ESTIMATING THE WEALTH ELASTICITY OF BEQUESTS FROM A SAMPLE OF POTENTIAL DECEDENTS

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The elasticity of lifetime bequests with respect to lifetime resources is an important determinant of the transmission of inequality across generations, the aggregate savings rate, the factor income distribution, and the incidence of factor taxation. If this elasticity exceeds one, the rich will leave proportionately more to their heirs than the poor, tending to enhance the degree of lifetime resource inequality.[1] An elasticity of bequests in excess of unity means a growing economy will exhibit increasing savings rates leading to higher capital labor ratios with concommittant changes in factor returns and factor shares depending on the elasticity of substitution. A higher than unity elasticity also implies that progressive taxation of labor income reduces savings and hence shifts the long run burden of the tax onto labor.

While these are obviously important economic issues the size of this key elasticity has received only limited empirical attention. Estate tax data exists detailing actual bequests and panel data provides earnings histories, however, there exists no data set reporting both actual bequests and earnings histories. This fact has precluded any direct estimation of actual bequests with respect to lifetime resources.[2]

This paper presents a direct estimation of the bequest elasticity by exploiting information on potential decedents. The discussion in much of the empirical and theoretical literature has ignored the issue of uncertainty as

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[1]See Atkinson (1971) for a discussion of the bequest elasticity and the dynamics of lifetime resource inequality.

[2]See Blinder (1976) for a survey of some indirect evidence.

to date of death and treated the demand for bequests as the demand for a certain, although quite special, commodity. This paper reemphasizes the fundamental uncertainty of the date of death; the uncertainty of death provides the opportunity to directly estimate the elasticity of bequests with respect to lifetime resources. The idea is quite simple; since death may occur at any time, people arrange their affairs to make a bequest contingent upon dying at each point in time. This contingent bequest may differ over time depending on the age of the potential decedent, the number, ages, and incomes of other surviving family members, changes in estate tax laws, etc. Life insurance and annuities are important mechanisms which permit the contingent bequest to differ from accumulated savings and free up the consumption decision from the contingent bequest decision. At any point in time the contingent bequest equals the face value of life insurance plus the potential decedent's current net worth.

The Retirement History Survey (henceforth RHS) of the Social Security Administration is a reliable panel of data detailing the two components of the contingent bequest, net worth and the face value of life insurance. In addition, the RHS provides substantial information about earnings histories permitting the calculation of lifetime earnings. This paper presents estimates of the elasticity of contingent bequests with respect to lifetime earnings. While stressing that contingent bequests are not actual bequests, rather they are the potential bequest if the respondent died at the time the information was gathered, the elasticity of contingent bequests with respect to lifetime resources should equal the elasticity of actual bequests with respect to lifetime resources if data existed to estimate one.[3]

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[3]One would have to control for age of the respondent in both estimations.

Given the uncertainty of date of death and the fact that contingent bequests may differ with the age of the respondent, the elasticity one would really like to know is not the contingent or actual bequest elasticity at a particular age, rather the elasticity of the present expected value of bequests with respect to the present expected value of lifetime resources. Given ample data one could calculate the contingent bequest elasticity at each age and then compute the present expected value elasticity. Unfortunately, to date, the RHS sample covers only household heads in the narrow age range of 58-65; hence there is only limited scope to consider changes in the elasticity with age.[4] However, as is demonstrated below for a widely used family of utility functions, the elasticity of contingent bequests is invariant with respect to age, hence our estimated elasticity may prove identical to the preferred expected present value elasticity.

This paper proceeds in the following manner. In section 1 we review the theory of bequests, life insurance and annuities within a simple 2 period life cycle model.[5] We demonstrate Yaavi's separation theorem and indicate its testable propositions. Section 2 describes the data and the calculation of lifetime earnings. Section 3 reports the results of our contingent bequest regression, and section 4 discusses some implications of the findings and concludes the paper.

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[4]The RHS is an ongoing 10 year longitudinal survey initiated in 1969 surveying household heads age 58-63. The 1969 data as well as the 1971 data are now available.

[5]Yaari (1965) represents the pioneering work on bequests, life insurance and annuities; our model simply elaborates his results.

Section I: The Theory of Bequests, Life Insurance and Annuities

Consider a two period model in which individuals die with probability p at the end of period 1 and die with probability (1-P) at the end of period 2. Individuals receive expected utility from consumption in periods 1 and 2 as well as bequests potentially realized at the ends of periods 1 or 2. Letting W stand for lifetime expected utility and assuming for simplicity separability of the expected utility function with respect to bequests and consumption in the different periods, we write W as:

$$(1)\ W = U_1(C_1) + pV_1(B_1) + (1-p)\ U_2(C_2) + V_2(B_2))$$

Here 1 and 2 subscript time periods and C and B stand for consumption and bequest. The first time period bequest function, V_1, may differ from V_2 and U_1 may differ from U_2. Letting A stand for the expenditure on annuities at the beginning of period 1 and Y_1 for first period earnings, B_1 may be expressed as first period savings (Y_1-C_1) less expenditures on annuities times 1 plus the interest rate r which is paid at the end of each period, ie.

$$(2)\ B_1 = (Y_1-C_1-A)\ (1+r)$$

For each dollar invested in annuities individuals receive 1+ra dollars in return if they survive to period 2. A may be negative or positive; negative A means the individual has purchased life insurance at a premium 1+ra which is paid in period 2 if the individual survives. Life insurance and annuities are thus opposite transactions. Life insurance represents a promise to pay money (premium) contingent upon survival in the future in exchange for receipt of money today.[6] Annuities represent a promise to receive money

[6] The fact that one does not actually receive money when one purchases life insurance is immaterial and does not represent a capital market imperfection.

contingent upon survival in the future in exchange for the payment of money today. The purchase of life insurance is thus equivalent to the sale of an annuity and visa-versa.

Taking Y_2 as second period earnings, the contingent second period bequest is:

$$(3)\quad B_2 = B_1(1+r) + (Y_2 + A\,(1+ra) - C_2)\ (1+r)$$

The individual surviving to period 2 enters the period with B_2, receives income, Y_2, and annuity payments, A (1+ra), and consumes C_2. The difference between these former quantities and C_2 times 1+r is the second period contingent bequest.

