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THE EFFECT OF SOCIAL SECURITY ON BEQUESTS

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ABSTRACT

The effects of Social Security on private saving has been one of the more hotly debated issues in recent years. Using the zero bequest variant of the life-cycle model of saving, Feldstein and Munnell argue that our pay-as-you-go system reduces private retirement savings and hence macro saving. Barro and others have argued that individuals will offset the forced intergenerational transfer component of the system by increasing their bequests, and that macro saving will not be reduced.

Using a sample of Wisconsin Income Tax records and probate records for Wisconsin males born 1890-1899, we attempt to test both of these hypotheses. Barro's hypothesis is tested by relating the lifetime wealth increment received by participants of the Social Security System to their actual bequests. The presence of the Feldstein-Munnell effect is tested by comparing the hypothetical age-wealth profile that *would* be observed in the absence of social security to that which *is* observed, conditional upon the subjects' *gross* social security benefits. Our data fail to support either of these hypotheses.

The Effect of Social Security on Bequests

INTRODUCTION

Whether the Social Security System discourages private saving has become one of the more hotly debated issues in recent years. Using traditional life-cycle models, Feldstein (1974) and Munnell (1974) argue that social security's pay-as-you-go system reduces private retirement savings, and hence macro saving. Barro (1974) and Miller and Upton (1974) have argued, however, that saving is done not only for retirement but for private transfers. Individuals, according to these authors, will attempt to undo what the Social Security System does by adjusting their private transfers so as to offset perfectly social security's forced intergenerational transfers. If in the absence of the program parents receive transfers from their children (negative bequests), imposition of the program will reduce these transfers in a dollar-for-dollar fashion. Alternatively, if parents plan to leave positive bequests to their progeny, they will bequeath an additional amount, the present value of their "lifetime wealth increment," LWI (the difference between anticipated benefits and their own taxes paid), to their children.[1] The analysis fails in the case of neither positive nor negative bequests. It also fails to apply to the so-called "free lunch" case, in which the economywide growth rate exceeds the real rate of return on assets. In this case there are potential efficiency gains in reducing saving and the capital stock to the Golden Rule level (the level at which the growth rate equals the real rate).

Unfortunately the analysis of aggregate time-series data has not resolved the debate (see, for example, Barro, 1978; reply by Feldstein, 1979; and Esposito, 1978).[2] It would seem that this issue is one in which the attribution of causality is particularly difficult when using time-series data. It is certainly true that growth in consumption (at the cost of saving) has accompanied the growth in social security wealth. However, other important changes in the twentieth century offer a competing explanation for the trend in consumption. Some of these are the rapid growth in private pensions, the reduction in the share of income received by the top quintile, the increase in importance of social insurance and government transfer payments, changes in the demographic structure, and the increase in the share of the population not psychologically affected by the Great Depression.[3]

The apparent importance of private pensions with respect to private savings is shown in a recent review by Boskin and Robinson (forthcoming). Their basic model (Model 3.1) presents aggregate Unites States consumption in the postwar period as a linear function of net disposable income (NYD), lagged net disposable income (NYD_{-1}), corporate retained earnings (RE), private wealth (W_{-1}), and gross "social security wealth" (SSWG). Estimates of the model indicate that social security has a positive and significant effect on consumption with a magnitude about three-fourths as large as that reported by Feldstein (1974):

Model 3.1 (Boskin and Robinson)

$$C = \underset{(0.057)}{0.367\ NYD} + \underset{(0.040)}{0.172\ NYD_{-1}} - \underset{(0.075)}{0.023\ RE}$$

$$+ \underset{(0.006)}{0.043\ W_{-1}} + \underset{(0.010)}{0.034\ SSWG} + \underset{(84)}{332}$$

(standard errors in parentheses);

$$D - W = 1.4,$$

When, however, the book value of private pensions (PENS) is added to the equation its presence knocks out the effect of social security:

Model 3.7 (Boskin and Robinson)

$$C = \underset{(0.049)}{0.404\ NYD} + \underset{(0.035)}{0.220\ NYD_{-1}} - \underset{(0.062)}{0.021\ RE}$$

$$+ \underset{(0.009)}{0.011\ W_{-1}} + \underset{(0.010)}{0.009\ SSWG} + \underset{(0.110)}{0.435\ PENS} + \underset{(81)}{489}$$

$$D - W = 1.6,$$

As Model 3.7 shows, the private pension variable has an enormous and statistically significant effect in increasing consumption while social security has no significant impact in its presence.[4] The authors have chosen to play down this finding, attributing it to collinearity between SSWG and PENS. However, the standard error of the coefficient SSWG did not increase in Model 3.7 as compared to 3.1, and PENS has as much theoretical status in the equation and has a stronger claim to statistical significance than does SSWG.

In our view it is necessary to use micro data to resolve the issue of the effect of social security on saving, and our project will be one such attempt.[5] One problem in the use of micro data is that most of the data bases used to measure private wealth-holding rely on self-reported responses to surveyors' questions. Validation studies show response errors and the problems of nonresponse bias to be enormous.[6] Our data rely on administratively determined estate values available in probate records. Although there may be incentives and opportunities for families in the top percentiles of the wealth distribution to understate certain assets for estate tax avoidance, this problem is minor in a study of the overall population and presents less of a problem than the one found in the validation studies.

The theoretical underpinning of the models of Feldstein and Munnell is the life-cycle model of saving with no bequest motive. The central notion is that individuals allocate their lifetime budgets over their life span, saving for later consumption in earlier years and dissaving in later years. The economywide stock of capital can therefore be generated by this pattern without any reliance on bequests, which may be seen as the difference between lifetime resources and lifetime consumption. Analysis of macro data has been invoked (Modigliani, 1966; Tobin, 1967) to support the no-bequest model as the sole explanation of the capital stock.

In the last few years, research relying on micro data has cast some doubt upon the validity of the zero-bequest prediction of the model. Indeed, there are findings that conventional net worth <u>increases</u> with age among the elderly.[7] A simulation study by White (1978) finds that saving for future consumption accounts for at most 60% of aggregate personal saving.

