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PRIMOGENITURE, EQUAL SHARING, AND THE U.S. DISTRIBUTION OF WEALTH

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Primogeniture, Equal Sharing, and the U.S. Distribution of Wealth

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Many of the results of this paper appear in my unpublished Ph.D. dissertation, A Study of Inheritance and Death Taxation; A Microeconomic Approach, University of Pennsylvania, 1976. Particularly helpful comments were received from Paul Taubman, Martin David, Eugene Smolensky, and Richard Easterlin. I thank William McKinstry and Harold Burdo for allowing me access to the data sources used here. Michael Watts and Felicity Skidmore provided valuable computational and editorial assistance, respectively.

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ABSTRACT

Intergenerational models discussed in the test place great distributional importance on the degree of bequest inequality between son and daughter. Regimes characterized by primogeniture (whereby the son(s) receives the entire estate, the daughter(s) receives nothing) will have a more unequal distribution of wealth than regimes characterized by equal sharing. Evidence presented in this paper (based on probate data from 379 estates) shows equal sharing between the sexes to be the rule in the U.S. Also, the proportion bequeathed to each sex does not vary significantly with estate size. Furthermore, it is demonstrated how death taxation affects relative shares bequeathed to children, and it is shown that the results are preference generated rather than tax induced.

Evidence in the literature indicates that first-born children enjoy more parental inputs than later-born children in the same family. The evidence presented here--based on a subsample of the data--indicates that the first-born do not receive more material inheritance than their later-born siblings.

The degree of bequest inequality among children in the same family is estimated. A theory by Becker and Tomes suggests that bequests attenuate earnings differences among family members, the higher earner receiving a smaller share of the estate. Although I cannot test this "compensatory" theory directly (since I do not have earnings data) it is doubtful that inheritance has much of an attenuating effect. Even if all the intrafamily variation is compensatory (though this is by no means clear),

bequests would not make much of a dent in human wealth inequality since:

(1) The degree of bequest inequality is "small," smaller than the degree of human wealth inequality among brothers; (2) For most of the U.S. population, human wealth is many times larger than parental inheritance.

Finally, I examine whether specific "lumpy" assets, family farms or businesses, were more often bequeathed to sons. Here I did find some favoritism of the male, but it is argued that this behavior indicates unequal inheritance of occupation, while inheritance of wealth is equal between the sexes.

Studies of the distribution of income and wealth generally take the distribution of inherited wealth as given and then seek to explain the current distribution of income and wealth. There are intergenerational models, however, which focus on the transmission of wealth across generations. Both types of model are needed in any effective explanation of the income and wealth distributions of current and future generations.

Recent intergenerational models by Blinder (1973), Pryor (1973) and Stiglitz (1969) are characterized by various simplifying assumptions concerning human capital formation, saving behavior, and fertility. Their assumptions with regard to two other behavioral relationships are, however, especially important. One relates to whether mates are or are not chosen from the same income class; the second relates to how wealth is passed on to heirs--by primogeniture or in some other way. This paper is concerned with the second--specifically, the pattern of actual wealth bequests to children according to sex and birth order, and the role of the size of the bequest in determining this division. Also discussed is the degree of intrafamily bequest inequality regardless of sex, the Becker-Tomes hypothesis that bequests attenuate earnings differences, and the devolution of "lumpy" assets.

It is important to note that the empirical results presented in this paper are preference generated not tax induced. Most states have forms of death taxation that create incentives to alter bequeathing patterns among children in the family (this point is discussed in detail in section 2). The data base used in this paper comes from a state (Connecticut) that does not create such tax incentives. Consequently, the results presented

reflect the true taste for, say, bequest discrimination against females (if such a taste exists). Another advantage of the data used here is that it is from a highly stratified sample, concentrating on the estates at the top of the distribution. If one is interested in the effect of inheritance patterns on the distribution of wealth in the U.S., this is important, since estate wealth is held so unequally.¹

Section 1 discusses the Blinder (1973), Pryor (1973) and Stiglitz (1969) models which emphasize the distributive significance of inheritance patterns. Section 2 examines the effects of estate and inheritance taxation on the division of the estate bequeathed to children. Empirical results including a description of the sample are presented in section 3. The paper ends with a brief conclusion.

1. DISCUSSION OF THE MODELS

Blinder's model posits families with two children, one of each sex, who together inherit the parents' entire after-tax estate. Both parents die at the same time. All wage and property income is consumed, and capital can be acquired only by inheritance. Blinder's hypothetical economy is stationary. Neither capital nor population grows, and the age distribution is unchanged over time. Differential fertility rates by income groups are assumed away.

Blinder hypothesizes three mating rules; class, random and assortive mating. Class mating occurs when men marry women of equal wealth; the intercorrelation between the wealth of the husband and wife (ρ) is unity. Random mating means that the choice of spouse is unrelated to the relative wealth holding of the couple, implying a wealth intercorrelation of zero.

Assortive mating implies a positive, but not perfect, correlation between the wealth of the mates ($0 < \rho < 1$).

Blinder shows that the percentage of wealth equalization in the economy in each generation, and the "half-life" of inequality (the number of generations necessary to halve the degree of wealth inequality as measured by the coefficient of variation) is sensitive to the share of the estate left to the male child, α (see, for example, Table 1 below). Blinder notes that the value of α in the United States is unknown, but he thinks it lies between the polar extremes of 1.0 (primogeniture) and 0.5 (equal sharing). He concludes by stating that "with existing institutions" the inequality of wealth will be reduced, although "very slowly," and guesses that, after a century, inequality will be reduced by 50% (p. 626).

In contrast to Blinder, Stiglitz hypothesizes a growing economy and shows that under equal sharing, and a variety of saving and fertility assumptions, there is a long-term trend toward income and wealth equalization. (He does point out that a "classical" saving function--i.e., one in which wage earners save nothing--yields no trend toward equality.) Under primogeniture, in contrast, the wealth distribution does not approach equality, but rather a version of the Pareto distribution (Stiglitz 1969, p. 396).

Pryor's simulation study shows the effect of alternative inheritance, mating, fertility, intergenerational saving, and redistribution rules on the "equilibrium" income distribution in a growing economy. All wealth is bequeathed to one's children, and children are not differentiated by sex. Household income is the sum of capital income (wealth multiplied by a specified interest rate, a constant across all households) and labor income.

Table 1
The Blinder Results

		α				
		.2	.4	.5	.6	.8
<u>A. Per Cent Equalization in One Generation</u>						
	0	.18	.28	.29	.28	.18
	.25	.13	.20	.21	.20	.13
ρ	.50	.08	.13	.13	.13	.08
	.75	.04	.06	.07	.06	.04
<u>B. Half Life of Inequality</u>						
	0	3.59	2.05	2	2.05	3.59
	.25	5.03	3.11	2.95	3.11	5.03
ρ	.50	7.95	5.03	4.82	5.03	7.95
	.75	16.63	10.84	10.38	10.84	16.63

Source: Blinder (1973, pp. 624, 625).

