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PLANNED AND UNPLANNED BEQUESTS

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ABSTRACT

We make the distinction between bequests that are planned as part of some lifetime optimization stemming from a bequest motive, and those that are unplanned and result when the date of death differs from what the consumer might forecast. Lifetime optimization should lead to a negative effect or no effect of the expected horizon on the size of the bequest, and to a negative relation between unexpectedly long life and the bequest.

Using data on wealthy decedents and their parents, we form measures of the expected horizon based on parents' longevity. There is no relation between unexpectedly early or late death and the bequest, but a significant positive relation between the bequest and the length of the horizon. Several explanations for this unforeseen result are offered, including the inference that uncertainty about length of life is important in studying bequest behavior.

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I. Introduction

A growing literature has begun to study the role of intergenerational transfers in households' life-cycle behavior. In part this increased interest has stemmed from the apparent inability of simple versions of the theory of life-cycle decision-making to account for such phenomena as the close correspondence between age-earnings and age-consumption profiles (Nagatani, 1972; White, 1978) and the inexplicably high average level of savings, far above what could be explained solely by planned saving for retirement (Kotlikoff-Summers, 1981). Saving for bequests has been proposed as an extension of the life-cycle theory that might reconcile these phenomena, and some evidence on the magnitude and determinants of bequests has been presented (Menchik-David, 1983).

What is missing from this reconciliation is any direct evidence that the bequests that are made are in fact an expression of people's tastes for passing on wealth to their offspring. Current evidence prevents one from distinguishing between this possibility and an alternative that views bequests as the assets that remain at the death of risk-averse consumers who cannot purchase actuarially fair annuities or catastrophic health insurance due to problems of adverse selection. In this study we construct a method that could allow us to examine these alternatives. The method is based on the distinction between planned and unplanned bequests, a distinction we try to make operational by introducing a proxy for individual differences in the planning horizons that will in part affect the amount of such transfers.

II. Bequests and Horizons

Two issues must be considered in distinguishing the effects of the horizon on bequests: 1) What does a more distant horizon do to the amount of the transfer, other things equal? and 2) If the planning horizon proves to be incorrect, what are the effects of the mistake on the transfer? We take these questions in order, assuming throughout that the consumer has point expectations about the horizon T^*. We assume that the wage rate and hours of work are fixed, so that earnings per period are not subject to choice and, for the moment, that lifetime earnings too are exogenous. Finally, we assume that the consumer horizon is fixed, though we examine the effects on our conclusions of relaxing this assumption.

Following Blinder (1974) we assume the consumer seeks to maximize:

$$(1) \qquad \int_0^{T^*} U(C(t))e^{-\rho t}\, dt + B(K_{T^*}),$$

where C is consumption, ρ is the rate of time preference, K_{T^*} is the bequest, and U and B are the components of the utility function defined over consumption and bequests, with $U'(0) = B'(0) = \infty$. Total utility (1) is maximized subject to the lifetime wealth constraint that:

$$(2) \qquad W_0 + E = e^{-rT^*}K_{T^*} + \int_0^{T^*} C(t)e^{-rt}dt,$$

where W_0 is initial wealth, E is the present value of lifetime earnings, and r is the rate at which households can borrow or lend.

The solution to this maximization problem includes the conditions:

$$(3a) \quad \dot{C} = -[r-\rho]U'(C)/U''(C), \text{ for any } t,$$

and

$$(3b) \quad U'(C(T^*))e^{-\rho T^*} = B'(K_{T^*}).$$

Condition (3b) states that the marginal utility of a dollar of consumption at

T* equals the marginal utility of dollar given in bequests. Together with the lifetime wealth constraint, conditions (3a) and (3b) imply initial consumption, terminal wealth (the bequest) and the pattern of consumption over time. Implicit in the solution is the notion that the consumer equates the discounted marginal utility of consumption, $V'(C(t))$, across all time periods t, $0 \leq t \leq T*$.