If these findings are true, savings that are eventually bequeathed constitute an important component of the capital stock. Darby (1979) separates net worth into two components: life-cycle assets (earnings saved but consumed later in the life cycle), and bequests (net worth at death). He finds that life-cycle assets constitute only 13% to 29% of total assets. Kotlikoff and Summers (1981) also divide capital accumulation into a life-cycle and an intergenerational transfer component. They find that the major share, approximately 80% of the total, is due to intergenerational transfers.

If bequests constitute a major component of total accumulation, saving responses to the Social Security System should be less than under the strict life-cycle model.

LIFE-CYCLE MODELS WITH PLANNED BEQUESTS

The life-cycle model with bequests allowed has been studied by Yaari (1964) and Blinder (1974), among others. Individuals derive utility from their lifetime consumption stream and (the anticipation of) bequests made in the final period of life. Discounted lifetime utility (U) for individuals dying at a certain age of T years is assumed as the additive sum of utility from consumption at time t and utility of terminal bequests:

$$U(T) = \int_0^T u[c(t)]e^{-\rho t}\, dt + V[B(T)], \tag{1}$$

Put in neat integral signs.

where c(t) is consumption at age t, B(T) is bequests at age T, ρ is the subjective rate of time preference in consumption, and u(·) and $\underline{\underline{v}}$(·) reflect the strength of preferences. Individuals are presumed to maximize their utility function subject to their lifetime resources constraint, with consumption and bequest demands a consequence of this process. Lifetime resources is

cap V

$$W = I_0 e^{rT} + \int_0^T E(t)e^{r(T-t)}dt, \tag{2}$$

where r is the rate of interest, T the length of life, I_0 the inheritance or gift received and discounted back to the initial period, and E(t) the earnings stream over the life cycle.[8] This model implies that an optimal consumption profile is

$$\dot{c} = (r - \rho) \frac{U'(c)}{U''(c)}.$$

The Imposition of Social Security

Let us now assume that a social insurance scheme is introduced. A combined employer-employee tax (assumed to be fully shifted) of $\theta E(t)$ per period finances benefits of BN(t). Total lifetime tax payments, assuming that E(t) is unaltered by the program, are

$$SST \equiv \int_0^T \theta E(t) e^{r(T-t)} dt, \tag{3}$$

while lifetime benefits are

$$GSS \equiv \int_0^T BN(t) e^{r(T-t)} dt. \tag{4}$$

The lifetime budget constraint facing the individual can be written

$$\int_0^T c(t) e^{r(T-t)} dt + B(T) = I_0 e^{rt} + \int_0^T E(t) e^{r(T-t)} dt + \int_0^T [BN(t) - \theta E(t)]\, e^{r(T-t)} dt. \tag{5}$$

If the last term on the right-hand side is zero, implying that the benefit received equals the taxes paid, lifetime resources are unaltered by the program, optimal bequests should remain unchanged, and the desired consumption profile should not be altered. If benefits are paid late in life when the worker is retired, and taxes are paid during the working life, social security taxes would replace life-cycle saving dollar for dollar until the retirement date, and private saving would be reduced (Kotlikoff, 1979, p. 397).

If, on the other hand, the program is financed not by intertemporal transfers but intergenerational transfers, behavioral responses to the system may be quite different. If retirement benefits are financed by taxes largely paid by the workers of the next generation, as originally was the case in the United States, the budget constraint is expanded by the last term on the right hand side. If bequests are a normal good, some of the differences between benefits received and taxes paid (the lifetime wealth increment, or LWI), will not be consumed but bequeathed to the next generation. This is a pure "wealth effect" on the lifetime allocation described earlier. In the polar case in which benefits equal the LWI (i.e., taxes paid by the recipients in the start-up generation are zero) it is conceivable that all of the LWI is bequeathed (either in the form of financial or in human bequests) and consumption and saving remain unaltered when compared to the no-social-security world. This is the case argued by Barro (1978).

In the Barro characterization of the economy, generations are linked by transfers. When social security is introduced, the start-up recipient generation recognizes that the benefits each member receives impose a liability on the younger, working generation, i.e., their children. Since the bequests the parents would have made in the absence of social security constituted an equilibrium situation, parents will not increase their consumption but increase their bequests (human or financial) to offset this forced intergenerational reallocation of resources. (If the parents were making net negative bequests to their children--i.e. receiving support from their children--before the imposition of the system, these negative bequests will be reduced as a consequence of it.) Our paper seeks to determine if social security augments positive bequests (as the Barro model predicts it should) among members of the start-up generation.

There is a feature of our Social Security System that may result in less than the complete offset envisaged by Barro. If the program is redistributive within as well as between generations (as has in fact been shown by Burkhauser and Warlick, 1979), and parents in the start-up generation expect their LWI to be paid for, not by their children, but by other people's children, the Barro effect may not occur. If parents care less (or not at all) about the welfare of the "future generation" in general than about their own progeny, the Barro prediction of complete offset would not be observed. This argument, of course, works both ways. If parents expect their children to pay more than they themselves receive in net social security benefits, they might bequeath more than their LWI to attenuate the "excess" burden the system has exacted from their children. We have no way of knowing parents' perceptions of their children's tax burden relative to their own LWI. We can only observe their actual bequest behavior, to determine if variations in bequests accompany variations in LWI among the populace.

What Should the Bequest Function Look Like?

> A man can have no stronger stimulus to energy and enterprise than the hope of rising in life, and leaving his family to start from a higher round of the social ladder than that on which he began.
>
> (Alfred Marshall, 1949, p. 228)

Yaari (1964) and Blinder's (1974) model of bequests offers little insight into the shape of the bequest function. In the spirit of Marshall's quote we assume that bequests can be generated in a model which includes both the conventional consumption of parents and the income of children as arguments in the parents' utility function. Parents bequeath because they want to augment the resources available to their children. The utility function of the g^{th} generation can be written:

$$U_g = U_g(C_g, W_{g+1}), \tag{6}$$

where C_g is the lifetime consumption of parents and W_{g+1} the lifetime resources of their children. W_{g+1} is the sum of two components, an inframarginal part and a marginally relevant part. The inframarginal part is what the children's earning capacity would be in the absence of parental investments.[9] Presumably this component would be determined by luck and genetic endowment. The second and marginally relevant part is the value to the recipient of parental investments. This type of utility function has been used most recently by Becker and Tomes (1976, 1979) and Tomes (1981) to analyze the quantity and quality of children. It is argued that parents expend resources to improve the "quality," i.e., the lifetime income, of their children and derive utility from doing so *regardless* of what the children decide to do with their enhanced income.

