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BEQUESTS AS A MEANS OF PAYMENT

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ABSTRACT

Although recent research suggests that intergenerational transfers play an important role in aggregate capital accumulation, our understanding of bequest motives remains incomplete. We develop a simple model of "exchange-motivated" bequests, in which a testator influences the decisions of his beneficiaries by holding wealth in bequeathable forms and by conditioning the division of bequests on the beneficiaries' actions. The model generates falsifiable empirical predictions which are inconsistent with other theories of intergenerational transfers. We present econometric and other evidence which strongly suggests that bequests are often used as a means of payment for services rendered by beneficiaries.

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"Tell me, my daughters
(Since now we will divest us both of rule,
Interest of territory, cares of state).
Which of you shall we say doth love us most,
That we our largest bounty may extend
Where nature doth with merit challenge."

- King Lear, Shakespeare (1608)

Much recent research suggests that intergenerational transfers play an important role in aggregate capital accumulation. Kotlikoff and Summers (1981) estimate that about four-fifths of U.S. wealth accumulation is due to intergenerational transfers.[1] Several other studies, including Brittain (1978), Mirer (1979), and Bernheim (1984a) have found that the savings behavior of retirees is inconsistent with strong forms of the Life Cycle Hypothesis.[2] While intergenerational transfers appear to be of central importance in understanding patterns of capital accumulation and familial behavior, relatively little is known about what motivates individuals to leave bequests.

In this paper we develop a model of "exchange motivated" bequests, and present some preliminary empirical tests of it. The central premise underlying our formulation is that testators use bequests to influence the behavior of potential beneficiaries. Such influence may be overt as when parents threaten to disinherit miscreant offspring, or more subtle as when parents reward more attentive children with family heirlooms. As we discuss below, models of exchange motivated bequests have very different implications for the effects of institutions such as Social Security and private pensions on the rate of capital formation, and individual behavior more generally, than do alternative models.

In our theoretical formulation, we envision a testator who derives satisfaction from consumption, and who is also affected by actions taken individually by a number of potential beneficiaries. The testator has no conventional bequest motive, and so, apart from strategic considerations, would prefer to hold his entire wealth in annuities. However, his preferences differ from those of his potential beneficiaries (he may, for example, wish to receive additional attention, or more generally to alter behavior). By holding wealth in bequeathable forms and by conditioning the division of bequests (perhaps through informal means) on actions taken, he can attempt to influence his beneficiaries' decisions. However, he is constrained in this regard by considerations of credibility; he cannot, for example, credibly threaten universal disinheritance. We show that as long as there are at least two credible beneficiaries, it is possible for the testator to devise a simple, intuitively appealing bequest rule which overcomes the problem of credibility, and allows him to appropriate all surplus generated from testator-beneficiary interaction. This surplus provides the incentive for the testator to hold at least part of his wealth in bequeathable forms.

No single tractable analytic model can capture as varied a phenomenon as intergenerational transfers. We believe, however, that the model of exchange motivated bequests presented here is a valuable supplement to conventional formulations which rely on ad-hoc bequest motives or intergenerational altruism. In particular, our model helps to explain several empirical observations which seem inconsistent with other formulations. Furthermore, it generates falsifiable empirical predictions, thereby lending itself to econometric testing.

Since undertaking this project, the authors have frequently been accused of harboring a perhaps too pessimistic view of human nature. It is therefore important to emphasize that we intend for the current work to supplement, rather than substitute for, current theories of bequests. Surely. not all individuals behave manipulatively, nor does limited self-interest necessarily determine the disposition of all bequeathable wealth. However, even the optimist must concede that certain cases smack of financial motivation. For example, rich, elderly, childless widows often appear to have unusually attentive relatives. More commonly, although many families seem to divide the bulk of financial wealth in accordance with certain principles of fairness, specific possessions (for instance, heirlooms and other valuables) may be distributed in part on the basis of "merit." We model a polar extreme in order to highlight analysis of the exchange motive, rather than to suggest the absence of other motivation. The relative significance of different motives is properly the subject of empirical inquiry (as in sections II and III), rather than casual anecdotes.

The notion that bequests may arise as a consequence of exchange between parents and children has previously received varying amounts of attention from Sussman <u>et al</u>. (1970), Barro (1974, footnote 14), Ben-Porath (1978), Adams (1980), Kotlikoff and Spivak (1981), Tomes (1981), and Becker (1974, 1981). These studies, however, lack a complete model of the exchange process. Where formal models of exchange are developed, it is implicitly assumed that unwritten agreements between family members are perfectly enforceable. By explicitly modelling the strategic choices of parties of such agreements, we generate sharp, empirically testable predictions concerning the circumstances under which these agreements are enforceable.

Aside from the issue of enforceability, our analysis is perhaps most closely related to that of Becker (1974, 1981), but in his framework, the parent (testator) is an altruist, and is primarily concerned with alleviating inter-family conflict (see, however, Becker's discussion of "merit goods"). We model a more elaborate game in which testators act selfishly at times, promoting conflict among potential beneficiaries to achieve personally desired goals. Further, we explicitly link the exchange motive to decisions to hold wealth in bequeathable, as opposed to annuitized forms.

The paper is organized as follows. Section I presents our model of exchange motivated bequests and characterizes its solution. In section II, we present econometric evidence on bequeathable assets and beneficiary behavior which supports the model. Section III discusses the ability of various bequest theories to account for certain stylized facts. Finally, in section IV we examine some implications of our model for issues such as the effect of Social Security, government debt, and private pensions on capital formation and family behavior. Conclusions are also presented.

I. A Model of Exchange Motivated Bequests

In this section, we present a model in which savings and bequests are partly determined by non-cooperative interaction among self-interested agents. For a variety of reasons, testators' preferences may not coincide with those of their potential beneficiaries. In such cases, decisions of potential beneficiaries may be influenced by the hope of financial reward. Examples abound: An individual might desire more attention from his children, object to a relative's choice of spouse, or want to be cared for by a sibling or grandchild. Institutions (such as universities) commonly treat wealthy patrons particularly well, perhaps to encourage further support in the form of gifts and bequests.

A formal discussion of strategic issues necessarily requires us to select a structural model. In particular, we envision a world in which the testator is a dominant, fully informed player. By designing the rules governing the division of bequests, he influences the behavior of potential beneficiaries, extracting the full surplus generated by this exchange. There are, of course, a variety of other ways to model exchange motivated bequests; ours has no particular *a priori* claim to realism. However, it does have the virtue of simplicity and tractability, and in addition generates falsifiable empirical predictions which are inconsistent with other models of intergenerational transfers, which lack the element of exchange. This allows us to test the model in sections II and III. On the whole, the evidence appears to support the hypothesis that bequests are used extensively to facilitate intrafamily exchange.

In solving for the equilibria of the game described in the following subsection, we make extensive use of Selten's (1975) notion of subgame perfect Nash Equilibrium. Formally, an equilibrium is subgame perfect if strategies form an equilibrium in every proper subgame. Intuitively, this refinement of the Nash concept requires agents to act in a dynamically consistent fashion (that is, in their own interests) both on and off the equilibrium path. This is commonly interpreted as meaning that an agent cannot credibly threaten to take in certain contingencies actions, which, should those contingencies arise, would be contrary to his interests. In the case of bequests, testators obviously need to establish credibility in order to manipulate potential beneficiaries. Threats of universal disinheritance are, for example, unlikely to be believed.

Our task is to show that the testator can (in our model) successfully manipulate potential beneficiaries even though he is constrained to make credible threats.

A. The Model

Consider a single testator with N potential beneficiaries, indexed n = 1, ..., N. This set of beneficiaries is intended to be exhaustive: it includes all individuals (spouse, children, other relatives) and institutions (charities, churches, universities) to which the testator could credibly promise a substantial fraction of his estate. For any particular individual, the size of this set is an empirical question.

Time proceeds in discrete periods, labelled t = 0, 1, 2, ... The conditional probability that the testator will die at the end of period t given that he is alive at the beginning of period t will be denoted π_t. We assume that the testator's lifetime is deterministically bounded (there exists T such that $\pi_T = 1$). Let

$$P(t,t') = \prod_{s=t}^{t'-1} (1 - \pi_s),$$

i.e., the probability that he will survive until t', given that he is alive in period t. These survival probabilities are assumed to be publicly known. Although the testator's lifetime is uncertain, we take potential beneficiaries to be infinitely lived. Relaxing this does not change any substantive conclusions.[3]

Each period, the testator and potential beneficiaries choose to consume amounts C_t, and $\{C_{n,t}\}_{n=1}^{N}$, respectively. In addition, potential beneficiaries choose actions $a_t = \{a_{n,t}\}_{n=1}^{N}$ which affect the testator's well-being.[4] For simplicity, we assume that $a_{n,t}$ is a real number lying in some interval $0 \leq a_{n,t} \leq \bar{a}$. We assume that the testator's utility is additively separable in time and discounted at the rate β. In particular, for every period s and for all streams of future consumption and actions, his *ex ante* utility is given by:

$$\sum_{t=s}^{T} \beta^{t-s} P(s,t)\ U_t\ (c_t,\ a_t)$$

We take U_t to be increasing and strictly concave in each of its arguments. Similarly, for a potential beneficiary n, utility is given by:[5]

$$\sum_{t=s}^{\infty} \beta_n^{t-s}\ U_{n,t}\ (C_{n,t},\ a_{n,t})$$

$U_{n,t}$ is taken to be increasing and concave in $C_{n,t}$.[6] Since we are primarily interested in cases of strategic conflict between testator and beneficiary, we assume that $a_{n,t}$ is "bad" from the beneficiary's point of view (that is, $U_{n,t}$ is decreasing and concave in $a_{n,t}$).