Note: α denotes the proportion of the estate bequeathed to the son; ρ denotes the wealth intercorrelation between marital partners.

Labor income is a random variable equal to the average wage rate multiplied by a stochastic ability parameter distributed around one with a standard deviation equal to .15, the standard deviation of I.Q. test scores.

Like Blinder, Pryor posits several though different mating rules. His simulations assume either equal sharing or primogeniture for two-children families. For three-children families he adds a compromise rule under which one child gets 50% of the estate, and the other two children each receive 25%. Starting with an initial distribution of wealth he simulates a series of generations until the distribution of income reaches a steady state, i.e., the Gini coefficient converges.

Pryor's simulation results for the two children case, with all income consumed, appear in Table 2. Equilibrium Gini coefficients differ substantially when primogeniture rather than equal sharing is assumed.

The saving and redistribution assumptions also result in important differences among equilibrium Gini coefficients (Pryor 1973, pp. 55-61). Differential rates of fertility by income class are also shown to be important. The population is divided into three income classes and equilibrium Gini values under alternative fertility rates (the rich have three children; the middle class have one child; and the poor have three children and so on) are calculated. Finally, Pryor (Table 3) shows that the Gini coefficient is highest under primogeniture, lower under the compromise rule, and lowest under equal sharing (though the difference in the calculated Gini value between the compromise rule and equal sharing is quite small in most cases, see pp. 63 and 68).

Though the models presented differ considerably in terms of methodologies and assumptions, they are similar in one respect. For all of them, equal

Table 2

Gini Coefficient (at Equilibrium) of Income Distribution

Inheritance Rules	Mating Rules		
	No Choice	Limited Choice	Equal Choice
Primogeniture	.307	.308	.297
Equal Sharing	*	.064	.060

* depends on initial conditions, the other Gini coefficients do not.

Source: Pryor (1973, p. 54).

Table 3

Gini Coefficients of Equilibrium Income Distribution
Assuming Differential Fertility Rates

	Marriage Rules		
	No-Choice	Limited Choice	Equal-Choice
Number of Children			
Rich	M.C.	Poor	
3	1	3	
Primogeniture	.310	.306	.303
Compromise	.168	.160	.135
Equal division	.168	.158	.130

Source: Pryor (1973, p. 68).

sharing predicts less distributive inequality than primogeniture and, in general, the smaller the within-family degree of bequest inequality, the smaller the predicted degree of distributive inequality in society.

Previous Empirical Research

There are no prior estimates for the twentieth century United States, of the proportion of the total estate bequeathed to children that went to males. For Britain, Wedgewood (1928) found that unequal sharing between sexes was the rule (although the proportion bequeathed to males was not estimated). Wedgewood (1928, p. 48) wrote:

There is little doubt that, among the very wealthy, equal division of the spoils among the family, irrespective of place and sex, is not the general rule. It appeared to be usual, among wealthier predecessors in my sample, for the sons to receive a larger share than the daughters. In the case of the smaller estates, equal division is much more common.

On the issue of bequest inequality by birth order and among children Wedgewood (1928, p. 47) wrote:²

I found that, in many cases, the richer predecessors bequeathed the lion's share of their property to one particular son-- usually, but not always the eldest. This was not only due to the custom of primogeniture among the landed aristocracy. For the desire to leave a large property intact in the hands of a single descendant caused a number of wealthy testators, who did not strictly belong to the landed classes, to reject the principle of legitime.

Wedgewood's statements suggest that four attributes are likely to characterize the distribution of bequests to children: unequal sharing in favor of male and first-born children, increasing inequality between the sexes with increasing estate size, and unequal sharing regardless of sex. (These hypotheses are tested in section 3.) First, however, a detour on the effect of alternative tax regimes will be taken in order to simplify the interpretation of the empirical results.

2. THE EFFECT OF DEATH TAXATION ON THE DIVISION OF ESTATE WEALTH AMONG CHILDREN

The structure of inheritance and estate taxes may influence bequeathing behavior. For example, progressive inheritance taxation (progressive with respect to bequests to each heir) creates incentives to distribute one's wealth more equally than preferences alone would dictate.

Let us suppose that bequeathing preferences can be approximated by a utility function. For simplicity let us assume, as Blinder does, that all wealth is bequeathed to two children. Let $U(X, Y)$ be a utility function for (net of tax) bequests to child X and child Y, and $T(E)$ be the average estate tax rate.³ The testator maximizes the following Lagrangian expression:

$$L = U(X, Y) - \lambda [X\{1 + T(E)\} + Y\{1 + T(E)\} - E].$$

If U is strictly concave, the unique solution is characterized by the following first order conditions:

$$(i) \quad \frac{\partial U}{\partial X} - \lambda \{1 + T(E)\} = 0$$

$$(ii) \quad \frac{\partial U}{\partial Y} - \lambda \{1 + T(E)\} = 0$$

$$(iii) \quad \frac{\partial U}{\partial \lambda} - X\{1 + T(E)\} + Y\{1 + T(E)\} - E = 0;$$

therefore the marginal rate of substitution is given by

$$MRS_{X,Y} = 1.$$

The interpretation of the first order conditions is obvious, viz. the utility maximizing testator will allocate his estate such that the marginal utility he derives from the (net) bequest to each heir is equal. Furthermore, equilibrium will occur where the indifference curve has a

slope of unity. There is no substitution effect influencing the allocation of the estate between heirs (and if U is homothetic, no wealth effect either). In the no-tax case ($T(E) = 0$) we get the same results. Furthermore, the results are not affected by the characteristics of $T(E)$ --whether progressive, regressive, or proportional.

The Progressive Inheritance Tax

An inheritance tax differs from an estate tax since the tax base is the amount bequeathed to each heir, not the total estate. The inheritance tax function is the same for both children, and $T(\cdot)$ is the average tax rate. Let $T(\cdot)$ be everywhere differentiable and progressive,⁴ such that

$$\frac{\partial T(X)}{\partial X} \geq 0 \quad \text{and} \quad \frac{\partial T(Y)}{\partial Y} > 0.$$

The Lagrangian expression facing the testator is:

$$L = U(X, Y) - \lambda [X \{1 + T(X)\} + Y \{1 + T(Y)\} - E].$$

The first order conditions are

$$(i) \quad \frac{\partial U}{\partial X} = \lambda [1 + X \frac{\partial T(X)}{\partial X} + T(X)] = 0$$

$$(ii) \quad \frac{\partial U}{\partial Y} = \lambda [1 + Y \frac{\partial T(Y)}{\partial Y} + T(Y)] = 0$$

$$(iii) \quad \frac{\partial U}{\partial \lambda} = X \{1 + T(X)\} + Y \{1 + T(Y)\} - E = 0.$$

Defining the (within brackets) right-hand sides of (i) and (ii) as the (gross) marginal tax rates (MTR) on X and Y , the marginal rate of substitution is

$$MRS_{X,Y} = \frac{MTR_X}{MTR_Y}.$$

The right-hand side is equal to unity if and only if $X = Y$ (equal sharing).⁵

The interpretation of the first order conditions is: The utility maximizing testator will allocate his estate such that the ratio of the marginal utility he derives from bequests to each child equals the ratio of their (gross) marginal tax rates.

