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The Family, Inheritance, and the Intergenerational Transmission of Inequality

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Unequal inheritance of material wealth is commonly considered a major cause of inequality in consumption. However, theoretical models of the intergenerational transmission of inequality by Becker, Blinder, and Ishikawa imply that unequal inheritance may either increase or reduce consumption inequality. Differences in inherited wealth resulting from unequal parental incomes increase inequality in recipients' consumption. However, unequal bequests caused by differences among families in the endowed ability of children or the costs of producing human capital are equalizing. Empirical results confirm these predictions: The inheritance received by children is inversely related to both children's income and parental education. Thus bequests are "compensatory" in that (ceteris paribus) low-income children inherit more than their advantaged contemporaries.

> The ultimate difficulties . . . center around the problem of social continuity in a world where individuals are born naked, destitute, helpless, ignorant and untrained. . . . The fundamental fact about society . . . is that it is made up of individuals who are born and die and give

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> place to others; and . . . that it is dependent upon the utilization of three great accumulating funds of inheritance from the past, material goods and appliances, knowledge and skill, and morale [which] . . . must in some manner be carried forward to new individuals devoid of all these things as older individuals pass out. . . . [T]he institutions of the private family and private property, inheritance and bequest and parental responsibility, afford one way for securing more or less tolerable results in grappling with this problem. [KNIGHT 1921, pp. 374–75]

I. Introduction

Inequality in economic status and the reproduction of inequality in succeeding generations—"social mobility"—continue to be objects of social concern and the subject of investigation by social scientists. It has long been suspected that the institution of the family plays a major role in the generation and transmission of inequality and may severely limit the ability of public policy to alter the existing social order (Knight 1921).

The role of the family has been examined in a large number of empirical studies conducted within the human capital framework (e.g., Parsons 1975*a*). In contrast to this literature, there exists a research tradition which has examined the role of inherited material wealth in producing and perpetuating inequality (Stamp 1926; Wedgwood 1929; Blinder 1973, 1976*a*; Harbury and Hitchens 1979; Menchik 1979).

Empirical research on the intergenerational transmission of inequality has, for the most part, been conducted within the context of these two mutually exclusive approaches. However, models of family behavior recently proposed by Becker (1974), Ishikawa (1975), and Blinder (1976*b*) strongly suggest the possibility of substitution between alternative modes of transfer and their dependence on a common set of ability and opportunity variables. Thus, the "ability" of children and the education of parents—important determinants of children's schooling—should also influence parent-child transfers of material wealth.

Recent theoretical models suggest that the family may not contribute as much to inequality as is commonly thought. Since parents are predicted to adjust the magnitude of intergenerational transfers in response to differences in the endowments of children, the institution of the family permits a redistribution of resources which tends to equalize consumption, both between parents and children (Stiglitz 1978; Becker and Tomes 1979)[1] and among disadvantaged and advantaged siblings (Becker and Tomes 1976; Griliches 1979). Because of the equalizing role of the family, government redistribution measures may have little, zero, or even a perverse effect on the distribution of income and consumption (Barro 1974; Becker and Tomes 1979).

The purpose of this paper is to empirically test the altruism model of the intergenerational transmission of inequality proposed by Becker, Ishikawa, and Blinder. In this model, parental bequests of material wealth and human capital investments represent substitute forms of intergenerational transfer and are simultaneously determined. The present paper extends previous work in a number of directions. First, previous studies of inheritance (Menchik 1979; Adams 1980) have been concerned with estimating the income elasticity of bequests[2]—and hence the extent to which unequal parental incomes are responsible for inequality in subsequent generations. In contrast, this paper emphasizes the response of parental bequests to variations in children's incomes resulting from differences in child ability or in the ability of parents to produce human capital in their children. Since intergenerational transfers serve in part to redistribute resources among family members, when parental income is held constant, the amount inherited is predicted to be inversely related to the recipient's income. Thus, within parental income strata, bequests of material wealth are predicted to be *equalizing*. Further, if more educated parents are more efficient at producing learning or earning skills in their children, the progeny of more educated parents will receive higher lifetime incomes from human capital. As a result, the equalizing role of the family will also be reflected in an inverse relationship between inherited wealth and parental education.

Second, the choice of family size, a variable emphasized in simulation models (Pryor 1973) and empirical studies (Lebergott 1976;

[1] In the model of Becker and Tomes (1979), it can be shown that, if the marginal propensity of parents to transfer resources to children exceeds the inheritability of endowments, the relative inequality in the steady-state distribution of income (as measured by the coefficient of variation) is less when parents choose the optimum level of transfers than if there were no intergenerational transfers.

