NBER WORKING PAPER SERIES

LIFE-CYCLE EFFECTS ON CONSUMPTION AND RETIREMENT

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Working Paper No. 976

NATIONAL BUREAU OF ECONOMIC RESEARCH
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September 1982

Professor of Economics, Michigan State University, and research associate, NBER. The work reported in this paper was supported by the National Science Foundation under grant DAR-8008458. I am indebted to Lee Cronbach for providing the data used in Section III, to Alan Blinder, Paul Menchik, Olivia Mitchell, Robert Moffitt, John Wolfe, and to participants in seminars at Cornell, Michigan State, Wisconsin and the NBER for helpful suggestions, and to Paul Wendt for research assistance. The research reported here is part of the NBER's research program in Labor Studies. Any opinions expressed are those of the author and not those of the National Bureau of Economic Research.

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ABSTRACT

The effects on consumption and retirement of characteristics of the life cycle, especially the length of the horizon, are examined. At any given age people will work more and consume less if they expect to live longer. This and other propositions are tested on several sets of data. The Terman sample of gifted individuals (320 in 1972, 228 in 1977) is used to relate work status to the length of the horizon, as proxied by parents' longevity. The results suggest the expected positive effect on effort, but its magnitude is quite small. The panel from the Retirement History Survey is used, and life-cycle effects on consumption and retirement are estimated jointly for 1973 and 1975. There is a weak small effect of a more distant horizon (proxied by the number of living parents) in increasing work effort and a stronger, but still fairly small effect in reducing consumption; goods and leisure are consumed jointly, suggesting their complementarity in household production; and spending propensities out of Social Security wealth are far below those out of pension wealth. The small effect of changes in the horizon on work effect suggests the rapid secular increase in longevity has produced a disproportionate increase in people's lifetime demand for leisure. The implied small increase in lifetime income and the slight reduction in consumption among persons with longer horizons indicate that increased longevity has not been met with sufficient spending cuts to enable people to maintain real consumption over their longer lifetimes.

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I. Introduction

There has been a boom in empirical research on life-cycle models of choice about consumption and labor supply. Yet with very few exceptions (Feldstein, 1977, and Skinner, 1981) these studies exclude variables that even implicitly represent such crucial life-cycle factors as length of horizon, number and spacing of children, other family members who must be supported, etc. This study attempts to remedy these defects by adding such life-cycle measures to empirical models of consumption and labor supply of older workers, a group for which such variables may be especially important.

I examine here whether there are differences in the propensity to retire among individuals with different life expectancies. If so, we may infer that the tremendous increases in life expectancy that have occurred have led to lower labor force participation rates among older persons (because there are more very old people).[1/] This finding should carry over into the consumption function: People with greater expected lifetimes should consume less, other things equal, if they choose to consume most of that greater lifetime as leisure.

Most recent empirical work on life-cycle behavior has concentrated on savings (or asset accumulation) and retirement separately; I consider consumption and retirement decisions jointly for several reasons.[2/] Information on current saving in the available micro data sets appears to be subject to very large errors. Also, the social insurance programs whose effects provide much of the impetus for recent empirical work on life-cycle models are aimed at maintaining consumption (Hamermesh, 1982a); that being the case, it seems worthwhile to examine consumption directly rather than to make inferences about the need for such programs by looking at asset holdings. Finally, jointness in decisions about goods consumption and labor supply is implicit in the theory of household production; the analysis of what determines these choices should thus be aided by considering this jointness in empirical work.

Section II below provides the motivation for the empirical work with a brief derivation of how the horizon affects choices about consumption and retirement. Section III examines retirement choices in the Terman sample of gifted individuals, while Section IV reports on estimates of consumption functions and labor supply using data from the Social Security Administration's Retirement History Survey. These two data sets are the only ones available that include information on consumption and/or labor supply along with data that allow us to form proxies for the respondent's horizon.

II. The Horizon, Wealth and Optimal Consumption and Labor Supply

Let the typical individual maximize discounted lifetime utility over goods consumption, C, and fraction of time spent at leisure, L:

$$\int_0^T U\,[C(t),\ L(t)]\ e^{-\rho t}dt, \tag{1}$$

where ρ is the rate of time preference. He faces a lifetime wealth constraint:

$$We^{rT} + w\int_0^T [1-L(t)]e^{r[T-t]}\ dt \ = \ B + \int_0^T C(t)\ e^{r[T-t]}\ dt, \tag{2}$$

where W is initial wealth, B is a planned bequest, w is the wage rate and r the real rate of interest. Let:

$$U = \frac{kC^{n+1}}{n+1} + \frac{akL^{n+1}}{n+1} ,$$

where a, k, n > 0 are parameters. Then the first-order conditions for maximizing (1) subject to (2) are:

$$kC^n e^{-\rho t} + \lambda e^{r[T-t]} = 0; \tag{3}$$

$$akL^n e^{-\rho t} + \lambda w e^{r[T-t]} = 0; \tag{4}$$

and (2), where λ is a Lagrangean multiplier indicating the increment to lifetime utility of another dollar of, for example, initial wealth, and I have dropped the t indexes from C and L.

Solving (2)-(4) for C and L in terms of the parameters of the utility function, W, w, B, ρ and r, yields:

$$C = \delta e^{-\delta t}[We^{rT}-B]/[1-e^{-\delta T}]\left(1-w[1-(1/a)^{1/n}]\right), \tag{5}$$

where $\delta = [r-\rho]/n$, and:

$$L = [\frac{1}{a}]^{1/n} C . \tag{6}$$

One can demonstrate, albeit messily, that $\partial C/\partial T < 0$; since $\frac{1}{a} > 0$, $\partial L/\partial T < 0$ also. Given the same wealth, wage rate and planned bequest, a more distant horizon lowers consumption of goods and leisure at each age.