At time t = 0, the testator and potential beneficiaries possess initial wealth W_0 and $\{W_{n,0}\}_{n=1}^{N}$, respectively. Aside from interest, there are no infusions of income into the system after period 0.[7] In each period t, agents allocate wealth $(W_t,\ \{W_{n,t}\}_{n=1}^{N})$ between consumption $(C_t,\ \{C_{n,t}\}_{n=1}^{N})$, one period annuity contracts (A_t. $\{A_{n,t}\}_{n=1}^{N}$), and riskless bonds, the latter yielding a return in the following period of r. In contrast, for the testator, annuities yield $\rho_t > r$; however, payment is conditional upon survival. For the case of fair annuities, $1 + \rho_t = (1 + r)/(1 - \pi_t)$. Since beneficiaries survive with probability one, their annuities are equivalent to bonds.

The testator's total wealth evolves according to equation (1).

$$W_{t+1} = (W_t - C_t - A_t)\ (1 + r) + A_t\ (1 + \rho_t) \tag{1}$$

Should he die at the end of period t, his total bequest B_t is given by

$$B_t = W_t - C_t - A_t \tag{2}$$

The evolution of a potential beneficiary's wealth will be governed by an equation similar to (1):

$$W_{n,t+1} = (W_{n,t} - C_{n,t} + b_{n,t}\ I(t))\ (1 + r) \tag{3}$$

Here, I(t) equals 1 if the testator actually dies in period t, and 0 otherwise; $b_{n,t}$ is the amount bequeathed to the n^{th} beneficiary in the event that the testator dies in period t.

It is convenient at this point to define, for each n and t, the indirect utility function $V_{n,t}(W)$ as the solution to the following program:

$$\max \sum_{\tau=t}^{\infty} \beta_n^{\tau-t}\ U_{n,t}\ (C_{n,\tau}, 0)$$

subject to

$$\sum_{\tau=t}^{\infty} c_{n,t}/(1 + r)^{\tau-t} = W$$

That is, for each potential beneficiary n, time period t, and wealth level W, $V_{n,t}(W)$ indicates the maximum present discounted utility which the potential beneficiary could obtain if he left the game (i.e., set $a_{n,t} = b_{n,t} = 0$ for each t), and simply performed life cycle maximization.

Strategic considerations enter through decisions affecting the size and distribution of bequests. In particular, choices within a period take place in the following sequence. First, the testator determines his consumption level, and divides his remaining wealth between annuities and bequeathable assets. In addition, he selects a bequest rule, which specifies criteria for determining the distribution of his bequeathable assets should he die at the end of the period. Second, potential beneficiaries observe the testator's level of bequeathable wealth,[8] and select current actions and consumption levels, taking into account the testator's bequest rule. Nature then determines whether or not the testator survives; in the case of death, the estate is divided according to the bequest rule.

Formally, the bequest rule is a vector of N functions, b_n (H, B), which map the history of the game up until the testator dies (H) and the level of bequeathable wealth (B) into a bequest for each beneficiary. In period t, the testator may choose a rule which depends on all behavior that is observable prior to the soonest possible time of his death (i.e., the end of the period); we assume that the history of beneficiaries' actions is observable, but that their current consumption cannot be monitored by testators. We require that the bequest rule satisfy only one condition for all histories H:

$$\sum_{n=1}^{N} b_n (H, B) = B \tag{6}$$

This restriction reflects two considerations. First, for feasibility, the left hand side of (6) cannot exceed the right. Second, since potential beneficiaries must receive all bequeathable wealth upon the testator's death, (6) specifies equality. Since we have defined the set of potential beneficiaries to be exhaustive, this simply follows from the fact that the testator "can't take it with him." We have assured that it is possible to identify a set of credible potential beneficiaries -- a testator will prefer to leave his wealth to some subset of these individuals and institutions even if they all ignore his wishes[9] (as discussed in the introduction, threats to do otherwise are then simply not credible; the perfectness requirement is imposed here). Thus, for example, parents may not be able to successfully issue unreasonable ultimaturs to their children, threatening universal disinheritance.

In the next subsection, we show that if there are at least two credible beneficiaries ($N \geq 2$), then the testator can design a simple, intuitively appealing bequest rule which allows him to extract the entire surplus associated with testator-beneficiary interaction, even though he is constrained to bequeath his entire estate to them. The rule establishes a game in which potential beneficiaries compete for bequests. Thus, "sibling rivalry" emerges as a consequence of parental self-interest. The potential benefits of such exchange induce the testator to hold wealth in bequeathable forms, even though his personal rate of return falls.

B. Equilibrium in a Single Period

Solving for the perfect equilibria of the game described in the preceding section is a somewhat intricate task. Significant insight into the nature of this solution can be garnered by first analyzing a single period model. This provides a basis for the recursive solution of the full dynamic model presented in the next subsection. Specifically, assume that there is a single period, at the end of which the testator dies with certainty. His utility is a function of consumption and beneficiaries' actions, $U(C, a)$; each potential beneficiary's utility depends on his chosen action and bequest received, $U_n(a_n, b_n)$. Decisions are made in the following order: (1) the testator chooses consumption and a bequest rule, (2) beneficiaries choose actions. Subsequently to these decisions the testator dies, and his estate is divided according to the specified rule.

We motivate the solution to this simple game as follows. Figure 1 illustrates a particular beneficiary's indifference curves in the (a_n, b_n) plane. Recall that he thinks of a_n as a "bad" -- utility increases to the northwest. Consider the set:

$$S_n = \{(a_n, b_n) : U_n(a_n, b_n) \geq U_n(0, 0)\}$$

S_n consists of all pairs which the beneficiary weakly prefers to minimum action ($a_n = 0$) and no bequest (see figure 2). Since he always has the option to set $a_n = 0$, and since bequests are constrained to be positive, any equilibrium must involve beneficiary n consuming an allocation in S_n.

