Volume Title: Topics in the Economics of Aging

Volume Author/Editor: David A. Wise, editor

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-90298-6

Volume URL: http://www.nber.org/books/wise92-1

Conference Date: April 5-7, 1990

Publication Date: January 1992

Chapter Title: Wealth Depletion and Life-Cycle Consumption by the Elderly

Chapter Author: Michael D. Hurd

Chapter URL: http://www.nber.org/chapters/c7101

Chapter pages in book: (p. 135 - 162)

5 Wealth Depletion and Life-Cycle Consumption by the Elderly

Michael D. Hurd

Although the life-cycle hypothesis of consumption has been the most important theory for the study of saving behavior, interest in the bequest motive for saving has grown considerably.[1] This interest has been stimulated by three kinds of empirical results. (1) In simulations of lifetime earnings and consumption trajectories, "reasonable" utility function parameter values lead to savings that are considerably smaller than observed household wealth (White 1978; Darby 1979). This implies that a good deal of household wealth has been inherited. Although, when the date of death is unknown, large inheritances are not necessarily inconsistent with the life-cycle hypothesis, many people would think they indicate that at least part of the bequests are intentional. (2) Kotlikoff and Summers (1981) find from estimated earnings and consumption paths that as much as 80 percent of household wealth is inherited. (3) The elderly do not seem to dissave as they age (Danziger et al. 1982; Kotlikoff and Summers 1988). Because this contradicts a prediction of the life-cycle hypothesis, it has been taken to be particularly damaging to the hypothesis.

In this paper, I first review some evidence on how wealth changes as the elderly age. The best evidence is that the elderly do dissave as required by the life-cycle hypothesis. Then I present some findings based on consumption data in the Retirement History Survey (RHS). As measured in the RHS, consumption declines as households age, which is in accordance with the life-cycle hypothesis. If a bequest motive for saving is an important determinant

Michael D. Hurd is a professor of economics at the State University of New York, Stony Brook, and a research associate of the National Bureau of Economic Research.

Support from the National Institute on Aging is gratefully acknowledged. Many thanks to Du Wang for excellent research assistance.

1. In this paper, the life-cycle hypothesis of consumption generally allows that the date of death is unknown. No utility is derived from a bequest.

of consumption, the consumption paths of parents and nonparents should differ, but no systematic difference between their consumption paths is found. The overall conclusion is that the wealth and consumption data in the RHS are consistent with the life-cycle hypothesis; they do not support a role for a bequest motive as a determinant of consumption behavior.

5.1 Wealth Change

As originally formulated, the life-cycle hypothesis (LCH) of consumption specified that utility derives only from consumption, not from bequests, and that the length of life is known with certainty. In this formulation, a condition of lifetime utility maximization is that wealth will decline to zero by the date of death. If the date of death is uncertain but the maximum age to which anyone can live is fixed and known, wealth must decline to zero at that maximum age. In either case, a prediction of the LCH is that at some age wealth will decline with increasing age. The age at which wealth should decline is not known, however, without further specification about the form of the lifetime utility function. A specification that is often made is the following (Yaari 1965).

An individual maximizes in the consumption path $\{c_t\}$

$$\int_o^N u(c_t)e^{-\rho t}\, a_t dt$$

in which $u(\cdot)$ is the instantaneous utility function, ρ is the subjective time rate of discount, a_t is the probability of living at least until t, and N is the maximum age to which anyone can live ($a_N = 0$). Because in this formulation utility does not depend on leisure, the model is valid only after retirement. The constraints on the maximization are initial wealth and the equation of motion of wealth, w_t,

$$\frac{dw_t}{dt} = rw_t - c_t,$$

in which r, the real interest rate, is constant and known. Utility maximization implies that

$$(1) \qquad u_t = u_{t+h} \frac{a_{t+h}}{a_t} e^{h(r-\rho)} \approx u_{t+h}\, e^{h(r-\rho-m_t/a_t)}$$

over an interval $(t, t + h)$ in which $w_t > 0$. u_t is marginal utility at t. m_t/a_t is the mortality hazard rate, which increases approximately exponentially at ages over, say, 60. If $\rho > r$, marginal utility will increase with age, which implies, under the usual assumption about the concavity of $u(\cdot)$ ($u'' < 0$), that consumption will fall with age. If $\rho < r$, the age at which marginal utility will begin to rise and consumption fall is found from

$$\frac{m_t}{a_t} = r - \rho.$$

For example, if $r = 0.03$ and $\rho = 0$, consumption will begin to fall at about age 66 for males and age 74 for females. If consumption declines with age, wealth must also decline: if dw_t/dt were positive and dc_t/dt negative,

$$\frac{d^2w_t}{dt^2} = r\frac{dw_t}{dt} - \frac{dc_t}{dt} > 0,$$

which implies that dw_t/dt would remain positive for all future ages, violating the terminal condition that $w_N = 0$. Therefore, the LCH makes the strong prediction that, in the absence of a bequest motive for saving, wealth should begin to fall at some age and that it will continue to fall at all greater ages. A reasonable guess would be that the wealth of retired single men would begin to fall by their 60s or possibly earlier and of retired single women by their early 70s or earlier.

Many studies, however, have found that wealth seems to increase with age in cross section (Lydall 1955; Projector and Weiss 1966; Mirer 1979; Blinder, Gordon, and Wise 1983; Menchik and David 1983). These results have been interpreted to be particularly damaging to the LCH. For example, "Perhaps the most decisive attack on the life-cycle theory of savings came from the direct examination of the wealth-age profile itself" (Kurz 1985).

The cross-sectional findings have stimulated interest in the bequest motive for saving. A common formulation is that lifetime utility depends on consumption and on a bequest (Yaari 1965). The consumer chooses $\{c_t\}$ to maximize

$$\int_0^N u(c_t)e^{-\rho t} a_t dt + \int_0^N V(w_t)e^{-\rho t} m_t dt, \tag{2}$$

in which $V(\cdot)$ is the utility from a bequest. The first-order conditions imply

$$u_t = u_{t+h}\frac{a_{t+h}}{a_t}e^{h(r-\rho)} + \int_t^{t+h} V_s e^{(s-t)(r-\rho)}\frac{m_s}{a_t}ds, \tag{3}$$

in which V_s (> 0) is the marginal utility of a bequest. Comparison of (3) and (1) shows that for given u_{t+h}, u_t will be larger with a bequest motive for saving than without a bequest motive and that the path of marginal utility will therefore be flatter. Thus, the bequest motive will flatten the consumption path and could even cause it to rise. A flatter consumption path leads to a flatter wealth path, and, depending on the form of the bequest utility function and the initial conditions, wealth could increase with age (Hurd 1989). Of course, because the bequest motive means that wealth enters the utility function (2), it follows almost directly that more wealth will be held.

Although the observation that wealth seems to increase with age in cross section was an important motivation for interest in the bequest motive, as an empirical matter it appears that the observation was itself incorrect. Table 5.1 has cross-sectional wealth profiles from four data sets, normalized so that wealth is 1.0 at ages 55–64 (Hurd 1990). The table shows that, in cross section, wealth falls with age, as required by the LCH. Just why these results differ from previous results is not clear. One explanation is that the results in the earlier papers had too much age aggregation (Wolff 1988): combining the older age intervals into one interval 65 and older can cause wealth to seem to increase with age in some of the data sets.