Consider the effect of greater planned bequests on consumption of goods and leisure. It is easily seen from (5) and (6) that $\partial C/\partial B < 0$, $\partial L/\partial B < 0$. Also, $\partial C/\partial W$, $\partial L/\partial W > 0$: Given the specific utility function needed to derive analytic results, leisure is a normal good.

Writing each individual's leisure and consumption choices generally:

$$L_i = F(X_i, T_i, B_i, W_i) + \theta_{i1}; \tag{7}$$

and

$$C_i = G(Z_i, T_i, B_i, W_i) + \theta_{i2} , \tag{8}$$

where the X_i and Z_i are vectors of other factors affecting individual i's leisure and goods consumption. The θ_{ij} are stochastic error terms, present in (7) and (8) because there are components of leisure and goods consumption that are affected by unmeasured factors. Perhaps the major consideration on these disturbances is the failure of (7) and (8) to account for household production. To the extent that this is important, goods and leisure are complements in the production of commodities. Thus an individual with unusually large amounts of leisure at a point in time will consume larger amounts of goods, other things equal; we should thus observe $E(\theta_{i1}\theta_{i2}) > 0$.

III. Evidence on Retirement: The Terman Sample, 1972 and 1977

In this section I study retirement behavior among male participants in the Terman study of gifted individuals, people interviewed at irregular intervals over more than fifty years. I use data from 1960, 1972, and 1977 interviews to examine retirement status in 1972 and 1977. Members of the sample were chosen on the basis of their outstanding performance on intelligence tests; while the sample is not representative of the population as a whole, it should be ideal for testing predictions of life-cycle theory, insofar as these people presumably have an above-average ability to make the calculations implicit in that theory. (See Leibowitz, 1974, and Tomes, 1981, for further description and uses of this sample.)

The sample is uniquely suited for some of my purposes. In addition to the usual demographic information, it contains data on each respondent's parents' ages or, if they are deceased, ages at death, as well as on the respondent's age when each parent died. Also available are data on the respondent's living children and siblings. Unfortunately, no consumption or spending data exist in the sample, nor is there any information that allows us to construct measures of wealth.

Of the 654 men who completed interviews in at least one of the years 1960, 1972, and 1977, only 320 could be used in the estimates for 1972 and only 228 in 1977. The criteria for inclusion were: 1) Complete information on all the relevant variables (see below); 2) Between ages 55 and 70 in the year under study; 3) Worked in each year between 1956 and 1959; and 4) Both parents deceased in the year under study. The final sample decreases sharply in size between 1972 and 1977, chiefly because the passage of time removes many respondents from the range of ages included.[3/]

With the exception of data available only in 1977 on the presence of a requirement for mandatory retirement on the respondent's current or last job, the variables included in the vector X are measured identically in the 1972 and 1977 samples. Because no wealth measures are available, I include a vector of age measures designed to proxy for provisions of pension and Social Security programs. This includes the respondent's age, and dummy variables for whether he is less than 62 or is at least 65. Similarly, under the admittedly restrictive assumption that the respondent's earnings capacity throughout his later working life is a constant fraction of the average for his age, I use his average earnings between 1956 and 1959 to measure his market opportunities in 1972 (or 1977).[4/] Also included as reflecting the market opportunities facing the respondent are dummy variables for his occupation, equalling one if he is a professional worker, or one if he is a manager. Reflecting differences in potential labor supply is a dummy variable equalling one if the man's self-assessed health status is good or very good and another equalling one if he has a working spouse.[5/]

To measure differences in the horizon among individuals I form an explicit measure of the subjective horizon, T, as defined as:

$$T_i = e^o_{x_i} + 3NOLD_i - 2NYNG_i \quad , \qquad (9)$$

where $e^o_{x_i}$ is the actuarial life expectancy of a white male the same age as person i; NOLD (NYNG) are the number(s) of parents who lived to age 80 or beyond (did not live to age 60). These latter variables are multiplied by factors that roughly reflect the transformation people make from their parents' objective length of life to their forecasts of their own horizons (see Hamermesh, 1982b). While much of the variation in T is due to age, a substantial amount is also due to variation in parents' longevity.[6/]

The role of bequest motives is represented by the number of living children the respondent has. Assuming that additional children increase total net transfers from parents to children--either by increasing the total planned bequest or decreasing the respondent's lifetime wealth available for his own use--persons with more children will consume less leisure.[7/] The coefficients on this measure thus provide an indirect test of whether the expected net transfer is from older to younger persons.

The final life-cycle variable is the respondent's age when his latter remaining parent died. If his parents left a bequest later in his life, the annuity value of the bequest will be greater. Greater age when the second parent dies will produce a positive income effect on the probability of being retired, so long as the bequest was not completely expected. On the other hand, if on net the respondent supported his parents for a greater part of his own adult life, the fraction of his lifetime wealth available for his own consumption later will be lower. In that case the variable proxies below-average wealth and should produce a negative effect on the probability of being retired. Here too we can test for the direction of net intergenerational transfers, in this case between older workers and their parents.[8/]

I proxy the consumption of leisure by the respondent's self-reported work status. I combine the responses into three choices: not working, working part-time, or working full-time. Alternatively, I form the dichotomous variable, working full or nearly full time, or not. The probability of being in each of the three categories (two in the second case) is estimated as a multinomial (binomial) logit function.