Substituting expressions (2) and (3) into (1) and maximizing expected utility over C_1, C_2 and A yields the first order conditions:

$$(4)\quad U_1' = pV_1'\ (1+r) + (1-p)\ V_2'\ (1+r)^2$$

$$(5)\quad U_2' = V_2'\ (1+r)$$

$$(6)\quad V' = \frac{(1-p)\ V_2'}{p}\ \ (ra-r)$$

If annuities (life insurance) are actuarially fair, the present expected value of the return on a dollar invested in annuities must equal a dollar, ie.:

$$(7)\quad 1 = (1-p)\frac{(1+ra)}{1+r}$$

Using (7) expressions (4) to (6) may be rewritten as:

$$(8)\quad U_1' = V_1'\ (1+r)$$

(9) $U_1' = U_2'(1+r)$

(10) $V_1' = V_2'(1+r)$

Equations (8) to (10) represent three equations in the choice variables C_1, C_2 and A and may be solved for the expected utility maximizing values C_1^* C_2^* and A*. Starting at the optimum, consider now changes in the stream of life time earnings that leave the present expected value of lifetime resources unchanged. Present expected lifetime resources are

$$(11) \quad ER = Y_1 + \frac{Y_2(1-p)}{1+r}$$

and changes in Y_1 and Y_2 holding ER fixed satisfy:

$$(12) \quad dY_1 = -dY_2\frac{(1-p)}{1+r} = \frac{-dY_2}{1+ra}$$

Examining expressions (2) and (3), let Y_1 increase by dollar and Y_2 fall by (1+ra) to satisfy (12). If A also increases by one dollar, B_2 and B_1 as well as C_1 and C_2 remain at their former optimum levels. Since the individual expected utility maximizer chose Y_1-A and Y_2+A (1+ra) optimally before the change in the Y_1, Y_2 stream, changes in annuities simply offset changes in the stream to maintain the optimum values of Y_1-A and $Y_2+A(1+ra)$. This is Yaari's separation theorem; when annuity markets are actuarially fair bequests are constrained globally by the value of expected lifetime resources but they are not affected by the pattern of lifetime resources. This implies, of course, that the contingent bequest B_1 for example, does not depend on the level of savings, (Y_1-C_1), given the value of ER. In addition, differences in individuals' holdings of life insurance and annuities for fixed ER can be explained by the pattern of the lifetime earnings stream. Ceteris paribus people with more future relative to current and past earnings will hold more life insurance.[7] Essentially, life insurance allows people to borrow against their contingent future earnings.

Present expected lifetime bequests are:

$$(13)\quad EB = \frac{p\,B_1}{1+r} + \frac{B_2\,(1-p)}{(1+r)\,2}$$

using (7), (13) may be rewritten at:

$$(14)\quad EB = p\,(Y_1 - C_1') + \frac{(Y_2 - C_2)(1-p)}{1+r}$$

From (14) it is clear that life insurance and annuities affect expected lifetime bequests only in so far as they permit C_1 and C_2 to differ from the no life insurance - no annuity optimum solution. Expected bequests equals the present expected value of networth holdings over the life cycle. The use of networth at a given age as a proxy for either the contingent bequest at that age or expected lifetime bequests may be seriously miss-leading; as was demonstrated above, two individuals can have identical contingent bequests at every age and thus the same expected bequest, but have markedly different networth holdings if the timing of their expected resource

[7]The automatic conversion of some life insurance polieies into annuities at retirement is thus easily explicable by the theory.

streams differ.[8] The contingent bequests, B_1 and B_2, rather than networth, are the focus of this study. While B_1 and B_2 may differ in level, there seems no compelling argument for differences in their elasticities with respect to lifetime resources. Indeed, the oft used iso-elastic utility function of the general form given in (15) exhibits identical elasticities (over age) of contingent bequests with respect to expected lifetime resources.

$$(15) \quad W = \frac{\lambda c1 C_1}{(1-\gamma)} + \frac{(1-p)\lambda c2 C_2^{1-\gamma}}{(1-\gamma)(1+\alpha)} + \frac{p\lambda b2 B_1^{1-\theta}}{(1-\theta)(1+\alpha)} + \frac{(1-p)\lambda b2 B_2^{1-\theta}}{(1-\theta)(1+\alpha)^2}$$

where α is the rate of time preference and the λ's are other constants. From expression (10) we have:

$$(16) \quad B_2 = \left(\frac{(1+r)\lambda b2}{(1+\alpha)\lambda b1}\right)^{\frac{1}{\theta}} B_1$$

For the family of utility functions represented in (15) B_2 is proportional to B_1, hence they have identical elasticities with respect to lifetime resources; furthermore, since the elasticity of expected bequests with respect to expected lifetime resources is just a weighted average of the two contingent elasticities, the contingent bequest elasticity at a given age equals the expected bequest elasticity.

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[8] Adams (1977) was constrained by his data set, the Federal Reserve Survey of Consumer Finances, to use current networth as a proxy for bequests and current income as a proxy for lifetime resources. He reports an elasticity in excess of 1; however, this elasticity may simply reflect his proxy problem. Suppose all members of his sample had identical expected lifetime resources, then the elasticity $\frac{d(Y_1-C_1)}{dY_1} \frac{Y_1}{Y_1-C_1}$ would equal $\frac{Y_1}{Y_1-C_1}$ since $\frac{dC_1}{dY_1}$ would equal zero. Presumably Y_1/Y_1-C_1 exceeds unity, hence Adams' greater than unity elasticity may have little to do with the true expected bequest elasticity.