[2] A limitation of these studies is that estimates of the income (wealth) elasticity of bequests do not distinguish between alternative models of bequest behavior. Both altruistic models and models of "egoistic" life-cycle accumulation in the presence of uncertain lifetimes and imperfect capital (annuity) markets are consistent with a high income elasticity of bequests (see Tomes 1979).

Blomquist 1979), is treated as endogenous,[3] as suggested by the "new microeconomic" approach to fertility.

Third, the observation that 55–60 percent of individuals do not receive an inheritance of material wealth (Blinder 1973; Blomquist 1979) suggests that there are two categories of households: those making transfers exclusively in the form of human capital who are at a corner solution making no transfers of material wealth; and second, households making transfers in both forms. These two groups (regimes) are predicted to respond differently to variations in parental income and education (Ishikawa 1975; Blinder 1976*b*; Edwards and Grossman 1977). In the absence of data on material wealth transfers, previous investigators (Edwards and Grossman 1977; Leibowitz and Friedman 1979) were restricted to indirect tests of this model. The present paper reports direct empirical tests of the two-regime model.

Empirical tests of the model are performed using a unique data set which contains information on the inheritance, income, and schooling of children and the occupation, education, and family size of parents.

The empirical results offer strong support for the Becker, Blinder, and Ishikawa models of family intergenerational transfers. The most striking empirical finding is that the inheritance received by children is inversely related to the recipient's income. This result supports the prediction that, within parental income strata, inheritance is equalizing—low-income children are "compensated" in the form of larger bequests, and high-income children are "taxed" in that they receive smaller bequests. Alternative explanations for the inverse relationship between inheritance and recipient's income are that it is the result of (i) the work-disincentive effect of nonlabor income on earnings, (ii) the payment by donors for greater old-age care rendered by low-income children, or (iii) the reallocation among siblings of shares in a given total bequest. These alternative explanations are not supported by the data, leading us to accept the hypothesis implied by the Becker, Blinder, and Ishikawa models: differences in inherited material wealth perform a role of equalizing the distribution of resources between successive generations of the family.

The plan of the remainder of the paper is as follows: Section II briefly outlines a model of the simultaneous determination of inheritance, human capital investment, and family size which captures the essential features of the Becker, Blinder, and Ishikawa models of

[3] Blinder suggests that "the taste for bequests . . . would rise with the number of children" (1976*b*, p. 90). Easterlin (1976) presents a "bequest" model of fertility in which parents choose the number of children consistent with achieving a given target bequest to each child. In the model outlined below, the bequest per child is simultaneously determined together with parental fertility.

intergenerational transfer behavior by the altruistic family. In Section III the data are described, and the model is specified empirically. Empirical results are reported in Section IV. Finally, Section V presents a summary and conclusions.

II. A Model of Inheritance, Human Capital Investment, and Family Size

Let us abstract from uncertainty and life-cycle factors[4] and consider a static, certain world in which individuals, endowed with perfect foresight, live for two periods—initially as a "child" and subsequently as a "parent." Generations of the family are assumed to be interdependent and overlapping. Parental fertility and the transmission of resources to children are assumed to be motivated by altruism, in that the number of children and their per capita consumption enter the parent's utility function together with the parent's own consumption. This utility function may be written as

$$U = U(N, z_c, z_p), \tag{1}$$

where N is the number of children and z_c is the per capita consumption of children during their subsequent tenure as parents. For simplicity, per capita consumption is assumed to be the same for all N children within a given family. The quantity z_p represents the aggregate consumption of parents.[5]

This formulation captures the essence of the Becker, Blinder, and Ishikawa models[6] in which parents derive satisfaction from a gross measure of the well-being of children—their lifetime utility, income, or consumption. The donor's utility does not depend on the composition of recipient's consumption (i.e., there are no "merit" goods), on direct services (e.g., old-age care), or on the sources of recipient's lifetime income—the division between human wealth and financial wealth.

Individuals are assumed to enter the world with an endowment of income determined by such factors as genetic and cultural inheritance, government fiscal and social policy, exogenous economic

[4] This assumption rules out "contingent bequests" when life-cycle savings for future consumption become bequests due to the uncertain incidence of mortality. Bevan and Stiglitz (1978) and Tomes (1979) discuss such models. In the present model, all bequests are planned and are motivated by parental altruism.

[5] All households are assumed to be composed of two parents plus children. I do not distinguish between the consumption of individual parents.