In the first columns of Table 1 and 2 I list the means of the life-cycle and economic variables. How atypical the sample is is shown by these: Only ten percent of the respondents were not professional or managerial workers; and average earnings in 1956-59 were over $16,000 per annum.[9/] The sample is clearly far more affluent than the population and has far more human capital embodied in it. Despite these economic differences, though, the indicators of the respondents' demographic status are not unreasonable. The average respondent's father died at age 70, his mother at age 74. These figures are quite consistent with differences in life expectancy between the sexes for persons who survive to the age of child-bearing and rearing. The number of children living is low but nearly consistent with observed population figures.[10/] In short, though their economic opportunities differ sharply from those of the general population, their demographic characteristics do not. Not surprisingly, given the aging in the Terman sample, the mean age of persons included in the

TABLE 1

Logit Estimates for Money and Life-Cycle Variables, Terman Sample, 1972, N = 320[a/]

Variable (Mean) (1)	Probability of Less Than Full-Time Work (2)	Probability of: No Work (3)	Probability of: Part-Time Work (4)	Probability of: No Work (5)	Probability of: Part-Time Work (6)
<62 (.412)	.550 (1.12)	.900 (1.48)	.143 (.23)	---	---
>65 (.278)	-.385 (-.68)	-.565 (-.83)	-.266 (-.39)	---	---
Age in 1972 (62.55)	.372 (2.86)	.511 (3.19)	.215 (1.37)	---	---
Adjusted Earnings 1956-59 (16.864)	-.032 (-2.49)	-.058 (-3.18)	-.010 (-.68)	-.056 (-3.21)	-.008 (-.58)
Number of Children (2.23)	-.307 (-2.43) (-.072)	-.306 (-2.02) (-.045)	-.304 (-1.92) (-.045)	-.327 (-2.28) (-.052)	-.316 (-2.02) (-.045)
Age Last Parent Died (49.23)	.014 (.85) (.003)	.022 (1.12) (.003)	.006 (.32) (.001)	.064 (3.66) (.010)	.025 (1.44) (.004)
T (16.95)	-.126 (-2.04) (-.030)	-.160 (-2.13) (-.024)	-.093 (1.21) (-.014)	-.378 (-6.12) (-.060)	-.197 (-3.23) (-.028)
-2 log λ	96.04	116.26		88.28	
Fraction in Category	.413	.250	.163	.250	.163

[a/] t-statistics in parentheses, here and in Tables 2-5; derivatives at means below statistics on life-cycle variables, here and in Table 2.

TABLE 2

Logit Estimates for Money and Life-Cycle Variables,

Terman Sample, 1977, N = 228

Variable (Mean) (1)	Probability of Less Than Full-Time Work (2)	No Work (3)	Probability of: Part-Time Work (4)	No Work (5)	Part-Time Work (6)
<62 (.079)	-1.11 (-1.31)	-1.26 (-1.02)	-1.02 (-1.03)	---	---
≥65 (.724)	1.68 (2.77)	1.65 (2.29)	1.78 (2.60)	---	---
Age in 1977 (65.82)	.091 (.70)	.118 (.81)	.069 (.48)	---	---
Adjusted Earnings 1956-59 (16.65)	-.029 (-1.85)	-.067 (-2.88)	-.011 (-.71)	-.059 (-2.71)	-.007 (-.543)
Number of Children (2.31)	-.203 (-1.81) (-.050)	-.367 (-2.43) (-.075)	-.106 (-1.65) (-.025)	-.432 (-3.02) (0.089)	-.168 (-1.30) (-.038)
Age Last Parent Died (52.68)	-.022 (-1.85) (-.005)	-.022 (-1.51) (-.005)	-.023 (-1.65) (-.005)	.005 (.41) (.001)	.003 (.25) (.001)
T (15.11)	.168 (2.49) (.037)	.160 (2.04) (.033)	.173 (2.34) (.039)	-.036 (-.60) (-.007)	-.013 (-.23) (-.003)
-2 log λ	66.49	86.33		47.13	
Fraction in Category	.636	.325	.311	.325	.311

estimates rises from 62.5 almost to 66 between 1972 and 1977. Finally, the fraction of respondents not working full-time rises sharply between 1972 and 1977, with most of the shift being from full-time to part-time work rather than to complete retirement.

The estimated logit coefficients and their accompanying t-statistics for the money and life-cycle variables are shown for 1972 and 1977 in Tables 1 and 2, columns (2)-(4). (I also list the derivatives evaluated at the means of the other variables for each of the life-cycle variables.) Nearly all the estimates are consistent with expectations about the impacts of the X variables.[11/] Aging increases the probability of being fully retired, and seems to have (in 1972 at least) some effect in increasing that of being partly retired as well.

Those with greater full-time earnings during their peak earnings years are significantly less likely to be completely retired, and less likely, but not significantly so, to be partly retired. The effects are not large, though: In 1972 someone with potential earnings 10 percent above the mean is 1.4 percent less likely than average to be fully retired, and .2 percent less likely to be partly retired. In 1977 the corresponding differences are 2.3 percent and .4 percent.

Consider now the effects of the respondent's number of children and the age when his second parent died, variables designed to reflect the impact of expected intergenerational transfers on labor supply.[12/] In both samples persons with more children have a lower probability of being partly or completely retired. The effects are almost always significant, and they are also fairly sizable: At the sample means a two standard-deviation increase in the number of children decreases the probability of being fully retired by nearly 10 percentage points in 1972 (15 percentage points in 1977). The presence of additional children clearly represents a negative wealth effect on the demand for leisure in this older population; on net, persons in this sample appear to expect less support in their old age from their children than the sum of their planned bequest and their support of those children while rearing them. Implicitly the net transfer is from members of this older generation to their children.