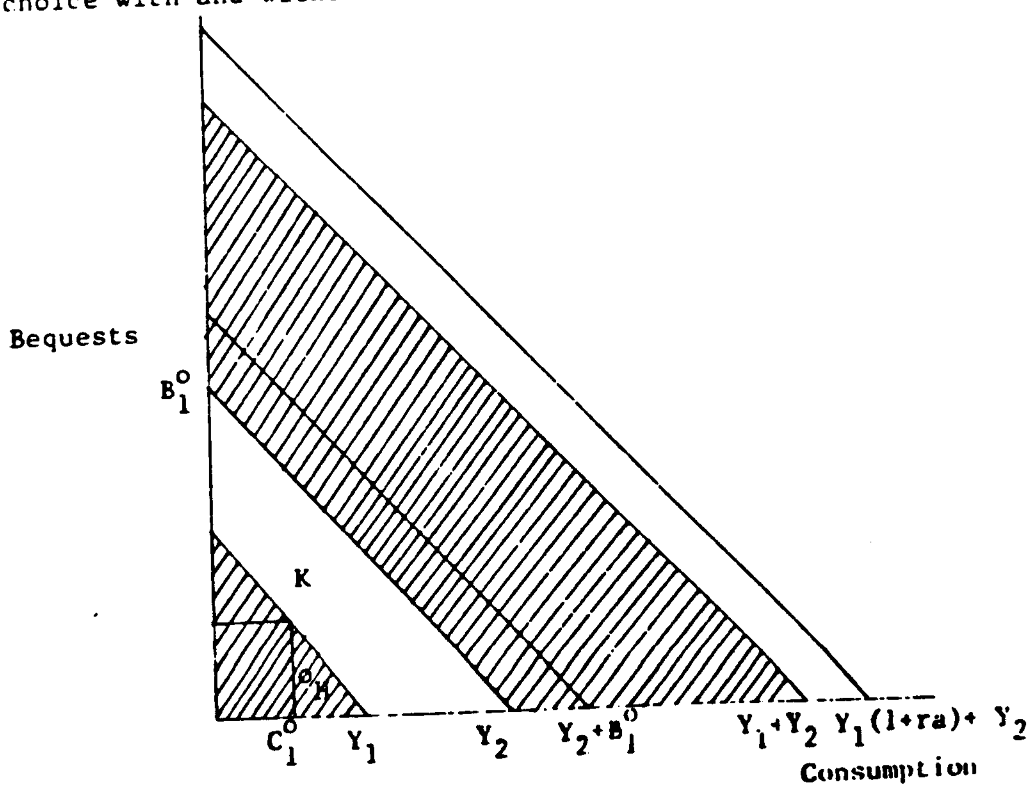
So far the discussion has assumed the existence of perfect insurance markets. In the case that such markets do not exist, contingent bequests as well as the path of consumption depend on the pattern of the earnings stream. The relevant first order conditions are now (4) and (5). Holding expected resources, ER, constant it is easy to show:

$$(17) \quad \frac{dC_1}{dY_2/ER} < 0 \qquad \frac{dB}{dY_2/EY} \;?\; 0,$$

$$\frac{dC_2}{dY_2/EY} > 0, \text{ and } \frac{dB_3}{dY_2/EY} > 0.$$

The reduction in current earnings Y_1 needed to maintain ER as Y_2 rises leads to a fall in C_1 to offset the decline in B_1 which now equals Y_1-C_1; second period consumption and bequests unambiguously increase. The impact on present expected bequests is ambiguous.

Figure 1 below summarizes these points about bequest and asset choice with and without life insurance.



In the absence of life insurance and annuities the two shaded regions of figure 1 indicate the feasible choice set. The line rising from Y_1 with slope 1+r depicts the first period consumption bequest trade off. The choice of a pair such as C_1° and B_1° determines the second period budget line $Y_2 + B_1^{\circ}$. The introduction of life insurance and annuities broadens the choice set to include the non shaded regions to the left of $Y_1(1+ra)$ $+ Y_2$. A point such as H indicates first period purchase of annuities, while K corresponds to the purchase of life insurance. Using (13) one can easily obtain the second period budget line corresponding to first period choices such as K or H. The algebra and diagram indicate that when annuities and life insurance are available and actuarially fiar, the relevant determinant of the contingent bequest is the level of expected lifetime resources, otherwise the timing of these resources is important as well. We consider both the level and timing of expected resources in the empirical analysis. There seems little question as to the availabliity of life insurance and annuities. About 85 percent of married men and 67 percent of non-married persons interviewed in the RHS had life insurance.[9] Given the theory one would expect the corresponding percentage holding annuities to be much smaller. Only 3 percent of all respondents reported holding annuities. However, if one takes into account the enormous annuity represented by future social security and pension benefits, then almost all respondents hold annuities. Indeed, life insurance may be purchased in part to offset the government forced purchase of the social security annuity.

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[9] Sherman (1973)

Section II: The RHS Data and the Calculation of Lifetime Earnings

The Retirement History Survey of the Social Security Administration is an ongoing ten year longitudinal study of the retirement process. Data is currently available for the survey years 1969 and 1971. These surveys consitute the data body for this paper. In the 1969 survey 11,153 married and single males and single females between the ages 58 and 63 were interviewed. 9924 of these respondents were reinterviewed in 1971, the remainder either refused the reinterview, had died in the interim, or could not be located. The two surveys ask a wide range of questions covering current assets, past, current, and expected future earnings, retirement plans, current and expected pension and social security benefits as well as current medical expenditures. Components of networth and life insurance information is available for both 1969 and 1971.

The two questionaires are highly complementary in terms of detailing lifetime earnings histories. The 1969 survey reports current earnings, earnings in 1968, and age and earnings at last job. The 1971 survey reports 1971 earnings, 1970 earnings, and the age and earnings at the beginning of the respondent's first full time job. In addition, the 1971 questionaire asked the respondent the ages at which he or she earned 1/3 and 1/2 of current earnings or earnings at his or her last full time job if the respondent was not currently working. All together, then, there are 8 potential age earnings observations reported per respondent. In the case of married respondents identical information was gathered for the wife as well. Years of schooling are also available for both respondent and spouse. Finally, the surveys give extensive information detailing the respondents' and spouses' occupational histories; they also detail the type of worker (self-employed, private, and government) he or she was at the various ages for which the occupational information is available. From the surveys we know age, occupation and type of worker in 1969 and 1971, at the beginning of the 1969 job, and at both the beginning and end of the last job. The age at which the respondent (spouse) experienced a big change in his occupation as well as the occupation and type of worker before and after the big change is available. The initial and terminal ages of the respondents' (spouses') longest duration job, and the occupation and type of worker at that job is stated. Finally, the surveys tell us whether the respondent has ever changed jobs.

This information permitted the calculation of twelve potential age, occupation, and type of worker observations per respondent. Some of these ages corresponded to the ages for which earnings were reported, others did not. The age earnings information and the age - occupation - type of worker information was jointly sorted to yield 8 potential age earnings observations per respondent (spouse) with codes indicating either the exact occupation and type of worker at that age if it was known or a new code indicating the closest available age adjacent occupations and type of worker codes if the exact information was not known. Thus, if the respondent reported earnings of $4000 at age 27 in 1936 and his occupation in 1936 is unknown but his occupations in 1939 and 1928 are known and they are different, we specify a code which denotes the two occupations the respondent is between. If the two closest age adjacent occupations or type of worker codes are identical, we assume the respondent had that occupation or was that type of worker at the interviewing age.