Graphical Comparison of the Estate and Inheritance Tax

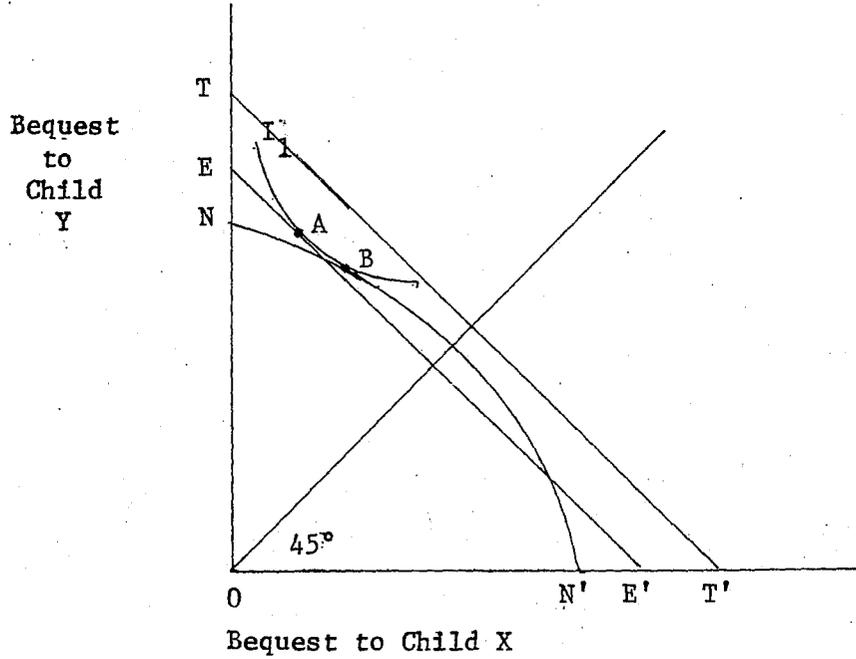
Graphically we can contrast the estate and progressive inheritance taxes as illustrated in Figure 1 panels A, B, and C. Assume that the testator's indifference curve is convex to the origin and Y is the preferred child. The no-tax budget line TT' and the estate tax budget line EE' both have slopes of negative unity, so the dollar value of the tax is the vertical (or horizontal) distance between EE' and TT' . The inheritance tax budget line NN' is concave to the origin, implying that the relative marginal tax rate increases with the size of the relative share. Note that NN' has a slope of -1 if and only if the shares are equal, i.e., at the point of intersection with the 45° line.

Comparison Under Equal Welfare Loss

I consider first the case in which both taxes leave the testator on the same indifference curve i.e., both taxes result in the same real income or welfare loss. Under the estate tax, equilibrium occurs at A in Panel A, where $MRS_{X,Y} = 1$. Under the inheritance tax, equilibrium occurs at B, which lies between A and the 45° line. Equilibrium will not be at A since the slope of NN' is flatter than the indifference curve at

Figure 1. Comparison of the Estate and Inheritance Tax:
The Effects on Estate Sharing Between Children

Panel A



Panel B

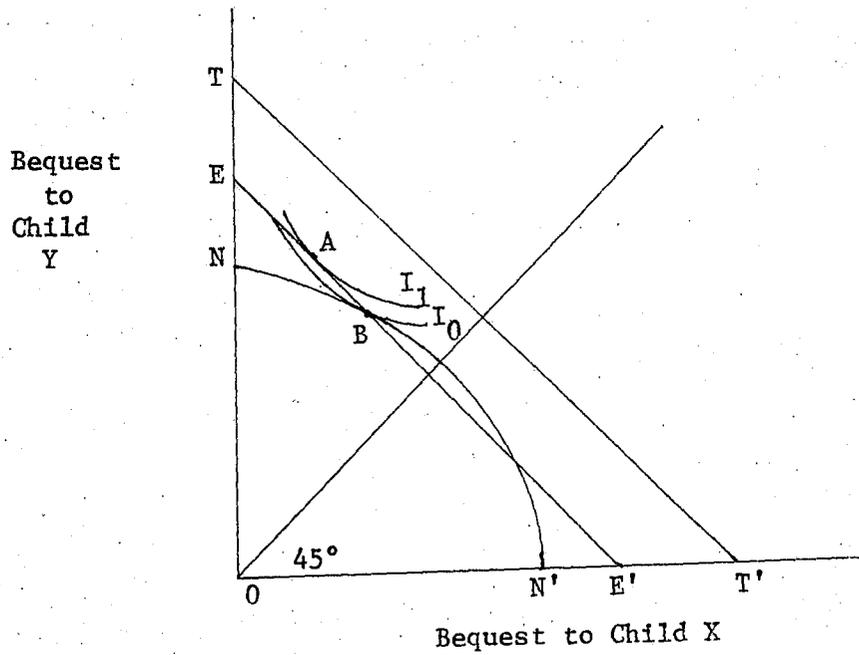
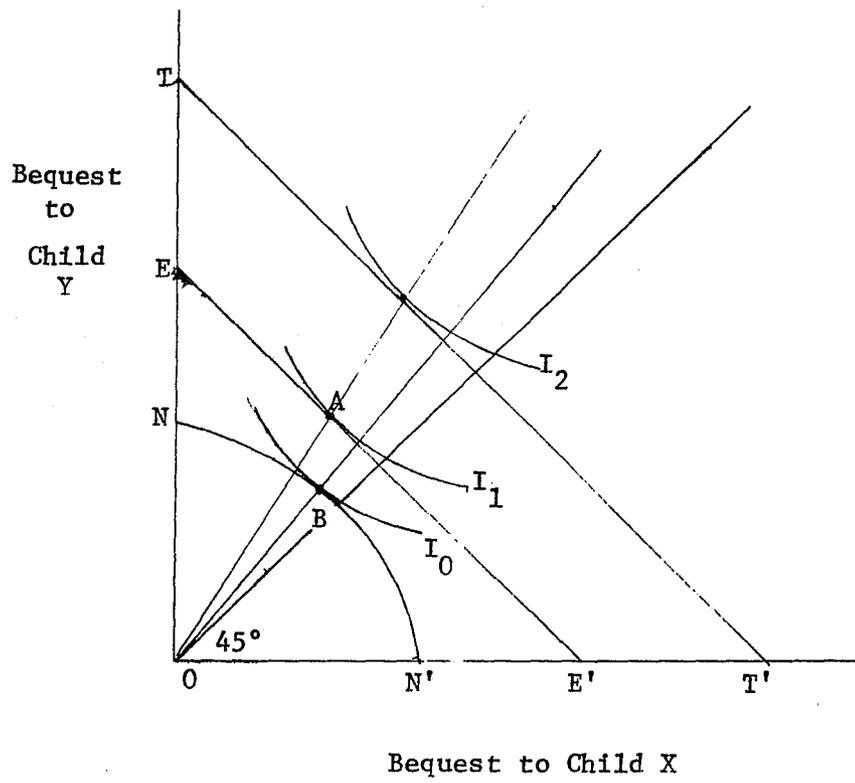


Figure 1.--Continued.