[6] The differences in the formations of Becker, Ishikawa, and Blinder may be of importance for some issues, such as the wealth effects of bond-financed fiscal policy. Of greater importance in the present context are the aspects that these theoretical models have in common.

growth, and random "luck." For simplicity, I assume that all children within a given family possess equal endowments. Thus, endowed income may vary across families but not within families.[7]

Motivated by their altruism, parents may augment the consumption of their children either by investing in their human capital or via direct transfers of material wealth.[8] The relationship between the child's consumption and parent-child transfers is determined by the income-expenditure constraint of the child generation and the technology described by the income-generating function,

$$z_c = I_c = e + \beta x^{1-\eta} e^{\gamma} + a = e + k + a, \tag{2}$$

where $k = \beta x^{1-\eta} e^{\gamma}$ is the constant elasticity human capital production function, $0 < \gamma, \eta < 1$.

The left-hand side of (2) represents the child's income-expenditure constraint which indicates that, in the absence of transfers by the child to subsequent generations, consumption equals income.[9] The right-hand side of (2) defines income in terms of its proximate determinants: e represents the endowed income of the child; k, income from human capital; and a, the child's income from material wealth.[10] Financial asset markets are assumed perfect, so that the rate of return on material wealth is constant and independent of the individual's stocks of human and nonhuman capital.

In general, both market-purchased goods (e.g., tuition) and home-produced inputs (e.g., the time of parents) enter the production function for human capital. For simplicity, we assume that market-purchased goods and home-produced inputs are perfect substitutes, so that a single aggregate input (x) enters the production function. Investment in the human capital of a given individual is assumed subject to diminishing returns with respect to x (i.e., $1 > \eta > 0$). The return to (home and market) inputs in the production of children's earning skills is also permitted to depend on the child's

[7] Becker and Tomes (1976) consider differences in transfers to children within the same family when children differ in endowed ability. Evidence relating to intrafamily inequality in bequests of financial wealth is presented in Sec. IV.

[8] We assume that all parents are at the interior solution where net parent-child transfers are positive—i.e., altruistically motivated transfers are nonzero. Even with the secular growth of incomes over the generations, regression toward the mean in endowed income and reverse (child-parent) transfers effected by bond-financed fiscal policies and social security programs would tend to make positive private parent-child transfers optimal for at least some households. Given the observed prevalence of "forward" transfers in forms such as schooling, this assumption seems plausible.

[9] Becker and Tomes (1979) consider intergenerational transfers in the context of many generations.

[10] For simplicity, stocks of both human capital and material wealth are measured in units of the child's income. Note also that in general e would represent a vector of earning and learning abilities.

characteristics—in the form of the child's endowments. To the extent that the child's endowment represents the ability to learn, greater child endowments will be associated with greater income for given inputs (i.e., $\gamma > 0$).

Families are permitted to differ in their ability to produce income-earning skills in their children (Leibowitz 1974). The parameter β in equation (2) represents the level of parental efficiency, which is assumed to operate in a manner equivalent to technological progress, increasing the next generation's income for given inputs and child endowments.

In the absence of intrafamily public goods and fixed cost components, and given identical children, the full income constraint of parents can be written as[11]

$$I_p = z_p + pNx + p_a Na, \tag{3}$$

where parental consumption (z_p) is the numeraire, I_p is the full income of parents, p is the unit price of human capital inputs, p_a is the cost of increasing the asset income of each child by \$1.00,[12] and pNx and p_aNa represent (respectively) the total expenditures by parents on the human capital and material wealth of the next generation.

The Commodity Demand Functions

The allocation problem of parents is to maximize utility (1) subject to (2) and (3). The first-order conditions for an interior solution are:

$$\frac{U_p}{\Psi} = 1 \equiv \pi_p, \tag{4}$$

$$\frac{U_c}{\Psi} = \frac{pN}{\beta x^{-\eta} e^{\gamma}(1-\eta)} = p_a N \equiv \pi_c, \tag{5}$$

$$\frac{U_N}{\Psi} = px + p_a a = p\left(\frac{k}{\beta e^{\gamma}}\right)^{1/(1-\eta)} + p_a a \equiv \pi_N, \tag{6}$$

where Ψ is the marginal utility of parental income, U_i is the marginal utility of consumption by the ith generation, and U_N is the marginal utility of family size.

The marginal rate of substitution between each commodity and parental income is equated to the marginal cost defined by the first-order conditions (π_j for the jth commodity). The interaction of

[11] Since all children have equal endowments and the same income-generating function (2), human capital investment and material wealth transfers will be equal for all children within a given family.

[12] In the absence of estate and income taxes, $p_a = (1 + r)^{-1}$, where r equals the intergenerational rate of return on assets.

"quality and quantity" dimensions of choice is reflected in the fact that the marginal costs of heir's consumption and family size (π_c and π_N, respectively) depend not only on prices but also on the level of commodity outputs. Because of this interdependence, we predict an inverse relationship between family size and parent-child transfers.