The Calculation of Lifetime Earnings

The strategy followed in calculating lifetime earnings was to use the above described data to estimate an age earnings regression; from this regression we predict the individual's earnings at every age between his first and last or current job and accumulate these predicted earnings up to either 1969 or 1971 at an interest rate. Following some recent findings by Lillard (1977) the specification of the earnings equation includes an individual constant term. Letting LE_{it} stand for the logrithim of earnings of individual i in year t, $LAWAGE_t$ for the logrithim of the national average wage and salary earnings in yeart , and X for a matrix of other exogeneous variables including schooling, experience, occupation and type of worker dummies, the earnings regression is:

$$(18)\quad LE_{it} = \gamma_1 + \gamma_2 LAWAGE_t + XB + \alpha_i + E_{it}$$

γ's and B are coefficients; the error is decomposed into an individual constant α_i and a transitory independently and identically distributed error E_{it}. The α_i's are assumed to be uncorrelated with the exogeneous variables as well as uncorrelated across individuals. The coefficients of (18) are estimated by first doing pooled ordinary least squares, ignoring the error structure and then computing each individuals' average residual to obtain an unbiased estimate of α_i. The assumption that the L_i's are independent of the exogeneous variables may be invalid, in which case simple pooled OLS ignoring individual constants will produce biased coefficients. However, since we use the pooled OLS coefficients for prediction and include a potentially biased individual constant, the resulting predicted earnings are unbiased, which is all we require. Armed with the OLS coefficients and the individual constants we predict earnings at each age including each individuals' constant in the prediction.

Separate earnings regressions are run for males and females. The LAWAGE variable is included to capture inflation and non-experience related growth in earnings such as a rise in productivity from capital deapening. The 15 original occupational categories were combined to obtain a more managable set of 4.[11] In the tables to be presented OCC1, OCC2, OCC3, and OCC4 are dummies indicating the respondent's occupation was unambiguously 1,2,3, or 4 in the year of the observation. Dummies such as OCC103 mean the individual was between occupations 1 and 3 at the age of the observation but exactly which occupation, 1 or 3, he actually had is unknown. Dummies such as OCC200 mean the individual's earlier as well as current occupation is unknown but that his next reported occupation is 2. Dummies such as OCC200 were used primarily for the age earning observation for the first full time job for which we often know only the earliest future occupation but not the current or past occupation. A similar notation for type of worker was used. Here CW1 corresponds to private workers, CW2 are government workers and CW3 are self employed. To preclude singularity, dummies CW1 and OCC4 are excluded from the regressions. In addition, some of the potential occupational

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[11] The average wage serious comes from Historical Statistics, P. 169, Occupation Category 1 includes: professional, technical and kindred co-workers, farmers and farm managers, managers, officials and proprietors. Category 2 includes clerical and kindred workers and sales workers. The third category is comprised of operatives and kindred workers and craftsmen, foremen and kindred workers. The 4th group is private household workers, service workers, farm laborers and foremen, and other laborers.

and class of worker dummies had no variance (ie, were zero for all observations) and were ommitted.

Besides the occupation and class of worker dummies, there is a dummy, MAR, for respondents who never married, a dummy RACE for whites, and two urban dummies UR1 and UR2. UR1 takes the value 1 when the age-earnings observation occurs in 1969 and the respondent lives in an urbanized area. UR2 is coded one for non 1969 observations when the respondent stated in 1969 that he did live in an urbanized area; UR2 is thus similar to the less than full information occupation and class of worker variables. Finally, since the age of retirement was reported, RET is coded one when the age of the observation equals or exceeds the stated age of retirement. Since only observations with positive earnings are included in this regression, RET signals a decline in full time work. In the prediction of earnings the appropriate occupation, class of worker, retirement and urban dummies are turned on depending on the age in question. Thus, for ages for which occupations or worker types are known exactly the dummies OCC1-OCC3 or CW2-CW3 are used, otherwise the between occupation and type of worker dummies are used.

Turning to the continuous exogeneous variables, experience (EXP), its square (EXP2) and its cube (EXP3) are included. Experience is measured as the age of observation less the age at first job. Age at first job, (AGEFJ), years of schooling (S), schooling squared (S2), schooling times experience (EXPS), experience squared times schooling (EXP2S) and experience times schooling squared (EXPS2) complete the list of exogeneous variables in the earnings regression.

Given the extensive computations required to predict lifetime earnings, only the first 3500 of the 11,153 RHS observations were used. From these 3500 records, 2013 males and 1310 females (including wives) with satisfactory information were used in the separate age earnings regressions. For each male there are, on the average, 6.07 age earning observations leading to a sample size of 12,217 for the pooled male OLS regression. The corresponding female figures are 4.95 and 6541.

Table 1 reports coefficients for the two pooled OLS regressions. The R^2 for the males regression is .593; for the females it is .496. The residual variance can be decomposed into the part due to individual constants and the part due to random error. Individual constants explain 36.7% of residual male variance and 35.7% of residual female variance.[12] Correspondingly, 78.4% of the total male earnings variation and 74.9% of total female earnings variation is explained by the exogeneous variables and the individual constants.

The effects of experience and schooling on earnings is described in Table 2 where we present the returns to an additional year of schooling or an additional year of experience at given levels of schooling and experience. Holding years of experience constant, Table 2 reveals increasing return to additional years of schooling for both males and females. For males the returns to schooling are greater the greater the years of experience. Female

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[12] We use individual residual variation around the mean individual residual to obtain an unbiased estimate of σ_ε^2, the variance of the Eits'. Subtracting this from the square of the standard error of estimate yields an unbiased estimate of σ_α^2, the variance of the individual constants. Lillard (1977) finds a higher ratio of $\sigma_\alpha^2/\sigma_\alpha^2 + \sigma_\varepsilon^2$ and probably reflects the bunching of most of his data between 1955 and 1968. On the other hand, our initial OLS R^2s are higher and, hence, we explain a greater fraction of total variation than Lillard.