Panel C



that point (NN' has a slope of -1 only along the 45° line), nor will it be above A since indifference curve I_1 becomes steeper (than at A) while NN' becomes flatter. Furthermore, given the convexity assumption equilibrium will not be at or below the 45° line since I_1 cannot have a unit (or steeper) slope in that region. The inheritance tax equilibrium must, thus, be between the estate tax equilibrium and the 45° line (e.g., at point B), hence the inheritance tax induces more equal sharing between the heirs. Of course, if Y were not the preferred child, A would be on the 45° line and there would be no difference in equilibria; equal sharing would be observed.

The vertical or horizontal distance between B and TT' measures the revenue yield of the inheritance tax. Since B lies outside EE' we can say that the testator is suffering the same utility loss as under the estate tax, but with a smaller tax loss. This reflects the excess burden of the inheritance tax, the dollar amount of which can be measured by the vertical distance between B and EE'. Unless A is on the 45° line, B must lie outside EE' (under the assumption of equal welfare loss) since I_1 is outside of EE' at all points but A.

Comparison Under Equal Revenue Yield

Panel B illustrates the case in which both taxes yield the same revenue (distance ET). Equilibrium under the estate tax is at point A. Equilibrium under the inheritance tax must occur at a point of intersection with EE in order to satisfy the revenue constraint, and must be tangent to an indifference curve (I_0 in Panel B) at that point. It must also occur between A and the 45° line. It cannot occur at A since

indifference curve I_0 cannot be tangent to two lines of different slope at the same point. Equilibrium above A is impossible since an indifference curve tangent to NN' would (in that range) have a slope flatter than unity and would therefore intersect indifference curve I_0 . Furthermore, equilibria at or below the 45° line are impossible since the indifference curve tangent to NN' would, at equilibrium, have a slope steeper than (or equal to) unity and would intersect I_0 . As in the previous case, the only possible inheritance tax equilibrium would fall between A and the 45° line. The inheritance tax creates an excess burden (in the absence of equal sharing), since I_0 lies below I_1 .

Comparison of Estate and Inheritance Taxation Without the Equal Yield or Equal Welfare Loss Side Conditions

Without the side conditions cited above, results depend upon whether or not preferences are homothetic. If preferences are non-homothetic, i.e., a wealth effect alters relative bequests between the children, any result is possible, although the inheritance tax substitution effect will encourage more equal sharing. If preferences are homothetic, the imposition of an estate tax resulting in a parallel shift of the budget constraint (from TT' to EE' in Panel C) will not alter relative shares since the post-tax equilibrium occurs on the same ray as the pre-tax equilibrium. With homothetic preferences (I_2 , I_1 , and I_0) a progressive inheritance tax will attenuate but not eliminate bequest inequality. A progressive inheritance tax budget constraint (such as NN'), having a flatter slope than the estate tax budget constraint at a point of unequal sharing (such as along OA), would yield a tangency on a flatter ray than OA (e.g. OB).

Note further that the inheritance tax equilibrium would not completely eliminate, nor reverse, bequest inequality since indifference curves must have a slope flatter than unity along the 45° line, while NN' must have a slope of unity at that point.

To recapitulate, if one child is preferred by the testator the equilibrium distribution of bequests between children under a progressive inheritance tax, as defined, will be more (but not exactly) equal than under an estate tax of either equal yield or equal welfare loss. If the two taxes are compared under neither of the above criteria we cannot say, a priori, which will yield more equal shares⁶ unless bequeathing preferences are homothetic. If homothetic, relative bequest inequality will be lessened (as compared to the no-tax, or estate tax cases) but not eliminated by a progressive inheritance tax.⁷ Furthermore, if preferences are homothetic, the imposition of an estate tax will not alter relative bequests between children.

In an empirical study of inheritance patterns, one must be careful about making inferences concerning testator taste since institutions in the sampling region may influence the observed behavior. More specifically, if the data come from the majority of states that have progressive inheritance taxation on bequests to children (there are 37 such states in the United States⁸) the degree of bequest inequality that is, in fact, preference generated will be understated by the data due to the inheritance tax substitution effect. The data used in this study come from the state of Connecticut. Connecticut's death tax law is unique because it is an "estate-inheritance" tax.⁹ There are three heir classes, and the tax rate

applied to bequests within a class depends on total bequests within that class. Unlike a pure inheritance tax, the tax liability of heirs of a specific class is not affected by the relative distribution of the estate among heirs of a tax class. Therefore, the Connecticut death tax structure is tantamount to three estate taxes, one for each heir class. Since all children are in one class the testator budget constraint is a straight line of slope -1 (like the estate tax or no-tax cases) and there is no substitution effect encouraging more equal sharing. Hence the degree of bequest equality (or inequality) among offspring revealed in the data base can be interpreted as preference generated not tax induced.

3. EMPIRICAL RESULTS

Description of the Sample

The data in this study were drawn from the probate records of the Inheritance Tax Division of the Connecticut State Tax Department. They were collected by William J. McKinstry and I am indebted to him for allowing me access to it.¹⁰ A total of 1050 estates are included for the basic sample years of 1931, 1938, and 1944; additional sample years, 1939, 1945, 1946; and parts of 1930, 1932, and 1940. The additional years were included to increase the number of the largest estates. The sample is highly stratified, including only net estates of \$40,000 or more (in dollars of the day). Sampling rates varied directly with estate size, with the median estate size being \$145,000.¹¹ Obituary column data (of varying quality) were available in 494 cases and were used as a check on family size. The probate data revealed net bequests

to each heir and the heir's family relationship to the testator. Also revealed were the recipient and the size of gifts made by the testator (intervivos transfers), usually via the federal summary sheet.

Contingent bequests. When a testator bequeaths the life interest of an asset to an heir, with the asset passing to a subsequent heir (the remainderman) after the initial heir dies, the present value of the contingent bequest is allocated to the remainderman. The present value is calculated using the age and life expectancy of the initial heir, and an appropriate discount rate (4% was used by the Connecticut authorities). The difference between the current value of the asset and the present value of the contingent interest is allocated to the life tenant.

