)	(0.11)	(1.32)	(0.52)
New health condition	0.112	−0.038		
	(1.29)	(0.52)		
Minor			−0.164	−0.067
			(1.73)	(1.05)
Major			−0.001	−0.059
			(0.01)	(0.79)
Change in household income ($10,000)	0.016	0.028	0.004	0.016
	(0.52)	(1.40)	(0.38)	(2.28)
Change in household wealth ($10,000)	0.017	0.004	0.004	0.005
	(3.83)	(1.31)	(1.07)	(2.24)
Widowed	0.362	0.127	−0.214	−0.174
	(1.99)	(0.75)	(0.84)	(0.92)
Retired			−0.341	0.021
			(2.02)	(0.21)
N	1,222	1,591	1,310	3,379
Average conditional probability	0.296	0.153	0.401	0.217

Notes: Entries are estimated effects (probit coefficients) on the probability that a bequest will be positive given that the prior-wave probability was zero. Absolute *t*-statistics in parentheses. Includes controls for race, sex, ethnicity, education, region of residence, and birth cohort.

11.8–11.11, most of the coefficients on the change in the own subjective probability of survival are statistically significant.

To judge the magnitude of the effect of own survivor probability, consider the estimates in table 11.8 for the probability of moving from a zero response in wave 1 to a positive in wave 2, and consider an increase in survival chances from 0 to 100. Such a change would increase the probit index by 0. 2. Evaluated at the average probability of a transition from 0 to positive (0.296), the predicted change is about 0.06. That is, an increase in the subjective survival probability would increase the probability of reporting positive chances of a bequest from about 0.30 to 0.36. The effect at the target of $100,000 is somewhat larger, increasing the probability of reporting positive bequest chances from 0.15 to 0.22. The changes in probabilities for HRS would be approximately the same. These results are in accord with the effect of the subjective survival probability on bequest

Table 11.9 **Probits That the Probability of a Bequest is Less Than 1.0 Given Prior-Wave Probability of 1.0**

	Target Amounts			
	AHEAD		HRS	
	$10,000	$100,000	$10,000	$100,000
Change in subjective survival probability	−0.002	0.000	−0.003	−0.004
	(1.88)	(0.07)	(2.98)	(2.56)
Change in subjective survival probability of spouse	−0.002	−0.001	0.002	0.002
	(1.52)	(0.51)	(1.51)	(0.98)
Out-of-pocket medical costs ($100)	0.024	0.048	−0.001	−0.006
	(0.71)	(1.04)	(0.16)	(1.22)
New health condition	0.048	−0.022		
	(0.72)	(0.22)		
Minor			0.029	−0.166
			(0.48)	(1.85)
Major			0.142	0.409
			(1.83)	(3.29)
Change in household income ($10,000)	0.024	0.023	0.001	0.001
	(0.76)	(0.73)	(0.37)	(0.40)
Change in household wealth ($10,000)	−0.036	−0.035	−0.001	−0.002
	(4.33)	(3.83)	(1.63)	(2.02)
Widowed	−0.059	−0.162	−0.279	−0.217
	(0.40)	(0.72)	(1.27)	(0.66)
Retired			0.017	−0.072
			(0.21)	(0.59)
N	1,939	827	3,528	1,468
Average conditional probability	0.368	0.432	0.281	0.360

Notes: Entries are estimated effects (probit coefficients) on the probability that a bequest will be less than 1.0 given that the prior-wave probability was 1.0. Absolute *t*-statistics in parentheses. Includes controls for race, sex, ethnicity, education, region of residence, and birth cohort.

probabilities among decedents (as shown later in table 11.15; in that table, those with higher subjective survival chances anticipated a smaller reduction in wealth before death).

As explained above, without any behavioral responses an increase in survival chances makes a large accidental bequest early in life less likely. However, individuals may react to their improved survival chances by reducing their current consumption so as to finance consumption over a longer lifetime, and the resulting larger wealth holdings would make bequests more likely. Our estimates indicate that the behavioral reactions dominate and that changes in bequests and survival probabilities are positively related.