However, whether wealth seems to increase in cross section is practically irrelevant for assessing the LCH because of the difficulties in recovering the wealth paths of individuals (or cohorts) from the cross-sectional age-wealth relation. (1) Because the poor die earlier than the well to do, wealth can rise in cross section even though the wealth holdings of all individuals fall as they age. (2) Each cohort has different lifetime earnings and historical saving experiences that are difficult to account for. (3) In cross section, it is difficult to establish whether individuals are retired. Apparently, these problems with cross-sectional data have empirical content. In panel data, the differences between the cross-sectional wealth paths and the individual wealth paths can be studied: in the National Longitudinal Survey (NLS) "there does not appear to be any systematic differences between cross-section and cohort age-wealth profiles which could be used to correct the cross-sectional profiles" (Jianakoplos, Menchik, and Irvine 1989).

In the RHS, I found annual rates of dissaving of retired individuals and couples of about 3 percent per year excluding housing and about 1.5 percent per year including housing (Hurd 1987). In the NLS of older men, Diamond and Hausman (1984) found rates of dissaving after retirement of about 5 percent per year. Mirer (1980) used a one-year panel from the 1963 and 1964 Federal Reserve wealth surveys to find median rates of dissaving of 1.2 percent per year. These findings are good evidence that the elderly do dissave

Table 5.1 **Relative Bequeathable Wealth by Age**

	Data			
Age	1962 SFCC	1979 ISDP	1983 SCF	1984 SIPP
55–64	1.00	1.00	1.00	1.00
65–69	1.09	.85	1.27	.96
70–74	.96	.81	.84	.79
75–79	.89	.62*	.69	.69[a]
80+	.67	.62*	.52	.69[a]

Sources: 1962 SFCC (Survey of Financial Characteristics of Consumers) and 1983 SCF (Survey of Consumer Finances): Wolff (1988); 1979 ISDP (Income Survey Development Program) and 1984 SIPP (Survey of Income and Program Participation): Radner (1989).

[a]75 and over.

after retirement as required by the LCH, but in view of the high and variable rate of inflation during the 1970s we need studies based on data from the 1980s before we can be confident of the empirical facts.

Dissaving by the elderly is consistent with the LCH, but it is also consistent with the LCH augmented by a bequest motive, which does not rule out dissaving. However, many have argued that, even though the elderly may dissave, the rate of dissaving is so low that a bequest motive must be important (Bernheim 1987; Modigliani 1986, 1988; Kotlikoff 1988; Kotlikoff and Summers 1988). I find it difficult to assess what the appropriate rate of dissaving should be in the LCH model with mortality risk aversion. Suppose, for example, that the instantaneous utility function is

$$u(C) = \frac{1}{1-\gamma}C^{1-\gamma}.$$

Then

$$\frac{dc_t}{dt}\frac{1}{c_t} = \frac{1}{\gamma}(r - \rho - \frac{m_t}{a_t}).$$

If the risk aversion parameter, γ, is large, consumption will be practically flat. Take that extreme case, and assume a real interest rate of 3 percent and a maximum age of 105. Then wealth at age 85 would be about 65 percent of wealth at age 65, an average rate of dissaving of about 2 percent per year. This is certainly consistent with observed rates of dissaving.[2]

Because the rate of wealth decumulation does not by itself provide any evidence about the importance of a bequest motive for saving, additional information needs to be used to identify its importance. It is reasonable to suppose that parents will have a stronger bequest motive than nonparents (V_s will be larger in [3]). Then, ceteris paribus, they will dissave at a lower rate, and the difference in the rates of dissaving will be a measure of the bequest motive.

In the RHS, the rates of dissaving of parents and nonparents are practically the same whether measured in a way that is almost free of functional form restrictions or in a way that imposes a good deal of functional form (Hurd 1987, 1989). I take this to be good evidence either that the bequest motive is weak for most people or that it is not operable.[3]

5.2 Consumption Paths

Consumption data offer a more promising way to estimate parameters associated with the LCH and to test for the presence of a bequest motive than wealth data: the rate of change of consumption depends directly on current

2. The rate of wealth decumulation increases with age. With less risk aversion than the extreme case, the rate of decumulation predicted by the LCH could be rather small at the younger ages observed in the RHS and NLS.

3. For a discussion of the difference between an operable and an inoperable bequest motive, see Abel (1987).

mortality rates and the degree of risk aversion, whereas the rate of change of wealth depends on the level of consumption, which depends on the entire time path of mortality rates. The importance of annuities (mainly Social Security) further complicates estimates based on wealth: they enter the utility maximization problem as a flow, not a stock of wealth. Because the optimal level of the consumption path depends on the entire path of annuities, the rate of change of wealth depends on the entire time path of annuities. However, the rate of change of consumption does not depend on annuities as long as a boundary condition on wealth is not binding. This greatly simplifies estimation.

Consider the utility maximization problem of (2) but with the modified equation of motion of wealth:

$$dw_t/dt = rw_t - c_t + A_t,$$

where w_t is bequeathable wealth and A_t is the flow of annuity income. Annuities are important for the elderly: in 1986, 57 percent of the elderly (age 65 and over) received more than half their money income from Social Security.

If $w_t > 0$, the solution to the utility maximization problem is given in (3); if $w_t = 0$, $c_t = A_t$. Therefore, the LCH predicts that, if $w_t > 0$, consumption will eventually decline with age. The bequest motive predicts that individuals with a strong bequest motive will have a more slowly declining consumption path than individuals with a weak bequest motive.

5.3 Consumption Data in the RHS

The RHS has direct measures of the following categories of consumption: food purchased in grocery stores, food from vendors and home delivery, food purchased away from home, nonfood items purchased in grocery stores, gifts and donations, recreation and membership fees, and gasoline and other transportation expenses (but excluding automobile purchases). I estimate that the covered categories comprise about 34 percent of total consumption by the elderly.[4] To avoid ambiguity, I will refer to the sum of the covered categories as RHS consumption.

Table 5.2 has some food consumption statistics from the six years of the RHS. These numbers are supposed to show measures of weekly food consumption in current dollars, but they are not interpretable and appear to be of no value for analysis. Case-by-case study of the household data, however, showed systematic coding errors. Detection and correction of the errors was a considerable part of the effort of this paper.

4. This estimate comes from the consumption distribution by the elderly in the 1972–73 Consumer Expenditure Survey (CES) (Boskin and Hurd 1985). The covered categories would be a larger fraction of out-of-pocket expenditures because the CES data include an imputed value of owner-occupied housing consumption, which is about 20 percent of total consumption.

Table 5.2 **Food Consumption**

Year	Mean	Median	Maximum	Minimum
1969	18.8	16	103	0
1971	1,289.6	1,200	7,500	0
1973	36.0	20	3,500	0
1975	2,722.2	2,500	50,000	0
1977	29.1	25	200	0
1979	33.5	30	400	0

Source: Author's calculations from the RHS.