Table 1 Pooled OLS Age Earning

Regression Coefficients*

Variable	Males Mean	Males Coefficient	Females Mean	Females Coefficient
RACE	.958	.118 (.032)	.935	.042 (.038)
MAR	.048	-.251 (.029)	.131	.154 (.028)
LAWAGE	8.290	.129 (.051)	8.360	.505 (.045)
AGEFJ	18.339	.030 (.003)	21.297	.013 (.002)
UR1	.109	.162 (.024)	.116	.293 (.036)
UR2	.690	.103 (.016)	.735	.150 (.026)
RET	.025	-.532 (.040)	.033	-.598 (.051)
S	11.561	-.161E-3 (.019)	11.542	-.032 (.020)
S2	145.360	.394E-3 (.772E-3)	143.38	.347E-2 (.899E-3)
EXP	28.927	.069 (.008)	25.618	.064 (.010)
EXP2	1117.600	-.158E-2 (.294E-3)	945.45	-.185E-2 (.349E-3)
EXP3	45651.0	.206E-4 (.340E-5)	37275.0	.168E-4 (.407E-5)
EXPS	332.31	.142E-2 (.742E-3)	297.26	-.127E-2 (.961E-3)
EXPS2	4150.0	.567E-4 (.230E-4)	3705.3	-.185E-5 (.288E-4)
EXP2S	12744.0	-.419E-4 (.100E-4)	10933.0	.320E-4 (.153E-4)
OCC1	.206	.408 (.026)	.131	.639 (.041)
OCC2	.100	.176 (.028)	.304	.400 (.030)
OCC3	.345	.171 (.022)	.219	.440 (.031)
OCC100	.033	.227 (.065)	.024	.465 (.081)
OCC102	.016	.449 (.054)	.008	.665 (.105)
OCC103	.009	.449 (.068)	.917E-3	1.047 (.302)
OCC104	.003	-.281 (.122)	.003	.455 (.164)
OCC200	.020	.136 (.071)	.054	.382 (.065)
OCC201	.003	.376 (.117)	.002	.399 (.210)

Table 1 (continued)

Variable	Males Mean	Males Coefficient	Females Mean	Females Coefficient
OCC203	.004	.143 (.099)	.002	.105 (.202)
OCC204	.002	-.050 (.127)	.002	.397 (.195)
OCC300	.081	.071 (.059)	.055	.374 (.065)
OCC301	.003	.259 (.124)	.001	.820 (.275)
OCC302	.006	.200 (.086)	.001	.457 (.249)
OCC304	.017	.176 (.051)	.002	-.110 (.202)
OCC400	.028	-.007 (.067)	.031	.229 (.072)
OCC401	.001	-.161 (.175)	.002	.610 (.046)
OCC402	.002	.221 (.159)	.002	.610 (.257)
OCC403	.007	-.082 (.079)	.003	.094 (.154)
CW2	.087	-.052 (.023)	.020	.079 (.339)
CW100	.144	.011 (.055)	.168	-.095 (.054)
CW102	.009	.050 (.067)	.017	.201 (.072)
CW103	.001	-.100 (.160)	.306E-3	.404 (.526)
CW200	.015	-.049 (.073)	.021	-.046 (.080)
CW201	.001	-.029 (.257)	.001	.075 (.234)
CW203	.245E-3	-.200 (.406)		
CW300	.017	-.085 (.068)	.008	-.234 (.111)
CW301	.003	.159 (.118)	.001	-.247 (.261)
CW302	.327E-3	-.293 (.348)		
CW3	.079	-.188 (.025)	.020	-.176 (.324)
Constant		4.929 (.365)		2.075 (.324)

*Standard errors in parentheses

returns to schooling exceed male return at high initial levels of schooling and early years of experience. Rather than increasing returns we see declining returns to experience for both sexes at all levels of schooling. Again, the positive interaction between experience and schooling in earnings leads to greater return to experience the greater the level of schooling.

While the female return to schooling generally exceeds that of the male, the opposite is true for the return to experience. The inference that one can draw from this is that females should invest more than males in human capital; ie., remain in school longer. For a male with 15 years of schooling, an additional year of schooling will increase his wages by an average of about 4 percent. In addition, Table 1 indicates that postponing work by 1 year raises earnings by 3 percent due to the vintage effect of AGEFJ. Hence, 7 percent is the figure one should compare with the 9.6 percent opportunity cost of foregoing the first year of work. For females with 15 years of schooling, an additional year adds an average of about 6.5 percent to future wages; the vintage effect is 1.3 percent for females, hence, 7.8 represents the gain to remaining in school while 7.9 is the opportunity cost. The optional length of school thus appears longer for females than males, although the simularity in the average male and female years of schooling, 11.561 and 11.542 respectively, does not lend support to this. One should also bear in mind that the schooling and experience effects of Table 2 are obtained holding occupation and type of worker constant. It seems likely that schooling and experience indirectly influence occupation; Table 2 only reports the direct effects of schooling and experience and ignores the indirect effects.

Table 2: Returns to Additional Years of Schooling and Experience at Initial Levels of Schooling and Experience

	Years of Schooling					
Years of experience	5	10	15	18	Return to:	Sex
1	.006	.011	.015	.018	Schooling	Male
	.005	.040	.075	.095		Female
	.072	.083	.096	.106	Experience	Male
	.065	.072	.079	.083		Female
5	.013	.020	.027	.031	Schooling	Male
	.000	.035	.070	.091		Female
	.059	.069	.081	.089	Experience	Male
	.047	.049	.051	.051		Female
10	.020	.031	.040	.046	Schooling	Male
	-.003	.031	.066	.086		Female
	.047	.054	.064	.070	Experience	Male
	.034	.038	.041	.042		Female
20	.028	.044	.059	.069	Schooling	Male
	-.007	.028	.062	.082		Female
	.030	.033	.039	.043	Experience	Male
	.026	.023	.028	.033		Female
30	.028	.048	.069	.083	Schooling	Male
	-.004	.030	.065	.085		Female
	.025	.024	.025	.028	Experience	Male
	.008	.018	.027	.033		Female
40	.019	.046	.072	.088	Schooling	Male
	.006	.040	.074	.094		Female
	.032	.027	.025	.024	Experience	Male
	.009	.021	.034	.041		Female

Table 1 indicates that self employed males and females earn substantially less on average. Male government workers also make less than private workers, while the wages of female government workers exceed those of female private workers. Retirement and the urban dummies are important explanatory variables as is the dummy for never married, MAR. Interestingly, non-marriage appears to lower wages of males and raise wages of females, the presumption being that married males work harder as do unmarried females.

Section 3: Estimates of the Elasticity of Bequests With Respect to Lifetime Earnings

In this section we present regressions of 1969 and 1971 contingent bequests on lifetime earnings and other exogeneous variables. Lifetime earnings are calculated at both a 3 and 6 percent rate of interest. Exactly what interest rate to use is unclear. From 1926 to 1970 the rate of return on common stock averaged 9.6 percent.[13] During this period the long return U.S. bond yield averaged 2.9 percent and the long term corporate bond yield averaged 3.6 percent. The yield on short term claims including cash, time deposits, and short term bonds presumably was below the long term bond yield. However, only about 15 percent of the middle class portfolio is invested in corporate stock.[14] Another 20-30 percent is invested in short term claims and long term bonds. A major chunk 40-50 percent is invested in home and other real estate and business equity and about 12 percent is invested in consumer durables. The historic return on homeownership is uncertain since reliable data is not available on the capital gains component of the yield on housing even ignoring the problem in imputing rent. Tax contributions to social security yielded far in excess of 6 percent.[15] Finally there is the issue of lending versus borrowing rates. Heckman and Ben Porath report interest rates in the neighborhood of 18 percent implicit in human capital accumulation. On the basis of these figures we feel that a rate of interest close to 6 percent is most reasonable but present results assuming a 3 percent rate of interest as well to test for the sensitivity of the elasticity with respect to the interest rate.