If the Marshallian model allows for two types of bequests, human and financial, it may be possible to predict the shape of the financial bequest function from theory. Assume that human bequests (schooling, health care, etc.) initially provide a higher rate of return than the financial market yields.[10] As the amount expended on each child increases, however, the marginal rate of return falls. When the rate of return on human investments falls below the financial market return on assets, all subsequent investments will be in the form of financial bequests (which conceptually include both *inter vivos* and testamentary transfers).

In Figure 1, H and F are human and financial bequests, r indicates the varying rate of return on human bequests, and r^* is the market return on financial capital. Panel a relates the marginal return on human bequests to the amount invested. Parents will invest up to, but not greater than, H^* in human bequests since additional investments would yield less than r^*, the return yielded by financial bequests. All subsequent bequests will be in the financial form. Consequently, the planned bequest function will appear as presented in panel b under the assumption that transfers to children are normal goods. Human bequests will rise with parental resources, W, until H^*, and will then become flat. Beyond W^*, planned financial bequests, F, become positive and increase with W.

THE DISTINCTION BETWEEN PLANNED AND UNPLANNED BEQUESTS

The foregoing characterization of the bequest process yields predictions about optimal or planned bequests. It could be argued, however, that since in the real world the date of death is a random variable not generally known in advance to the decedent, actual bequests may depart from planned or optimal bequests. Consequently it might be useful to distinguish beween planned and unplanned bequests even though such a distinction may be an oversimplification.

For a death occurring at age s, actual bequests B are equal to planned bequests B_p plus unplanned bequests (an error term) B_u, or

$$B \equiv B_p + B_u. \tag{7}$$

Planned bequests constitute the amount I would leave to my heirs if I knew the date of my death at the start of the planning period. If individuals are risk-averse about running down their wealth too soon, the expected value of unplanned bequests would be positive, and actual bequests should exceed planned bequests. Unplanned bequests include resources held for precautionary purposes, resources held for future consumption, and certain durable goods that yield consumption services. Imperfect annuity markets due to adverse selection explain the existence of substantial unplanned bequests.[11]

Unplanned bequests can be somewhat more rigorously defined by extending the Tomes (1981) model. Decision-making consists of a two-part process: (1) the selection of a planning horizon, and (2) optimization of utility within that horizon to maximize utility. The model has the advantage of placing greater weight on consumption in years in which the decision-maker is unlikely to survive than on the maximization of expected utility. It also operates within a fixed rather than a stochastic budget constraint. We formulate the model for an unmarried person, for the sake of simplicity. The same ideas apply to couples, although the analytical results are considerably more complex.

Choice of a planning horizon requires information on the probability of survival of the decision-maker. Define $s_j(A)$ as the probability that a person aged A will survive j years. U_j is the utility associated with the suboptimization of a consumption and bequest plan over the period j; L_j is the utility loss experienced during years of pauperization beyond j. Choice of the optimum horizon entails the choice of j to maximize U*:

$$U^* = U_j s_j(A) + [1 - s_j(A)]L_j. \tag{8}$$

Call the optimizing value of j, J.

Optimization of a consumption plan within the horizon J entails an initial division of resources between those allocated to <u>certain</u> bequests and those allocated to a certain consumption plan for the period to J.

Recognition of an uncertain lifetime implies that the expected value of unconsumed lifetime wealth can also be considered to increment utility via an "unplanned bequest." Assume that each dollar of bequests increases utility at a constant rate λ, reflecting the marginal valuation of the lifetime wealth constraint of the heirs. (See equation 6, above.) Then the optimal plan maximizes

$$U_j[(C_t),B] = \sum_{t=0}^{J}(1+r)^{J-t}U(C_t) + \lambda\left[B + \sum_{t=0}^{J}[1 - s_t(A)C_t\ (1+r)^{J-t}\right], \qquad (9)$$

subject to the resource constraint

$$W = \sum_{t=0}^{J} C_t(1+r)^{J-t} + B. \qquad (10)$$

The principal value of this formulation is that it highlights the possibility that life-cycle savings, reserved to meet a consumption plan in later life, may be bequeathed. In fact a pattern of accumulating life-cycle savings in early life is followed by decumulation in retirement. Insofar as death is not anticipated, that pattern should be incorporated into observed bequests as a portion of the unplanned bequest (see below, Figure 3, panel a).

These ideas have been explicitly modeled by the F(AGE) function. AGE is the age of the person at death. We assume that individuals prepare for retirement by accumulating a capital amount through equal annual payments earning interest. Accumulation is assumed to begin at age 45. After retirement at age 65, the accumulated sum is assumed to be paid out in equal annual inst ...

allocated by any ind ...

and equal contribution assumption ... portion of the capital amount in a bequest will depend only on the age of the person at death:

$$
\begin{aligned}
F(AGE) &= 0 && AGE < 45 \\
&= \left(\sum_{t=0}^{AGE-45} (1+r)^{t}\right)\left(\sum_{t=0}^{25} (1+r)^{-t} \Big/ \sum_{t=0}^{20} (1+r)^{t}\right) && 45 \le AGE < 65 \\
&= \sum_{t=0}^{90-AGE} (1+r)^{-t} && 65 \le AGE < 90 \\
&= 0 && AGE > 90.
\end{aligned}
$$

THE EFFECT OF SOCIAL SECURITY ON PLANNED AND UNPLANNED BEQUESTS

Among those planning to make a financial bequest, it is hypothesized that the larger the LWI, other things constant, the larger will be the bequest. Consequently, the planned bequest function in the presence of social security, $B_p(LWI)$, as shown in Figure 2, should lie above the planned bequest function in the absence of social security, $B_p(0)$. The shift should be parallel unless, among those planning bequests, those with higher lifetime resources have higher marginal propensities to bequeath their LWI.[12] Thus we can write the planned bequest function (for those of the same age) as

$$
\begin{aligned}
B_p &= \alpha_0 + \alpha_1 W + \alpha_2\, LWI \\
&= 0, \qquad\qquad \text{if } \alpha_0 + \alpha_1 W + \alpha_2\, LWI < 0. \qquad (11)
\end{aligned}
$$