Because the unit of observation is the individual, each spouse provides an observation on his or her subjective bequest probability and on his or her subjective survival probability. The estimates show that, especially in

Table 11.10 Change in the Probability (percent) of a Bequest: AHEAD

	Target Amounts			
	OLS		Tobit	
	$10,000	$100,000	$10,000	$100,000
Change in subjective survival probability	0.085 (4.48)	0.065 (3.97)	0.090 (4.34)	0.097 (4.01)
Change in subjective survival probability of spouse	0.020 (0.66)	−0.051 (1.97)	0.021 (0.66)	−0.024 (0.69)
Out-of-pocket medical costs ($1,000)	−0.145 (1.98)	−0.105 (1.67)	−0.155 (1.95)	−0.083 (0.94)
New health condition	−0.246 (0.18)	−0.472 (0.39)	−0.287 (0.19)	−1.038 (0.62)
Change in household income ($10,000)	0.003 (0.03)	0.006 (0.08)	−0.028 (0.03)	0.018 (0.21)
Change in household wealth ($10,000)	0.038 (2.25)	0.030 (2.05)	0.040 (2.32)	0.023 (1.33)
Widowed	1.730 (0.55)	0.370 (0.37)	4.810 (1.42)	1.610 (0.42)
N	4,211	4,119	4,211	4,119

Notes: Entries are estimated effects on the change in the probability that a bequest will be at least as large as the target amount. Absolute *t*-statistics in parentheses. Subjective survival probability scaled 0–100. Includes controls for race, sex, ethnicity, education, region of residence, and birth cohort. OLS = ordinary least squares.

AHEAD, the effects of changes in the spouse's subjective probability of survival are small and often have no consistent pattern. This is to be expected. For example, a wife can give information about her own survival probabilities and how they affect her own bequest probabilities, yet not be aware of her husband's assessment of his own survival probabilities. Thus, were he to lower his subjective survival probabilities, the wife might not alter her bequest probabilities even though the subjective survivorship of the household would be lower. The estimates suggest this scenario.

There are two other health-related measures in these models: out-of-pocket medical expenses and the onset of new health conditions in the household. Out-of-pocket medical expenses had little effect on the transitions from 0.0 or from 1.0 (tables 11.8 and 11.9), but they reduced the average change in bequest probabilities (tables 11.10 and 11.11). In AHEAD, for example, out-of-pocket expenditures of $10,000 are estimated to reduce the probability of a bequest at the $10,000 target by about 1.5 percentage points. Of course, a considerable amount of the variation in health costs is likely to be anticipated because of their ongoing nature. If that were fully the case they would not be associated with any revision in bequest chances.

The onset of new health conditions has no consistent affect on revisions

Table 11.11 Change in the Probability (percent) of a Bequest: HRS

	Target Amounts			
	OLS		Tobit	
	$10,000	$100,000	$10,000	$100,000
Change in subjective survival probability	0.085 (5.95)	0.065 (4.72)	0.088 (5.83)	0.067 (4.71)
Change in subjective survival probability of spouse	0.024 (1.16)	0.037 (1.82)	0.027 (1.22)	0.039 (1.84)
Out-of-pocket medical costs ($1,000)	−0.107 (2.00)	−0.105 (2.01)	−0.109 (1.93)	−0.107 (2.02)
New health condition				
Minor	−1.292 (1.23)	0.760 (0.75)	−1.308 (1.19)	0.763 (0.73)
Major	0.797 (0.61)	−0.998 (0.79)	0.938 (0.62)	−1.114 (0.85)
Change in household income ($10,000)	0.047 (0.97)	0.142 (3.04)	0.052 (1.02)	0.150 (3.10)
Change in household wealth ($10,000)	0.021 (1.72)	0.041 (3.38)	0.021 (1.68)	0.041 (3.35)
Widowed	11.980 (3.50)	8.710 (2.64)	12.500 (3.46)	9.230 (2.69)
Retired	−2.990 (1.95)	−0.148 (0.10)	−3.090 (1.92)	−0.177 (0.11)
N	7,735	7,645	7,735	7,645

Notes: Entries are estimated effects on the change in the probability that a bequest will be at least as large as the target amount. Absolute *t*-statistics in parentheses. Subjective survival probability scaled 0–100. Includes controls for race, sex, ethnicity, education, region of residence, and birth cohort. OLS = ordinary least squares.

in bequest probabilities, suggesting that survivor probabilities and out-of-pocket medical expenses may be the two principal mechanisms through which unexpected health events alter expected bequests.[7]

The effect of widowing is likely to increase bequest chances in AHEAD. The death of a spouse reduces needs for consumption relative to wealth, so that the death acts like an increase in wealth. Such an increase will increase bequests. At the same time, however, the death reduces life expectancy of the household. According to the theory, this reduction has an ambiguous effect on bequests, and according to our estimates it has a small effect. The sum of the two effects is likely to be to increase bequests.