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[13] Ibbotsen (1976), pp. 20-34.

[14] See Lebergoot (1976), p. 244.

[15] See Kotlikoff (1971), p. 21-22.

The data includes all major components of networth except the market value of automobiles. Automobile debt is recorded, however, and is used in constructing networth. In 1971 the value of the wife's stocks, bonds, and savings and checking acocunts were reported separately from that of the husband; for 1969 there is no breakdown of networth by ownership. The face value of life insurance in 1969 and 1971 is reported separately for the husband and wife. Bequests cannot be negative hence we define the contingent bequest to be zero if the value of networth plus life insurance is less than zero.[16]

The regressions of contingent bequests of married males are presented in Tables 3 and 4;CB69, CB71, and RB71 are the three dependent variables. CB69 and CB71 are the contingent bequests in 1969 and 1971 defined using the combined husband and wife networth plus the husband's life insurance. RB71 uses only the husband's networth when a breakdown is given. For 1969 the sample size is 370, for 1971 it is 347. The small sample sizes at this stage of the analysis reflect the non-reporting of the age at first job for many wives. This question was only posed to the wife if she was home at the time of the interview. In addition, about 25% of the records give incomplete asset information.

In the 1969 regression the exogeneous variables include a dummy for race, age of the husband (AGEM), age of the wife, (AGEF), schooling of the husband (MYSCH), schooling of the wife (FYSCH), and a dummy for the respondent's

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[16] The husbands life insurance may be owned by the wife in which case the face value of the life insurance cannot be used to pay debts of the estate. Defining the bequest as the face value of the husband's life insurance plus networth, if networth was positive, or zero otherwise, led to virtually identical results as those reported in the text.

health reported to be worse than average (HEALTH69). LIFEM693, LIFEM696, LIFEF693, LEFEF696 are lifetime earnings of the husband and wife computed at 3 and 6 percent interest rates.* CKIDSUP, PKIDSUP, and NKIDSUP are the number of children completely, partially, and not at all supported by the parents. PAR is a dummy for couples who indicate they support their parents. For non-retired husband and wives who give an expected retirement age, FUTERNM and FUTERNF are current earnings multiplied by the number of years the husband or wife expects to work in the future. NEURETM and NEURETF are dummy variables for husband and wives stating they will never retire multiplied by current earnings. Lastly, ORETM and ORETF equal current earnings for husband and wives when the other measures of future earnings are both zero. The group with positive ORETM and ORETF are primarily retiries.

The major finding of Table 3 and this paper is that the contingent bequest elasticity is less than unity. For the six percent accumulated lifetime earnings variable, the 1969 elasticity at mean values of LIFEM696 and B69 is .520. The coefficient of LIFEM696 is .059 with a standard error of .027. Adding the standard error to the coefficient would raise the elasticity to .760. .520 is significantly smaller than the .113 value required to make the elasticity unity. For the three percent definition of lifetime earnings the 1969 elasticity is .815. Adding in the standard error here would, however, raise this value to 1.08. While we shall discuss the 1971 results in detail below, we mention here that they confirm the finding of a smaller than unity elasticity of bequests.

This finding is strengthened by considering the coefficient on the wife's lifetime earnings. Table 3 reports significantly negative coefficients. Presumably, the husband's bequest is intended in part to support the wife. High levels of the wife's lifetime earnings reflect a high earnings capacity

*To be more precise they are lifetime earnings up to 1969 or 1971.

and hence diminish the need for a wife supporting bequest. To calculate an elasticity of bequests with respect to the husband and wive's joint lifetime earnings a reasonable procedure seems to be to consider changes in bequests resulting from a dollar increase in the husband's lifetime earnings and a fraction of a dollar increase in lifetime earnings of the wife where the fraction is given by the ratio of the average wife's lifetime earnings to that of the husband. Such a procedure yields an elasticity of .222 at mean value of LIFEM696 plus LIFEF696 and B69. The corresponding 3 percent elasticity is .576.

It is important to know whether the estimate of the elasticity is sensitive to the functional form imposed. Inclusion of the square of the husband and wives lifetime earnings did not yield significant coefficients. With the squared terms the LIFEM696 elasticity is .354 and the LIFEM693 elasticity is .567 at the means. Since the magnitude of the other exogeneous coefficients may not be scale free we regressed B69 divided by LIFEM696 against the exogeneous variables of Table 3. Again, the estimated elasticity is far below unity, namely, .401. Finally, to check for a significantly higher elasticity at higher lifetime earnings the sample was truncated to include the mean. For this sample the estimated elasticity is .571 at 6 percent and 1.04 at three percent.

Returning to Table 3 we find that the wife's age and the husband's schooling significantly influence bequests in the positive direction. There is a significant difference, about $4000, in bequests to completely supported children and bequests to non-supported children. More children per se appear to reduce rather than increase bequests. This is not surprising since the effective resources available to the husband and wife are diminished by the

Table 3: Contingent Bequest Regression (B69)
Coefficients (Standard Errors

Variable	Mean	Coefficient	Coefficient
LIFEM693	161460	.169 (.055)	
LIFEM696	297070		.059 (.027)
LIFEF693	80621	-.180 (.050)	
LIFEF696	142410		-.088 (.026)
AGEM	60.235	440.80 (1317.7)	634.55 (1371.3)
AGEF	55.841	853.66 (423.63)	973.25 (442.72)
MYSCH	11.016	3454.0 (854.64)	4030.5 (816.49)
FYSCH	11.473	427.04 (785.75)	214.63 (786.64)
RACE	.957	11500 (9824.6)	12017 (9896.3)
HEALTH69	.159	-4207.9 (5422.1)	-4221.8 (5482.6)
CKIDSUP	.346	1164.0 (2830.0)	1136.6 (2853.7)
PKIDSUP	.062	-338.34 (5808.9)	-441.68 (5856.1)
NKIDSUP	2.127	-2945.8 (1209.6)	-2920.5 (1219.7)
PAR	.022	-8375.2 (13392)	-110.14 (3113.6)
FUTERNM	18691	.012 (.027)	.259E-3 (.006)
FUTERNF	4035.6	-.045 (.140)	-.035 (.033)
NEVRETM	291.02	-.817 (1.446)	.814 (1.458)
NEVRETF	132.28	-1.495 (2.658)	-1.707 (2.679)
ORETM	2997.0	1.474 (.457)	1.603 (.458)
ORETF	2374.5	1.393 (.664)	1.324 (.663)
Constant		-.108E6 (76235)	-.123E6 (79129)
R^2		.278	.265

Mean of B69 = 33594
STD deviation of B69 = 42025

presence of children. If we divide the lifetime earnings variables of Table 3 by family size, the number of children plus 2 and reestimate, the coefficient on number of children entered separately is insignificant and small, -769. (t + -.483). The future earnings variables are all insignificant with the exception of ORETM and ORETF.