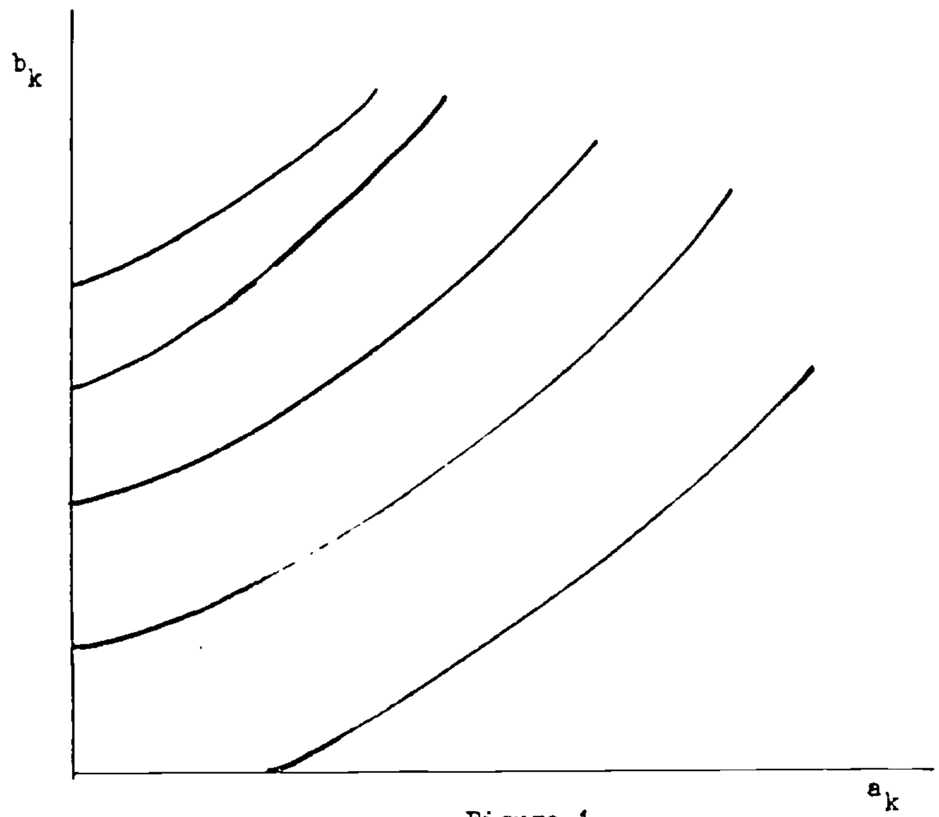

Figure 1

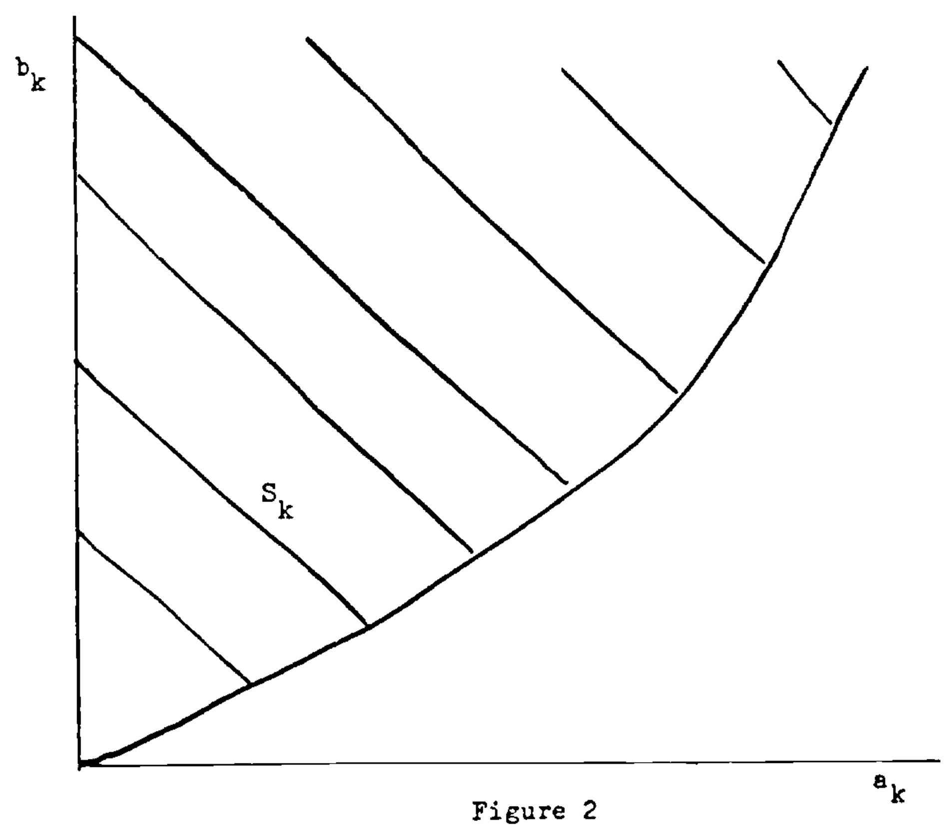

Figure 2

Now consider the following artificial problem for the testator:

$$\max_{C,a,b,} U(C, a)$$

subject to

$$\text{s.t.} \sum_{n=1}^{N} b_n + C = W$$

$$(a_n, b_n) \in S_n \text{ for each } n.$$

The solution to this problem, denoted C^*, $\{a_n^*. b_n^*\}_{n=1}^{N}$, would be appropriate if testators could choose actions for potential beneficiaries subject to the constraint that each is still willing to participate. Assume there exists a bequest rule which, along with a consumption level C^*, induces $\{a_n^*, b_n^*\}_{n=1}^{N}$ as an equilibrium. Since this allocation achieves the optimum ignoring incentive constraints, it must necessarily be the testator's best choice. The perfect equilibrium of this simplified game would then consist of the testator choosing C^* along with this bequest rule, and the beneficiaries playing Nash strategies in the subgame defined by the bequest rule.

To characterize the perfect equilibria for this game, we need only exhibit a bequest rule satisfying (6) for which $\{a_n^*, b_n^*\}_{n=1}^{N}$ emerges as an equilibrium in the beneficiaries' subgame.[10] One such rule operates as follows. We will refer to $\{a_n^*, b_n^*\}_{n=1}^{N}$ as "benchmark" actions and bequests. Denote the set of beneficiaries who take at least their benchmark actions as $K = \{n : a_n \geq a_n^*\}$; let $\overline{K}$ denote the complement of K. If K is non-empty, the testator bequeaths nothing to members of $\overline{K}$. In contrast, members of K receive their benchmark bequests, plus equal shares of the benchmark bequests for members of $\overline{K}$. If K is empty, then the testator bequeaths the entire estate to some beneficiary r whose action is closest to his benchmark level: $a_r^* - a_r < a_n^* - a_n$ for all n. Note that total bequests always equal $W_0 - C^*$, so feasibility and credibility are satisfied.

This rule defines a simultaneous move subgame where potential beneficiaries choose actions a_n. It is easy to verify that there are N + 1 Nash equilibria for this subgame; one consists of every beneficiary playing his benchmark level. In the N remaining equilibria, N - 1 beneficiaries choose their benchmark levels, while one takes the minimum action. However, for a variety of reasons, one can safely ignore these less desirable equilibria.[11]

To summarize: for the simplified game described at the beginning of this section, the perfect equilibrium consists of the testator choosing consumption C^* along with the bequest rule described in the preceding paragraph, while potential beneficiaries play Nash strategies in the subgame defined by the bequest rule. All other perfect equilibria will yield the same realizations of consumption, attention, and bequests along equilibrium paths. Note that the testator succeeds in extracting all surplus from his beneficiaries ($U_n\ (a_n^*, b_n^*) = U_n\ (0, 0)$). The bequest rule exhibited is intuitively appealing: each child normally receives a positive bequest, but is disinherited if he fails to meet a standard of "good" behavior. If all children are "bad," the "best" child receives the entire estate.

Note that the ability of the testator to successfully influence beneficiaries depends critically upon the existence of more than one credible beneficiary. A single credible beneficiary cannot be "played off" against another agent. Since he is assured of receiving all bequests, no exchange is possible, and the game unravels.

C. Equilibrium in the Full Model

We are now prepared to characterize the perfect Nash equilibria of the fully dynamic game described in the preceding subsection. We use recursion to show that the above results generalize: as long as $N > 2$, the equilibrium realizations of all variables directly relevant to the testator (annuities, bequeathable wealth, testator's consumption, beneficiaries' actions, and potential bequests) are uniquely determined, and coincide with the values which the testator himself would select if he maximized his utility subject to the constraint that beneficiaries are willing to participate. Thus, the testator manages to extract all the surplus associated with testator-beneficiary interaction through the use of a sequence of simple, intuitively appealing bequest rules. This surplus induces the testator to hold wealth in bequeathable forms, even though his personal return falls.

The solution is determined through backward recursion, beginning with period $T + 1$. Each beneficiary n starts this period with some (yet to be determined) wealth level, $W_{n,T+1}$. Since the testator has previously died with certainty, no strategic considerations arise. Optimal individual behavior from period $T + 1$ onwards yields utility $V_{n,T+1}(W_{n,T+1})$, as previously defined.

We generate complete equilibrium strategies by induction. That is, assume we have solved all subgames beginning in period $t + 1$. Assume that the testator's equilibrium utility for all such subgames (that is, for all period $t + 1$ wealth levels) can be written as $V_{t+1}(W_{t+1}, \{W_{n,t+1}\}_{n=1}^{N})$,[12] and that the

n^{th} beneficiary's equilibrium utility is given by $V_{n,t+1}(W_{n,t+1})$ whether or not the testator is alive at the beginning of the period. Decisions in period t must be predicated upon subsequent optimization. There are two cases to consider. First, the testator may have died prior to period t. In this case, beneficiaries act non-strategically, and receive indirect utility $V_{n,t}(W_{n,t})$. Second, the testator may be alive at the beginning of period t. The n^{th} beneficiary's expected utility is then given by.

$$U_{n,t}(C_{n,t}, a_{n,t}) + \beta_n \{(1 - \pi_t) V_{n,t+1}[(W_{n,t} - C_{n,t})(1 + r)] + \pi_t V_{n,t+1}[(W_{n,t} - C_{n,t} + b_{n,t})(1 + r)]\}$$

For any levels of $a_{n,t}$, $b_{n,t}$, and $W_{n,t}$ let the maximizing value of $C_{n,t}$ be $C_{n,t}(a_{n,t}, b_{n,t}, W_{n,t})$, and denote corresponding utility by $\bar{U}_{n,t}(a_{n,t}, b_{n,t}; W_{n,t})$. The testator's utility is given by

$$U_t(C_t, a_t) + \beta(1 - \pi_t) V_{t+1}[W_{t+1}, \{W_{n,t+1}\}_{n=1}^N]$$

where

$$W_{t+1} = (W_t - C_t - A_t)(1 + r) + A_t(1 + \rho_t)$$

and

$$W_{n,t+1} = [W_{n,t} - C_{n,t}(a_{n,t}, b_{n,t}, W_{n,t})](1 + r)$$

We will write this utility more compactly as:

$$\bar{U}_t(C_t, A_t, a_t, b_t, W_t, \{W_{n,t}\}_{n=1}^N).$$

By reproducing (with minor modifications) our analysis of the single period case, it is possible to show that the testator can design a simple bequest rule depending only on current actions which supports his constrained optimum (beneficiaries must willingly participate) as an equilibrium. Consequently, during actual play, the testator necessarily selects such a rule. Formally, we consider the following program.