In the 1972 sample the coefficients on the individual's age when his second parent died are positive but not significantly different from zero; in 1977, though, these coefficients are negative and nearly significant. Accounting for all transfers from their parents to this generation of older persons, the results imply at least that the net transfer was not positive. If we interpret this coefficient as a wealth effect, we may infer that the respondents transferred at least as much wealth to their parents (presumably supporting them in their old age) as they received in the form of bequests.

How can one explain the apparent anomaly that members of this sample implicitly have made or expect to make positive net transfers to their children, yet did not receive positive net transfers from their parents? Several alternatives seem consistent with the nature of the sample. First, persons in the sample are unusually successful relative to others of their cohort; insofar as there is some regression to the mean ability, neither their parents nor their offspring are likely to have been or be so well off relative to others in their cohorts. If they behave altruistically, they would have made net transfers both to their parents and their offspring. A second rationale is based on unobserved changes in net wealth. This sample reached retirement age at the time when the rate of return on one's Social Security contributions and the lifetime Social Security wealth net of taxes were greatest in the program's history. Because this group is implicitly receiving a large subsidy from members of its children's generation, the net wealth transfer from their children may in fact be small and thus of the same magnitude as transfers from the respondents to their parents. A third rationale is provided by Caldwell (1978) and Willis (1981): In a demographic transition net wealth flows cease going from children to parents and begin moving in the other direction. To demonstrate that the sample is in the transition generation I would have to show that their parents had many siblings, but that they and their children have few. As Tables 1 and 2, and footnote 8, show, the latter two conditions exist. Unfortunately, there are no data on the respondents' aunts and uncles.[13/]

In 1972 there is fairly good evidence supporting the hypothesis that a farther horizon reduces the probability of retirement. This is consistent with life-cycle theory, and is even stronger when we remember that we include age separately in the equations and do not attribute its effects on retirement to maximizing behavior. Despite this consistency the magnitude of the effect is small. A two standard-deviation difference in T at each age 55 and up results in a difference in the expected years of full- and part-time work remaining to a 55-year-old of only 1.7 years. Since the extra longevity implied by such an increase is 4.2 years, most of the extra longevity that people with longer-lived parents project is consumed as leisure.[14/] The fraction of the extra lifetime spent working is far less than would be consistent with a simple Modigliani-Brumberg (1954) model that makes leisure time a fixed fraction of total lifetime. In 1977 a more distant horizon <u>increases</u> the probability that the respondent is retired. Though the effect implies only a small reduction in working life as a fraction of the extra years of longevity implicit in a two standard-deviation rise in T, it is in the unexpected direction.[15/]

This striking difference in the results--estimated coefficients significantly different from zero but of opposite signs--clearly requires some explanation. One possibility is that I have misspecified the model by interpreting the age variables as proxying the provisions of the Social Security system, when they may instead partly be representing the horizon. To account for this possibility, the multinomial logit was reestimated without the age variables; the results are shown in the last two columns of Tables 1 and 2. This respecification increases the negative effect of the horizon on the probability of retirement in the 1972 sample, so much so that an extra year of life expectancy adds nearly a year to the expected work life. In the 1977 sample, though, the effect on retirement is still very small, though it becomes negative.

Another possible explanation is that the results on T differ as people age. However, interacting T with age did not change the sharp difference between the samples in the effects of T on retirement probabilities. Yet another possibility is that a few outliers in each sample are producing the anomaly. To test this the equations in columns (2)-(4) were reestimated using the 183 men who appeared in both samples. In the binomial logit equations the partial derivatives of the probability of retirement with respect to T were -.019 and .049 -- <u>less</u> negative than the results in Tables 1 and 2. (The multinomial logit results were similar.) Randomness in the sample did not cause the difference in the results between the two years.[16/]

A final, though not testable possibility rests on the changes in the Social Security system that took place as the sample aged between 1972 and 1977. The value of Social Security wealth increased sharply between 1972 and 1977 because of the one-time increase in benefits in 1972 and the double-indexing of them thereafter. These presumably unexpected increases represented a much larger increase in wealth to persons with longer horizons (since Social Security benefits are paid to eligible recipients until their death). That being the case, the proxy for the length of the horizon may in 1977 also be a proxy for windfall Social Security wealth, though it would not have been such in 1972. If so, I would expect the horizon variable to produce a positive effect on the probability of being retired even though it produced a negative impact in 1972.

At the very least we may conclude that the people in this sample consume a very high fraction of additional subjective years of remaining life as leisure; differences in the length of the horizon produce only small differences in the length of the working life. This finding is inconsistent with the simplest versions of life-cycle theory. It may though, stem from a lack of data on wealth that a specification grounded properly in that theory requires, or from a similar lack that prevents estimation of the effects on goods consumption jointly with those on leisure.

IV. Evidence on Consumption and Labor Supply: The Retirement History Survey, 1973 and 1975

In this section I address many of the same issues discussed in the previous section, as well as the additional ones involved in testing for the effects of life-cycle variables on consumption and for the nature of the jointness between consumption and retirement. I use the Retirement History Survey (RHS) data, available biennially beginning in 1969 on a sample of over 11,000 persons ages 58-63 in 1969. This sample is the only one that has data on labor-force behavior and a large part of consumer spending; physical and pension wealth; and on the life status of the parents of the respondent and his wife. Further, the data have been linked to Social Security wealth.

I focus the analysis on the respondent's behavior in 1973 and 1975, when they were 62-67 and 64-69 years respectively. Of the over 8,000 persons alive in the sample in 1975, 4,008 were white men married to the same spouse from 1969-75. Disqualifications that: 1) The wife be at least age 56 and less than 80 in 1975; 2) The man not be self-employed, in the military or in the public sector on his current and most recent job; and 3) Information be available on family earnings, retirement status, spending in the various consumption categories, and the life status of the couple's parents, reduced the sample to 1,798 in 1973, and 1,422 in 1975.