In Table 4 we report regression results for the 1971 contingent bequest. Data was not available to create the NEVRETF variable, so this group is combined in ORETF. ACTROH71 replaces the parental contribution dummy PAR. ACTROH71 is the dollar amount of contributions made to relatives outside of the household in 1971. In 1971 the survey reports the networth of children under age 18. This variable is KNW71 in the regression.

At 3 percent the elasticity of CB71, total networth plus the respondent's life insurance is .677; at 6 percent the elasticity is .367. For the RB71 bequest definition, the husband's networth plus his life insurance, the 3 percent elasticity is .693 and the 6 percent elasticity is .357. Again the six percent elasticities are significantly different from unity while the 3 percent elasticities are not. As with the 1969 regression, entering squared values of the lifetime earnings variable reduces the estimated elasticities. In addition, the elasticities for the 71 bequests when bequests are deflated by earnings are also smaller than the elasticities when the absolute value of bequests is the dependent variable. For 1971 truncating the sample to include only observations with greater than the average lifetime earnings leads to a 1.387 elasticity at 3 percent and a .818 elasticity at 6 percent. The corresponding RB71 elasticities are 1.528 and .909. In the 71 regressions the age of the husband enters negatively and is significant in the CB71 three percent equation. To test whether the elasticity depended upon the age of the respondent, we

Table 4: 1971 Contingent Bequest Regression Coefficients (Standard Errors)

Variable	Mean	CB71	CB71	RB71
LIFEM713	175990	.112 (.04)		
LIFEM716	334750		.032 (.020)	.026 (.019)
LIFEF713	88035	-.017 (.042)		
LIFEF716	159610		.001 (.022)	-.005 (.021)
AGEM	62.266	-2282.8 (1146.4)	-1968.9 (1190.6)	-1685.0 (1136.3)
AGEF	57.934	1033.1 (371.24	981.19 (389.40)	965.68 (371.62)
MYSCH	11.012	2132.3 (676.97)	2591.1 (638.17)	2147.9 (609.01)
FYSCH	11.546	429.97 (636.47)	362.85 (630.88)	522.58 (602.06)
RACE	.965	11805 (8718.3)	12709 (8769.1)	10257 (8368.6)
HEALTH71	.165	-5026.0 (4341.8)	-5481.9 (4365.6)	-3369.0 (4166.2)
CKIDSUP	.260	1040.2 (2639.2)	1133.0 (2655.6)	1207.0 (2534.3)
PKIDSUP	.121	-2061.1 (3586.4)	-2389.1 (3605.3)	-1418.8 (3440.6)
NKIDSUP	2.136	-653.62 (970.18)	-643.39 (982.07)	-801.93 (937.22)
ACTROH71	36.827	17.787 (7.050)	17.247 (7.090)	17.764 (6.766)
KNW71	62.384	- 3.854 (3.379)	- 3.965 (3.398)	- 3.218 (3.243)
FUTERNM	12434	- .102 (.061)	- .081 (.061)	- .045 (.058)
FUTERNF	8939.4	.144 (.080)	.136 (.080)	.028 (.076)
NEVRETM	1445.9	- .518 (.497)	- .368 (.495)	- .398 (.472)
ORETM	1000.7	.030 (.414)	.067 (.416)	.057 (.397)
ORETF	1172.5	.005 (.491)	.001 (.491)	.014 (.469)
Constant		55706 (70199)	41019 (72611)	28654 (69295)
R^2		.197	.188	.158
Mean of dependent variable		29006		24803

introduced an interaction between the husband's age and his lifetime earnings. The interaction term proved significantly negative indicating a .798 elasticity at mean value of AGEM, CB71, and LIFEM713 and .436 at mean values of AGEM, CB71 and LIFEM716. Hence, to the extent that the elasticity of contingent bequests depends on age it appears that the elasticity declines with age.

There are other differences between the 69 and 71 results besides the AGEM coefficient. The wife's lifetime earnings coefficient is insignificant and small and none of the future earnings variables is significant. The difference between the children's coefficients is not significant. On the other hand, as with 1969, the schooling of the husband as well as the age of the wife contributes significantly to the contingent bequest. The amount contributed to relatives outside the household enters with the expected positive sign and is significant. The coefficient of KNW71, although of the expected sign, is insignificant.

The theory suggests that future earnings should be a key determinant of the fraction of the bequest which consists of life insurance. Unfortunately, regressions of the fraction of the bequests composed of life insurance yielded very low R's (.02-.07); neither the absolute levels of future earnings nor the ratio of future earnings to the past earnings significantly influences this dependent variable. One obvious explanation for this poor performance is that much of the life insurance (about 2/3) held by respondents is whole life rather than term. The decision to purchase whole life life insurance was presumably made when the respondents were substantially younger based on what they perceived then to be future earnings. Hence, our own future earnings variable may have little to do with the relevant future earnings at the time the life insurance was actually purchased.

Joint Bequests of Husbands and Wives

In addition to investigating the bequest contingent upon the husband's dying, we can inquire as to the joint bequest contingent upon both spouses dying at the same time. This involves simply adding in the face value of the wife's life insurance to the previous bequest definition CB71. The elasticities for the joint contingent bequests proved almost identical to those excluding the wive's life insurance. The other coefficients of the equations changed little from their Table 3 and Table 4 values.

Elasticities for Never Married Respondents

The less than unity finding holds for the contingent bequests of both male and female respondents who report they never married. In 1969 at 3 percent the male elasticity with respect to LIFEM693 is .866 and the female elasticity is .220. In 1969 at 6 percent the elasticities are quite similar, .857 for the males and .219 for females. Turning to 1971 we find an elasticity for males of .922 at 3 percent and .726 at 6 percent and for females .100 at 3 percent and .075 at 6 percent. The sample size in 1969 for never married respondents is 205; in 1971 it is 165. In both years the male's lifetime earnings enter significantly and the female's insignificantly. In these regressions, the education of both males and females are significant positive influences on contingent bequests; in addition, for older males bequests are significantly smaller. Interestingly, even for this group of single individuals, the proportion holding life insurance is quite high, 80.0 percent in 1969 and 75.1 percent in 1971. The mean value of life insurance is, however, about 50 percent smaller for single respondents.