$$\max_{C_t,\, A_t,\, a_t,\, b_t} \bar{U}_t \left(C_t, A_t, a_t, b_t \,;\, W_t, \{W_{n,t}\}_{n=1}^{N}\right)$$

$$\text{subject to} \quad \sum_{n=1}^{N} b_{n,t} + C_t + A_t = W_t$$

$$(a_{n,t}, b_{n,t}) \in S_{n,t} \text{ for all } n$$

where

$$S_{n,t} = \{(a_{n,t}, b_{n,t}) : \bar{U}_{n,t} (a_{n,t}, b_{n,t} \,;\, W_{n,t}) > \bar{U}_{n,t} (0, 0 \,;\, W_{n,t})\}$$

The solution to this problem offers the testator the maximum utility which he could obtain if he was unconstrined by incentive problems regarding the choice of actions in the current period, subject only to a free participation of beneficiaries restriction,[13] we denote this as $V_t \left(W_t, \{W_{n,t}\}_{n=1}^{N}\right)$. Since the free participation constraint ordinarily binds at the optimum,[14] we have:

$$U_{n,t} (a_{n,t}, b_{n,t} \,;\, W_{n,t}) = U_{n,t} (0, 0 \,;\, W_{n,t}) = V_{n,t} (W_{n,t}). \tag{8}$$

Thus, the beneficiary's indirect utility in period t is independent of whether or not the testator has died; only the testator succeeds in extracting positive surplus from this exchange of bequests for attention. This completes the induction step, allowing us to characterize the unique allocation sustained by the perfect Nash equilibria of this model.

II. Econometric Evidence

In this section, we provide empirical support for the hypothesis that bequests are used, in part, as a means of payment for services rendered by beneficiaires. Specifically, our examination of microeconomic panel data reveals that contact between parents and children is much higher in families where the elderly parent has a substantial amount of bequeathable wealth to offer. We show that this correlation is robust with respect to a variety of specifications and estimation techniques, which are designed to rule out alternative explanations based on potentially spurious factors. In addition, we explore some implications of the particular model developed in section I which differentiate it from closely related alternatives, and use these implications to test the model. The results are extremely favorable to our formulation of exchange motivated bequests.

Bequests can serve as a means of payment for services only if the presence of bequeathable wealth can influence the behavior of potential beneficiaries, and if testators exercise this influence. We adopt a slight abuse of terminology, referring to these two distinct aspects of exchange as the "supply" and "demand" sides. Primarily due to the nature of available data, our basic strategy if to estimate the effect of bequeathable wealth on the amount of services which beneficiaries provide to testators -- the "supply" side. Although we do not estimate the "demand" side explicitly, we provide indirect statistical evidence for the claim that testators exploit the relationship between services and bequests.

The econometric investigation detailed below requires rather specific data concerning assets and family interactions for a sample of elderly individuals. The Longitudinal Retirement History Survey (LRHS), conducted by the Office of Research and Statistics of the Social Security Administration, collected surprisingly extensive information on these characteristics. Data from the 1969, 1971, 1973, and 1975 waves of the LRHS were available at the time of this writing; unfortunately, insufficient data on assets were collected in 1973, so we were forced to drop this year. Over 11,000 individuals aged 58 to 63 were included in the first wave. Many of these were lost to attrition, on top of this, we restricted our sample to married couples who had at least one child, no children living at home, and for whom sufficient data on non-bequeathable assets were available.[15,16] Our final sample consisted of 1,166 observations, 855 of which had two or more living children, and 311 of which had only one living child.

Measures of attention were constructed as follows. For each observation, the LRHS contains information on total number of children (C_i), number of children who visit or telephone their parents weekly (VW_i), and number of children who visit or telephone their parents monthly (VM_i).[17] Our measure of attention per child was constructed from these variables as follows:

$$V_i = \frac{4 \cdot VW_i + VM_i}{4 \cdot C_i}$$

V_i indicates contact per child, normalized so that maximum contact equals unity. We have adopted the approximation that children who visit weekly give their parents four times as much attention as those who visit monthly. It is interesting to note in passing that the mean of V_i was 0.54 in 1969, and rose to 0.63 in 1975 -- evidently, the average level of contact is quite high, and rises with age.

Other variables were constructed as follows. Bequeathable wealth per child (b_i) includes financial wealth (stocks, bonds, mutual funds, bank accounts, checking accounts), residential and other property, the face value of life insurance,[18] privately purchased annuities,[19] and debt. Non-bequeathable annuity wealth per child (aw_i) includes Social Security and pension wealth. These were obtained by converting data on income from those sources to capitalized values applying a discount rate of 1.03 and actuarial survival probabilities. Matching administrative records contained data on income earned from 1951 to 1975 in employment covered by Social Security up to the taxable maximum. This information was extrapolated to yearly earnings using the method described in Fox (1976). The resulting income stream was then accumulated at a 3% rate of return to produce a measure of lifetime earnings for both husband and wife. Other variables used in the following analysis included age of respondent, and dummy variables indicating whether the respondent's health is better (BH_i) or worse (WH_i) than that of other members of his cohort, as well as whether the respondent is retired (RET_i).

One practical difficulty with these data is that information on the behavior of potential beneficiaries is limited to children. For any given individual, the set of credible beneficiaries may or may not be larger. Since our theory suggest that successful exchange takes place only when this set contains at least two candidates, we cannot be certain that single child families will behave in the manner predicted here. Consequently, we initially restrict attention to families with two or more children. Analysis and discussion of behavior in single child families is deferred to the end of this section.

Another general issue which arises with regard to the use of these data concerns the treatment of separate sample years. Except where noted, results presented in this paper are based on simple pooling of the samples years -- no correction is made for potential correlation between distinct observations on the same household. Such correlation would not, by itself, cause our estimates to be inconsistent, however, it would imply that standard errors are calculated incorrectly. In order to determine the probable magnitude of the resulting error, we reestimated a number of our specifications, employing the appropriate GLS correction. Although small changes in some point estimates were noted, no qualitative conclusions were altered. More importantly, estimated standard errors on critical coefficients (such as b_i) differed only slightly from those obtained with simple pooling.

We begin our analysis by specifying the supply of attention from children as a function of potential bequest per child:

$$V_i = \beta_0 + \beta_1 b_i + \varepsilon_i \tag{9}$$

where V_i and b_i are defined above, and where ε_i is a random error term. Within the context of our theoretical model, one can think of equation (9) as a linear approximation to the implicit function defined by (8), aggregated over beneficiaries.

Our first step was to estimate equation (9) using OLS.[20] Results are presented as equation 1 in Table 1. While the sign of the coefficient on b_i is consistent with our theory, one cannot reject the hypothesis that bequeathable wealth holdings have no effect on attention per child.

There are, however, a variety of reasons for believing that OLS estimates of this relationship may be inconsistent. One reason follows directly from the structure of our model: explicit consideration of the "demand" side suggests that b_i will be determined endogenously. The parent's optimal choice of b_i depends in part upon the preferences of his children, and ε_i is an important component of these preferences. Thus, as long as the parent has more information about the preferences of his children than does the econometrician, b_i and ε_i will be correlated. The direction of the resulting bias is, however, ambiguous.

Correlation between b_i and ε_i is likely to be present for other reasons as well. Stepping outside the formal model of the last section, one particularly plausible story is that some parents get along well with their children, while others do not.[21] Those that do may hold more bequeathable wealth simply because they like their children, while the children in turn may be attentive simply because they like their parents.

Our solution to this set of problems is to instrument for b_i in equation (9), using the parents' lifetime earnings y_i. We justify this choice of instrument as follows. It is clear that lifetime earnings are positively correlated with holdings of bequeathable wealth. We must establish that, in addition, this instrument is uncorrelated with ε_i. For our first story, y_i may be correlated with ϵ_i if parents work harder when young, so that they have more wealth with which to influence their children when old. For our second story, this correlation may be non-zero if the elderly parents whose children particularly like them have been particularly hardworking (or lazy).[22] Although one could, in both cases, plausibly argue that the correlation is non-zero, it is difficult to believe that it is very large.

2SLS estimates of equation (9) are presented in column 2 of Table 1. Notice that the coefficient of b_i is approximately eight times as large as the corresponding OLS estimate, and that the hypothesis of no effect on attention can be rejected at extremely high levels of confidence. This regression confirms our prediction that, in multiple child families, bequeathable wealth will be strongly correlated with attention.

The apparently striking difference between OLS and 2SLS estimates can be tested formally. A Hausman (1978) test reveals that exogeneity of b_i can be rejected at a high level of confidence. This conclusion is consistent with our model (in which b_i and a_i are simultaneously determined), and constitutes limited evidence in favor of an operative "demand" side. One should, of course, bear in mind that this rejection of exogeneity is also consistent with other alternatives. Nevertheless, it is worth noting that the particular alternative outlined above (correlation between filial and parental altruism) implies that OLS estimates of the coefficient on b_i should be biased upwards. In fact, we observe the opposite.