Table 5.3 has some typical examples of the consumption data. Three households in the RHS (Households 1, 85, and 89) were chosen to illustrate the source of the data problems found in the food consumption data. The top panel for Household 1 has missing values in 1969–73 because the household did not retire until after 1973. The RHS has three measures of food consumption: "usual" (amount usually spent in grocery stores and on food from vendors and deliveries in a week), "general" (amount spent on food including nonfood items in general stores last week, excluding vendors and deliveries), and "foodentr" (amount actually spent on food last week including vendors and deliveries; in 1969, "foodentr" is missing for all households). I developed an algorithm for choosing among them; the algorithm aimed at selecting the measure closest to "normal" food consumption. In 1975, "usual" consumption was missing (9999998), so "general" was used with the appropriate adjustment for differences in coverage. Total consumption of Household 1 was estimated to be $4,319. In 1977, "gastran" was missing, so total consumption was missing. In 1979, "usual" was again missing; total consumption was estimated to be $90.

Obviously, there are several data problems. Data are missing in some consumption categories such as "gastran" (amount spent on gasoline and transportation not including automobile purchases) for Household 1, "donation," "memberfee," "recreation," and "gift" for Household 85 in 1973, and all 1973 data for Household 89. A more serious data problem is the extreme variation in some consumption categories and the incredible consumption levels in some years. For example, Household 1 appears to have consumed $4,319 per week in 1975 and $90 per week in 1979. Close examination of the panel data at the household level revealed that the following categories were recorded in cents, rather than in dollars, as was called for the code book:

1971: purchased from grocery stores and *general* stores last week;
food from a grocery store last week;
nonfood from a grocery store last week;
food from a *vendor* last week;
food from a *delivery* last week;

Table 5.3 Consumption by Detailed Category

A. Household 1

	Year					
	1969	1971	1973	1975	1977	1979
1. Raw data:						
usual				9999998	35	9999998
general				3,500	38	55
nonfood				0	0	5
foodentr				4,300	43	50
vendr				800	5	0
delivery				0	0	0
dinsnack				0	0	0
donation				1	0	1
memberfee				0	0	0
recreation				0	0	1
gift				10	8	16
gastran				8	9,999,995	16
consumption				4,319		90
2. Impute:						
usual				9999998	35	9999998
general				3,500	38	55
nonfood				0	0	5
foodentr				4,300	43	50
vendr				800	5	0
delivery				0	0	0
dinsnack				0	0	0
donation				1	0	1
memberfee				0	0	0
recreation				0	0	1
gift				10	8	16
gastran				8	12	16
consumption				4,319	56	90
3. Rescale and impute:						
usual				9999998	35	9999998
general				35	38	55
nonfood				0	0	5
foodentr				43	43	50
vendr				8	5	0
delivery				0	0	0
dinsnack				0	0	0
donation				1	0	1
memberfee				0	0	0
recreation				0	0	1
gift				10	8	16
gastran				8	12	16
consumption				62	56	90
4. Deflate by CPI:						
usual				9999998	21	9999998
general				24	23	28

Table 5.3 (continued)

A. *Household 1*

	Year					
	1969	1971	1973	1975	1977	1979
nonfood				0	0	3
foodentr				29	26	25
vendr				5	3	0
delivery				0	0	0
dinsnack				0	0	0
donation				1	0	1
memberfee				0	0	0
recreation				0	0	1
gift				7	5	8
gastran				5	6	8
consumption				42	33	45
5. Deflate by detailed price index:						
usual				9999998	20	9999998
general				22	21	25
nonfood				0	0	2
foodentr				27	24	23
vendr				5	3	0
delivery				0	0	0
dinsnack				0	0	0
donation				1	0	1
memberfee				0	0	0
recreation				0	0	1
gift				7	5	8
gastran				5	6	8
consumption				40	31	43

B. Household 85

	Year					
	1969	1971	1973	1975	1977	1979
1. Raw data:						
usual	0	9999998	40	7,000	9999998	9999998
general	40	3,000	35	6,000	50	25
nonfood	10	200	5	0	0	0
foodentr		4,100	35	6,700	70	25
vendr	5	1,000	5	700	20	0
delivery	4	300	0	0	0	0
dinsnack	5	3	6	7	7	3
donation	6	1		3	3	1
memberfee	0	0		0	0	0
recreation	0	0		0	0	0
gift	1	1		3	2	6
gastran	5	5	19	5	10	0
consumption	67	4,310		7,018	92	35

(*continued*)

Table 5.3 (continued)

B. Household 85

	Year					
	1969	1971	1973	1975	1977	1979
2. Impute:						
usual	0	9999998	40	7,000	9999998	9999998
general	40	3,000	35	6,000	50	25
nonfood	10	200	5	0	0	0
foodentr		4,100	35	6,700	70	25
vendr	5	5	5	700	20	0
delivery	4	300	0	0	0	0
dinsnack	5	3	6	7	7	3
donation	6	1	2	3	3	1
memberfee	0	0	0	0	0	0
recreation	0	0	0	0	0	0
gift	1	1	2	3	2	6
gastran	5	5	19	5	10	0
consumption	67	3,315	75	7,018	92	35
3. Rescale and impute:						
usual	0	9999998	40	70	9999998	9999998
general	40	30	35	60	50	25
nonfood	10	2	5	0	0	0
foodentr		41	35	67	70	25
vendr	5	10	5	7	20	0
delivery	4	3	0	0	0	0
dinsnack	5	3	6	7	7	3
donation	6	1	2	3	3	1
memberfee	0	0	0	0	0	0
recreation	0	0	0	0	0	0
gift	1	1	2	3	2	6
gastran	5	5	19	5	10	0
consumption	67	53	75	88	92	35
4. Deflate by CPI:						
usual	0	9999998	33	48	9999998	9999998
general	40	27	29	41	30	13
nonfood	10	2	4	0	0	0
foodentr		37	29	46	42	13
vendr	5	9	4	5	12	0
delivery	4	3		0	0	0
dinsnack	5	2	5	5	4	2
donation	6	1	2	2	2	1
memberfee	0	0	0	0	0	0
recreation	0	0	0	0	0	0
gift	1	1	1	2	1	3
gastran	5	5	16	3	6	0
consumption	67	48	61	60	55	18
5. Deflate by detailed price index:						
usual	0	9999998	31	43	9999998	9999998
general	40	27	27	37	28	11

Table 5.3 (continued)

B. Household 85

	Year					
	1969	1971	1973	1975	1977	1979
nonfood	10	2	4	0	0	0
foodentr		38	27	42	39	11
vendr	5	9	4	4	11	0
delivery	4	3	0	0	0	0
dinsnack	5	2	5	4	4	2
donation	6	1	2	2	2	1
memberfee	0	0	0	0	0	0
recreation	0	0	0	0	0	0
gift	1	1	1	2	1	3
gastran	5	5	19	3	6	0
consumption	67	49	62	56	52	17

C. Household 89

	Year					
	1969	1971	1973	1975	1977	1979
1. Raw data:						
usual	0	14		1,400	9999998	9999998
general	10	1,200		1,200	13	14
nonfood	2	60		0	2	2
foodentr		1,140		1,200	11	12
vendr	0	0		0	0	0
delivery	0	0		0	0	0
dinsnack	0	0		92	1	1
donation	0	0		0	1	1
memberfee	0	0		0	0	0
recreation	0	0		0	0	0
gift	1	1		0	1	1
gastran	1	1		0	0	0
consumption	12	77		1,494	15	17
2. Impute:						
usual	0	14		1,400	9999998	9999998
general	10	1,200		1,200	13	14
nonfood	2	60		0	2	2
foodentr		1,140		1,200	11	12
vendr	0	0		0	0	0
delivery	0	0		0	0	0
dinsnack	0	0		92	1	1
donation	0	0		0	1	1
memberfee	0	0		0	0	0
recreation	0	0		0	0	0
gift	1	1		0	1	1
gastran	1	1		0	0	0
consumption	12	77		1,494	15	17