Section 4: Caveats, Implications of the Findings, and Conclusion

Throughout this paper we have discussed bequests, financial transfers made at death, as if they comprised the only form of lifetime transfers. This is obviously untrue. Transfers may be made to children in the form of expenditures on education as well as direct gifts while the transferor is still alive. The true elasticity of lifetime transfers with respect to lifetime resources is a weighted average of the elasticities of the components. Hence, even if the contingent financial bequest elasticity is less than unity, the lifetime transfers elasticity may exceed unity if the other components are elastic. Ishikawa has put forward one theoretical argument which suggests that the financial bequest elasticity should exceed the elasticity of transfer in the form of schooling for children. Effectively, Ishikawa's argument is that additional dollars transferred in terms of schooling expenditures will eventually be subject to diminishing returns in terms of producing more earnings for the child. On the other hand, each dollar given in the form of gifts and bequests will yield a dollar to the child. Hence, parents whose children are in the diminishing return to schooling expenditure range will tend to leave greater and greater fractions of their incremental transfers in financial form. Hopefully, future empirical work will enlighten us on the elasticity of this very important transfer component.

The elasticity of gifts with respect to lifetime resources is also quite unknown. Certainly the presence of the estate tax would argue for a elasticity in excess of unity. However, at least for the sample of married households considered in this study the amount of gift giving is likely to be small. Our sample covers essentially the middle class. We have no observations on millionaires and fewer than two percent of the observations have networth in excess of $100,000. Few if any of the respondents in our sample would be subject to the estate tax and, hence, would have little incentive for lifetime gift giving. In any case, determining the size of the total transfer elasticity will require learning more about the other components as well.

The financial contingent bequest elasticity for the very wealthy may differ from that of the middle class. The estate tax is one reason; differences in tastes is another. Hence, we caution against facile imputation to the rich of our general findings of inelastic bequests. Indeed, our truncation of the sample by lifetime earnings indicates higher elasticities for those with higher lifetime resources.

The taxation of lifetime earnings is an important factor not considered in our empirical work. Assuming that respondents reported gross rather than net earnings our bequest elasticities are biased downward by a turn involving the elasticity of the tax rate with respect to lifetime earnings. The taxes involved here are the payroll taxes and the income tax. We obtained one estimate of the tax-lifetime earnings elasticity by first calculating the level of nominal earnings which if earned each working year would generate each respondent's lifetime earnings. We then regressed this earnings figure on the computed tax rate for that earnings figure using the 1958 tax tables. The derived correction factor to be applied to our reported elasticities is 1.56. This procedure should however be viewed with extreme caution since it ignores differences across respondents in growth rates of earnings and earnings fluctuations. In addition the calculation does not allow for differences across individuals in tax deductions and exemptions nor does it consider tax rate changes over time. Unfortunately the data do not really permit more sophisticated investigation of this source of bias.

An additional caveat is that the computed lifetime earnings may measure true lifetime earnings with error. Since we have no information on out of labor force and unemployment spells it was assumed that both men and women worked each year from the age of their first job to the age of their last job. This is probably more problematic for the lifetime earnings of the wives than the husbands. Indeed, we experimented with an interaction of the wife's calculated lifetime earnings and the number of children expecting to find a negative coefficient. The coefficient was positive, but insignificant. In males the error involved in ignoring spells of unemployment is probably greater for the lower earners. This suggests running the regression only on the high lifetime earners; as described, this regression yielded higher elasticities, although they are still below unity at 6 percent.

Another issue not yet addressed is the extent to which bequests are in some sense involuntary. Lack of information and poor terms due to adverse selection may partly explain the limited experience of the middle class with annuities. Certainly, private pensions and social security are other important reasons. Whatever the reason, individuals who desire not to leave bequests but who fail to purchase annuities may leave a bequest involuntarily. The large fraction of respondents with life insurance (86.7 percent of husbands and 74.6 percent of wives in 1971 and 92.2 percent of husbands and 80 percent of wives in 1969) argues against the notion of involuntary bequests.[17] Surely those people purchasing life insurance were concerned about their bequest at least at some point in their life. Restricting our sample to those holding positive

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[17] Although some of this life insurance may be "forced" upon the respondents by their empolyers at work.

life insurance leads to even less elastic bequests. Furthermore, even assuming all bequests were unintended and involuntary the elasticity of unintended bequests would still be of interest as an important determinant of lifetime resource inequality over time.

Our analysis has omitted one important component of contingent financial bequests, namely the life insurance component of the future stream of social security benefits. When the husband is alive and the wife is older than age 62, the wife may collect dependent social security benefits which total 50 percent of the husband's benefit. Upon the death of the husband, the widow may collect surviving wife benefits which amounted to 81.25 percent of the husbands benefits (the current figure is 100 percent, but it was 81.25 percent in 1969 and 1971). Hence, the present expected value of 31.25 percent of the husbands benefit where the expectation is taken over the probability that the wife survives and the husband dies represents the life insurance component of social security. If, however, the wife could collect more than 81.25 percent of her husband's benefit by receiving benefits based on her own work record, then the life insurance component of social security would be zero. The inclusion of social security life insurance would surely reduce the estimated elasticities since the husband's benefit is a concave function of his lifetime earnings.

Finally, we must admit that from the evidence presented, one can only weakly infer who the actual receipients of these contingent bequests will be. For the issue of intergenerational resource inequality the elasticity of lifetime transfers to children is crucial.

While the inequality transmission process is only partially clarified here because our sample lacks the super rich, the lifetime consumption behavior of the numerous middle class is crucial to an understanding of the aggregate savings rate and tax incidence. Our findings suggest that progressive labor income taxation will increase rather than diminish aggregate savings. In addition, real growth in the economy may occur at slower and slower rates in the future; the inelastic bequests mean greater and greater shares of consumption out of the economy's real output as the economy grows.

In conclusion, we feel the evidence presented here strongly supports the notion that the elasticity of contingent bequests with respect to lifetime resource is less than unity for the broad middle class. Since the contingent bequest elasticity appears, if anything, to decline with age, the expected financial bequest elasticity with respect to expected resources is surely less than unity as well.

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