Let T* increase, all else, including lifetime resources, remaining constant.[1] (Essentially we are comparing two otherwise identical people at the same point in time whose life expectancies differ from one another for some reason.) Then if $C(t)$ decreases for any t, it must by (3a) decrease for all t, including T*. If $C(T*)$ decreases, though, the discounted marginal utility $V'(C(T*))$ must increase. The only way (3b) can still be satisfied if this occurs is if K_{T*} decreases also. Similarly, if $C(t)$ increases for any t, it must increase in all periods, and K_{T*} must increase also. Since $C(t)$ cannot increase for all t, this demonstrates that an increase in the length of the planned horizon reduces the amount of the bequest if lifetime resources remain constant, assuming an additively separable utility function. It is also easily shown that increases in W_0 and E increase the size of K_{T*} if T* is constant.

Maintaining the assumptions of fixed lifetime earnings and point expectations about the date of death, consider now how imperfect forecasting of that date affects the bequest. If consumers reach T* and are still alive, they reallocate K_{T*} according to a new utility-maximizing plan derived at T* and projected forward to some new horizon, $T** > T*$. The assumption that the marginal utility of consumption approaches infinity as C approaches zero guarantees that consumption will be positive for all $t > T*$, and thus that actual bequest, K_T, will be less than K_{T*}.

If consumers die suddenly at $T < T^*$, they bequeath:

$$(4) \qquad K_T = K_{T^*} e^{-r(T^*-T)} + \int_T^{T^*} C(t)e^{-r(T^*-t)} dt;$$
$$= K_{T^*} + \int_T^{T^*} C(t)e^{-r(T^*-t)} dt - K_{T^*} [1-e^{-r(T^*-T)}] .$$

Whether the amount actually bequeathed at the date of death, K_T, exceeds or falls short of the planned bequest, K_{T^*}, depends on the relative magnitudes of the last two terms in (4). Some insight into this issue can be gained if we assume $T = T^*-1$ and operate in discrete time. The comparison of the last two terms becomes a comparison of $C(T^*)$ and rK_{T^*}, i.e., a comparison of the resources that are not consumed, because the person dies unexpectedly, to the interest that is lost on the amount that the person planned to bequeath at T*. ($K_T > K_{T^*}$ if $C(T^*) > rK_{T^*}$.) Since there is some evidence (Menchik-David, 1983) that bequests are on average not more than five years of consumption, unless r exceeds .20, $C(T^*) > rK_{T^*}$. This implies that $K_T > K_{T^*}$; together with the discussion of the case of unexpectedly long life, it indicates that unplanned bequests are negatively related to unexpected extra years of life.

The analysis thus far has assumed lifetime resources are unchanged by changes in T*. To the extent we can measure lifetime resources well this assumption makes sense. However, if they are measured imperfectly, differences in T* will represent differences in lifetime income as well. Thus if consumption, leisure and bequests are normal goods, an interior solution to the consumer's maximization would imply lifetime resources and bequests both rising as T* increases. If lifetime earnings are large relative to initial wealth, errors in measuring them will produce a positive relationship between T* and the amount of bequests.

Dropping the assumption of fixed resources may also affect inferences about the impact of a deviation of the date of death from T*. Without specifying a dynamic model of utility maximization defined over consumption, bequests and labor supply, we cannot infer the effect of this deviation on the amount bequeathed if lifetime resources are variable. However, if the consumer survives beyond an initial planning horizon T*, <u>and</u> had planned to retire before T*, the unexpected extra years of life will probably reduce the actual bequest below K_{T*}: Having already retired the person is unlikely to reenter the labor force.[2] Resources are fixed as of T*, and the arguments made above that $K_{T**} < K_{T*}$ apply. Since most people do plan some period of retirement, we may assume that unexpectedly long life reduces bequests in most cases. Thus people who live an unexpectedly long time will bequeath less than otherwise identical people whose expectations about T* are fulfilled. Also, if death occurs before T* and the person had already retired, $K_T > K_{T*}$.