In HRS these effects are dampened. Wealth is increased relative to needs, but the surviving spouse has many years in which to consume the

7. In HRS, new onsets are separated into severe and mild new onsets. Previous research has shown that there is not yet enough data to make this distinction in AHEAD, so that all new onsets are combined in that data. See Smith (1999b) for a discussion of these issues.

increase in wealth before mortality risk becomes substantial. Said differently, the surviving spouse can consume most of the increase rather than bequeathing it. Furthermore, in HRS most men are still working, so widowing is typically associated with an unanticipated loss of future earnings. The overall effect is likely to be a reduction in bequests.

Although no coefficients are significant, the pattern in AHEAD is consistent with this reasoning: Widowing is associated with an increase in bequest probabilities.[8] In the HRS, however, this reasoning is not supported. The only consistent pattern of significant coefficients is in table 11.11, which shows that widowing is also associated with an increase in the bequest probabilities. Apparently the reduction in need for consumption dominates the loss of human capital.

In the AHEAD population, changes in household income have little effect either on the transition probabilities or on the change in bequest probabilities. This is not surprising in view of the predictability of most AHEAD income sources, such as pension and Social Security income. A change in household income has an impact in the HRS sample at the $100,000 bequest target, possibly a reflection that some income changes were unexpected, due, for example, to better-than-anticipated salary increases.

Increases in household wealth are consistently associated with increases in the probability of bequests. This positive relationship is found both in the probits and in the expected changes in bequest probabilities. Yet the magnitude of this effect is not large. For example, an increase of $100,000 should increase substantially the chances of leaving a bequest of $10,000; yet the predicted effect in AHEAD would be an increase from 0.30 to 0.35. The effects on the other targets are even smaller. Of course, some of the observed wealth change in the panel may have been anticipated, which would explain the smaller effect.

As we have already discussed, only unanticipated wealth change should change anticipated bequests; yet in general we have no method for separating unanticipated from anticipated wealth change. However, HRS has a series of questions about new purchases and sales of stocks. We will say that the difference between the total change in the value of stock holdings and net new investments in stocks is unanticipated capital gains (Smith 2001). Total anticipated financial wealth change will then be total financial wealth change less unanticipated capital gains.

Table 11.12 summarizes the results of using these variables in estimation over the HRS sample.[9] Compared with previous tables and with the effects associated with anticipated wealth change, unanticipated capital gains

8. That is, the wave-to-wave subjective bequest probability of the surviving spouse increases.

9. The regressions include the other covariates listed in table 11.11.

Table 11.12 Change in the Probability of a Bequest: HRS

	Target Amounts			
	Tobit Estimates[a]		Probit Estimates[b]	
	\$10,000	\$100,000	\$10,000	\$100,000
Financial capital gains	0.007	0.003	−0.004	−0.008
	(0.32)	(1.46)	(2.62)	(5.24)
Other financial wealth change	0.045	0.082	0.002	−0.003
	(1.08)	(2.05)	(0.80)	(1.49)

Note: Capital gains and wealth change in \$10,000.
[a]Expected value.
[b]$P(p_2 < 1 \mid p_1 = 1)$

have their greatest effect on the probit for the \$100,000 target: Those with large gains have a high likelihood of continuing to state that their bequest probability is 1. 0. Compared with the target of \$10,000, the differential effect is probably due to large capital gains being concentrated among the relatively well-to-do, who are certain to give a bequest of \$10,000 regardless of capital gains.

In summary, we have shown in this section that at the individual level, subjective probabilities of bequests change with changes in covariates in a manner that is consistent with the predictions about actual bequests based on our model of consumption and saving. These results are consistent with the view that the subjective bequest probabilities are valid predictors of actual bequest probabilities.

11.6 Subjective Bequest Probabilities as an Index of Saving Intentions

Equation (4) in section 11.5 gives a relationship among the subjective bequest probabilities at wave 1, actual bequests by decedents between the waves, and subjective bequest probabilities by the survivors in wave 2. It can also be used, however, to show how the subjective bequest probabilities contain information about what the cohort anticipates bequeathing, and, when combined with actual wealth holdings, what the cohort anticipates saving or dissaving.