(*continued*)

Table 5.3 (continued)

B. Household 85						
	Year					
	1969	1971	1973	1975	1977	1979
3. Rescale and impute:						
usual	0	14		14	9999998	9999998
general	10	12		12	13	14
nonfood	2	1		0	2	2
foodentr		11		12	11	12
vendr	0	0		0	0	0
delivery	0	0		0	0	0
dinsnack	0	0		92	1	1
donation	0	0		0	1	1
memberfee	0	0		0	0	0
recreation	0	0		0	0	0
gift	1	1		0	1	1
gastran	1	1		0	0	0
consumption	12	17		108	15	17
4. Deflate by CPI:						
usual	0	13		10	9999998	9999998
general	10	11		8	8	7
nonfood	2	1		0	1	1
foodentr		10		8	7	6
vendr	0	0		0	0	0
delivery	0	0		0	0	0
dinsnack	0	0		63	0	0
donation	0	0		0	0	0
memberfee	0	0		0	0	0
recreation	0	0		0	0	0
gift	1	1		0	1	1
gastran	1	1		0	0	0
consumption	12	15		73	9	8
5. Deflate by detailed price index:						
usual	0	13		9	9999998	9999998
general	10	11		7	7	6
nonfood	2	1		0	1	1
foodentr		10		7	6	6
vendr	0	0		0	0	0
delivery	0	0		0	0	0
dinsnack	0	0		59	0	0
donation	0	0		0	0	0
memberfee	0	0		0	0	0
recreation	0	0		0	0	0
gift	1	1		0	1	1
gastran	1	1		0	0	0
consumption	12	16		68	9	8

Source: Author's calculations from the RHS.

1975: usually spent on food in a week;
purchased from grocery stores and *general* stores last week;
food from a grocery store last week;
nonfood from a grocery store last week;
food from a *vendor* last week;
food from a *delivery* last week;

These coding errors were systematic, common to all households. In addition, in 1973 the food consumption data of some observations (but not all observations) were entered in cents. This is apparent from the maximum food consumption entry for 1973 (3,500) given above.

Missing values in the small categories of consumption were imputed by geometric interpolation between adjacent years or by backcasting or forecasting for end-point years. An example is the imputation of $12 for "gastran" for Household 1 in 1977. Because food consumption is about 60 percent of RHS consumption, no imputation in a particular year was made if food consumption was missing in all of its three forms in that year: RHS consumption for that household was entered as missing. The second panel shows the results of imputation and the third panel the results of both imputation and of rescaling the categories that were recorded in cents. Household 89 illustrates that no imputation is made when food consumption is missing. At this point, the data are recorded in current dollars per week.

The fourth panel has consumption measured in real dollars when the deflator is the CPI. The consumption by Household 1 is at reasonable levels but has considerable year-to-year variation due to low consumption in 1977. Examination of the individual components, however, does not reveal any that are obviously in error. Household 85 has fairly smooth consumption except for 1971 and 1979. Between 1977 and 1979, one of the spouses died, so the 1979 data will not enter any data sets based on constant household composition over two-year periods. For 1971, it is not obvious from inspection of the components which, if any, are recorded with error. Household 89 has declining consumption except in 1975. It seems probable that "dinsnack" (dinners and snacks purchased outside the home) is observed with considerable error, although it is certainly possible that in the month surveyed the household had some dinners in expensive restaurants. In any event, there is no systematic error in "dinsnack" common to all observations in 1975 that could be identified and corrected.

Some of the components of consumption were observed in the work preceding the survey, some are monthly averages (converted to weekly amounts), and some are annual averages. Prices were changing rapidly during some years of the RHS: if all the components of consumption were deflated by the CPI, considerable mismeasurement could arise simply from the timing of the measurement. Furthermore, the relative prices of some of the RHS components changed over the ten years. These considerations led to the use of monthly or annual deflators of the individual components of consumption depending on the time period over which the consumption component is defined. Table 5.4 shows the deflators and the time period of measurement. For example, "food at home" was measured for the week preceding the survey (in April), so the April food index was used as the deflator. "Gasoline" was measured on a monthly basis in 1973, so the March deflator was used. But in 1977 annual expenditure was measured, so the annual (1978) deflator was used.

These deflators can be used to define a Laspeyres price index for the consumption components of the RHS that can be compared with the CPI. Table 5.5 has the ratio of the CPI to the RHS deflator. The ratio of indices was roughly constant between 1969 and 1973, and again between 1975 and 1979, but at a different level. This was due to higher inflation rates in food and gasoline than in the other components of the CPI. For example, between 1973 and 1975, the food price index increased by 26 percent, whereas the CPI increased by just 21 percent. Between 1973 and 1979, the gasoline price index increased by 13 percent and the CPI by 61 percent. The ratio shows that deflating by the CPI could introduce mismeasurement of the changes in consumption that are systematically as large as any actual average changes. Therefore, to find the changes in real consumption of the components in the RHS, I deflated each component by the detailed price indices given in table 5.4.

Estimated consumption of Households 1, 85, and 89 are shown in the last

Table 5.4 Components of Detailed Price Index and CPI

Year	Food at Home	Date	Food away from Home	Date	Gasoline	Date	Recreation	Date	CPI	Date
1971	1.09	2	1.14	1	.96	2	1.10	3	1.10	3
1973	1.28	2	1.24	1	1.03	1	1.15	2	1.21	3
1975	1.61	2	1.57	1	1.50	2	1.40	3	1.47	3
1977	1.78	2	1.79	1	1.74	3	1.54	3	1.65	3
1979	2.18	2	2.18	1	2.44	3	1.73	3	1.98	3

Note: Date: 1 = March price index (monthly consumption was reported); 2 = April price index (weekly consumption was reported); 3 = annual average price index (annual consumption was reported).

Table 5.5 Ratio of the CPI to the Detailed Price Index

Year	Ratio
1969	1.000
1971	1.017
1973	.983
1975	.945
1977	.961
1979	.939

Source: Author's calculations from the RHS.

panel of table 5.3. Comparison of panels 4 and 5 shows that in most years the consumption levels do not depend greatly on the deflator. However, year-to-year consumption changes can be rather different: in panel 4 of Household 89, consumption fell by 2 percent between 1973 and 1975 according to CPI-deflated consumption but by 10 percent according to the RHS-index-deflated consumption measure.

The composition of RHS consumption deflated by the CPI is given in table 5.6 and deflated by the detailed price indices in table 5.7. Although the fractions in most categories are stable over time, the fractions spent on gasoline and food varied substantially regardless of which deflator was used. I imagine that this is at least partly caused by the difficulty of measuring real consumption during periods of high and varying inflation. Certainly, I would have more confidence that the variation in consumption in the RHS is a good indicator of variation in total consumption if the components of consumption in tables 5.6 and 5.7 had more stability.

The composition of consumption in tables 5.6 and 5.7 gives little guidance in choosing between the two deflators. For most of the rest of the paper, I use the detailed indices, but the basic results of the paper are unchanged if the CPI is used as the deflator.