While our theoretical model offers one explanation for the set of results described above, the observed correlation between attention and bequeathable wealth could also be attributed to a number of spurious factors. We now turn to the task of ruling out these alternative explanations.

One might object that our basic specification omits a number of important variables with which both attention and bequeathable wealth are highly correlated. For example, healthy parents may be more pleasant to visit (or conversely, less needy of attention), as well as more successful in the marketplace. Older parents belong to a poorer cohort, and in general require more care. Retired parents may have a greater desire for contact with children. We correct for these difficulties by adding a vector of parental characteristics, Z_i, to our basic specification:

$$V_i = \beta_0 + \beta_1 b_i + Z_i \gamma + \varepsilon_i \tag{10}$$

In particular, Z_i includes age, health dummies (BH_i, WH_i), and a retirement dummy (RET_i). Results are presented as equation 3 in Table 1. The inclusion of these additional variables appears to have very little impact on either the magnitude or statistical significance of the coefficient on b_i.

Another apparently compelling objection is that wealth may affect attention through a variety of spurious channels. For example, parents with higher wealth may simply pay for travelling expenses, telephone calls,and so forth in order to have more contact with their children. Wealth effects may also be less direct. In particular, there is presumably a positive correlation between the incomes of parents and their children. A wealthy child may be more difficult to influence, or more desirable to visit. Wealthy children may be more capable of defraying the costs of travel and telephones, buy may also, on average, live farther from their parents. Thus, the direction of the potential bias is not obvious.

Note, however, that these alternative explanations do not distinguish between bequeathable and non-bequeathable (social security and pension annuity) wealth, as does our theory. A parent's ability to defray the costs of contact is determined both by his ordinary wealth, and by his claims on annuities. Similarly, while it is true that the wealth of children is correlated with parental resources, it is not likely to be highly correlated with the division of parental resources between bequeathable and non-bequeathable forms. Thus, in order to determine the magnitude of spurious wealth effects, we add annuity wealth (aw_i) to our basic specification:

$$V_i = \beta_0 + \beta_1 b_i + \beta_2 aw_i + Z_i \gamma + \varepsilon_i \tag{11}$$

The effect of holding another dollar of wealth in bequeathable form is then given by the difference between the coefficients on b_i and aw_i ($\beta_1 - \beta_2$).[23]

Estimates of specification (11) are presented as equation 4 in Table 1. Note that the coefficient of aw_i (the spurious wealth effect) is negative and statistically significant, while the coefficient on b_i is positive, and highly significant. The effect of holding wealth in bequeathable rather than annuitized form, given by the difference between these coefficients, is estimated to be 6.36, with a standard error of 1.89. Thus, correcting for spurious wealth effects only strengthens our original conclusion.

Another possible solution to the problem of spurious wealth effects is to restrict attention to a subsample for which these effects are likely to be unimportant. If the source of contamination concerns ability to pay, then such effects may be minimized by considering a subsample for which financial costs of contact are negligible. Presumably, geographic proximity eliminates much of these costs. Fortunately, the LRHS contains relevant information. In Table 2, we reestimate equation (11) for two subgroups: parents whose children all live within the same city or neighborhood, and parents whose children all live within 150 miles. The parameter estimates are quite close to those obtained for the entire sample. In fact, the effect of bequeathable wealth on attention appears to be largest for parents living in closest proximity to their children.

A related objection concerns the inclusion of housing wealth in our measure of b_i. It has been suggested to us that a positive coefficient on b_i may simply reflect the fact that children prefer to visit parents who live in nice houses. To accomodate this objection, we reestimated equation (11), substituting bequeathable non-housing wealth (bnh_i) for b_i. Our results were as follows:

$$V_i = \underset{(.211)}{.150} + \underset{(1.38)}{5.42}\ bnh_i - \underset{(.762)}{1.50}\ aw_i$$

$$+ \underset{(.325)}{.647}\ age_i/100 \ \underset{(1.84)}{-2.95}\ bh_i/100 \ \underset{(2.50)}{-.956}\ wh_i/100 \ \underset{(1.97)}{-2.98}\ ret_i/100$$

Despite the fact that most elderly individuals hold a large fraction of their portfolios in residential housing, these estimates are very close to those presented in Table 1. On the basis of this evidence, we are inclined to reject the hypothesis that our results are simply an artifact of some special feature of housing wealth.

As a final check on the robustness of our results, we reestimated equation (11) separately for each of our sample years. Estimates based on cross section data from 1969, 1971, and 1975 are presented in Table 3. Note that the coefficients of interest (those on b_i and aw_i) are extremely stable over the sample period.

So far, our empirical analysis has been solely concerned with establishing a link between attention and bequeathable wealth, and with ruling out alternative explanations based on potentially spurious factors. We now explore some other implications of the particular model developed in section I which differentiate it from closely related alternatives, and use these implications to test the model.

First, a number of the variables included in Z_i should affect the "price" at which attention can be purchased, as well as the absolute amount of attention supplied by children. Consider, for example, the variable WH_i (worse health). Although sick parents may recieve more attention simply due to filial devotion, on a more cynical view, illness increases the probability of death, thereby making a potential bequest of fixed magnitude more valuable to the child. To differentiate between these effects, we reestimated equation (11), adding interactions between b_i and WH_i, BH_i, and AGE_i.[24] The results presented in Table 4 are quite striking. Only three coefficients are statistically significant: those on aw_i, WH_i, and $WH_i \cdot b_i$. The coefficient of aw_i changes very little from our original estimate. The coefficient of WH_i is negative, indicating that, aside from exchange motivated concerns, sick parents receive <u>less</u> attention. In contrast, the coefficient of $WH_i \cdot b_i$ is large and positive. This strongly suggests that, for multiple child families, rich parents who are in poor health receive much more attention than their indigent counterparts. Once again, the data suggest significant financial motivation.

A second strong implication of our particular theory is that exchange motivated holding of bequeathable wealth can influence the behavior of potential beneficiaries only if there are at least two credible candidates. Unfortunately, as mentioned above, there is no way to determine the number of such candidates for any particular respondent in the LRHS. However, logically speaking, our theory admits the possibility that children are, in some meaningful sense, the only credible beneficiaries for the bulk of a parent's estate. This hypothesis can be tested empirically by investigating behavior in single child families, and comparing them to our multiple child results. We must emphasize that this hypothesis is not a consequence of our theory; thus, failure to differentiate between behavior in single and multiple child families would not recommend rejection of our theory. However, the absence of a positive correlation between attention and bequeathable wealth in single child familes would strongly support our theory, as well as the supplemental hypothesis that parents cannot credibly threaten to disinherit all of their children.

These considerations motivated us to reestimate each specification above using data on single child families. A representative set of results is presented in Table 5. Note that in equations 1 through 4, the pattern of signs on the coefficients of b_i and aw_i is precisely the opposite of that obtained for multiple child families. In addition, the standard errors of coefficients on key parameters are relatively small. It is worth noting that the coefficient of b_i in these regressions is quite close to the magnitude of the spurious wealth effect estimated for multiple child families.[25] This is what one would expect, since b_i is no longer "contaminated" by an exchange motivated effect. The only troubling aspect of these estimates is that there appears to be a statistically significant difference between the coefficients of b_i and aw_i, presumably, aw_i should carry only the spurious wealth effect as well. Strictly speaking, this is inconsistent with our model. Note finally that in equation 5, worse health continues to have a negative impact on attention (although the magnitude is not statistically significant); however, there is no evidence that this can be compensated for by high bequeathable wealth holdings, as in multiple child families. This evidence strongly supports the hypothesis that exchange motivated bequests take place only in families with at lest two children; thus, children are usually the only credible beneficiaries. It is difficult to reconcile this conclusion with any known model of bequests other than that presented in section I.

One possible alternative explanation of the differing results for single child families runs as follows. Suppose children are altruists, but they are primarily concerned with making certain that their parents receive a particular amount of total care and attention from all children. Then within any sample of families with the same number of children (such as single child families), there will be no observed relationship between attention and bequeathable wealth. However, comparing families with different number of children but the same total level of bequeathable wealth, one would find a correlation between attention per child and bequeathable wealth per child -- children "shirk" in larger families. As long as total wealth is not too highly positively correlated with the number of children (which seems plausible), one would observe a positive correlation between wealth per child and attention per child in the "several children" subsample, but no such correlation among single child families.

Note that this argument does not entirely succeed in explaining the results of this section, since it applies equally well to both bequeathable and annuity wealth. Our case is predicated upon the difference between these coefficients. Nevertheless, as a further check of robustness, we reestimated equation (11) separately for two and three child families. Results are presented in Table 6. For both groups, key parameter estimates are very close to those obtained for the original sample. We must qualify this conclusion only by noting that the standard error for the coefficient of b_i in three child families is substantially larger than either that obtained for two child families, or for the pooled sample. We interpret these results as additional strong support for the exchange motivated bequest hypothesis.