Family size classification. The observations used in this paper consist of 379 estates in which (a) there were two or more children and (b) bequests were made to at least one child. Family size was taken as indicated by the probate records. If only one child was alluded to in the probate records, the family was classified as a one-child family. It is entirely possible that the testator could disinherit one child from the estate and make no mention of him in the will. If disinheritance and testamentary omission were more prevalent for one sex than the other, the resulting measurement error would bias the results pertaining to sharing between the sexes as well as understate bequest inequality among children. The newspaper obituary information used as a check on family size on roughly half the sample,¹² however, yielded only two cases in which the obituary mentioned the existence of a child who was not alluded to in the probate records. This implies 99%

agreement between the probate and obituary records. (Both discrepancies were for three children families; in one case a male was not mentioned, in the other the omitted child was female.)

There were, of course, cases in which children received no bequest, but generally these fell into three categories: Cases where all the wealth was left to the wife (or husband) instead of the children; cases in which a child was disinherited but in which either he received intervivos transfers, or his own children were bequeathed wealth; and cases where a child was disinherited but his existence was revealed in the probate records. Consequently, if either probate records or obituary columns are reasonably accurate, family size classification in this paper is also.

We now proceed to the empirical findings.

Inheritance by Sex

Two-children families. The first subsample analyzed consists of 82 families with two children of opposite sex. On the average, males received 48.3% of after-tax bequests to children (standard deviation, $\sigma = .121$), which is surprising in view of the fact that the theoretical literature (Blinder, 1973) expects the ratio to be greater than 50%.¹³ In 60% of the cases the children received exactly the same amount, and in 25% the female received more. Mean bequests to son and daughter are extremely similar (\$99,333 and 100,670, respectively) and the difference between the mean percentage and 50% is well within one standard deviation either side of the estimate.¹⁴

Perhaps a more inclusive definition of bequests to children is more appropriate. One might, for instance, also want to include bequests to

the child's children, grandchildren, and spouse, since these bequests fulfill some of the same purposes as direct bequests to the child (the transmission wealth and economic power to the child's line, for example). In large estates, substantial tax savings can be realized by wealth transfers spanning more than one generation since the wealth is taxed only when the wealth holder dies. A bequest to one's child (with the child eventually bequeathing to the grandchild) is taxed twice, whereas bequeathing directly to one's grandchildren eliminates one occasion for taxation.¹⁵

When the data were analyzed in this form, 36% of this subsample was affected. That is, in 30 cases wealth was bequeathed directly to the child's spouse or offspring. The average share to the male and his line rises to 49.3% ($\sigma = .10$) of the estate bequeathed to siblings and their lines, which is not statistically significantly different from the share going directly to males.

A third alternative is to add gifts made before death (intervivos transfers), since such gifts would also accomplish many of the same purposes as bequests and would also be subject to a lower rate of taxation.¹⁶ The data on gifts used in this paper are much less reliable and complete than the inheritance data. A gift would only be identified if reference to it appeared in the probate records (usually via the federal summary sheet). Gifts below \$3000 would be less likely to appear in the records than those above \$3000, since they are not taxable by federal or state governments. For this two-children family subsample of 82 observations, there is evidence of intervivos transfers in 10 cases. The average share to the male using the most inclusive definition is 49.5% ($\sigma = .099$)

and agrees with the previous results of equal sharing between the sexes.

Three-children families. Next I present the evidence for equal sharing by sex among three-children families. Pryor posited three inheritance rules, primogeniture, equal sharing, and the compromise rule (one child receives 50% and the others 25% each). The evidence again supports the equal sharing hypothesis. If equal sharing between sexes were the rule we would expect the total share to the males in two-male, three-children families to be two-thirds, and in the one-male families to be one-third. For the 48 three-children, two-male families in the sample, the estimated proportions to the male children using the three definitions cited above are .665, .661, and .654 (with standard deviations of .146, .136 and .127, respectively). For the 39 three-children, one-male families, the estimated proportions are .343, .345, and .349 (with standard deviations of .157, .156, and .149, respectively).

Comparison across different family sizes and compositions. In order to compare sharing by sex across different family sizes and compositions, I constructed an index of estate division by sex:

$$\theta_m \equiv \frac{\text{Amount Bequeathed to Male Children}}{\text{Total Bequeathed to Children}} \cdot \frac{\text{Number of Children}}{\text{Number of Male Children}}$$

Equal sharing by sex implies $\theta_m = 1$, while larger bequests to males implies $\theta_m > 1$. Estimates of the index (and the standard deviations of the estimate), by family size and for the sample taken as a whole, are presented in table 4. The subscripts 1, 2, and 3, respectively, denote the three definitions of wealth transfer to children from the least to the most inclusive.

These results also support the hypothesis of equal sharing by sex.

Table 4

Estate Division by Sex, Disaggregated by Family Size

	Family Size (Number of Children)						Total
	2	3	4	5	6	7	
Number of Observations	82	87	42	17	9	9	246
θ_{m_1}	.966	.992	.968	.992	1.02	.983	.980
σ_{m_1}	.243	.341	.195	.234	.076	.043	.266
θ_{m_2}	.987	.996	.964	.970	1.02	.984	.986
σ_{m_2}	.200	.335	.181	.234	.076	.042	.250
θ_{m_3}	.990	.995	.957	.970	1.02	.984	.986
σ_{m_3}	.200	.318	.180	.231	.076	.042	.241

Note: θ_m is the index of estate division as defined in the text.
The subscripts refer to the three definitions of bequests.
The σ 's are the standard deviations of the estimated index values.

Homothetic Preferences. Two regression models were used to test the Wedgewood hypothesis that the proportion bequeathed to the male varies directly with the size of the estate bequeathed to children. First, this hypothesis was tested directly by regressing X_1/W_1 , the share going to the males, on W_1 , the size of the estate going to children. A coefficient of W_1 that was significantly different from zero would mean rejection of the null hypothesis of wealth homotheticity.¹⁷ This ratio specification was found to be appropriate because the residuals were homoscedastic using the Goldfeld-Quandt (1965) parametric test. (A linear specification, regressing the amount bequeathed to males on the total bequeathed to children was found to have heteroscedastic residuals.) This econometric test supports the hypothesis that the ratio form presented below, explains the relationship between estate size and division between the sexes.

The estimated regression equation for the 82 two-sex two-children families is:

$$X_1/W_1 = .475 + .407 \times 10^{-7} W_1 \quad \bar{R}^2 = .008. \quad N = 82$$

(27.98) (.786)

The t statistics are in parenthesis. The coefficient of W_1 , though positive, is not statistically significantly greater than zero, therefore, the null hypothesis of homotheticity cannot be rejected.