An independent assessment of the reasonableness of the consumption mea-

Table 5.6 **Composition of Consumption in Percentages: Components Deflated by CPI**

Year	food	nonfood	donation	memberfee	recreation	gift	gastran	Total
1969	64	9	6	1	2	6	11	100
1971	63	8	7	1	2	6	12	100
1973	60	8	7	1	1	6	17	100
1975	66	8	8	1	2	7	7	100
1977	62	9	8	2	2	7	10	100
1979	62	9	8	1	1	8	11	100

Source: Author's calculations from the RHS.

Table 5.7 **Composition of Consumption in Percentages: Components Deflated by Detailed Price Index**

Year	food	nonfood	donation	memberfee	recreation	gift	gastran	Total
1969	59	8	6	1	2	6	18	100
1971	62	8	7	1	2	6	14	100
1973	64	8	8	1	2	7	10	100
1975	65	8	9	1	2	8	8	100
1977	60	9	9	2	2	7	12	100
1979	56	9	8	1	2	8	15	100

Source: Author's calculations from the RHS.

sure can be found as follows. In the 1972–73 Consumer Expenditure Survey (CES), about 17.4 percent of total expenditures were for food at home among the elderly in the relevant age range. If this percentage of income were spent by the 1978 RHS households (excluding earnings), weekly food consumption at home would have been about \$29.50. This compares with the cross-sectional average (1977 and 1979) of measured food consumption at home of \$31.30.

5.4 Changes in Consumption

If the measured components of consumption are normal goods, the components will fall when total consumption falls. Under that assumption, the direction of the change in total consumption can be found by studying changes in measured consumption.[5] Table 5.8 has average consumption (in 1969 dollars) by marital status for each of the initial two-year periods in the RHS. An observation is used in the calculation for a particular year if it has complete data for that year and for the second following year and if household composition remains constant over the two years. Thus, there is no control for composition: households may enter the sample at retirement, yet they may leave the sample in some other year because of missing values or change in marital status.[6] The table shows generally falling consumption each year, which indicates that, in cross section, consumption falls with age. As would be expected, consumption by couples is greater than by singles, about 77 percent greater on average. In this comparison, there is no control for economic resources that are much larger among couples.

Table 5.9 has consumption changes that hold composition constant. An observation enters one of the two-year data sets if household composition did not change during the two-year period, if the household was retired (defined to be no earnings during the remainder of the panel), and if there were no missing values.[7] Other conditions are given at the bottom of the table. The entries are

$$\frac{\Sigma(C_2 - C_0)}{\Sigma C_0},$$

which is robust against random observation error. The table shows declining consumption in each two-year period for both couples and singles. The declines are not at all constant, especially between 1973 and 1975. I imagine

5. If, in addition, the indifference curves are homothetic and relative prices are constant, the percentage change in the components of consumption gives the percentage change in total consumption. This is the implicit assumption of Hall and Mishkin (1982) and Bernanke (1984).

6. In addition, sixty-nine observations were deleted because consumption changed by more than \$100 over two years. The effects of excluding these outliers will be discussed below in connection with tables 5.10 and 5.11.

7. Except for food consumption, some of the other consumption values may have been imputed.

Table 5.8 **Cross-Sectional Consumption (dollars per week)**

	Singles			Couples		
Year	Mean	SE	*N*	Mean	SE	*N*
1969	23.59	1.07	406	44.00	1.58	233
1971	23.31	.93	482	41.13	1.59	234
1973	23.55	.79	663	42.75	.88	485
1975	20.13	.39	918	35.80	.59	882
1977	20.83	.34	1,175	37.05	.50	1,180

Source: Author's calculations from the RHS.
Note: Consumption in 1969 dollars.

Table 5.9 **Consumption Change by Two-Year Periods (fraction of initial consumption)**

Years	All	Couples	Singles
1969–71	−.02	−.02	−.02
	(649)	(237)	(412)
1971–73	−.05	−.05	−.06
	(728)	(237)	(491)
1973–75	−.21	−.21	−.21
	(1,166)	(492)	(674)
1975–77	−.03	−.05	−.00
	(1,818)	(892)	(926)
1977–79	−.06	−.06	−.05
	(2,366)	(1,187)	(1,179)
All	−.38	−.39	−.35
	(6,727)	(3,045)	(3,682)

Source: Author's calculations from the RHS.
Note: Number of observations is in parentheses. In this data set there are no children in house; no human capital; no farmers; no marital status change in two adjacent years; no missing value in consumption in two adjacent years; no missing value in wealth in two adjacent years. The data set is indexed by detailed price index to 1969 dollars.

that this is due to the difficulty of measure gasoline and food consumption accurately during those years. This view is supported by the budget shares in tables 5.6 and 5.7. The last line of table 5.9 gives the estimated ten-year decline in consumption. It is just the sum of the two-year changes. The rate of decline is about 4 percent per year for couples and 3.5 percent for singles.

The finding of falling consumption in the panel data holds if the CPI is used to deflate all the components of consumption that are in RHS consumption: the total decline in consumption is estimated to be 31 percent for couples and 26 percent for singles.

Detailed examination of the data at the individual level showed a number of outliers. Table 5.10 has some examples. Households 2577 and 3394 have ex-

Table 5.10 **Households with Large Changes in Consumption**

A. Household 1

	Year					
	1969	1971	1973	1975	1977	1979
1. Household 2577:						
usual	35	9999998	9999998	10	34	46
general	50	37	39	31	28	41
nonfood	5	5	4	0	6	6
foodentr		34	38	33	28	41
vendr	6	2	3	2	6	6
delivery	0	0	0	0	0	0
dinsnack	0	0	6	12	4	4
donation	9	9	8	7	3	3
memberfee	0	0	0	0	0	0
recreation	17	1	3	8	0	0
gift	4	7	6	5	5	7
gastran	6	7	10	438	7	12
consumption	75	62	74	479	57	79
2. Household 3093:						
usual			9999998	9999998	9999998	11
general			19	124	11	0
nonfood			0	1	2	1
foodentr			19	11	10	0
vendr			0	0	0	0
delivery			0	0	0	0
dinsnack			0	0	0	3
donation			0	0	0	0
memberfee			0	0	0	0
recreation			0	0	0	0
gift			1	2	1	1
gastran			0	1	0	0
consumption			21	127	13	18
3. Household 3394:						
usual	24	9999998	9999998	16	11	9
general	20	23	19	9	14	14
nonfood	2	5	2	0	0	0
foodentr		18	19	9	14	14
vendr	0	0	1	0	0	0
delivery	0	0	0	0	0	0
dinsnack	0	0	0	0	0	0
donation	0	3	2	1	0	0
memberfee	0	0	0	0	0	0
recreation	0	0	0	0	0	0
gift	6	1	2	3	5	1
gastran	4	5	4	539	2	3
consumption	36	32	28	559	18	13
4. Household 3539:						
usual	0	9	9999998	16	11	9999998
general	15	7	16	12	8	14

Table 5.10 (continued)