A further remark on the difference between single and multiple child families is in order. Just as it is difficult to see how this difference could be reconciled with any other known theory of bequests, it is also difficult to see why any explanation of our multiple-child results based on potentially spurious factors would not apply equally well to single child families. Thus, our results refute any alternative explanation which fails to account for the single/multiple child distinction. We believe that this makes the empirical case for our theory compelling.

Taken as a whole, the preceding estimates are extremely favorable to our model. It is therefore important to emphasize that our results were extremely robust, and that these estimates are representative of other regressions which we ran, but did not include in this paper. Aside from some problems with selecting a proper subsample (for example, one preliminary sample inadvertently included observations of which children lived at home, making interpretation of visits and telephone calls difficult), our procedures produced favorable results on the first try, and subsequent modifications altered no substantive conclusions. Full disclosure requires that we report three apparent "failures." First, OLS estimates of all but the simplest specification (equation 1, Table 1) yielded negative coefficients on b_i. This is not surprising in light of our arguments concerning the endogeneity of b_i; in fact, we submit that the discrepancy between OLS and 2SLS estimates strengthens the case for an operative "demand" side. Second, attempts to estimate a fixed effects version of the model produced nonsensical coefficients with large standard errors. However, since no sensible instrument is available for fixed effects estimation (there is only one observation on lifetime earnings for each respondent), we were not troubled by this finding. Finally, estimates based on an alternative measure of attention (letters received from children) were much less striking. Although the pattern of coefficients was consistent with our theory (the coefficient of b_i was greater than the coefficient for aw_i for multiple child families, and visa versa for single child families), alternative hypotheses could not be rejected with any reasonable level of confidence. Upon reflection we decided that the letters variable was not a very satisfactory proxy for attention since parents who were frequently visited persumably received few letters.

Estimates of $\beta_1 - \beta_2$ have a very tangible interpretation: since holding an additional dollar of wealth in bequeathable forms elicits $\beta_1 - \beta_2$ units of attention, one can infer from these coefficients a "price" of attention. We undertake the following rough calculations to get some feel for magnitudes. Under the normalization employed, our estimates ($\beta_1 - \beta_2 \approx 6$) imply that increasing bequeathable wealth per child by roughly \$160 000 will raise V_i from 0 (no attention) to 1 (maximum attention). If we interpret maximum attention as 52 contacts per child per year (each child visiting or calling once per week is consistent with $V_i = 1$), then holding bequeathable wealth of approximately \$3,000 results in an additional visit per year, on average. The cost of holding wealth in this form is the incremental return which the parent would have received had he invested this money in annuities. If, for example, the return sacrificed is 2 percent, then our estimates imply that an additional visit or call costs the parent \$60 on the margin.[26] This figure is, of course, very imprecise, but not implausible.

III. Other Evidence

The preceding econometric analysis of the LRHS data favors the view that exchange plays an important role in bequest behavior. By and large the predictions of our model are confirmed. At least some of these predictions are not implications of alternative models of bequest behavior. Beyond this evidence, there are a number of other aspects of individual behavior which are more easily reconciled our model of exchange motivated bequests than with alternative formulations.

There are at least three alternative formulations to the present model of bequest behavior which have been widely studied. These are the "accidental bequests," "bequests for their own sake" and "altruistic bequests" models. The first, recently urged by Davies (1981), suggests that consumers do not have bequest motives, and that bequests arise only as a consequence of uncertainty about the date of death in conjunction with annuity market imperfections. A second model, used by Blinder (1974) and many others, assumes that consumers' lifetime utility depends in part on the size of their bequest. On this view bequests are a form of terminal consumption. A final possibility is the "altruistic" view of bequests put forth by Barro (1974) and Becker (1974, 1981). On this view parents maximize a utility function in which the utility of their children also enters.

Each of these formulations is inconsistent with the empirical observation that consumers are reluctant to participate in annuity type arrangements even on quite favorable terms. Moreover, the second and third formulations cannot account for the apparent insignificance of gifts. We first review the available evidence, then indicate why it contradicts the three standard models of bequest behavior, and finally describe why such behavior is consistent with our model.

Privately purchased annuities are a rarity in the American Economy. The Retirement History Survey revealed that such annuities rarely represented more than a very small fraction of wealth, and in most cases were not purchased at all. Of course, this may well be due to the fact that adverse selection complicates the working of this market.[27] Perhaps more persuasive evidence comes from the lack of market response to "reverse annuity mortgages." These instruments allow individuals to annuitize their home equity. Even where they are offered on relatively favorable terms, they do not appear to be well received.[28] A similar conclusion is suggested by the lack of a response to a California state program which allowed property owners to defer property taxes until after their death, on a subsidized basis.[29]

Perhaps the strongest evidence of consumer resistance to annuities comes from an examination of the choices made by retirees under the TIAA-CREF program. This group is mainly comprised of educators who are presumably better informed than most pension recipients. Retirees are offered several options, including full annuities and "n year certain" plans.[30] A 10 year certain plan, for example, guarantees that a retiree and his heirs will receive at least 10 years worth of benefits, even if the retiree dies sooner.[31] A 1973 study reported that over 70 percent of beneficiaries chose plans other than those providing full annuity protection. This suggests a desire to make allowances for bequests.

This evidence suggests that there is no strong latent demand on the part of aged Americans for annuity protection, and is clearly inconsistent with the "accidental bequest" model. On this view individuals should purchase annuity protection even if it is very unfair actuarily, since bequests are not valued at all. In particular, the choice of "years certain" annuity protection directly contradicts the "accidental bequests" model.

Less obviously, the reluctance of consumers to take advantage of actuarially fair or subsidized annuities is inconsistent with the "bequests for their own sake" and "altruistic" models of bequests. It is well known (see, for example, Sheshinski and Weiss (1981) or Bernheim (1984b)) that under such formulations, consumers who have access to actuarially fair annuity markets will perfectly insure, financing consumption entirely out of annuity income. An underannuitized individual will finance consumption partly out of bequeathable wealth, while an overannuitized individual will save some fraction of his annuity income, thereby building an estate. Thus, if an individual consumes some portion of either the principal or income from his bequeathable wealth, we infer that he is underannuitized, and should take advantage of actuarially fair opportunities to purchase annuities.

There are two reasons to believe that individuals hold bequeathable wealth, in part to finance their own personal consumption. First, despite the earlier findings of Brittain (1978) and Mirer (1979), more recent studies by King and Dicks-Mireaux (1983), Diamond and Hausman (1983), and Bernheim (1984a) suggest that retirees do dissave from bequeathable wealth. Second, if bequeathable wealth is held only for the purpose of making intergenerational transfers, then these transfers would be made as gifts, rather than as bequests at death. Early transfer confers two advantages: it allows beneficiaries to annuitize the optimal fraction of transferred resources immediately; and it may ease liquidity constraints encountered by beneficiaries early in the life cycle.[32]

To summarize: behavioral evidence suggests that individuals hold bequeathable wealth in part to finance personal consumption. Under either the "bequests for their own sake" or "altruistic" models, this implies that such individuals are underannuitized, and should take advantage of actuarially fair opportunities to insure. Yet this prediction is counterfactual.

The reluctance of very wealthy individuals to convert bequests into *intra vivos* gifts poses a further puzzle for these alternative theories. Despite the existence of significant tax advantages to transferring resources during lifetimes, many wealthy individuals who can anticipate leaving large bequests with virtual certainty, do not make significant *intra vivos* gifts. This observation has disturbed some proponents of dynastic altruism, who recognize that an important implication of this model is that families will conjure their affaris to minimize total tax liability. While some (notably Adams (1978)) have defended dynastic altruism by arguing that, contrary to Shoup (1966), Cooper (1979), and Menchik (1980), tax minimizing transfers are in fact observed, we find this claim implausible.[33]

The exchange motivated bequest model described in Section I does not share these counterfactual implications concerning the acceptance of annuities and the use of gifts. Since parents do not care about their children's consumption directly, there is no reason to smooth out transfers over states of nature. Furthermore, by making all intentional transfers at once, the parent attenuates his ability to influence his children in subsequent periods. Finally, it is quite likely that it is easier to influence children by promising bequests, as opposed to gifts. Few families are so mercenary as to countenance explicit *quid pro quo* contracts; thus, the lure of gifts tends to be more speculative than a claim on a known estate, and vague promises of contemporaneous rewards are subject to equivocation by parents who would prefer to retain resources, *ex post*.

A common finding in empirical analyses of bequests (Sussman et.al. (1970), Brittain (1978), Menchik (1980))[34] is that, in most cases, parents give equal amounts to each of their offspring. In part, this conclusion may arise from focusing primarily on cash rather than the more difficult to value tangible bequests. The model here makes no prediction that bequests should be equal across children, except by coincidence or if beneficiaries are identical. Equal bequests pose an equal or greater problem for the altruistic model, which issues the clear prediction that bequests should be used to equate as closely as possible the utilities of various offspring.[35] The implication that, in effect, parents impose 100 percent tax rates on their children's other income is clearly counterfactual. The other two models of bequests do not have any clear implications for this issue.