If the person had planned to work until T*, or if death occurs before retirement, no unambiguous conclusion about the effect of a deviation from T* is possible. The outcome depends on the relation of the age-consumption and age-earnings profiles, and on the relative magnitudes of planned lifetime earnings and W_0. If initial wealth is much greater than annual earnings, $K_T > K_{T*}$ even if T*-T is large (since the lost earnings comprise only a small fraction of lifetime earnings).

Other inferences can be drawn based on observations of patterns of retirement. Assume there is some normal retirement age, perhaps 65.[3] If T* is below this retirement age, the person is more likely to have planned to work until T*. That being the case, an unexpectedly early death will reduce lifetime resources and make it less likely that $K_T > K_{T*}$. Similarly, if death occurs substantially before the normal retirement age, it is more likely that the person had planned additional years of work, and thus more likely that the observed bequest will fall short of what was planned.

Throughout this discussion we have assumed that the expected date of death, T*, is constant even as t increases. This is unlikely: Consumers, as shown by Hamermesh (1985), are aware that the expected age at death is higher the older one is. If we specify a model that allows horizons to be updated ($dT^*(t)/dt > 0$), K_{T*} will fall continually with t. However, each worker/consumer will die "earlier than expected," and thus each will leave positive unplanned bequests. Given two worker/consumers with identical resources and the same age and T*, the one who dies earlier after retirement will leave a larger unplanned bequest. Thus even if people do continually update their forecasts of the horizon as they age, we should still find that unplanned bequests are negatively related to T-T*.

III. Data and Estimation

The discussion in Section II suggests estimating:

$$(5) \qquad K_i = \theta_0 + \theta_1 T_i^* + \theta_2 T_i^u + \theta_3 W_{oi} + \theta_4 M_i$$

where W_o is initial wealth, M is lifetime earnings, i is an individual, and T^u is the number of years of unexpected life. If M is measured without error, or if M is small relative to W_o, we should observe that θ_1, $\theta_2 < 0$; regardless of these provisos, we should also find θ_3, $\theta_4 > 0$. In order to separate planned from unplanned bequests we need to derive some method of determining the consumer's horizon. While simple actuarial data provide some distinctions among individuals, the effects of differences in horizons based on such data cannot be distinguished from those based on age and cohort differences (since these are what determine the actuarial data) except because of the underlying nonlinearities. Accordingly, we calculate the years remaining until death, T*, as:

$$(6)\ T^* = e^o + \beta\ NPARGE80 - \gamma\ NPARLT60\ .$$

e^o is the expected years of remaining life based on data from actuarial tables at time t; NPARGE80 is the number of the person's parents who survived to age 80, and NPARLT60 is the number who did not survive to age 60. The coefficients β and γ are fixed at 3 and 2, reflecting the findings on subjective horizons in Hamermesh (1985).

The formulation of T* in (6) is implemented in two ways. First, we calculate T^*_1 as of the fixed chronological age of 55 for all observations. Second, we calculate T^*_2 as of the date when the second parent of the individual in question died. Thus for each person the forecasted horizons will reflect parents' longevity as well as the actuarial life expectancy for people of their sex during their lifetimes. Throughout the study we assume $T^u_1 = T-T^*_1$ and $T^u_2 = T-T^*_2$, where T is the years of life remaining from the time T* is calculated.

The data set is from Connecticut and was used by Menchik (1979) to examine the relation between the estates of parents and those of their offspring. It covers men and women who died between 1939 and 1976 and whose parents left large estates. These data are especially suited to this problem, as they contain information on the decedents' estates as well as on bequests the decedents had received (a partial measure of W_o). They also contain information on the age of death of the individual and of one or both parents, as well as the individual's date of death. The people in the sample had very large inherited wealth, a mean of \$202,560 (in 1967 dollars), a median of \$50,844, and a range from \$0 to \$2,917,757. Even though we may measure lifetime earnings with error or with poor proxies, W_o, as proxied by inheritance of physical wealth, may be sufficiently large relative to lifetime earnings that our hypotheses about θ_1 and θ_2 could hold in this sample if the simple model we have outlined is correct.