A. Household 1						
	Year					
	1969	1971	1973	1975	1977	1979
nonfood	0	0	0	1	1	2
foodentr		8	16	12	8	11
vendr	2	0	0	0	0	0
delivery	0	1	0	0	0	0
dinsnack	1	1	2	1	0	1
donation	1	1	1	1	0	0
memberfee	0	0	0	0	0	0
recreation	0	0	0	0	0	0
gift	0	1	1	1	2	2
gastran	1	123	2	0	0	0
consumption	20	135	21	19	13	17
5. Household 3835:						
usual	0	9999998	9999998	9	9999998	9999998
general	10	9	39	16	11	9
nonfood	1	2	4	1	1	0
foodentr		7	35	14	11	9
vendr	0	0	0	0	0	0
delivery	0	0	0	0	0	0
dinsnack	2	3	2	1	1	3
donation	12	9	10	10	6	10
memberfee	0	0	0	0	1	0
recreation	0	1	1	1	0	1
gift	3	9	7	5	6	8
gastran	200	2	15	0	5	5
consumption	228	33	74	29	30	35

Source: Author's calculations from the RHS.

ceptionally large gasoline expenditures in 1975. In that year, actual weekly expenditures were recorded. Those households showed no strong propensity for substantial driving during the other years of the survey; the most plausible explanation is a coding error that recorded expenditures in cents rather than in dollars.[8] Household 3093 apparently generally spent $124 on groceries in 1975, whereas in other years it generally spent about one-tenth as much. In that all entries of "general" in 1975 have already been divided by 100 (under the assumption that they were recorded in cents rather than in dollars), the entry looks like a misplaced decimal point. Gasoline consumption of Household 3539 in 1971 and of Household 3835 in 1969 appears to have been entered in cents rather than in dollars.

8. At $1.00 per gallon (1969 prices) and fifteen miles per gallon, household 2577 would have driven 6,570 miles in a week.

These are typical examples of thirty-one couples and thirty-eight singles whose consumption changed by more than \$100 in absolute value over two adjacent years.[9] Deleting the observations with a change in consumption of more than \$100 in absolute value produces the consumption changes in table 5.11. In line with the previous discussion of the large price changes near 1975, the most observations (eighteen) were deleted in the 1973–75 and 1975–77 data sets. Deleting the observations causes the estimated ten-year decline in consumption to fall from 39 to 28 percent for couples and from 35 to 18 percent for singles. The year-to-year pattern becomes more uneven, and in particular estimated consumption rose between 1971 and 1973 and between 1975 and 1977. Nonetheless, the overall conclusion is that consumption declined as the households aged, as required by the LCH.

Imputing the small categories of consumption changes somewhat the year-to-year pattern of the change in consumption but does not alter the overall conclusions of declining consumption. Consider table 5.12, which compares consumption changes calculated over all observations with changes calculated only over observations with no imputations. (Comparisons cannot be made for the years 1971–73 and 1973–75 because all observations had imputations in 1973.) About 33 percent of couples and 36 percent of singles had at least one imputed value.[10] The total decline in consumption over the years in the table is the same regardless of whether observations with imputed values are included or not, even though there is some year-to-year variation in the rate of decline.

I have been writing of consumption as measured in the RHS as if it were total consumption. The conclusion that consumption declines with age is based on the observation that the total of the components in the RHS declines with age. But if, as people age, they change the composition of their consumption, RHS consumption could decline even though total consumption was stable or even rising.[11] A way to test for taste changes associated with aging is to compare the change in consumption of households who have bequeathable wealth with households who have no bequeathable wealth. A condition of utility maximization is that consumption equals annuity income if bequeathable wealth is zero. Therefore, households who have no bequeathable wealth and constant annuity income should have constant consumption. Then, if there is no age effect on the components of consumption, the RHS measure of consumption should be constant.

Table 5.13 shows consumption by singles and couples classified according

9. One household can account for two observations on large changes. For example, household 3394 has a positive change of \$531 from 1973 to 1975 and a negative change of \$541 from 1975 to 1977, accounting for two of the outliers.

10. Again, food consumption is never imputed: if it is missing, the observation is dropped.

11. Of course, the allocation of consumption could change because of price and/or wealth changes. Investigation of changes associated with price and wealth changes will be the subject of future research.

Table 5.11 Consumption Change by Two-Year Periods: Outliers Excluded (fraction of initial consumption)

Years	All	Couples	Singles
1969–71	−.06	−.08	−.04
	(639)	(233)	(406)
1971–73	.04	.06	.03
	(716)	(234)	(482)
1973–75	−.19	−.21	−.17
	(1,148)	(485)	(663)
1975–77	.03	.02	.04
	(1,800)	(882)	(918)
1977–79	−.06	−.07	−.04
	(2,355)	(1,180)	(1,175)
All	−.24	−.28	−.18
	(6,658)	(3,014)	(3,644)

Source: Author's calculations from the RHS.

Note: Number of observations is in parentheses. In this data set there are no children in house; no human capital; no farmers; no marital status change in two adjacent years; no missing value in consumption in two adjacent years; no missing value in wealth in two adjacent years. The data set is indexed by detailed price index to 1969 dollar, and there is no consumption change of more than $100 per week in two years.

Table 5.12 Consumption Change by Two-Year Periods: Effects of Imputation (fraction of initial consumption)

	Couples		Singles	
Years	Not Imputed	Imputed	Imputed	Not Imputed
1969–71	−.07	−.08	−.00	−.04
	(130)	(233)	(242)	(406)
1975–77	.01	.02	.04	.04
	(603)	(882)	(605)	(918)
1977–79	−.08	−.07	−.07	−.04
	(799)	(1,180)	(762)	(1,175)
All	−.13	−.13	−.04	−.04
	(1,532)	(2,295)	(1,609)	(2,499)

Source: Author's calculations from the RHS.

Note: Number of observations is in parentheses.

to whether they had any bequeathable wealth (excluding housing wealth). Those with no wealth were further restricted to those whose only annuity is Social Security, which is taken to be constant. The change in consumption holds composition constant in that it is the average over five two-year periods in each of which composition is constant. As would be expected, those households with no bequeathable wealth consumed less than households with bequeathable wealth. Singles both with and without bequeathable wealth reduced consumption as they aged, but the average rate of reduction was about

Table 5.13 **Test of Age Effects**

	Singles		Couples	
	Zero Wealth	Positive Wealth	Zero Wealth	Positive Wealth
Initial consumption (C_0)	15.54	22.37	22.76	38.68
Second-period consumption (C_2)	14.86	21.55	22.87	36.36
$C_0 - C_2$	.67	.82	−.11	.232
	(.57)	(.20)	(1.77)	(.27)
No. of observations	314	3,330	43	2,971

Source: Author's calculations from the RHS.
Note: Standard errors are in parentheses.

4 percent for both. The null hypothesis that $\Delta c = 0$ cannot be rejected for singles whose bequeathable wealth is zero, but it can be for singles whose bequeathable wealth is not zero. Of course, because of the small sample size, the first test has low power, so this is very weak evidence for no age effect on tastes. Among couples, the sample size is even smaller. Couples who had no bequeathable wealth increased consumption slightly, whereas couples with bequeathable wealth decreased consumption by about 6 percent over a two-period on average. This again offers mild evidence in support of the view that taste changes associated with aging are not the cause of the fall in RHS consumption.