Suppose that in equation (4) t refers to the present time period and $t + 1$ to the greatest age possible. Everyone dies shortly after t, and the set d would be the entire baseline population and the set s would be empty. Then in equation (4) the second term on the right-hand side would be zero and the first term would be the fraction of the population that had actual bequests greater than b. Therefore, the average of the subjective bequest probabilities predicts the fraction of actual bequests greater than b. Equivalently, the average of the subjective bequest probabilities gives a point on the distribution of the bequests the cohort will actually make. We can compare this point with an appropriate point from the distribution of actual wealth holdings to learn about anticipated or intended saving or dissaving by the cohort. This result will be used to find whether the AHEAD population anticipates dissaving before death by comparing points on the distribution of wealth with subjective bequest probabilities.

There are a number of important reasons for wanting to establish whether the elderly are dissaving. If they do dissave, their control of economic resources will decline with age and, should they survive to advanced old age, they may be poor. Dissaving implies that they will bequeath less than their current wealth to the next generation. In that the elderly own substantial amounts of assets, dissaving by them will reduce the national household saving rate. Finally, anticipations of saving would be strong evidence for a bequest motive: A major implication of the pure life-cycle model (no bequest motive) is that wealth should decline with age among those of sufficient age.

Estimation of anticipated or desired saving behavior based on the subjective bequest probabilities has advantages over tests based on actual wealth change in panels that span just a few years. Unanticipated capital gains at the macro-level can cause observed wealth change to differ from anticipated wealth change over most households in a sample. The subjective probabilities of bequests take into account rates of return over long time periods, so that average rates of return would be closer to normal.

Table 11.13 shows, for the AHEAD baseline sample, the fraction of persons with wave 1 wealth at least as large as the target and the average of the subjective bequest probabilities. For example, in wave 1, 84.9 percent had wealth at least as large as $10,000, yet on average only 57.4 percent of households will die with bequests that large. That is, $10,000 is approximately the 15th percentile point in the distribution of wave 1 wealth but, under the assumption that the expectations about bequests are realized, it will be the 43rd percentile in the distribution of bequests. Similarly, $100,000 is approximately the 47th percentile in the wave 1 wealth distribution but the 72nd percentile of the bequest distribution. The implication is that the AHEAD population anticipates substantial dissaving before death.

These results are consistent with the average change in the subjective

Table 11.13 Percentage with Wave 1 Wealth At Least As Large As Target Amounts and Subjective Bequest Probabilities: AHEAD

	Target Amounts	
	$10,000	$100,000
Wave 1 wealth	84.9	52.6
Average subjective bequest probability	57.4	28.1
N	5,204	5,073

Table 11.14 Percent of Decedents with Wealth or Estates At Least As Large As Target Amounts and Average Subjective Bequest Probability: AHEAD

	Target Amounts	
	$10,000	$100,000
Wave 1 wealth	75.0	38.0
Actual estates	73.7	36.0
Average subjective bequest probability	47.8	19.6
N	456	450

bequest probabilities among survivors as reported in table 11.5. The average bequest probability at the $10,000 target declined by 1.97 percentage points with standard error of 0.58. At the $100,000 target the probability declined by 0.90 percentage points with standard error of 0.49 (p-value of 0.06). Declining subjective bequest probabilities are consistent with intended dissaving.

The decedents differed at baseline somewhat from the full sample, but they also planned to dissave before dying. Table 11.14 shows the percent of decedents that had wave 1 wealth at least as large as the target amounts, the percent with actual estates at least as large as the target amounts, and their average subjective bequest probabilities.[10] Their wealth was smaller than the average of the entire sample both because of their greater age and also because of differential mortality: The less well-to-do die sooner than the wealthy. At the $10,000 target the average of their subjective bequest probability was 47.8, which implies that had the decedents lived and consumed as they had anticipated when they responded in wave 1, about 48 percent of them would have died with estates at least as large as $10,000. Yet about 75 percent had wave 1 wealth at least as large as $10,000, and 74 percent had actual estates that reached $10,000. The implication is that the group planned or anticipated that they would decumulate wealth before dying. Because they died unexpectedly early, they were not able to decumulate.