Similar results were obtained for the two more inclusive definitions of bequests and for the other family sizes and compositions. In no instance did the proportion bequeathed to the males statistically significantly increase with the size of estate bequeathed to the children. An example of a "representative" result, the proportion bequeathed to the

males and male line for three children, two male families, follows:

$$X_2/W_2 = .650 + .423 \times 10^{-7} W_2 \quad \bar{R}^2 = .0016. \quad N = 48$$

(29.79) (1.10)

Another variant of this test was to regress, for the entire sample, the overall index of sharing, θ_m , on the total estate bequeathed to children. No size of wealth effect was found. The results using the three definitions of θ_m and W follow:

$$\theta_{m_1} = .970 + .458 \times 10^{-7} W_1 \quad \bar{R}^2 = .0547 \quad N = 246$$

(47.60) (0.917)

$$\theta_{m_2} = .979 + .243 \times 10^{-7} W_2 \quad \bar{R}^2 = .0293 \quad N = 246$$

(52.07) (0.686)

$$\theta_{m_3} = .983 + .108 \times 10^{-7} W_3 \quad \bar{R}^2 = .0066 \quad N = 246.$$

(54.18) (0.338)

As a second test of the Wedgewood hypothesis I regressed the log of the amount bequeathed to the male on the log of the total estate bequeathed to children. The regression coefficient--the estate elasticity of bequests to males--clustered around unity. In no family size and composition designation did the coefficient significantly differ from unity. These estimates (with the pooled data) for the alternative definitions of wealth transfer follow (with L denoting logarithms):

$$LX_1 = -.764 + .986 LW_1 \quad \bar{R}^2 = .582 \quad N = 246$$

(-1.23) (18.51)

$$LX_2 = -.558 + .972 LW_2 \quad \bar{R}^2 = .625 \quad N = 246$$

(-0.06) (20.24)

$$LX_3 = -.641 + .986 LW_3 \quad \bar{R}^2 = .8034 \quad N = 246.$$

(-1.75) (31.65)

Birth Order Effects

Do first or earlier born children receive disproportionate bequests in the twentieth century U.S.? Evidence exists to suggest that first born children enjoy more parental inputs and, consequently, have higher I.Q.'s and achievement than later born children in the same family (see Zajonc 1976, Zajonc and Markus 1975, and Lindert 1977).¹⁸ Do first or earlier born children enjoy advantages in material (as opposed to human) inheritance as well? In order to answer this question, it was necessary to find out the year of birth of each child in the same family. I was able to get this information, for a subsample of cases, in two ways. In certain cases the ages of the children at the time of the parent's death were listed in the probate records or obituary columns. In a subsequent effort I searched the Connecticut Vital Records for the names of children who had died in Connecticut by 1976. Since the death certificate includes the decedent's year of birth, I was able to establish birth orderings (some partial some complete) when the death certificate of more than one sibling was located.

Two-children families. I was able to establish childrens' birth order in 31 of the two-children families. The mean and standard deviation of the proportion of the estate to children bequeathed to the first born using the three definitions listed above are presented in table 5. These data indicate no disproportionately large bequest to the first born child in two-children families.

Three-children families. I was able to get a complete birth ordering in 19 of the three-children cases. In addition, I determined a partial ordering (the relative birth position of two of the three children) in 11 other cases. The results appear in table 6 and support the previous

Table 5

Estate Proportions to the First Born in
Two-Children Families (N=31)

	Mean	Standard Deviation
X_1/W_1	.491	.052
X_2/W_2	.498	.048
X_3/W_3	.495	.047

Table 6

Estate Proportions by Birth Order,
Three-Children Families (N=30)

Complete Ordering N=19		
First Born	Mean	Standard Deviation
X_1/W_1	.329	.127
X_2/W_2	.342	.090
X_3/W_3	.339	.091
<u>Second Born</u>		
X_1/W_1	.317	.069
X_2/W_2	.312	.067
X_3/W_3	.310	.066
Partial Ordering N=11		
Earlier Born	Mean	Standard Deviation
X_1/W_1	.321	.055
X_2/W_2	.334	.079
X_3/W_3	.336	.081
<u>Later Born</u>		
X_1/W_1	.331	.096
X_2/W_2	.333	.066
X_3/W_3	.334	.064

results that first born or older children receive no preferential treatment in material inheritance.

Inequality Among Children

In distribution models that make no distinction concerning the sex of the children (Pryor's 1973 model, for example), the degree of bequest inequality among all children is important. Consequently, a measure of the within-family bequest inequality, regardless of sex, is presented in this section.

Recent papers by Becker (1974) and Becker and Tomes (1976) attempt to explain private within-family transfers that augment both human and nonhuman capital. They hypothesize that transfers of nonhuman capital (bequests and gifts) are used to attenuate earnings differences among children and that, hence, the less able child will receive a larger compensatory bequest. At one point in the paper, Becker and Tomes (1976, p. S154) go so far as to state that nonhuman transfers will completely offset differences in the ability of children:

Since the marginal costs of all investments are equal in equilibrium, the total quality (based on nonhuman as well as human capital) of all children must be the same. Therefore investment in nonhuman capital must sufficiently compensate children with poorer endowments to offset exactly the greater investment of human capital in children with better endowments.

A weaker statement of the Becker-Tomes hypothesis would be that transfers of nonhuman capital vary inversely, even if they do not completely offset, the earning abilities of children within the family. This data base does not include the relative economic position of the children, so a direct test of the weaker Becker-Tomes hypothesis is not possible. However, presentation of statistics indicating the degree of intrafamily bequest

inequality is useful in that it shows how the observed variation in bequests could potentially equalize the economic positions of siblings.

Two-and three-children families. There are 173 two-children families in the sample. In 108 cases (62.5%) both children received exactly equal bequests and in 122 cases (70.5%) the children receiving the smaller or equal shares inherited 49% or more of the total wealth transferred to children. The average share going to the smaller or equal inheritor was 45% of the total estate bequeathed to children.¹⁹

There are 117 three-children families in the sample. In 48 cases (41%) all three children received equal bequests and in 58 cases (49.5%) all children received a bequest within 1% of the mean amount transferred. The average smallest size share is 28.3%, and the average middle size share is 32.5% of the total transferred to children.²⁰

Bequest inequality for all family sizes. The general index used to convey within-family bequest inequality is the coefficient of variation²¹ (the ratio of the standard deviation and mean), and the estimates are presented in table 7. Also included in table 7 is the median per child bequest by family size. Note that within this sample the endowment of nonhuman wealth per child varies inversely (except for five children families) with family size.²² This finding is analogous to Lindert's results which suggest that human endowments per child vary inversely with family size.