Tests based on the fraction of households with falling consumption produce about the same conclusion as shown by table 5.14. More households who had bequeathable wealth had a fall in consumption than households who did not have bequeathable wealth. The null hypothesis that the probability of a decline in consumption is 0.5 cannot be rejected for households with no bequeathable wealth, but it can be for households with bequeathable wealth. Again, this is mild support for no taste changes with age.[12]

The LCH with a bequest motive implies that a strong bequest motive will flatten the consumption path. Under the assumption that parents have a stronger bequest motive than nonparents, parents should have consumption paths that decline more slowly than nonparents. Table 5.15 has average consumption of singles and couples according to whether the household had children.[13] No children lived in the households. Singles both with and without

12. If the sample for this test is restricted to 1975–79 (Social Security benefits were better indexed over those years), and if the definition of "no wealth" is made either less than $500 or less than $1,000, the same general results are found.

13. Although the RHS has no information on the ages of the children, most were probably in their 30s and 40s.

Table 5.14 **Fraction of Households with a Decline in Consumption**

	Wealth Equals Zero	Wealth Greater Than Zero
Singles	.538	.562
	(.028)	(.009)
Couples	.512	.585
	(.076)	(.009)

Source: Author's calculations from the RHS
Note: Standard errors are in parentheses.

Table 5.15 **Test of Bequest Motive**

	Singles		Couples	
	No Children	Children	No Children	Children
Initial consumption (C_0)	22.72	21.35	37.89	38.58
Second-period consumption (C_2)	21.44	20.76	35.95	36.22
$C_0 - C_2$	1.28	.59	1.93	2.37
	(.34)	(.23)	(.54)	(.30)
No. of observations	1,160	2,484	563	2,451

Source: Author's calculations from the RHS.
Note: Standard errors are in parentheses.

children had declining consumption on average, but the consumption of single parents declined somewhat less. This supports a bequest motive. Couples also had declining consumption, but the parents had the greater decline, which offers no support to the bequest motive. Table 5.16 gives the difference between the consumption change of nonparents (C_{nc}) and the consumption change of parents (C_c) and summarizes this test of the bequest motive. Under the null hypothesis of no bequest motive, the differences should be zero; under the hypothesis of a bequest motive, the differences should be negative. For singles the null hypothesis cannot be rejected, and for couples the statistic has the wrong sign of rejection.

An alternative test is based on the fraction of households with declining consumption. If a bequest motive is important, a smaller fraction of parents than of nonparents should have falling consumption. As shown in the first two columns of Table 5.17, this holds among singles but not among couples. The third column has the differences in the fractions and the standard errors of the differences. Under the null hypothesis of no bequest motive, the differences in the fractions should be zero; under a bequest motive, they should be positive. Although for singles the sign of the difference supports the bequest motive,

Table 5.16 **Test of a Bequest Motive Based on the Difference in Consumption Change**

	$\Delta C_{nc} - \Delta C_c$	
	Singles	Couples
	−.69	.44
	(.41)	(.61)

Source: Author's calculations from the RHS.
Note: Standard errors are in parentheses.

Table 5.17 **Fraction of Households with Declining Consumption**

	No Children	Children	Difference
Singles	.572	.554	.018
	(.015)	(.010)	(.018)
Couples	.568	.587	−.019
	(.021)	(.010)	(.023)

Source: Author's calculations from the RHS.
Note: Standard errors are in parentheses.

the null hypothesis cannot be rejected. For couples the statistic has the wrong sign for rejection.

5.5 Conclusion

When the date of death is unknown, the LCH implies that consumption by individuals of sufficient age will decline with age. If consumption is observed to increase with age, it may simply be that the individuals are not old enough to be on the downward-sloping part of their consumption trajectories. However, it is likely that, at least by the end of the panel, the RHS cohorts were old enough to have declining consumption. If consumption is falling, bequeathable wealth should fall: if it does not, a terminal condition on wealth will be violated. In the RHS, observations on both consumption and wealth are consistent with the LCH in that both are observed to decline after retirement.

While the findings that consumption and wealth decline with age are consistent with the LCH, they are not inconsistent with a bequest motive for saving: the bequest motive (if it is operable) will change the shape and level of the consumption and wealth paths, but they will not necessarily rise. A test for the importance of the bequest motive is based on the assumption that the marginal utility of bequests of a parent is greater than the marginal utility of bequests of a nonparent. This assumption implies that, ceteris paribus, the wealth and consumption paths of a parent should decline more slowly than the wealth and consumption paths of a nonparent. In the RHS, the wealth paths decline at the same rate. The consumption paths of singles show some support for the bequest motive, but, possibly due to low power, the difference in the paths is not statistically significant. The consumption paths of couples show no support for the bequest motive: the rate of decline over a two-year period is about 6 percent for parents and 5 percent for nonparents.

The RHS data on wealth and consumption are consistent with the life-cycle hypothesis of consumption. They offer no support for a bequest motive for saving as an important determinant of consumption behavior.

References

Abel, Andrew B. 1987. Operative Gift and Bequest Motives. *American Economic Review* 77 (5):1037–47.

Bernanke, Ben. 1984. Permanent Income, Liquidity, and Expenditure on Automobiles: Evidence from Panel Data. *Quarterly Journal of Economics* 99 (3):587–614.

Bernheim, B. Douglas. 1987. Dissaving after Retirement: Testing the Pure Life Cycle Hypothesis. In *Issues in Pension Economics*, ed. Zvi Bodie, John B. Shoven, and David A. Wise, 237–74. Chicago: University of Chicago Press.

Blinder, Alan S., Roger H. Gordon, and Donald E. Wise. 1983. Social Security, Bequests and the Life Cycle Theory of Saving: Cross-SectionalTests. In *Income Distribution and Economic Inequality*, ed. Zvi Griliches. New York: Halstead.

Boskin, Michael J., and Michael D. Hurd. 1985. Indexing Social Security Benefits: A Separate Price Index for the Elderly? *Public Finance Quarterly* 13 (4):436–49.

Danziger, Sheldon, Jacques van der Gaag, Eugene Smolensky, and Michael Taussig. 1982. The Life Cycle Hypothesis and the Consumption Behavior of the Elderly. *Journal of Post Keynesian Economics* 5(2):208–27.

Darby, Michael R. 1979. *Effects of Social Security on Income and the Capital Stock.* Washington, D.C.: American Enterprise Institute.

Diamond, Peter A., and Jerry Hausman. 1984. Individual Retirement and Savings Behavior. *Journal of Public Economics* 23:81–114.

Hall, Robert E., and Frederic S. Mishkin. 1982. The Sensitivity of Consumption to Transitory Income: Estimates from Panel Data on Households. *Econometrica* 50 (March):261–81.

Hurd, Michael D. 1987. Savings of the Elderly and Desired Bequests. *American Economic Review* 77 (2):298–312.

———. 1989. Mortality Risk and Bequests. *Econometrica* 57 (4):779–813.

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

Jianakoplos, Nancy A., Paul L. Menchik, and F. Owen Irvine. 1989. Using Panel Data to Assess the Bias in Cross-Sectional Inference of Life-Cycle Changes in the Level and Composition of Household Wealth. In *The Measurement of Saving, Investment, and Wealth*, ed. Robert E. Lipsey and Helen Stone Tice, 533–640. Chicago: University of Chicago Press.

Kotlikoff, Laurence J. 1988. Intergenerational Transfers and Savings. *Journal of Economic Perspectives* 2 (2):41–59.