The equation actually estimated is:

$$(5') \quad \log(\text{Estate}) = \theta_0' + \theta_1' T^* + \theta_2' T^u + \theta_{31}' \log(\text{Inheritance}) + \theta_{32}' \text{ET} + \theta_4' \text{Male},$$

We measure the dependent variable as the logarithm of one plus the value (in 1967 dollars) of the estate left by the individual. Initial wealth is proxied by one plus the value (in 1967 dollars) of the bequest the individual received from his or her parents. Since people who receive their inheritances earlier have greater initial wealth (because of the interest that can accumulate on that inheritance), we also include, following Menchik (1979), ET, a weighted average of the differences between the dates of death of each parent and of the child.[4] No data are available on earnings or any of the standard human capital measures that affect earnings. However, we do know that female labor-force participation during the lives of members of our sample was far below that of men, and that wage discrimination by sex also existed. Accordingly, a dummy variable equalling one for males is also included in (5′) as a partial proxy for differences in M.

For a number of sample members data were only available on one parent. For these people we treat the second parent as if he or she died between ages 60 and 80. Also, for those people who died before age 55, or predeceased one or both parents, we calculate T^*_1 and/or T^*_2 based on information available at the time of the individual′s death.

Of the full sample of 165 usable observations, 81 had one or more siblings in the sample. The OLS estimates of the residuals from equation (5′) can thus be used to examine the extent to which there is a correlation of the error terms within families. The intra-class correlation coefficient of the residuals for these observations is a measure of this correlation, ρ_i.[5] To the extent that this correlation is important it also suggests that the OLS estimates of (5′) are inefficient, and that some generalized least squares method should be applied to this equation.

IV. Results and Discussion

Two aspects of the sample require us to estimate (5′) on various subsamples as well as on the entire 165 observations. First, one person left no estate; for this person the dependent variable takes the value zero and accounts for approximately 25 percent of the sample variance. Second, 15 people died before age 56. These include all but one of the people who predeceased their parents. Thus for this group $T*_2$ provides a poorer measure of the horizon; and, unlike for other sample members, $T*_1$ is measured at ages before 55. Accordingly we form three subsamples, respectively excluding the person who left no estate, excluding early decedents, and excluding both of these.

Table 1 shows the sample statistics on the T* and T^u measures for each of the four samples. It is worth noting that there is substantial variation in the T*, especially in $T*_2$, which is measured at different ages for each sample member, but even in $T*_1$, which is measured at age 55 for each person (except for early decedents). Also, the means of the T^u are negative, even for the subsamples that exclude early decedents. Since the means of forecast errors should equal zero if forecasts are on average correct, the negative means on these measures suggest a bias in the forecasts we have attached to these individuals. The sources of the bias and their potential effects on the estimates of the parameters in (5′) are discussed below.

Table 2 presents the estimates of equation (5′) for each of the four samples, in each case using horizons based on $T*_1$ and $T*_2$. The coefficients on

Table 1. Means, Standard Deviations and Ranges, T^* and T^u

Sample Definition	T_1^*	T_1^u	T_2^*	T_2^u
	Variable			
Entire Sample (N = 165)	21.33 (2.54) (14.8,27.8)	-5.65 (11.15) (-38.8,18.4)	20.25 (4.33) (10.3,33.7)	-4.57 (10.90 (-38.8,20.6)
Reduced Sample (N = 164)	21.32 (2.54) (14.8,27.8)	-5.73 (11.14) (-38.8,18.4)	20.16 (4.21) (10.3,33.1)	-4.57 (10.93) (-38.8,20.6)
Excluding Early Decedents (N = 150)	21.59 (2.39) (16.1,27.8)	-3.53 (9.21) (-23.8,18.4)	20.53 (4.30) (12.0,33.7)	-2.48 (8.93) (-22.8,20.6)
Reduced Sample (N = 149)	21.58 (2.40) (16.1,27.8)	-3.60 (9.21) (-23.8,18.4)	20.45 (4.17) (12.0,33.1)	-2.47 (8.96) (-22.8,20.6)

ET suggest that each extra year during which people own their inheritance adds between 1 and 9 percent to their estates. The upper part of this range implies a remarkably large real rate of return on the assets that form the inheritances these people received. It is not inconceivable, though, that this very wealthy sample is willing to undertake investments that are sufficiently risky to yield a fairly high average real rate of return.[6] The coefficient on the dummy variable for men (who constitute about 60 percent of the samples) is positive and quite large, as expected. While its magnitude seems large, one should remember that this variable proxies any sex-related differences in lifetime earnings, differences that may be big enough to generate bequests that are about twice as large for men as for women.