So far we have been content to infer motives indirectly from behavioral observations. Studies by Sussman et.al. (1970) and Horioka (1983) offer much more direct evidence on the nature of bequest motives. Both studies confirm the significance of exchange motivated bequests.

Sussman et.al. conducted a painstaking study of close to 1,000 estates selected from Cleveland probate court. They document the use of bequests as a means of payment by finding a significant effect of intrafamily exchange on deviations from equal division of bequests. In case after case, "reciprocity was expressed through the distribution to particular children for services rendered to parents," so that "children who took care of their elders ... received the largest share of the parent's property or the only share if the estate was very small" (p. 290). Disinheritance was usually a side effect of rewarding a specific child for care given in old age (p. 103), although some parents specifically disinherited children who ignored them.

It is important to emphasize that both testators and beneficiaries clearly perceived and consciously exploited opportunities for exchange involving bequests. Testators frequently left most of their estates to spouses in part so that the spouses would "have a legacy to use in bargaining for services from children and others later on" (p. 290). Likewise, "children feel that they should maintain intimate contract with aged parents in order to provide them with emotional support and social and recreational opportunities, and that such contact maintenance is requisite for obtaining a share of the inheritance" (p. 119). When interviewed, children "generally accept the notion that the sibling who has rendered the greatest amount of service to the aged parent should receive a major portion of the inheritance" (p. 118), and usually prefer that bequests be divided according to the principle of reciprocity (p. 148).

Horioka (1983) reproduces the results of a survey of attitudes of the elderly in Japan toward the distribution of their assets among their children. 35.1 percent of the respondents indicated that they would "give more to the child or children who did more for me." This, however, should be thought of as a lower bound on the significance of exchange motivated bequests. The traditional pattern in Japanese families is for the eldest son to move in with and care for his elderly parents until their deaths, at which time he receives the entire estate. Thus, the 43.2 percent of respondents who indicated that they would "give all to the eldest son" may have simply announced their equilibrium choices, having already received cooperation from that child. It is worth noting that only 12.1 percent said that they would "divide equally between one's children," while only 4.3 percent were inclined to "give to the child who is ill or physically weak or who has no income-earning power." Thus, neither utilitarian nor altruistic motives appear to be particularly prevalent.

IV. Macroeconomic Implications

In the preceding section, we developed the implications of our model for several aspects of individual behavior, and contrasted these with predictions based on alternative models. This section focuses on the macroeconomic implications of exchange motivated bequests.

Our paper provides an example of an environment in which parents and children are linked by voluntary utility maximizing intergenerational transfers, but for which the "Ricardian equivalence theorem" and related propositions are nevertheless false. The implications of our formulation for issues such as the effects of Social Security and government indebtedness on capital formation correspond very closely to the implications of standard life-cycle models.[36] To see this, observe that the bequests made by parents are independent of the economic welfare of their children, except to the extent that changes in their economic welfare affect their supply curve of attention. Note that the sign of the effect of an increase in children's economic welfare on bequests (parental "expenditures" on attention) will depend on whether the elasticity of demand for attention is greater or less than unity.

Several reasons for preferring the current model to the "dynastic altruism" formulation of Barro were discussed in the preceding sections. We are unaware of any direct microeconomic evidence favoring the notion of altruistic bequests. Until such evidence is provided, economists should be cautious about justifying the analytical use of infinite lived consumers by appealing to dynastic altruism.

The model developed here suggests a number of potentially important interactions between demographic and economic phenomena. By conditioning bequests on behavior, parents may successfully influence decisions by their children concerning education, migration, and marriage. The desire to purchase services from children, coupled with the need to have at least two credible beneficiaries, may also affect fertility. This could, for example, account for Park's (1983) observation that Korean households have a strong preference for two male children, and could strengthen theories of the so-called "demographic transition" based on parental desire for care during old age. The model also suggests that various exogenous demographic trends will have specific economic effects. Declining population growth means more single child families, and therefore less incentive to save to purchase attention. For similar reasons, rising life expectancies, longer retirement periods, and increasing geographic mobility may all affect the national savings rate. These and related issues are discussed in Bernheim (1984c).

The model also suggests that international variations in savings rates may be related to differences in family structure, as well as to legal institutions governing the distribution of estates. For example, Horioka's evidence indicates that exchange motivates the division of bequests in many Japanese households. In addition to the survey of attitudes discussed in section III, he documents that over 80 percent of elderly Japanese live with their children, compared to approximately 10 percent for the U.S. This may help to account for Japan's high rate of saving. In contrast, certain European countries such as Sweden (see Blomquist (1979)) require testators to divide the bulk of their estates evenly between their children. This restriction neutralizes the mechanism outlined in Section I, and removes a strong incentive for accumulating bequeathable wealth.

Our analysis also suggests a subtle but possibly important side effect of the growth of Social Security and the spread of annuitized private pensions. The model here provides a partial explanation for consumers' reluctance to purchase annuities at even relatively attractive rates: annuities deny consumers the opportunity to purchase care and attention from their children (although much of the actual aversion to annuities is undoubtably based on ignorance and confusion). If Social Security or pensions foist more annuity protection on consumers than they wish, a collateral consequence will be that consumers are able to purchase less attention than they would prefer. A general decline in attentiveness of children to parents is widely alleged to have taken place since the introduction of Social Security (see for example Friedman (1980)). The significance of the effect stressed here is of course difficult to gauge.[37]

This research could usefully be extended in a number of directions. The theoretical model could be elaborated to allow more fully for the element of "caring" which explains why parents crave attention from their own children. It would also be valuable to explore models in which more elaborate interactions between children were possible. Empirically, the insights suggested by this model could be used to inform econometric analyses of the consumption and portfolio choices of the aged. In addition, it might be useful to use simulation techniques to examine the relation between bequests of the type modelled here and the level or capital formation. It is unlikely that any of these extensions would cast doubt on our conclusion that the exchange motive is central to the economic analysis of bequests.

Footnotes

1. The significance of intergenerational transfers is still the subject of much debate. Tobin (1967) and Davies (1981) present simulation results which indicate that pure Life Cycle motives are sufficient to account for the bulk of U.S. capital.

2. Brittain (1978) and Mirer (1979) document continued accumulation of wealth after retirement. Shorrocks (1975), King and Dicks-Mireaux (1981), and Diamond and Hausman (1983) find limited evidence to dispute this claim. Bernheim (1984a) confirms this finding, but demonstrates that behavioral responses of rates of decumulation to non-discretionary annuities are inconsistent with the predictions of simple life cycle models.

3. As long as it is impossible for a potential beneficiary to predecease the testator, relaxing this restriction simply involves adjusting the discount factors of children to account for survival probabilities after period T. Althugh the analysis becomes more complex when it is possible for children to die first (we must worry about what happens for all possible patterns of deaths), it is possible to show that, even in this case, our basic conclusions are unchanged.

4. In the case of parents and children, such actions might include attention, care, or choice of the "right" spouse. For institutional beneficiaries, $a_{n,t}$ might for example represent naming a building after a potential testator.

5. Notice that in the current formulation single period utility does not depend directly upon whether the testator is alive (the dependence is indirect, since we will never observe $a_{n,t} > 0$ once the testator has died). This restriction is convenient, but inessential.

6. Time separability of utilities simplifies the method of solution. We doubt that our basic insights would be changed in a more general model.

7. Allowing exogenous future income for potential beneficiaries would not alter the analysis at all. Allowing testators to receive some exogenous income would not affect the qualitative conclusions as long as desired wealth held by the testator is always strictly positive.

8. It is in the testators's interest to hold his wealth in easily observed forms. This may provide a partial explanation of the notorious reluctance of the elderly to sell their houses (although there are certainly other factors involved).

9. Limiting the set of potential beneficiaries does involve some notion of altruism which extends only to a certain class of individuals or institutions. In this very limited sense the bequests considered here are altruistic.

10. There may be many bequest rules which sustain $\{a_n^*, b_n^*\}_{n=1}^N$ as an equilibrium in the appropriate subgame. However, the perfect equilibrium will be unique in the sense that any such equilibrium must yield C^*, $\{a_n^*, b_n^*\}_{n=1}^N$ on the equilibrium path.

11. We suggest two reasons: (1) for all $\varepsilon > 0$ if the testator sets benchmark levels at $a_n^* - \varepsilon$ rather than a_n^* and otherwise employs the same rule, there is a unique Nash equilibrium consisting of all agents meeting their benchmarks. In other words, the testator can get arbitrarily close to his optimum without running into the problem of multiplicity; (2) the N undesirable equilibria are not trembling hand perfect (see Selten (1975)). Consider the potential beneficiary who sets $a_n = 0$, while expecting his competitors to offer their benchmark levels. He cannot be worse off by playing $a_n = a_n^*$. In addition, if he thinks there is any chance, however small, that another beneficiary will make a mistake ("tremble"), thereby missing his benchmark level, a_n^* will in that event yield strictly higher utility than $a_n = 0$.