Under Barro's (1978) hypothesis, α_2 should certainly exceed α_1. If *inter vivos* transfers were included in B_p and human bequests were inefficient relative to financial bequests in the positive B_p range, α_2 should

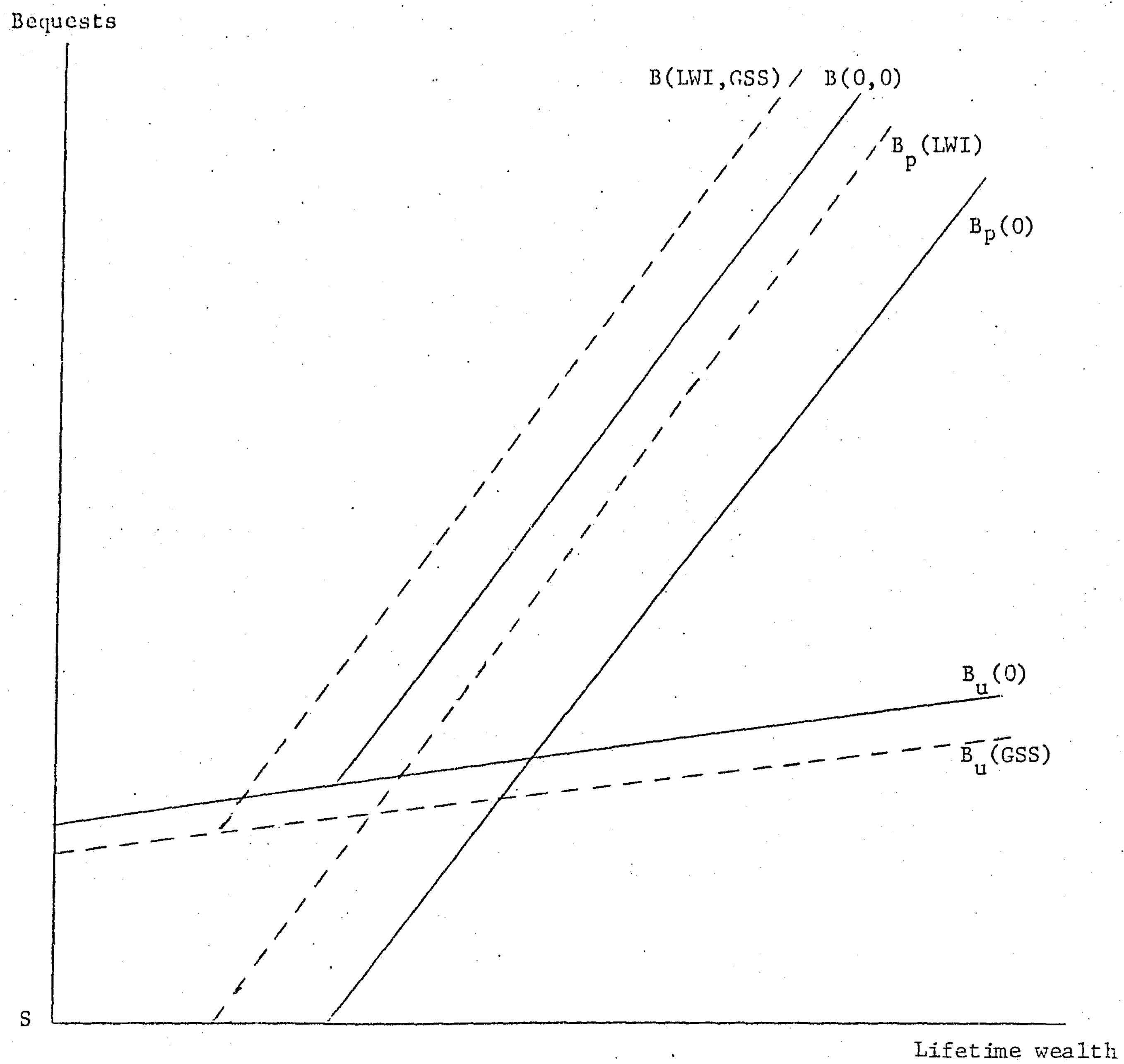

Figure 2

The Effect of Social Security Benefits on Planned and Unplanned Bequests equal unity.[13] If Barro is correct, the start-up generation bequeaths its LWI to the subsequent generation, whose future social security benefits constitute its own LWI (since it has already been compensated by its parents for taxes paid). That LWI would be bequeathed to the third generation, ... ad infinitum. In this scenario, social security would not alter consumption or accumulation; it would only redirect intrafamily wealth transfers.

Unplanned bequests (B_u) should be an increasing function of lifetime resources among those of the same age (see Figure 2). Under the line of reasoning expounded by Feldstein (1974) and Munnell (1974), the greater one's gross social security benefit level, GSS, the less is needed for retirement saving. Hence for those at the threshold of retirement (say age 65), B_u(GSS) should lie below B_u(0) by exactly GSS. Unless liquidity constraints on differences in rates of time preference exist across income classes, the B_u(GSS)'s shift below B_u(0) in a parallel fashion in Figure 2. For those of the same age we can write

$$B_u = \gamma_0 + \gamma_1 W - \gamma_2 \text{ GSS}. \tag{12}$$

The magnitude and statistical significance of γ_2 constitute a test of the Feldstein-Munnell wealth replacement hypothesis. As Figure 3 indicates, the reduction in unplanned bequests due to GSS depends upon the age of the subject. The wealth replacement effect of social security would be greatest among those at the threshold of retirement and would be smaller for those much older or younger. If the age profile of unplanned bequests in the absence of social security can be represented by the function F(AGE), we should add it along with its interaction with GSS to the B_u equation, i.e.,

$$B_u = \gamma_0 + \gamma_1 W - \gamma_2 \text{ GSS} + \gamma_3 \text{ F(AGE)} + \gamma_4 \text{ F(AGE)}\cdot\text{GSS}. \tag{13}$$

Since $B = B_p + B_u$, our basic equation for total bequests is

$$B = \gamma_0 + \gamma_1 W - \gamma_2 GSS + \gamma_3 F(AGE) + \gamma_4 F(AGE) \cdot GSS + \max[0, \alpha_0 + \alpha_1 W + \alpha_2 LWI]. \tag{14}$$

For those making planned bequests the coefficient of W is $(\alpha_1 + \gamma_1)$, which, of course, exceeds γ_1.