As discussed in section 11.2, the life-cycle model makes no prediction about the response of bequests to a change in mortality risk: If there were no behavioral response to an increase in risk, bequests would increase because, under the assumption of wealth decumulation, people would die earlier when their wealth was higher. If there were a strong behavioral response, consumption could initially increase so much that actual bequests would fall due to lower wealth holdings. The net effect could be either an increase or a decrease in bequests, so the actual effect must be found from

10. The number of observations in the table differs from the number of decedents because of missing data on the subjective survival probabilities.

Table 11.15 Percent of Decedents with Wealth or Estates At Least As Large As Target Amounts and Average Subjective Bequest Probability: AHEAD

	Subjective Survival Probability			
	Target Amount $10,000		Target Amount $100,000	
	0–10	90–100	0–10	90–100
Wave 1 wealth	75.2	73.3	37.6	43.3
Average subjective probability	49.4	49.6	19.8	26.7
Difference	25.8	23.7	17.8	16.6

Note: $N = 371$.

data. Similar reasoning shows that variation across individuals in their perceived mortality risk does not produce a definite predication about the variation in bequests.

Table 11.15 shows the percentage of individuals whose wave 1 wealth reached the target amounts and their average subjective bequest probability classified by the subjective survival probability in wave 1.[11] Among respondents who reported a subjective survival probability of 0–10 percent in wave 1, 75 percent had wealth that reached $10,000. Their average subjective bequest probability was about 49 percent, and the difference was about 26 percent. Among those with subjective survival probabilities of 90 to 100, wave 1 wealth was slightly lower, the average subjective bequest probability was about the same, and the difference between them was about 24 percent. The difference is about the same for the $100,000 target.

These results show that greater subjective survival probabilities have small but positive effects on anticipated bequests. The results are in accord with the effect of a change in the subjective survival probability on bequest probabilities as shown in tables 11.6–11.9. In those tables, individuals who assessed that their survival chances had increased between the waves increased their probabilities of bequests.

In table 11.15, those with high subjective survival chances anticipated that their bequests would be somewhat larger than the bequests of those with low survival chances even though the wealth of the two groups was about the same. An implication is that the first group anticipated less dissaving than the second in order to reach their expected bequests despite their greater expected lifetimes. This implies a rather large behavioral response to mortality risk, which is in accord with estimates based on actual rates of dissaving in panel (Hurd 1993): Were the behavioral response min-

11. Because we have individual-level observations on the subjective bequest probabilities we compare wealth of the household in which the individual lives to bequest probabilities. Thus, both the husband and the wife appear as separate entries in table 11.13.

imal, the group with the higher survival rates would anticipate lower bequests.

11.7 Conclusions

We have presented results about the magnitude and distribution of bequests based on new methods of measuring actual and anticipated bequests. Actual bequests were measured in exit interviews given by proxy respondents for 774 AHEAD respondents who died between waves 1 and 2 of the AHEAD survey. Among other things, these exit interviews provide data about the medical and nonmedical costs associated with the illnesses of the deceased respondents and the value and distribution of their estates. Even though the deceased were quite ill before they died, medical expenses did not cause a substantial reduction in their estates. Because the exit interview obtained information about estates that is representative of the population, the distribution of these estate values is quite different than one would suppose from estate records, which are obtained for only a wealthy subset of the population.

Anticipated bequests were measured in two waves of HRS and AHEAD by the subjective probability of leaving bequests. We studied the reasons for between-wave revisions of the subjective bequest probabilities. We found that increases in the subjective probability of surviving, in increments in household wealth, and in widowing were all associated with increases in bequest probabilities, whereas out-of-pocket medical expenses reduced the likelihood of a bequest. By comparing bequest probabilities with baseline wealth we were able to test a main prediction of the life-cycle model, that individuals will dissave at advanced old age. The AHEAD respondents anticipate substantial dissaving before they die.

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Comment David Laibson

Hurd and Smith have made three very important contributions to the life-cycle literature. First, they have documented the usefulness and high quality of bequest data (anticipated and actual bequests) from the Asset and Health Dynamics among the Oldest Old (AHEAD) survey and Health and Retirement Survey (HRS) panels. Second, they have used this data to analyze the life-cycle hypothesis. Third, they have powerfully critiqued standard theories of bequest motives. I will discuss each of these contributions.

The Bequest Data: Anticipated and Actual Bequests

The author's analysis of the data on anticipated bequests suggests that these data are reliable. Four observations support this claim. First, anticipated bequests covary positively with income and wealth. Second, measurements of anticipated bequests are relatively stable between survey waves. Third, anticipated bequests are good predictors of actual bequests (as measured in exit interviews with the decedents' families). Finally, the anticipated bequest variable evolves over time in ways that are consistent with rational expectations. For example, predictable information, such as changes in income for retired adults, does not affect anticipated bequests.