All of the life-cycle variables are included in both the consumption and leisure-demand equations. In addition to the three wealth measures and the horizon (all discussed below), both spouses' ages, household size and number of children are also included. Departing from the standard linear expenditure system framework, I include dummy variables for residence in large or medium-size SMSAs only in the consumption equation, to reflect differences in product prices facing persons in the sample. Also included are the household's after-tax earnings.

Clearly, earnings cannot be included in the leisure-demand equation. Rather than attempting to use a direct measure of the market opportunities facing older workers, I proxy these by a vector of human capital variables. (See Gordon-Blinder, 1980, for an attempt to circumvent the simultaneity between wages and retirement status using a more complex econometric methodology.) Included in this vector are occupational dummy variables, for professional and managerial workers and for clerical and sales workers. (These are based on the man's current or most recent job.) Dummy variables for persons with a college degree or more, and for those with a high-school diploma, are included, as is the individual's self-reported health status two years before the survey date. Also included to measure the man's reservation wage is a dummy variable equalling one if he is at least 65, and another equalling one if the wife works.

In both the goods and leisure demand equations I include measures of the household's total wealth. In the former these enable us to infer how rapidly the household is depleting its assets over its remaining lifetime; in the latter they can show the size of income effects. In each year 1973 and 1975 I use the wealth measure computed as of two years earlier (except for financial and real estate wealth, for which data are not available in 1973). The lagged values are chosen to avoid a simultaneity between them and consumption and labor supply. The three wealth measures included are: 1) Social Security wealth. This is computed using the Social Security earnings records that have been appended to the RHS. The benefit formula for 1971 or 1973 is used along with the formula that relates past earnings to the monthly benefit. Total benefits include dependents' and survivors' benefits (and account for actuarial reduction for workers who retired before age 65).[17/] The benefit stream is assumed constant in real terms, and is discounted using a rate of 2 percent. Each household's Social Security wealth is based on the 1969-71 mortality tables, then adjusted proportionately to differences in individual's horizons (based on (10) below). The longer the horizon, the greater the present value of the indexed annuity that constitutes Social Security benefits; 2) Pension wealth. The variable is calculated using the ages when the man and his wife expect to receive, or actually began receiving a pension, and the amount of that pension. Each spouse's pension (if there is one) is projected to remain constant in nominal dollars; the real stream of benefits is assumed to erode at 6 percent per year, and is discounted back at 2 percent per year. It too is based on life tables, adjusted for differences among households in the length of the horizon.

3) Other wealth. Reported debts are subtracted from reported assets. The net value of owner-occupied housing is included, as are the net values of any businesses or farms that are owned by the couple. There is no measure of human wealth. Instead, I use after-tax earnings, which include both permanent flows out of human wealth and transitory effects, in the goods consumption equations.

The life-cycle variables are less adequate than those used in the previous section because of the lack of data. As before, I use the number of living children to represent possible bequest/early support motives or to represent expectations about support in old age. The proxy for the length of the horizon is:

$$T_i = .5[e^o_{x_{iM}} + e^o_{x_{iF}} + 3(NOLD - .56)], \tag{10}$$

where e^o_x is the expected years of remaining life, based on the mortality tables for white males or females in 1973 or 1975; i refers to the couple, M to the husband, F to the wife; NOLD is the number of living parents the couple had in 1969 (between zero and four); and .56 is the mean number of living parents in the sample. T is designed to represent the remaining lifetime of the household under the assumption that both spouses are concerned about the average length of life of the couple, and that any surviving parent is at least 80, so that the couple projects its longevity as assumed in (9). The fraction of time spent at leisure, one minus the product of hours worked per week on the most recent job and weeks worked in the past two years, divided by 40 hours times 120 weeks, is used to represent demand for leisure.[18/] Consumption, or, more accurately, spending, contains all those categories for which usable data were available. In both years these include food consumed at home and away from home; nonfood grocery items; vacations, and the cost of renting or owning a house (including utilities, taxes and debt service). In 1973 the data also include transportation expenses; spending in 1975 also adds funds allocated for charity, gifts, "fun," "chores," and dues. (See Hamermesh, 1982c, for description of the construction of these spending flows. As I show there, despite their incompleteness (slightly more than half of spending is covered), they represent both the means and individual variation in total spending quite well.)

The wealth figures are quite reasonable, as suggested by their means, shown in Tables 3 and 4. The equations describing goods consumption and leisure demand are estimated jointly as a system of seemingly unrelated equations. The estimates of the parameters describing the responses of consumption of goods and leisure to the life-cycle, wealth and earnings variables are presented for 1973 and 1975 in Tables 3 and 4.[19/] Considering column (2) for both years, we find that the length of the horizon has the expected negative effect on goods consumption in both samples. These effects are nearly significant, and become quite significant when the system is reestimated using only those households that provided data in both years

TABLE 3

Parameter Estimates, Money and Life-Cycle Variables in the Joint Leisure-Consumption Model, 1973[a/]

	(1) Leisure	(2) Consumption ($000)	(3) Leisure	(4) Consumption ($000)
Social Security Wealth (39.01) (38.46)	-.0049 (-5.48)	.031 (7.37)	-.0050 (-4.13)	.024 (4.51)
Pension Wealth (13.00) (12.04)	.0033 (6.29)	.033 (14.24)	.0043 (5.33)	.031 (9.56)
Other Wealth (22.01) (20.57)	-.00012 (-.56)	.0097 (9.29)	.00050 (1.64)	.0045 (3.46)
After-Tax Earnings (5.79) (5.60)	---	.109 (13.05)	---	.136 (12.61)
Children (2.66) (2.74)	.0027 (.54)	.024 (1.04)	.0026 (.39)	.031 (1.12)
T (18.14) (18.03)	.012 (1.35)	-.078 (-1.87)	.006 (.48)	-.121 (-2.30)
Weighted R^2	.347		.353	
$\hat{\rho}_{\theta_1 \theta_2}$	.061		.141	
N	1798		896	
Mean of Dependent Variable	.425	4.58		

[a/] Means of independent variables for the whole and the reduced samples are shown below the variable names here and in Table 4.