12. For $t = T$ we adopt the convention that $V_{T+1}(W_{T+1}, \{W_{n,T+1}\}_{n=1}^N) = 0$ since the testator is no longer living.

13. Note that in this problem, we do not allow the testator to choose consumption levels for the beneficiaries. This is so because we have restricted bequest rules to depend on actions only. It might be possible for the parent to condition bequests on the beneficiary's consumption as well. Although in our model this makes no difference, in another specification it may be in parent's interest to do this. It is straightforward to modify the model so that such strategies are permissible.

14. Assume it does not bind. Then the testator can successfully demand more attention from each beneficiary without holding more bequeathable wealth. This directly increases utility. However, there is also an indirect effect. Changing $a_{k,t}$ will alter the beneficiary's optimal level of $C_{n,t}$, thus changing $W_{n,t+1}$. This has an ambiguous effect on V_{t+1}. It seems quite unlikely that such secondary effects would dominate.

15. Specifically, we include those who began to receive pensions and Social Security at some point during the sample.

16. Note that our theory predicts that use of bequests to obtain attention should be more effective when there is only one parent. By considering couples, we presumably stack the odds against finding evidence of exchange.

17. For some years, the survey also asked for the number of children who visit or telephone daily; in other years, this was simply incorporated into the "at least weekly" category. To be consistent over years, we added daily contact to weekly contact in years for which the former was available.

18. It is appropriate to include the face value of life insurance, since children wish to be named as beneficiaries. Unfortunately, data on life insurance are quite poor, in particular, it is impossible to determine how much individuals have borrowed against their policies. Omitting insurance from our definition of bequeathable wealth has an insignificant impact on the estimates presented in this section.

19. Most privately purchased "annuities" fail to match the economic definition, since they have bequeathable components.

20. Throughout, we have ignored potential problems arising from truncation of our dependent variable. There is little reason to believe that this biases our results in any particular direction.

21. Our goal here is only to suggest a significant exchange motivated element in bequest behavior, not to deny that altruistic aspects are also present.

22. The direction of this correlation is not clear. If a parent likes his child, he may work harder to provide more physical goods, or work less to spend more time with the child.

23. Equation (11) is equivalent to $V_i = \beta_0 + (\beta_1 - \beta_2)b_i + \beta_2 W_i + Z_i\gamma + \varepsilon_i$ where W_i is the total wealth of the i^{th} individual. β_2 captures spurious wealth effects, and $\beta_1 - \beta_2$ is the independent effect of holding wealth in a bequeathable form.

24. For the 2SLS regressions, we included interactions between lifetime income and WH_i, BH_i, and AGE_i in the instrument list.

25. That is, it equals the coefficient on annuity wealth in the equations presented in Table 1.

26. The one year probability of dying is 2.9 percent for 65 year old males and 1.5 percent for 65 year old females. The 2 percent figure assumes approximate fairness of available annuities.

27. Though one would expect the adverse selection to be much more serious in the relatively well functioning market for life insurance. Warshawsky (1983) presents evidence that loads on annuities are comparable to loads on life insurance.

28. For a survey of the evidence on this topic see A Summary of Recent Research on Inflation and the Elderly, by Urban Systems Research and Engineering, 1983.

29. See URSE (1983).

30. Annuity amounts are set so that the plans are, in principle, equivalent on an actuarial basis, see TIAA-CREF (1973).

31. In each case, provision is made for surviving spouses.

32. Note also that the failure of parents to transfer their homes to their children is inconsistent with the Kotlikoff-Spivak view that families serve to provide private annuity insurance.

33. Adams overstates the burden of the capital gains tax by neglecting the fact that the beneficiary can defer realizing any assets with capital gains, and can use a variety of other devices to shelter them. Nor does his analysis explain the failure of most families to set up non-reverting trusts which allow assets, and in some cases capital income as well to escape tax almost entirely. Lastly, Adams' analysis cannot explain why assets without capital gains, or even with capital losses, also appear to be transferred as gifts only infrequently.

34. Disputed, however, by Tomes (1981).

35. Assuming they enter symmetrically the parent's utility function.

36. Barro (1974, footnote 14) himself notes that the Ricardian equivalence theorem would not hold if exchange played a large role in motivating bequests.

37. The model also implies that Social Security offsets private savings by less than one for one.

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Table 1

Dependent Variable: V

Sarple Multiple Child Farilies - Pooled Panel

Equation	1	2	3	4
Procedure	OLS	2SLS	2SLS	2SLS
Constant	.560 (.008)	.531 (.013)	.088 (.201)	.225 (.215)
$b/10^6$	.333 (.308)	2.30 (.686)	2.57 (.715)	4.58 (1.18)
$aw/10^6$			-	-1.78 (.820)
age/100			.722 (.311)	.513 (.332)
bh/100			-2.55 (1.79)	-2.96 (1.84)
wh/100			-1.37 (2.43)	-.984 (2.49)
ret/100			-2.22 (1.89)	-3.26 (1.99)
Degrees of Freedom	2563	2563	2559	2558
Standard Error of Regression	.357	.360	.360	.369

Table 2

Dependent Variable: V

Sample: Multiple Child Families - Pooled Panel
Procedure: 2SLS

Equation	1	2
Subsample	All children within same city or neighborhood	All children within 150 miles
Constant	-.580 (.500)	-.070 (.306)
$b/10^6$	7.59 (2.91)	4.35 (2.08)
$aw/10^6$	-1.47 (1.37)	-1.43 (1.39)
age/100	2.10 (.772)	1.22 (.468)
bh/100	-1.07 (4.65)	2.16 (2.87)
wh/100	1.89 (5.49)	1.19 (3.44)
ret/100	1.86 (4.54)	-3.23 (2.82)
Degrees of Freedom	365	1007
Standard Error of Regression	.309	.331

Table 3

Dependent Variable: V

Sample: Multiple Child Families - Separate Years
Procedure: 2SLS

Sample Year	1969	1971	1975
Constant	.445 (.497)	.140 (.558)	1.26 (.491)
$b/10^6$	4.82 (1.70)	5.09 (2.27)	3.71 (2.24)
$aw/10^6$	-1.59 (1.14)	-1.80 (1.41)	-1.81 (2.19)
age/100	.070 (.811)	.610 (.881)	-.993 (.737)
bh/100	7.31 (6.02)	-4.50 (3.28)	-5.41 (2.61)
wh/100	-10.2 (11.1)	-2.10 (4.00)	-.091 (3.47)
ret/100	-.238 (4.26)	-763 (2.99)	-10.0 (8.09)
Degrees of Freedom	848	848	848
Standard Error of Regression	.374	.388	.344

Table 4

Dependent Variable: V

Sample: Multiple Child Families - Pooled Panel
Procedure: 2SLS

Variable	Coefficient
Constant	.230 (.350)
$b/10^6$	8.51 (18.4)
$aw/10^6$	-1.85 (.867)
age/100	.529 (.549)
bh/100	-2.41 (4.21)
wh/100	-24.2 (8.22)
ret/100	-3.67 (2.03)
$b \cdot age/10^7$	-.756 (2.92)
$b \cdot bh/10^7$	-.731 (20.7)
$b \cdot wh/10^7$	237 (80.3)
Degrees of Freedom	2555
Standard Error of Regression	.374

Table 5

Dependent Variable: V

Sample: Single Child Families - Pooled Panel

Equation	1	2	3	4	5
Procedure	OLS	2SLS	2SLS	2SLS	2SLS
Constant	.639 (.018)	.653 (.029)	-.489 (.409)	-.651 (.423)	-.688 (1.05)
$b/10^6$	-.662 (.288)	-1.00 (.615)	-1.23 (.628)	-2.37 (.864)	1.31 (24.7)
$aw/10^6$			-	1.26 (.618)	.987 (.658)
age/100			1.89 (.631)	2.12 (.649)	2.16 (1.65)
bh/100			-3.36 (3.60)	-2.27 (3.69)	5.82 (9.22)
wh/100			-11.8 (5.07)	-11.56 (5.13)	-12.6 (10.1)
ret/100			5.47 (3.86)	-4.83 (3.92)	-5.82 (4.07)
$b \cdot age/10^7$					-.448 (3.95)
$b \cdot bh/10^7$					-18.3 (19.6)
$b \cdot wh/10^7$					.251 (24.9)
Degrees of Freedom	931	931	927	926	923
Standard Error of Regression	.451	.451	.446	.452	.453

Table 6

Dependent Variable: V

Sample: Multiple Child Families - Pooled Panel
Procedure: 2SLS

Equation	1	2
Subsample	2 Child Families	3 Child Familes
Constant	.065 (.350)	-.164 (.370)
$b/10^6$	3.12 (1.31)	3.79 (3.26)
$aw/10^6$	-1.11 (1.06)	-1.45 (1.37)
age/100	.728 (.536)	1.24 (.573)
bh/100	.929 (2.74)	-9.74 (3.43)
wh/100	1.86 (4.24)	-.802 (4.41)
ret/100	-.229 (3.15)	-3.41 (3.42)
Degrees of Freedom	1124	710
Standard Error of Regression	.383	.345