The estimated intra-class correlation coefficients for the 81 sample members (68 in the samples excluding early decedents) who belong to 34 (28) separate families differ sharply depending on the sample used. If we include early decedents these coefficients are all significantly positive at least at the 95 percent level using the appropriate t-statistic. In the samples that exclude early decedents, though, none achieves this level of significance. There does appear to be some correlation within families in bequest behavior (controlling for initial inheritance, duration of life, and our admittedly poor proxy for lifetime earnings). The low correlation, at least in the samples excluding early decedents, suggests that any inefficiency in the estimates of the parameters that is induced by our failure to account for intra-family correlation in estimating (5′) is likely to be unimportant.

The effect of extra years of unanticipated life, T^u, on the size of the person's estate varies greatly with the choice of sample and proxy for T^u. When we exclude early decedents and base the horizon on people's life expectancy at age 55, we find either an unexpected positive impact or no

Table 2. Estimates of (5') -- Dependent Variable is Log (Estate)[a]

	Sample Size							
	N=149		N=150		N=164		N=165	
Constant	.139	.648	−0.008	1.558	2.734	2.604	2.352	3.366
	(.08)	(.49)	(−.01)	(.96)	(1.81)	(2.16)	(1.33)	(2.34)
log (Inheritance)	.530	.546	.506	.521	.391	.401	.372	.382
	(8.18)	(8.67)	(6.49)	(6.69)	(7.03)	(7.43)	(5.74)	(5.91)
ET	.017	.061	.051	.083	.014	.059	.045	.079
	(1.08)	(3.07)	(2.73)	(3.43)	(.89)	(3.02)	(2.51)	(3.42)
Male	1.210	1.061	1.128	.869	.929	.866	.861	.675
	(3.89)	(3.92)	(3.01)	(2.60)	(3.13)	(3.27)	(2.49)	(2.13)
T_1^*	.240		.211		.201		.184	
	(3.79)		(2.77)		(3.52)		(2.76)	
T_1^u	.029		−.003		.007		−.020	
	(1.71)		(−.18)		(.46)		(−1.15)	
T_2^*		.160		.099		.151		.096
		(4.87)		(2.49)		(4.75)		(2.59)
T_2^u		−.015		−.037		−.030		−.046
		(−.73)		(−1.51)		(−1.65)		(−2.12)
$\bar{R}^2$	.357	.388	.267	.265	.285	.323	.221	.223
$\hat{\rho}_i$	.134	.163	.212	.244	.363	.360	.412	.410

[a]t-statistics in parentheses.

effect on the size of the estate. When early decedents are included and the horizon is based on life expectancy at the death of the second parent, the impact is negative and significant. However, as we noted in Section III, the computation of both horizon measures $T*_1$ and $T*_2$ has problems in the case of early decedents.

These considerations suggest that the most reliable estimates come from the samples that exclude early decedents. That being the case, the results in the Table can best be interpreted as implying that there is little if any effect of extra years of unexpected lifetime on the size of the estate. Perhaps the best conclusion to be drawn from these estimates is that, given the way we have proxied the horizon using point estimates, unplanned bequests do not seem important.