REQUIREMENTS FOR THE DATA BASE

The theory sketched above makes it clear that a test of the Barro effect requires data in which variation in the lifetime wealth increment (LWI) occurs. For this purpose it is ideal to have data on the "start-up" generation of individuals receiving social security. In many cases this generation was able to obtain entitlement to benefits on the basis of periods of contribution that were extremely short--six quarters of coverage are sufficient to entitle survivors to insurance benefits (paid to survivors); and in many cases persons reaching retirement age shortly after 1950 could obtain full retirement benefits (i.e., pensions) with only a few additional quarters. One quarter of coverage for each year after 1950 and prior to the year in which a man reached age 65, or a woman reached 62, qualified the contributor to the system for a pension.

Need for variation in lifetime wealth increments made it appear useful to focus on persons retiring in the 1950s and early 1960s. This generation benefited from the enormous increases in social security coverages that accompanied the 1950, 1958, and 1964 amendments and were able to collect benefits on the basis of the minimal contributions just cited. At the same time some of the individuals in this generation had been paying FICA since the 1930s or 1940s and made proportionately greater contributions toward their retirement benefits. A few individuals remained entirely outside the OASDI system and therefore received no lifetime wealth increment. For all these reasons the generation born during the period 1890-1899 appears particularly germane to an investigation of the Barro hypothesis.

A second reason for focusing on this birth cohort is that a large part of their benefits from the OASDI system is captured in three types of benefits--retirement, wife (husband), and widow (widower) benefits. For younger persons the present value of benefits paid to spouses with children or to children and disability benefits is significantly larger than it is for others.[14] The model developed thus far focuses on bequests as a mechanism for intergenerational transmission of wealth rather than as influenced by the costs of raising children, so that it appeared wise to concentrate on a group of individuals for whom the former was a dominant motive for lifetime wealth accumulation, i.e., decedents.

A second requirement for testing the theories presented is that individuals exhibit variance in the level of gross national security benefits received. This is necessary to observe variation in the impact of the OASDI system in reducing the accumulation of wealth for consumption during retirement years. This type of variation is assured by the same factors that assure variability in the lifetime wealth increment and two others. First, because some individuals could achieve eligibility by working in a low-paying job after moving from a high-paying occupation that was not covered (e.g., municipal employees) while others could achieve eligibility by working for short periods in newly covered, high-paying employments, there is a wide range in average earnings covered by FICA for the start-up generation of 1890-1899. This variation is translated into differences in primary insurance amount (PIA), the basic multiplier for all types of benefits paid. Second, the variation in age at retirement for members of the cohort implies that workers who chose to remain in covered employments until later on in life benefit from larger average earnings (as the computation of the average earnings excludes some periods of low earnings in cases where more than the minimum number of quarters of coverage were earned). This second factor is important to both low- and high-wage workers as both farmers and professionals have considerable choice of the length of their working lifetime.

Figure 1 makes clear that a third requirement for the data base is that it is possible to control on the level of lifetime resources (lifetime earnings plus inheritances received).

The three requirements--variance in LWI, variance in GSS, and control on the level of lifetime resources--are largely met by the data available in the Wisconsin Assets and Incomes Study (WAIS). Earnings data are reported on Wisconsin state income tax forms for the period from 1947 to 1964; FICA and PIA can be obtained or estimated from Social Security Earnings Records (ER) and data on beneficiaries (Benefit) linked to the tax record panel data. Wealth passing into estate is reported from probate records examined for persons in the tax record sample who died between 1947 and 1978. This is the basis for our measure of bequests: the sum of gross assets passing into estate, life insurance (if in excess of $10,000) paid directly to beneficiaries, and, as required by our theory, *inter vivos* gifts reported in connection with inheritance tax assessment. In the next section the method for estimating LWI and GSS is discussed. Readers interested in more detail on the data base are referred to David et al. (1974) and Menchik and David (1979).

COMPUTING THE VALUE OF SOCIAL SECURITY WEALTH

In principle computation of social security wealth, GSS, and the lifetime wealth increment, LWI, would appear to involve a simple algebraic sum of benefits received and taxes paid appropriately discounted and summed over years. Several conceptual problems, intricacies of the law, and limitations of the data available imply a more involved procedure.

Conceptually it is not clear what is meant by *the* value of LWI. Lifetime wealth increment depends on the marital status and number of dependents of the person. It depends on the stage in the life cycle when LWI is being valued. As individuals respond to changes in their lifetime wealth and make dynamic adjustments in their lifetime consumption-bequest plan, it appears that some additional structure must be applied to reach a determinate value for LWI. We assume that the individual plans bequests *ex ante* from the perspective of recognizing his prospective LWI and GSS computed at age 65.[15]

This prospective view of LWI also dictates that we are concerned with *potential* benefits. Effectively, the government offers the individual a social contract that alters the budget constraint, and our measure of its value should be the compensating variation associated with that relaxation, not the actual benefits paid, which will reflect adjustments made in the amount of leisure taken.