Kotlikoff, Laurence J., and Lawrence Summers. 1981. The Role of Intergenerational

Transfers in Aggregate Capital Accumulation. *Journal of Political Economy* 89:706–32.
———. 1988. The Contribution of Intergenerational Transfers to Total Wealth: A Reply. In *Modeling the Accumulation and Distribution of Wealth*, ed. Denis Kessler and Andre Masson, 53–67. New York: Oxford University Press.
Kurz, Mordecai. 1985. Heterogeneity in Savings Behavior: A Comment. In *Frontiers of Economics*, ed. K. Arrow and S. Harkapohja, 307–27. Oxford: Blackwell.
Lydall, Harold. 155. The Life Cycle, Income, Saving, and Asset Ownership. *Econometrica* 23:985–1012.
Menchik, Paul L., and Martin David. 1983. Income Distribution, Lifetime Savings, and Bequests. *American Economic Review* 73 (4):672–90.
Mirer, Thad. 1979. The Wealth-Age Relation among the Aged. *American Economic Review* 69:435–43.
———. 1980. The Dissaving Behavior of the Retired Aged. *Southern Economic Journal* 46 (4):1197–1205.
Modigliani, Franco. 1986. Life Cycle, Individual Thrift, and the Wealth of Nations. *American Economic Review* 76 (3):297–313.
——— 1988. The Role of Intergenerational Transfers and Life Cycle Saving in the Accumulation of Wealth. *Journal of Economic Perspectives* 2 (2):15–40.
Projector, Dorothy, and Gertrude Weiss. 1966. *Survey of Financial Characteristics of Consumers*. Washington, D.C.: Board of Governors, Federal Reserve Board.
Radner, Daniel. 1989. The Wealth of the Aged, 1984. In *The Measurement of Saving, Investment, and Wealth*, ed. Robert E. Lipsey and Helen Stone Tice, 645–84. Chicago: University of Chicago Press.
White, Betsy Buttrill. 1978. Empirical Tests of the Life-Cycle Hypothesis. *American Economic Review* 68 (4):547–60.
Wolff, Edward N. 1988. Social Security, Pensions and the Life Cycle Accumulation of Wealth: Some Empirical Tests. *Annales D'Economie et de Statistique* 9:199–226.
Yaari, Menahem E. 1965. Uncertain Lifetime, Life Insurance and the Theory of the Consumer. *Review of Economic Studies* 32:137–50.

Comment Lee A. Lillard

Michael D. Hurd's paper is a continuation of his notable prior work on consumption and saving at the end of the life cycle. In that work, Hurd thoroughly explored the basic life-cycle model, in which an individual's lifetime utility depends on the path of consumption and on bequests.[1] Empirically, that prior research focused on assets and changes in assets at the end of the life cycle to test the predictions of this basic model using the panel data on assets from the Retirement History Survey (RHS). The primary contribution of this current research is to test the robustness of his previous results further using the consumption data, rather than the asset data, from the RHS. I will begin

Lee A. Lillard is senior economist and director of the Center for Aging Studies at the Rand Corporation.

1. See Michael D. Hurd, "Savings of the Elderly and Desired Bequests," *American Economic Review* 77, no. 3 (June 1987): 298–312, and "Mortality Risk and Bequests," *Econometrica* 57, no. 4 (1989): 779–813.

with comments on this current effort and then suggest areas for further theoretical and empirical enhancements of the model.

As Hurd suggests, the simple life-cycle model, with or without a bequest motive, has additional predictions about the rate of change of consumption that may be directly tested with time series of individual consumption values. A critical question is whether the RHS consumption data are worthy of this level of detailed examination. A substantial portion of the paper is devoted to a discussion of the measurement problems encountered in the various consumption items composing the observed consumption data. These problems include missing data in certain items for some individuals, alternative measures of items, systematic coding errors, purely random errors of measurement or reporting, and detection of extreme outliers. I think that Hurd has done a heroic job of addressing these problems, making imputations where necessary, and analyzing the resulting data. But one is ultimately left to wonder whether all the problem cases have been detected and solved, and what the implications are of all the various assumptions underlying the adjustments.

Even if the observed consumption data were error free, a potentially serious fault with the data is the fact that, as noted by Hurd, these covered consumption categories all together account for only about 34 percent total consumption. This is a rather small portion. The proportion of consumption accounted for by food, nonfood grocery items, gifts and donations, and gasoline and transportation may change systematically with age, with changes in health status, or with changes in the price of these goods relative to the prices of the unmeasured components. Biases could go either way. For example, as health deteriorates (on average) with age, total consumption may rise as medical expenditures increase, but consumption of the measured items may decline as individuals substitute away from, say, gifts and transportation, and therefore the measured components of consumption understate the change in total consumption. Alternatively, the relative prices of the measured items may have fallen, and therefore measured changes in consumption understated life-cycle changes.

Hurd has done a remarkably good job of analyzing inherently weak data. It is something that should be done because it does complement prior results, but the bottom line is that one is left with some uncertainty about the strength of the conclusions.

Let us turn to some potentially fruitful areas for further development of the theoretical and empirical models. These are not direct criticisms of Hurd's current effort but rather directions that the literature in general might take.

There are two major shortcomings of the theoretical model as it currently stands—the basic life-cycle consumption model with a bequest motive. One is the omission of health as a factor. It is widely recognized that health and medical care expenditures are important considerations of elderly individuals (not to mention government agencies), even within the age range of the RHS.

Recent evidence suggests that utility functions depend on health status.[2] So changes in health status with age may change both the level of consumption and its composition. In addition, potential changes of health status, and the resulting medical costs, pose an important source of uncertainty for elderly individuals, uncertainty that provides an additional motive for saving and thus may affect consumption even while those individuals are healthy.

A second omission of the theoretical and empirical models is consideration of how couples differ from single individuals. The life-cycle model is developed for an individual. Couples face two survival functions, one for the husband and one for the (usually younger) wife. Life-cycle consumption patterns should depend on both survivor functions and should account for both consumption by the widow(er) until death and the implied delay of any bequest. In the empirical implementation, couples are treated as if they were to follow the predictions of the life-cycle model developed for an individual. The predictions may be the same, but that is unclear. In any case, other testable predictions should emerge.

Empirically, the analysis relies on various forms of a simple difference in consumption between two time periods (surveys two years apart), the issue being whether consumption declines with age (for the age group represented in the RHS). First, this barely begins to exploit the richness of the panel data in the RHS, which includes up to six points in time (although fewer points after individuals retire from the labor force, as required by Hurd). Consumption changes for "pairs of adjacent years" are included whenever both years are eligible (e.g., no change in marital status, neither year's consumption is missing), and all eligible pairs of years are used. This might include more than one consumption change for a married couple or for a single person. These pairs of observations may not be independent, especially if they include a common consumption value (it was not clear whether this occurred). Some way of linking observations to exploit the full panel may be informative—such as dealing with measurement error explicitly and thus potentially improving the tests for declining consumption and for the bequest motive.

Additionally, the consumption change data might include an observed change for a married couple and an observed change for the surviving "single" widow(er) if either member of the couple dies. One may be able to exploit these changes in marital status, and other aspects of the panel, to study differences in the behavior of couples versus singles.

2. See W. Kip Viscusi and William N. Evans, "Utility Functions That Depend on Health Status: Estimates and Economic Implications," *American Economic Review* 80, no. 3 (June 1990): 353–74.