TABLE 4

Parameter Estimates, Money and Life-Cycle Variables in the Joint Leisure-Consumption Model, 1975

	(1) Leisure	(2) Consumption ($000)	(3) Leisure	(4) Consumption ($000)
Social Security Wealth (46.19) (46.51)	-.0012 (-1.62)	.011 (2.48)	-.0012 (-1.39)	.013 (2.71)
Pension Wealth (13.09) (13.02)	.0045 (8.43)	.029 (9.23)	.0045 (6.49)	.035 (9.59)
Other Wealth (24.96) (22.57)	-.00037 (-1.83)	.016 (12.37)	-.00003 (-.13)	.0091 (6.47)
After-Tax Earnings (3.87) (3.73)	---	.142 (13.02)	---	.193 (15.32)
Children (2.70) (2.74)	-.0014 (-.28)	.012 (.41)	.0051 (.87)	.007 (.21)
T (16.65) (16.65)	-.0095 (-1.04)	-.073 (-1.30)	-.014 (-1.28)	-.142 (-2.30)
Weighted R^2	.300		.348	
$\hat{\rho}_{\theta_1\theta_2}$	.042		.141	
N	1422		896	
Mean of Dependent Variable	.681	4.87		

(see column (4) of each table). (Presumably these people report their wealth and earnings more carefully.) However, an increase from the minimum to the maximum T in the reduced 1975 sample (a 36 percent increase) only reduces current consumption by 17 percent. (The effect is smaller still in the reduced 1973 sample.) The effect of the horizon on the demand for leisure differs in the two samples and is never significantly different from zero.[20/]

Before drawing any conclusions about the role of the horizon in affecting the demand for goods and leisure, it is worth reestimating the model deleting the variables measuring head's and spouse's ages, as these may reflect the horizon rather than the reservation wage. In systems like those for which the results are presented in columns (1) and (2) of Tables 3 and 4, but from which the head's age and that of his spouse have been deleted, the coefficients on T are -.0012 (t = -.30) and -.087 (t = -4.22) for 1973, -.015 (t = -2.96) and -.108 (-3.78) in 1975. These are all in the expected, negative direction. In the leisure-demand equations they still are very small, though; and even the effects on consumption fall far short of what a simple life-cycle model, with equal rates of time preference and interest, would predict.

The number of children has no significant effect on spending or on the fraction of time spent at leisure. These results contradict the findings in Tables 1-2, suggesting that these may be due more to the peculiar nature of the respondents in the Terman sample than to persons in this cohort being in the "transition" generation. At the very least, these results suggest that the bequest motive is not very important in a random sample of older couples, at least judging from its reflection in labor supply and consumption behavior. Given the relatively small lifetime incomes in this sample compared to the Terman sample, this result should not be surprising.

Spending propensities out of after-tax earnings seem a bit low compared to those out of financial, pension and Social Security wealth. The weighted averages of the MPC's from the three wealth measures are .025 and .015 in columns (2) of Tables 3 and 4 respectively. If earnings are solely a flow from human wealth, the implied returns on human wealth are 23 and 11 percent in the two years, about twice what is generally found. One may infer from this that a large part of extra earnings are transitory and are saved for retirement.

Spending propensities out of the three wealth measures differ sharply. (When the MPCs out of the three wealth measures in the goods demand equation are constrained to equality, the weighted R^2 for the system falls from .347 to .332 in the 1973 sample, from .300 to .294 in the 1975 sample.) The difference between spending propensities out of Social Security and pension wealth is negative and small in 1973, but significantly negative in 1975; in both years the propensity to spend out of other wealth is less than that out of pension wealth, and is less than that out of Social Security wealth in 1973, though not in 1975. Similar differences can be inferred from the estimates for the reduced samples (columns (4) of the tables); indeed, in these subsamples in which the respondents supplied all the required information in both years, the differences between the MPCs out of Social Security and pension wealth are somewhat more negative. Similarly, when the consumption equations are reestimated by OLS on subsamples of people who did not work during the year before the interview date (Table 5), this result still holds.[21/]

TABLE 5

Parameter Estimates, Money and Life-Cycle Variables in Consumption Equations for Nonworking Couples, 1973 and 1975[a]

	1973	1975
Social Security Wealth (36.21) (41.87)	.032 (3.39)	.012 (2.08)
Pension Wealth (18.05) (16.34)	.040 (8.29)	.038 (8.74)
Other Wealth (21.23) (20.82)	.021 (5.62)	.020 (7.18)
Children (2.72) (2.67)	.032 (.73)	.032 (.85)
T (16.93) (15.86)	-.079 (-.83)	-.084 (-1.12)
R^2	.316	.288
N	427	540
Mean of Dependent Variable	4.21	4.42

[a] Means of independent variables for 1973 and 1975 are shown below the variable names.

Differences in other wealth induce no significant differences in the fraction of time spent at leisure. That the effects are small is completely consistent with the low income elasticity of labor supply of adult males.[22/] Pension wealth induces large positive effects on the demand for leisure time. Unlike Social Security benefits, pension benefits are not usually earnings tested, so that extra benefits produce a pure income effect on the demand for leisure. The results on other wealth suggest the large effects are not income effects, but instead represent part of a life-long implicit contract between workers covered by pensions and their employers (Lazear, 1979).