Lastly, LWI must be the legal entitlement of the individual concerned. It should not be an aggregate of payments on behalf of a household, in which case it would be possible to "double-count" the LWI of members of the household when separately considering their individual decisions to bequeath wealth. To avoid double-counting, benefits have been computed on an individual basis, even though eligibility for the payment may derive from the spouse of the individual. This idea can easily be explained by introducing variable names to denote the relationship of a person and spouse to the Social Security System:

	Person	Spouse
Lifetime wealth increment	LWIP	LWIS
<u>plus</u> Amount of FICA taxes paid	AMT	SPAMT
<u>equals</u> Gross social security benefits	GSSP	GSSS
Primary insurance amount	PIAP	PIAS

The primary insurance amount is the key legal construct used to determine the value of monthly benefit payments. For each person, PIA determines three categories of benefits: retirement benefits R, husband (wife) benefits C, and survivor benefits S. Then monthly benefits, BN, are

$$BN = R + C + S.$$

Each of the components of BN is a function of PIAP and PIAS as follows:

$$R = PIAP,$$

$$C = \max(.5\ PIAS - PIAP,\ 0)$$

$$S = \max(.825\ PIAS - PIAP,\ 0).$$

It follows that a person may have positive social security benefits (and wealth) even though he has never been a contributor to the system!

Computation of LWIP and GSSP does not, however, imply that the corresponding values for LWIS and GSSS should be ignored. Wealth available to the spouse and concomitant changes in her lifetime resources may induce a substitution effect in the husband's behavior. Social security variables for the spouse have been introduced into the subsequent analysis to investigate the extent of such substitution effects.

THE CONTROL VARIABLES

The dependent variable in our model is net estate at death, plus the face value of life insurance, plus the value of any gifts made by the decedent before death that appear in the probate or state inheritance tax records. Inter vivos transfers were accumulated and added to net estate and insurance using a real rate of return of 1% per annum. The dependent variable reasonably measures lifetime saving (see Blinder, 1974). Since the population studied is male individuals, not households, our dependent variable does not fully capture the intergenerational transfers relevant to the Barro hypothesis. Bequests of women must also be considered. A more precise dependent variable is the sum of the net estates of husband and wife (in the case of ever-married people) less the interspousal transfer. We should not concede too much on this score, however, since the dependent variable includes both intergenerational transfers and interspousal transfers. Even a part of the latter is intergenerational as the spouse acts as a conduit and guardian for child beneficiaries.[16]

Since members of the Wisconsin (1890-1899) male cohort under study died in different years, we denominate all dollar values in 1967 dollars using the Consumer Price Index (CPI). Further, we discount all bequests (with a 1% rate) to their value at a fixed point in each individual's life--age 65. We have done this because equal estates constitute different economic magnitudes in the case of individuals born the same year and dying at different ages. The estate of the cohort member dying first is worth more, since it can grow to exceed the value of the second estate if the real interest rate exceeds zero.

Our data contain 720 male decedents in the 1890-1899 cohort, 531 of whom (about 74%) held estates at or above the filing requirement according to Wisconsin probate and inheritance records. The remaining 26%, we deduce, were "too poor to file."[17] We used the method proposed by Heckman (1976) to correct for sample selection bias in the estimating equations. If we assign zero estate values to the nonfilers, the mean estate (in 1967 dollars) is about $17,960 and the standard deviation is about $34,120 Among the 531 filers the mean and standard deviations are $24,350 and $39,730 respectively.

Although the model requires that we use the sum of lifetime earnings and inheritance received, only earnings information is available in our data.[18] We have individual earnings data for an extended period (up to 19 years with an average of about 14 years) from Wisconsin income tax returns for the period 1947 to 1964. Income reported on the tax return was dichotomized into returns from property income and earned income. The former includes rent, interest, dividends, and capital gains; earned income includes wage and salary and self-employment income. Earned income was cumulated during the period for which returns were available, compounded by the appropriate discount factor and deflated by the CPI (base 1967 = 100). To convert this sum into a number that was comparable for individuals who filed tax returns for different numbers of years, the sum was divided by the number of years filed. Thus, earned income is given by the equation

$$E_i = \frac{1}{N_i} \sum_{t=F_i}^{L_i} \frac{[E_i(t)(1+r)^{(BYR_i + 65 - t)}]}{CPI(t)},$$

where F_i is the first year in which tax returns were filed, L_i is the last, N_i is the total number of tax returns for the i^{th} individual; $E_i(t)$ is the amount of earned income reported for the t^{th} year; and BYR_i is the birth year of the i^{th} person.

The model displayed in Figure 1b shows a kink. Since we did not know a priori at what level of earnings the kink occurs, we employed a linear spline with one node at the median E_i for the cohort and the second node at the 80th percentile. We found no significant difference between the slopes in the first and second segments of the function (see below, Table 1, Model 0). Between the second and third segments, however, the slope increased dramatically, so we decided to place the single node of the spline at the 80th percentile of the cohort earnings distribution. Consequently earnings assume the form:

$$
\begin{aligned}
E_1 &= E_i && \text{if } E_i < E_{50} \\
&= E_{50} && E_i \geq E_{50} \\
E_2 &= 0 && E_i \leq E_{50} \\
&= E_i - E_{50} && \text{if } E_{50} < E_i \leq E_{80} \\
&= E_{80} - E_{50} && E_{80} < E_i \\
E_3 &= 0 && \text{if } E_i \leq E_{80} \\
&= E_i - E_{80} && E_i \geq E_{80} \\
E_{12} &= E_1 + E_2
\end{aligned}
$$

where E_{80} is the earnings level at the 80th percentile (approximately $5,400 in the period studied).[19]

In Model 0, dummy variables for never married (DNM) and married people (DM) were employed; these variables failed to attain statistical significance and were dropped from the equation.[20] Since those who are self-employed may leave a larger estate than others with the same <u>measured</u> earnings, due to tax avoidance or a greater desire to save, the existence of self-employment income is taken into account in this model. For those who report <u>any</u> self-employment income, Ds is unity, and zero otherwise. The variable Z represents the relative share of self-employment income in the individual's aggregate of earnings and self-employment income. The individual's age at death, represented by the variable AGE, was entered into the equation. In subsequent models F(AGE) (discussed in the previous section) replaced the linear AGE variable.

The variable PROPI, an average of the first three years of property income, was introduced in Model 1 to capture the effect of initial wealth (which in a full lifetime model would be inheritance received) on bequests. Although statistically significant, this variable has dropped since the observation that wealthy people have high bequests adds little to our understanding of the accumulation process.