Could bequests attenuate earning differences? Though it is not possible to test the weaker version of the Becker-Tomes hypothesis--that nonhuman transfers vary inversely with earning ability--we can ask the question, could these transfers have much of an attenuating effect on economic position? The answer is, probably not. First, the degree

Table 7

Within-Family Bequest Inequality Among Children

	Number of Children in Family						Overall N=379
	2 N=173	3 N=117	4 N=50	5 N=21	6 N=9	7 N=9	
CV ₁	.145	.241	.181	.163	.107	.075	.178
MBC ₁	42,200	37,680	21,690	24,180	11,710	8,693	27,920
CV ₂	.138	.235	.165	.142	.107	.052	.169
MBC ₂	44,370	43,470	23,400	24,180	11,710	9,228	30,990
CV ₃	.130	.229	.173	.151	.107	.052	.165
MBC ₃	46,410	44,780	25,100	24,180 ^a	11,710 ^a	9,228	34,240

Note: CV is the mean observed coefficient of variation of within-family transfers. Subscripts 1, 2, and 3 indicate bequests to child, bequests to child and child's family line (spouse, grandchildren, great grandchildren), and the sum of bequests to child, child's line and all gifts to child or child's line, respectively.

MBC is the median bequest per child (using the three definitions) in the designated family size class.

^aThough the mean bequest increased from definition 1 to definition 3, the median did not increase.

of bequest inequality is rather low. It was shown for the two- and three-children families that most children receive either equal, or within one percentage point of equal, shares. The overall coefficient of variation in the most comprehensive definition of bequests, .165, is considerably smaller than the coefficient of variation of earnings in the economy.²³ Furthermore, it is by no means clear that all the observed bequest inequality is compensatory. But even if it were, the degree to which bequests could attenuate earnings differences is quite small since, for the overwhelming majority of people, inheritance received is such a small percentage of lifetime earnings. Lillard (1977, p. 50) estimates lifetime earnings (human wealth) in 1970 dollars for those males retiring at age 66. Assuming a real discount rate of 5%, he calculates mean human wealth to be \$166,895. Blinder (1973), citing 1960 survey data estimates average inheritance received by members of the United States population to be about \$3,000. A 10% spread around that figure, amounting to \$300, could only have a trivial compensatory effect.

James Smith (1975) has compiled data on the estates of Washington, D.C. residents in 1967. The nonblack portion of his sample he describes as fairly representative of the wealth holding of the U.S. population. The number of deaths among Smith's nonblack sample is 1881, approximately one-half the total number of white adult deaths among Washington, D.C. residents during the same period (3694).²⁴ His data are restricted to those fulfilling the inheritance tax filing requirements of Washington, D.C., which specifies that those with net estates of over \$1,000 must file. The other 50% of deaths not accounted for in Smith's file must have occurred among the nonfiling population (which, presumably, had estates below or in the neighborhood over the \$1,000 limit). This implies that Smith's sample

is restricted to the top half of the population in terms of estate size. The median net estate of Smith's nonblacks is \$23,690.²⁵ On the assumption that Smith's sample is indeed restricted to those above the median, we can say that this \$23,690 estate level represents the estate level of the 75th percentile of the U.S. population.

The 75th and 25th estate percentiles on Smith's tape (which, by the previous argument, correspond to the 87½ and 62½ percentiles of the population) have values of \$63,720 and \$8,867, respectively. If the estates eventually are divided among children, the average bequest received is thus dwarfed in size by lifetime earnings. Even at the 87½ percentile the average share devolving on each of the two or three children (ignoring all death taxes and transaction costs) is \$31,860 or \$21,240 respectively--only 19% or 13% of mean human wealth is calculated by Lillard. Since the degree of intrafamily bequest inequality is considerably smaller (even if all the variation was compensatory) than the degree of earnings inequality (by factors of 1/2 to 1/3 or more depending on the estimates used), compensatory bequests couldn't have much of an attenuating effect on the inequality of earnings.

This subsection has presented estimates of the degree of bequest inequality among children regardless of sex. The Becker-Tomes hypothesis that bequests are used to attenuate earnings differences could not be directly tested, but it has been argued that the hypothesis is of doubtful validity because; (1) even if it is assumed that all the observed variation in bequests received is compensatory (by no means clear) the degree of bequest inequality is substantially lower than the earnings inequality in

the economy, and (2) for the overwhelming majority of people, lifetime earnings quantitatively dominate inheritance received.

Families with "lumpy assets". Does the form in which a family holds its assets influence overall bequest inequality or shares by sex? Do families who have owned farms or businesses bequeath differently than others?²⁶ The probate and obituary column data permitted the identification of 129 cases of multi-child families in which a farm or family business was held. The overall coefficients of variation of within-family bequests, using the three definitions utilized above, are .230, .204, and .190, respectively. They exceed by 29%, 21%, and 15%, the coefficients of variation for the entire sample reported in table 7.

A total of 84 of the 129 cases were two-sex families, i.e., families in which there is both a male and female child. Division of the estate by sex was calculated using the index of estate division-by sex (in which values less than unity, unity, and greater than unity imply more to the female, equal sharing and more to the male respectively). The calculated overall indices, using the three definitions are .966, .973, and .969, and are quite similar to the indices of the full sample presented in table 4.

Looking at a subsample of estates in which a family farm or business was held, I find sharing between the sexes to be about the same, but sharing among all children to be 15-29% more unequal, than for the full sample.

In a subsample of 73 cases, I was able to determine how the family farm or business actually devolved among heirs. This breakdown is presented in table 8. In most cases (25 out of 34) in which the testator was survived by both sons and daughters, the asset was divided equally by sex.

Table 8

Breakdown of Cases in Which a Family Farm or Business
Devolved to Heirs (as Indicated by Probate Records)

	Number of Cases
Asset devolved equally between sons and daughters	25
Most or all of the asset to sons when no daughters were alive	17
Most or all to daughters when no sons were alive	14
Most or all to sons when daughters were alive	7
Most or all to daughters when sons were alive	2
Most or all to spouse	
Both sons and daughters alive	2
Only daughters alive	3
Only sons alive	1
Probate records reveal asset was dissolved	
Only daughters alive	1
Both sons and daughters alive	1
	73

This usually involved granting equal shares in the family business to the children. However, in the 9 cases where one sex or another failed to share in the inheritance of the asset, the inheritor was usually male. Further analysis showed that 20 of the 25 equal sharing cases were among estates above the median level, while the unequal share cases were distributed uniformly by size. Hence, the observed behavior could be explained by the following scenario: when a larger, more partible business is bequeathed, the stock in the business is bequeathed equally by sex. Among the smaller, less partible businesses, where the child would probably have to be the owner-operator, preference for the male child is the rule. This behavior suggests unequal inheritance of occupation, while inheritance of wealth is equal between the sexes.²⁷

4. CONCLUDING COMMENTS

The evidence presented in this study indicates that wealth bequeathed to children is shared equally between children of opposite sex. Furthermore, the bequest proportion received by males does not significantly increase with the size of the estate bequeathed, and the wealth elasticity of bequests to males is equal to unity. First or earlier born children do not receive larger bequests than their later born siblings. Estimates of the degree of within-family bequest inequality, regardless of sex, were presented. In most cases the children received equal, or within one percentage point of equal, shares. Finally, analysis of bequeathing patterns for families that possessed farms or businesses was presented. Equal sharing by sex holds for this subsample, though the overall degree of within-family bequest

inequality is somewhat greater in this subsample than in the overall sample. The evidence on devolution patterns of business assets suggests that the son is more likely to inherit a family business if it is owner-operated, but wealth per se is inherited equally by sex. It is important to note that the results presented here, due to tax treatment in the sampling region, is preference generated, not tax induced.