The most surprising result in this section is the negative impact of Social Security wealth on the fraction of time spent at leisure. The effect is significantly negative in 1973, though not in 1975. Compared to the other two studies that have considered the effects of this measure on retirement, the results completely contradict those of Pellechio (1981), though they are not inconsistent with the finding of Gordon-Blinder (1980) of a small effect for Social Security wealth.[23/]

Are the results to be believed? I would argue in the affirmative, on a number of grounds: 1) The X variables in the leisure demand equations have effects similar to those observed in previous studies, suggesting that the results are consistent along most dimensions with what has been found before; 2) The results are not an artifact resulting from the peculiarities of one sample of people. Over half the individuals in the 1973 sample are not in the 1975 sample; 3) The sample is much more homogeneous than those used in other work on the effect of Social Security on retirement. I exclude unmarried males and women, the self-employed and, most important, government workers (whose Social Security wealth is often zero because their industry is not covered by the law); 4) The wealth measures are constructed exactly as those used by others (e.g., Feldstein, 1980) to examine the effects of the program on private saving; 5) Blinder et al (1980) have argued that Social Security provides an incentive to remain working for persons below 65. Insofar as the biggest negative effects are in the 1973 sample, when 54 percent of the respondents are below 65 (only 19 percent are in the 1975 sample), the results may merely demonstrate that older people respond as if they are aware of the incentives facing them.

Though the effects of Social Security wealth on the demand for leisure are negative, they are not large. Using the estimates in column (1) of Table 3, even a two standard-deviation (59.3 percent) increase in Social Security wealth produces only an 11.1 percentage point decrease in the fraction of time spent at leisure. (The elasticity at the means is -.44.) In the 1975 sample an analogous increase in Social Security wealth (61.1 percent) decreases the fraction of time spent at leisure by only 3.2 percentage points. (The elasticity at the means is -.08.)

The jointness of leisure and goods consumption in household production is demonstrated by the positive correlation of the residuals within each pair of equations. With the exception of $\hat{\rho}_{\theta_1\theta_2}$ for the first pair of equations describing the 1975 sample, all of these are positive at the 99 percent level of significance. In households in which the amount of leisure consumed is greater, other things equal, so too is goods consumption. That this correlation is significant suggests there is some payoff to studying goods and leisure demand jointly.

V. Conclusions

Using several sets of micro data, I have tested some empirical implications of the life-cycle theory of consumer behavior. The major novel aspects of the work are the inclusion of explicit proxies for the length of an individual's horizon, the use of data on actual consumption spending, and the recognition of the jointness of goods consumption and labor supply in the life-cycle context. I find that on net goods consumption and leisure are complements. Also, there is some weak evidence that the length of the horizon does affect the timing of retirement decisions. Even the strongest effects, though, are fairly small, suggesting that increasing life expectancy alone will not lead to substantial lengthening of the average person's work life. Instead, the extra length of life will be consumed as leisure.[24/]

Annual consumption spending is lower among persons with longer horizons. The reduced consumption with the lengthened horizon is too small, though, to enable older households to maintain consumption as they age. Thus we should expect, and I do find (Hamermesh, 1982c) that households reduce real consumption spending as they age. People behave myopically, consuming more than their knowledge of their horizon would enable them to and still keep a constant standard of living. That they ignore this knowledge suggests that the decline in consumption as people age should not be viewed as imposed by liquidity constraints; rather, it is the result of lifetime utility-maximization with a high rate of time preference and substantial knowledge of the length of the horizon.

Spending propensities out of Social Security wealth are less than those out of pension wealth. A reasonable interpretation is that certainty about flows of income from these assets differs, with older couples being more sure of their pension wealth than of the value of their Social Security benefits. Since Social Security wealth is computed on the assumption of indexed benefits, it may be the complete indexation about which beneficiaries are uncertain. Viewed in this light, anything that increases the uncertainty of current and prospective recipients about the future stream of Social Security benefits reduces the program's ability to maintain consumption.

Overall the results suggest the importance of considering life-cycle variables, especially the length of the horizon, when examining retirement and consumption, phenomena that are the central outcomes of life-cycle behavior. Care has to be given to interpreting the effects of aging upon these decisions: Part are due to a shortened horizon, part to changes in market and reservation wages. The way in which income streams that are paid as annuities, such as pensions and Social Security, affect retirement and consumption depends on how people view their survival prospects. Using actuarial survival probabilities to form measures of wealth from these annuities produces misspecifications of the determinants of consumption and labor supply.

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FOOTNOTES

1/ White males have experienced the smallest increase in life expectancy among the four race-sex groups; yet even their life expectancy at age 20 increased from 50.2 years remaining in 1969-71, to 52.3 years of remaining life in 1979.

2/ Feldstein (1980) and Kotlikoff-Summers (1981) examine the wealth-holdings of a sample of older persons. Gordon-Blinder (1980), Pellechio (1981) and many others have estimated determinants of the probability of being retired.

3/ Most of the exclusions resulted from incomplete information: Only 394 males responded in all three years.

4/ To remove any differences resulting from individuals being at different points along their age-earnings profiles, I adjusted the earnings data before using them in the logit equations. The adjusted figures are actual less predicted earnings (from an equation with age and age squared as independent variables) plus the sample mean of earnings. Because the range of ages in the sample was fairly narrow, this adjustment made very little difference.

5/ Parsons (1977) found that the wife's hours of work had a positive effect on the husband's hours of work in data on older males from the National Longitudinal Survey.