The variable PROPDIF was added with the ideal of correcting for heterogeneous tastes for saving within the cohort. PROPDIF is simply the difference in average measured property income during the first three years of tax records and the last three years. Suppose those who earn more also have a taste for saving more out of what they earn. If we regress savings on earnings (with nothing else used as a control) we might be incorrectly attributing a high propensity to save to earnings alone. This would attribute a personal characteristic that drives both earning and savings to earnings alone.

Though the logic for incorporating a taste variable is pure, the measure itself is not. If two people have the same earnings and one has a greater taste for saving, that person should accumulate more wealth over the period of observation and the change in wealth should generate a change in property income. A possible problem with this measure is that it doesn't take into account portfolio conversion (e.g., changes from high to low yield assets). Another complication is that PROPDIF may measure pure luck on (say) the stock market. In such a case the coefficient of PROPDIF would represent a pure wealth effect on bequests. Torn between the prospect of introducing an impure taste variable or none at all, we estimated the model both ways.

p 28 missing ?

to the model gives unbiased estimates of the parameters $\{A_j\}$. $-s$ is the standardized value of the product of the independent variables and their coefficients estimated for each observation from the probit (16); $f(s)$ and $F(s)$ are the standard normal density and the normal distributions respectively.

RESULTS

Model 0 in Table 1 represents the variant of the bequest function that contains three linear earnings segments. The slopes of the function within the first two segments do not differ significantly from zero but do differ significantly from the rather steep slope in the third segment (earnings above the 80th percentile). Age at death entered linearly is positive and is statistically significant.[21] In Model 1, PROPDIF and PROPI were entered, and age is replaced by the theoretically preferred F(AGE). In Model 2 the two insignificant marital status dummies and PROPI are omitted, and Age is replaced by the functional form discussed above, in the section on social security effects on planned and unplanned bequests. Both PROPDIF and PROPI are significant (though PROPI was later dropped from the model for reasons mentioned above).[22]

In the presence of the new variables and using the new functional form, age loses its significance. (The theory of lifetime saving is confirmed by a significant positive coefficient.) Model 2 will be the preferred specification for tests of the effect of social security wealth.

Table 2 displays the results of the computation of social security wealth. The first panel of the table indicates that it was possible to identify the extent of eligibility for 86% of the 531 persons for whom

Table 1

Regression Models of Bequests of Wisconsin
Males Born 1890-1899
(Bequests discounted to age 65, monetary values in 1967 dollars, t-ratios in parentheses)

	Regression Model		
Variable[a]	0[b]	1	2
E_1	1.992 (1.03)	--	--
E_2	2.534 (0.97)	--	--
E_{12}	--	.559 (.80)	1.020 (1.26)
E_3	9.489 (15.7)	6.267 (15.5)	8.054 (17.3)
Z	17,780 (3.57)	12680 (3.70)	10780 (2.69)
Ds	-1499 (0.37)	-4820 (-1.71)	1390 (.41)
Age	516.3 (2.40)	--	--
FAGE	--	163.2 (.67)	100.3 (0.34)
DNM	-21,510 (-0.61)	-17800 (-.72)	--
DM	1,096 (0.11)	14.32 (.00)	--
PROPI	--	11.07 (15.5)	--
PROPDIF	--	9.112 (20.3)	4.726 (11.2)
λ[c]	-733.9 (0.06)	704 (.075)	-1583 (-.50)

not adjusted as per request

Table 1 (Continued)

Variable[a]	Regression Model		
	0[b]	1	2
Constant	-30,030 (1.43)	6490 (.65)	8170 (1.37)
$\bar{R}^2$	.408	.678	.532
N	517	531	531

put on p 30

Source: Tax records, 1947-1964, and probate data for persons who died between 1947 and 1978.

[a]See text for definitions of variables.

[b]In Model 0 the dependent variable is bequests, not bequests discounted to age 65; the slightly smaller sample reflects missing age data located subsequently.

[c]λ for Models 1 through 8 are based on variables in Model 2 plus DMN and DM.

Table 2

Social Security Coverage and Lifetime Wealth Increment for Wisconsin Males Born 1890-1899

	Self	Spouse
Coverage (in percentages)		
Currently insured	1.5	7.8
Fully insured on quarters since 1950	85.2	20.0
Fully insured at death prior to age 65; other	7.6	2.2
No coverage	5.7	70.0[a]
Total	100.0	100.0
N	459	459
Value of Coverage (in 1967 dollars discounted to age 65)		
Mean gross social security benefit	12,911	9,048
Mean amount of FICA[b]	1,406	93.6
Lifetime wealth increment (mean)	11,505	8,954
Minimum	-1,524	-481
Maximum	17,572	20,913
N	218	218

Source: See Table 1.

[a]Includes decedents with no spouse.

[b]The sum of employer and employee payroll taxes.

probate data were available. In this analysis a further selection from the available data was made to focus on cases in which the decedents received benefits from social security prior to 1965. For that group the data base includes information on the primary insurance amount of the person. If data on PIAS were also available for that person, it was possible to compute each of the components of social security wealth. A complete set of data is available in three cases: (1) both PIAP and PIAS are available, (2) the individual never had a spouse and PIAP is available, and (3) the individual and his spouse are both known to be ineligible for social security because of insufficient quarters of coverage or the absence of a social security account number.

For the 218 cases where complete data are available, statistics on the value of social security are shown in the lower panel of Table 2. The amount of FICA shown is the cumulated value of payroll tax contributions by employee and employer deflated by the CPI and compounded at a real rate of interest of 1%. The negative values for LWI reflect cases in which the individual made contributions but did not live to receive retirement benefits and had no survivors receiving benefits.

Table 3 reflects the simplest possible models that can be constructed using the social security LWI data. The F(AGE) function is neglected, and only variables pertinent to the lifetime wealth constraint of the person and spouse are included. Each of the models displays the kink in the effect of lifetime earnings included in Model 2. The sample with social security data is remarkably similar to the full sample of probated estates; the only substantial differences are that in the subsample the value of BEQUEST is about 10% smaller and the value of PROPDIF is 40% larger:

Means of Variables in Table 3 (Subsample) and
Table 1 (Full Sample)

	Subsample	All probate
E_{12}	3,660	3,792
E_3	789	752
PROPDIF	421	284
Z	.321	.278
F(AGE)	15.9	16.3
BEQUEST	23,000	24,400
N	218	531

The principal difference between coefficients estimated for Model 2 and those in Table 3 is the smaller coefficient of E_3.