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Moreover, unpredictable information, such as capital gains, does affect anticipated bequests. In addition, anticipated bequests appear to follow dynamics (from wave to wave) that are consistent with Bayes' rule.

The data on actual bequests is particularly useful because we have no close substitutes for this new data source. Most preexisting evidence on bequests comes from estate tax records and wills filed in probate courts; but these preexisting data sources are incomplete. Only a small fraction of estates are large enough (the threshold for the estate tax is $600,000) to appear in the tax files and few wills pass through probate court. Hurd and Smith's evidence suggests that only 2 percent of estates are valued at more than $600,000. Even on a dollar-weighted basis, only one-fourth of the bequests in the HRS and AHEAD samples are worth more than $600,000. Hence, the Hurd and Smith bequest data—which include all bequests—represents a very important step forward for the bequest literature.

A Test of the Lifecycle Hypothesis

Hurd and Smith's empirical analysis shows that anticipated bequests fall with age.[1] This finding sheds light on the ongoing debate about whether wealth falls with age (after retirement). An age-related fall in an anticipated bequest implies that wealth is probably also falling. Of course, falling wealth is a central prediction of the life-cycle hypothesis (LCH). Hence, Hurd and Smith interpret postretirement declines in anticipated bequests as evidence of the LCH.

I am uncomfortable with this conclusion. First, the authors have not shown that the fall in wealth has the same magnitude as predicted by the LCH. They have shown only that the sign is right. Second, they do not acknowledge that almost every sensible theory of life-cycle decision making—whether rational and optimal or not—implies that wealth and anticipated bequests will fall with age (after retirement). Consider, for example, the myopic mental accounting rule: Consume 90 percent of your current labor/pension/Social Security income and 20 percent of your financial wealth. Such nonoptimal consumption rules also generate declining wealth during retirement.

Evidence on the Bequest Motive

Hurd and Smith's analysis provides new evidence against the leading economic theory of the bequest motive. Specifically, they show that 79 percent of bequests are split evenly among the children, contradicting any theory that requires that the bequest be chosen to equate the marginal utility of consumption across children. In addition, Hurd and Smith show that bequests do not depend on the number of children, another result that seems to violate economists' intuitions about the underlying mecha-

1. The consumers in this population are all close to retirement or already retired.

nisms that drive bequest choices. These strong results may be mitigated by inter vivos wealth transfers, but the results nevertheless indicate important departures from the classical economic theory of bequests.

There are several sensible economic and psychological reasons that bequests may be equal across children. First, the bequest decision necessarily creates a moral hazard problem if parents try to use bequests to equate marginal utilities of their children at the time of the parent's death. Specifically, children with siblings have an incentive to raise and thereby distort their own consumptions while their parents are still alive. Children who overconsume early in life will have low consumption during midlife, raising their marginal utility at exactly the time that their parents are making the bequest decision. The relative poverty of overspending children will in turn lead their parents to transfer bequests to them, away from siblings who did not overspend. To avoid this incentive for competitive impoverishment, parents should rationally commit not to equate marginal utilities through bequests (Gatti 1998). Moreover, parents may want to commit to reward children who "do the right thing" (e.g., get a law degree). This motive along with parental concern about the moral hazard problem may partially or fully offset the motive to help children with relatively bad luck or low consumption.

Equal bequests are also predicted by prospect theory and loss aversion (Kahneman and Tversky 1979). An even split is a natural reference point, and deviations from this norm may help the winners less than the hurt experienced by the losers.

It is also important to note that parents are not the only economic actors who make transfers. Sometimes children make transfers to parents, generating a form of dynastic insurance. This may explain why increasing the number of children does not empirically raise the magnitude of bequests from parents to children. As a parent has more children, the parent may have a reduced incentive to save, since the children will serve as an important source of consumption insurance for the parent. Hence, it is not at all clear whether the relationship between bequest value and number of children should be positive or negative.

Hurd and Smith have provided a rich set of facts that dramatically improves our understanding of lifecycle consumption and savings decisions. Most importantly, their work highlights the counterfactual predictions of existing models of intergenerational wealth transfers. Hopefully, their analysis will spur the development of much-needed alternative models.

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