6/ For example, 43 (31) percent of the 1972 sample had mothers (fathers) who survived to 80, while 16 (23) percent had mothers (fathers) who died before 60. Comparable figures in the 1977 sample are 50 (32) percent and 16 (24) percent.

7/ To ensure that this variable does not just reflect children still at home (and presumably requiring support), a variable measuring the number of children under age 18 was also included in 1977, the only year such data were available. Its addition had little effect on the coefficients of the measure of total number of children, undoubtedly because very few respondents still had children under age 18. (The mean number of such children in the 1977 sample was .05.) The presence of a young child did, though, lower the probability of being retired by .37 ($t = -1.74$).

8/ These effects may vary depending upon how many siblings the respondent has. An imperfect control for this problem, the number of living siblings, was entered into the logits for retirement status in 1977, the only year for which these data were available. (The measure is clearly imperfect: Its mean was 1.29, while in 1922 males in the Terman sample reported an average of 1.85 siblings; Leibowitz, 1974.) It produced only minute changes in the other coefficients; its coefficients were tiny (with t-statistics below .7), except for a negative effect on the probability of partial retirement ($t = -1.29$).

9/ In 1959 the median earnings of male professional workers ages 45-54 were only $7854. (Census of Population, 1960, PC (2) - 7A).

10/ For example, the number of children ever born among married women age 45 in 1959 was 2.39. (Current Population Reports, P-20, No. 107).

11/ The only anomalies are unexpected signs on the two dummy variables for age in the 1972 logits. While these are surprising, the coefficients are small enough that, together with the continuous age variable, they imply that the probability of being fully retired rises steadily with age, other things equal, except between ages 61 and 62. Among the other variables in X, a working spouse has a nearly significant negative effect on the probability of being retired in 1972, but no effect in 1977. Persons who consider themselves healthier are less likely to be retired, though this effect is smaller in 1977, when the average respondent is older. Professional and managerial workers are less likely to be retired.

12/ Among those fully retired the mean number of children in the 1972 sample was 1.88; among the partly retired, 1.98; and among those working full time, 2.44. The mean ages at the second parent's death were 50.1, 48.6 and 49.0 for the three groups respectively; the means of T were 15.8, 16.2 and 17.8 among the three groups. Analogous figures for 1977 on the number of children are 1.78, 2.38 and 2.71; on the respondent's mean age when the second parent died, 51.9, 52.8 and 53.3; on T, 14.8, 15.3 and 15.4.

13/ An astute observer of intergenerational relations and a member of the age cohort included in the Terman data, Madeline Hamermesh, refers to this cohort as "the hit generation -- they were hit by their parents and hit by their children." This appellation captures the implication of our results: At least in terms of transfers directly to individuals (rather than through the tax-transfer system) members of this cohort on net may have supported their parents and their children.

14/ As an additional proxy for the subjective horizon of persons in the 1972 sample, I included a dummy variable equalling one if the individual died before 1977. In an equation like that presented in column (2) of Table 1 this variable had a negative effect on the probability of being retired, with t = -.31. The coefficient and t-statistic on T changed by less than one percent when this variable was included.

15/ Of the 3.3-year increase in the subjective horizon implied by this difference, only .5 years fewer are spent consuming leisure among those with the longer horizon.

16/ The results are not due to the constraints used in (9) to form the single variable T. When the logit equations were reestimated using continuous variable measuring father's and mother's ages at death, both variables produced negative effects in the estimates based on the 1972 sample, positive effects in those based on the 1977 sample.

17/ See Feldstein (1980) for a more detailed discussion of the construction of the pension and Social Security wealth measures.

18/ 120 is used as the maximum number of weeks between two interview dates because a substantial number of respondents stated they had worked that many weeks.

[19] In both the 1973 and 1975 samples the city-size dummy variables have significant positive effects on consumption, with the coefficient for the big-city dummy being larger than that on the variable representing residence in a medium-size city. Spending increases significantly with household size and with the age of the household head, but the wife's age has no effect on total spending. In the equations for leisure demand, the dummies for professional/managerial and sales/clerical workers, for the college-educated, men with a working wife, and with a larger household produce the expected negative effects, as does household size. Bad health two years before the survey, being 65 or over, and aging increase the fraction of time spent at leisure. Only spouse's age and the dummy variable for completion of high school produce no significant effects.

[20] As a further test of the proxies for horizon interaction terms between T and the wealth measures were entered into the equations. These too did not add to the equations' explanatory power. To test whether the formulation in (10) is masking information, a vector of four dummy variables (one for each living parent) was substituted for T. In both years the weighted mean square error was increased by this substitution. Each of the four variables has a negative effect on goods consumption in each year; the effects on leisure demand are mixed.

[21] The differences between the spending propensities are not attributable to my use of lagged assets: Substituting current for lagged values does not change the conclusion qualitatively. Nor are they due to the inclusion of owned housing in the measure of other wealth: Exclusion of this part of other wealth from the equations in columns (2) and (4) also does not affect the conclusions. Finally, reestimating the equations excluding households with zero Social Security pension or other wealth in various combinations also does not change the conclusions.

[22] Borjas-Heckman (1978) summarize estimates of income elasticities among adult males and conclude they are quite small.

[23] Inclusion of each worker's average covered earnings from 1954-59 did not greatly affect this conclusion, though it did reduce the significance of the Social Security wealth variable (since this is a complicated nonlinear transformation of earnings).

[24] Wolfe (1982) finds that people who retire early have higher than average mortality rates, and interprets the causation as running from a shorter horizon inducing early retirement. This is not inconsistent with my results, for I concentrate implicitly (by holding health status constant) only on the effects of the horizon on the demand for leisure of the healthy older population (87 and 91 percent in the two Terman samples, 59 and 68 percent in the two RHS samples.)