In intergenerational models that distinguish between the sex of children (like the Blinder model) equal sharing by sex predicts the greatest equalizing trend in the wealth distribution. The evidence reported here supports this assumption.

Thus, though there is evidence that earnings differentials on the basis of sex exist in the United States, sex discrimination ends just this side of the grave.

NOTES

¹See Lampman (1962), for example, or Smith (1975). The data on the computer tape assembled by Smith reveals that among white Washington, D.C. residents with estate assets of \$1,000 or more, the coefficient of variation of net estate is 6.6, about ten times the coefficient of variations of annual earnings in the U.S. population.

²Wedgewood's sample size (for this determination) was 53 estates.

³This model is paternalistic. Testators derive utility from (net) bequests to heirs, not from their heirs' welfare. For a non-paternalistic model see e.g., Becker (1974). Since I have data on bequests but not on the before bequest economic position of heirs, the paternalistic model was more suitable for my purposes.

⁴The analysis of the effects of proportional inheritance taxation on bequests between children is equivalent to that of estate taxation, as long as bequests to each child face the same tax rate. (If, for example, bequests were taxed differently by sex or birth order the analysis would differ from that of estate taxation, but no state in the U.S. has such inheritance tax laws.) Regressive inheritance taxation would create incentives in the opposite direction to those created by progressive taxation, and could result in unstable or multiple equilibria as well. Since nowhere does regressive inheritance taxation exist in the U.S. (or anywhere else to my knowledge) it is not analyzed here.

⁵The right-hand side will be greater than unity if $X > Y$ and less than unity if $X < Y$.

⁶Though the substitution effect of the inheritance tax would induce more equal sharing.

⁷Evidence presented in section 3 supports the homotheticity assumption.

⁸These states (based on Advisory Commission on Intergovernmental Relations 1968) are Alaska, California, Colorado, Delaware, District of Columbia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Jersey, New Mexico, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Texas, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming. Five of these 37 have constant marginal tax rates above the exemption level: Maryland, Nebraska, New Mexico, Pennsylvania, and Wyoming.

⁹For a discussion of Connecticut's unique law, see Connecticut Temporary Commission to Study the Tax Laws of the State, Report, Hartford, The State of Connecticut (1934), especially pp. 508-509.

¹⁰For a more lengthy description of the sample see McKinstry (1959).

¹¹The sampling rates were 50% for net estates of \$40,000 to \$100,000, 100% for \$100,000 to \$400,000, 200% for \$400,000 to \$1,000,000 and 247% for \$1,000,000 and above (estates from the additional years were used for the last two estate size classes).

¹²Paul Taubman has suggested that obituary column data might not really be an independent check on family size since the source of this information might also come from the family. Hence, if the prodigal son is not mentioned in the will his existence may not be revealed to

writers of obituary columns. The Associated Press has confirmed that in general practice obituary information is provided by funeral homes, and funeral homes receive same from the families of the deceased, a state of affairs that supports Taubman's observation. The obituaries of prominent people, however, are likely to come from non-family sources-- and these can be expected, by and large, to be wealthier than average.

¹³In estimating the male's share, I am seeking a binomial point estimate of p . The maximum likelihood estimate of p is:

$$\hat{p} = \frac{\sum_{i=1}^N (X/W)_i}{N}$$

with X the net bequest to the son, Y the net bequest to the daughter, $W \equiv X + Y$, and N the number of observations.

¹⁴Discrimination by sex has been observed in the distribution of earnings (see Malkiel and Malkiel 1973 and Oaxaca 1973).

¹⁵The popularity of the life estate, whereby the son enjoys the income of an asset during his lifetime and the asset passes upon his death to his child, and the asset is thus only taxed once, is (at least partly) attributable to this tax avoidance feature (see e.g. Jantscher, (1967). The Tax Reform Act of 1976 has limited this preference to \$250,000 for each donee.

¹⁶The gifts were in current values at the time of the transfer, not present value at the time of death of the donor. The effect of this procedure on the size of the gift is small since the rate of interest during this period (the depression years) was rather low.

¹⁷ Recall that in this sample, the slope of the testator's budget line does not change with increasing estate levels in the bequest to children space. Consequently, if the proportion bequeathed males does not vary significantly with estate size, we can conclude that the testator utility function governing bequests to son and daughter is homothetic.

¹⁸ Robert Hauser is also studying this issue.

¹⁹ This implies a within-family Gini coefficient of .05 using trapezoidal approximation.

²⁰ This implies a within-family Gini coefficient of .097.

²¹ See Atkinson (1970) for a discussion of the merits of alternative measures of inequality.

²² Omitted from consideration are one-child families and families where no bequests were made to children (e.g., cases where the estate was left to the spouse).

²³ Lillard (1977, p. 49) reports a coefficient of variation of income for males 35-44 years of age who have at least a high school education of .69, based on the 1960 Census of Population. Using the more homogeneous NBER-TH data, he estimates .60 to be the coefficient of variation of earnings of men 40-44 years of age. Since siblings are more alike than non-related individuals, one must adjust these figures downward to reflect within-family inequality. Olneck (1977) finds, in his study of Kalamazoo brothers, that the average difference in earnings between brothers is 87 percent as large as the difference between random individuals. Hence the CPS income inequality and the NBER-TH earnings inequality

measures would be reduced to .60 and .52, respectively, for within-family inequality. Finally, Lillard argues that an extended accounting period would lower measures of earnings inequality, and, in the limit, lifetime earnings inequality is two-thirds annual inequality. Benus and Morgan (1975), however, using quite different methods argue that extending the accounting period past three years has almost no additional impact on measured inequality. Based on Michigan panel data, overall measured inequality using a four-year accounting period is only 2.8% less than the one-year measure (p. 223). Irving Kravis (1962) finds a 10% reduction in the Gini ratio using a five-year as opposed to a one-year period.

²⁴Taken from Vital Statistics of the United States, 1967,
Volume II - Mortality, Part B, page 7-169.

²⁵I am indebted to Smith for granting me access to his computer tape of the net estates of Washington, D.C. resident decedents.

²⁶Gagan (1976), in a study of 19th century Canadian estates, provides evidence supporting the affirmative position.

²⁷Research done by the sociologists Tyree and Treas (1974), supports this view.

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