Unlike the coefficients on T^u, those on the proxies for the horizon, T*, are significantly positive in all four samples and for both forms of this proxy.[7] If the errors in measuring lifetime resources had little impact because those resources were small relative to initial wealth in this sample, we would expect the point estimate of the horizon to have a negative effect on the size of the estate. The result is thus clearly quite surprising. There are three possible explanations for this finding. The first is simply a measurement problem: People's expectations, as proxied by the T*, overshoot the actual ages at death. As Table 1 showed, T^u is on average negative in this sample. We know (Hamermesh, 1985) that the estimates of β and γ used to form the T* are far above what epidemiological evidence indicates to be the true relation of parents' to offspring's longevity. Since many more people in the sample had long- than short-lived parents, this consideration suggests why T* could overestimate the actual horizon, and why higher T* would be associated with a larger estate. This possibility does not, however, explain the failure to observe a significant negative impact of T^u on the size of the estate.

A second possibility is based on our inability to measure differences in lifetime earnings (except weakly with the dummy variable indicating the decedent's sex). While we argued that lifetime earnings are small relative to initial wealth, the lack of good measures of earnings may still imply that our proxies for the horizon also proxy lifetime earnings. Since higher lifetime earnings are associated with higher consumption and larger bequests, this can explain the significant positive effect of T*. However, since T^u=T-T*, T^u will be negatively correlated with lifetime earnings if T* is partly a proxy for earnings. That correlation should have resulted in an even more negative coefficient on T^u than we would have observed if a good measure of lifetime earnings had been available. Thus this measurement problem too can explain the results on T* quite well, but cannot explain the general insignficance of the coefficients on T^u.

A third explanation, more in the nature of a specification than a measurement problem, is that it may not be correct to focus only on the means of people's subjective survival distributions. In particular, Hamermesh (1985) showed that having long-lived parents significantly increases the variance of this distribution. Thus our proxies for the horizon are also inextricably proxies for the degree of uncertainty about the horizon. If risk-averse consumers facing imperfect annuities markets accumulate assets sufficient to maintain consumption throughout a possibly quite long retirement, we would observe estates being left by people who had no bequest motive _per se_. As Davies (1981) discusses, this effect will be especially pronounced for those facing the greatest uncertainty (those who have the highest value of our measure of T*).

V. Conclusions

In this study we have constructed a model designed to examine the effects of differences in individuals' subjective horizons and years of unexpected longevity on their terminal wealth. Using a transformation of actuarial data and their parents' longevity to proxy the horizon of a sample of wealthy decedents, we have found a significant positive effect of proxies for the horizon, but no significant effect of unexpected years of life. Both findings are inconsistent with a simple model of a consumer with fixed lifetime earnings who derives utility from consumption and bequests and plans around a point estimate of the horizon. Two measurement problems help explain the first result, but neither can explain the insignificant effect of unexpected years of life. A third possibility is that our proxies for the horizon also proxy uncertainty about it, so that we cannot distinguish between the effects of a longer horizon and increased uncertainty on the size of bequests.

It is unlikely that something that affects the mean of the distribution of subjective survival probabilities does not also affect its variance, since both stem from the same underlying distribution of subjective survival probabilities. This suggests that the current state of our knowledge makes the distinction between planned an unplanned bequests empirically problematic. Only with substantially more research on the nature of subjective survival distributions, and careful modelling of proxies for their means and variances, can one hope to distinguish the relative importance of planned and unplanned bequests, and of bequests in the form of assets that remain at the end of an uncertain lifetime.

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FOOTNOTES

1. There is some evidence (Hamermesh, 1984b) that labor supply, and thus lifetime earnings, are independent of the horizon T*, though Wolfe (1983) implies this is not the case for early decedents.

2. Among a sample of older couples with no earnings in 1973 (Hamermesh, 1984a), average earnings in 1975 totalled only $93.

3. This may be induced by economic incentives associated with the interaction of public and private pension programs; see Lazear (1979).

4. The weights are the sizes of each parent's estate.

5. Kendall-Stuart (1973, p. 315) discuss how this correlation can be estimated in the presence of groups of varying sizes.

6. That the coefficients on ET are larger when T^*_2 and T^u_2 are used is the unsurprising result of the introduction of multicollinearity between these measures and ET. This problem does not exist when the other measures, which are based on the horizon at a given age, are used.

7. This is not due to a confusion of the T* with secular improvements in longevity: When the date of death is added to (5'), the significant positive effects of T* remain.