The simple models in Table 3 fail to reveal a significant effect of either gross social security wealth or lifetime wealth increments on the amount of bequest. For the cohort as a whole, no positive wealth effect is induced from the mean value of $11,500 LWIP. In theory the effect of LWIS could be either positive or negative--increased wealth of the spouse reduces the need for interspousal bequests; alternatively, the resources freed from interspousal bequests enable the husband to increase bequests to children. In any case no statistically significant effect of either LWIP or LWIS, or of GSSW, on bequests by males is found.

Table 4 presents the results from testing the functional form consistent with the interpretation of the Feldstein-Munnell and Barro hypotheses discussed earlier. Model 6 embodies both the shift in the level of the unplanned bequest function illustrated in Figure 2 (associated with the coefficients of GSSP and GSSS) and the change in the amount of life-cycle saving (associated with the coefficients of the interactions

Table 3

Regression Models of Bequests of Wisconsin Males Born 1890-1899, Including Lifetime Wealth Increment Data (Bequests discounted to age 65, monetary values in 1967 dollars, t-ratios in parentheses)

Variables	Model 3	Model 4	Model 5
E_{12}	2.827 (1.93)	1.438 (1.18)	1.505 (1.23)
E_3	4.921 (6.64)	4.500 (7.29)	4.495 (7.28)
Z	13920 (2.15)	11900 (2.22)	11810 (2.20)
Ds	1584 (.28)	-1340 (-.29)	-1283 (-.27)
λ	-6485 (-1.12)	-7353 (-1.52)	-7306 (-1.51)
Constant	-4160 (-.53)	4674 (.72)	4600 (.70)
PROPDIF	--	5.639 (9.79)	5.635 (9.78)
LWIP	.275 (.49)	-.180 (-.38)	--
LWIS	.620 (.86)	.811 (1.35)	--
GSS~~W~~eP	--	--	-.0980 (-.23)
GSS~~W~~eS	--	--	.693 (1.22)
$\bar{R}^2$	.263	.492	.492
N	218	218	218

Source: See Table 1.

Note: E_{12} and E_3 are defined to include the value of employer FICA taxes.

Table 4

Regression Models of Bequests of Wisconsin Males Born 1890-1899, With Interactions of Social Security and Other Variables (Bequests discounted to age 65, monetary values in 1967 dollars, t-ratios in parentheses)

Variable	Model 6	Model 7	Model 8
E_{12}	2.598 (1.75)	3.585 (2.08)	2.638 (1.86)
E_3	4.784 (6.45)	5.04 (6.50)	4.696 (7.36)
Z	12430 (1.92)	14720. (2.16)	14160. (2.53)
Ds	1929. (.34)	945.5 (.16)	-2915. (-.38)
λ	-3773 (-.63)	-4119 (-.68)	-5371 (-1.08)
Constant	25760 (1.25)	21500 (1.02)	23920 (1.39)
PROPDIF	--	--	5.743 (10.0)
FAGE	-1748 (-1.51)	-1727 (-1.49)	-1460 (-1.53)
FAGE·GSSP	.1283 (.933)	.1255 (.91)	.1935 (1.71)
FAGE·GSSS	.05296 (.256)	.04923 (.24)	-.08411 (-.49)
GSSP	-1.762 (-.783)	-1.625 (-.72)	-2.871 (-1.54)
GSSS	-.3911 (-.1146)	-.3102 (-.09)	1.777 (.63)
DE_3·LWIP	--	-.1724 (-.14)	-1.128 (-1.13)
DE_3·LWIS	--	-.4502 (.29)	.4850 (.38)
$\bar{R}^2$	.269	.267	.506
N	218	218	218

FACE·$GSSW^j$, j = P, S) of Figure 3. The four variables related to gross social security wealth do not add significantly to the variance explained by Model 3 ($F = 2.04$ with 4;207 degrees of freedom). The results do not indicate an inward rotation of the life-cycle saving level as suggested in panel a of Figure 3; that would require a positive coefficient on FACE and a negative coefficient on the interaction terms. The rotation effect estimated implies <u>increased</u> life-cycle saving, instead of reducing saving as hypothesized. Nor do the results significantly confirm the negative shift in the level of bequests suggested by Figure 2.

j is not subscript

The addition of LWIP and LWIS to the regression gives Model 7. (Recall that these values are only relevant for the population engaged in planned bequests. Hence each is multiplied by the dummy variable DE_3 which takes on the value 1 only when $E_3 > 0$.) The addition of those variables does not disclose a significant effect and the explained variance is not significantly increased by the addition ($F = 0.65$; 2,205).

The results are not appreciably altered by the inclusion of PROPDIF (Model 8).

In another experiment, the value of social security wealth for husband and wife were pooled (after adjusting for differences in their ages). The coefficients continue to display the same nonsignificance as those portrayed in Table 4.

CONCLUSIONS

This study of a cohort of males in an early generation of recipients of social security benefits fails to reveal a significant response to sizable gross benefits and lifetime wealth increments. One cannot distinguish between the bequeathing behavior of beneficiaries of the social insurance system and the behavior of persons who were ineligible. One cannot distinguish a response of those who contributed heavily to their old age benefits from those who did not.

This absence of expected effects does not in itself disprove the hypothesized effect of social security on life-cycle savings. Other cohorts may exhibit substantially different behavior. Nonetheless, one would expect to find evidence of the microeconomic behavior imputed to individuals in the controversy over social security and its impact on saving among the men in this particular cohort. They were the beneficiaries of large social insurance benefits to which they contributed little in their working lifetimes. They also lived at a time when more than one out of twenty men and the vast majority of women had no eligibility, so that one would expect to see differences in bequests of the eligible and the ineligible.

We intend to continue this work, looking at the wives of the individuals whose behavior is reported here and the bequeathing behavior of the cohort born in the first decade of this century.

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