The optimum scale and mode of intergenerational transfers are determined by the first-order conditions (4) and (5). We assume that the (increasing) marginal cost of human capital investment is initially below the (constant) marginal cost of asset transfers. If loans from outside the family or intrafamily loans from parents are available, all households would invest in human capital up to the point where the marginal costs of both forms of transfer were equalized. Under these circumstances, human capital investment would be independent of the "opportunities" defined by parental income and family size and would be determined solely by parental efficiency and the child's endowed ability.

Observation suggests that such equality of opportunity among households does not exist as regards human capital investment because of the absence of collateral and the high cost of enforcing implicit or explicit loan contracts. In the present model, this imperfection in the capital market is modeled in an extreme form by assuming that all human capital investment is financed internally within the family and neither intergenerational loans nor bequests of debt are permitted (i.e., $a \geq 0$). Under this financial liability constraint, all human capital investment constitutes an intergenerational transfer. In this context there will exist two categories of families—those making transfers on a scale sufficient to make positive asset transfers for whom the financial liability constraint is ineffective, and those households who would like to transfer debt to the next generation but for whom the financial liability constraint is binding.

For households for whom the financial liability constraint ($a \geq 0$) is binding, the first-order conditions (5) and (6) require modification to become

$$\frac{U_c}{\Psi} = \frac{pN}{\beta x^{-\eta} e^{\gamma}(1-\eta)} \equiv \pi_c < p_a N, \tag{5'}$$

$$\frac{U_N}{\Psi} = px = p\left(\frac{k}{\beta e^{\gamma}}\right)^{1/(1-\eta)} \equiv \pi_N. \tag{6'}$$

This latter category of households will make all transfers in the form of human capital, and material wealth transfers will be zero. Since, for these households, marginal transfers are in the form of human capital investment, the level of such transfers will depend on parental income and family size—determinants of opportunities—in addition to parental efficiency and child endowments.

For both categories of households, the solutions to the appropriate first-order conditions can be represented as a set of demand functions for family size and the consumption of both generations in terms of "family resources" and commodity marginal costs (π_i's) (Becker and Lewis 1973). The demand for the marginal form of transfer represents an excess demand function for children's consumption.

If the parental utility function (1) is homothetic CES with equal elasticities of substitution between all arguments, and if we assume that the next generation's consumption (in present value terms) represents no more than half of family resources,[13] the following sign predictions are obtained:

For $a > 0$:

$$a = \Psi[\overset{(+)}{I_p}, \overset{(?)}{\beta}, \overset{(-)}{k}, \overset{(-)}{N}], \tag{7a}$$

$$N = \delta[\overset{(+)}{I_p}, \overset{(?)}{\beta}, \overset{(?)}{k}, \overset{(-)}{a}]. \tag{7b}$$

For $a = 0$:

$$P(a > 0) = \theta[\overset{(+)}{I_p}, \overset{(?)}{\beta}, \overset{(-)}{k}, \overset{(-)}{N}], \tag{8a}$$

$$N = \mu[\overset{(+)}{I_p}, \overset{(+)}{\beta}, \overset{(-)}{k}], \tag{8b}$$

where equation (8a) predicts the probability of positive material wealth transfers.

The major predictions of the model can now be summarized.[14] When asset transfers are positive, greater parental income is predicted to increase both asset transfers and family size. Since the demand for material wealth transfers represents an excess demand for child consumption, the ratio of asset transfers to family size will increase with parental income, and further, the income elasticity of material wealth transfers is predicted to be decreasing (Becker and Tomes 1976). The inverse relationship between quality and quantity dimensions of choice is reflected in the negative signs on family size and asset transfers in equations (7a)–(7b).

Material wealth transfers are predicted to be inversely related to children's income from human capital, reflecting the substitution between the two modes of transfer. When parental efficiency is held

[13] This latter condition is sufficient to sign some of the comparative static results. This condition will hold if the rate of time/generation preference—reflecting both "impatience" and the fact that consumption on the part of one's heirs is not the same as own consumption—exceeds the rate of return net of the (endogenous) rate of population growth, i.e., $\delta > r - g > 0$, where $g = N - 1$.

[14] The comparative statics and predictions of the model are discussed in detail in an earlier version of this paper. See also Tomes 1981*a*, 1981*b*.

constant, variations in human capital reflect differences in child endowments. An increase in child endowments raises the next generation's income for given parental expenditures, which increases family resources and therefore the consumption of both generations. The increase in parental consumption is financed by reduced parental expenditures on children. Since expenditures on children's human capital are an increasing function of child endowments, this requires a more than offsetting reduction in material wealth transfers.[15] In this way, the reduction in intergenerational asset transfers redistributes resources away from children with high endowment incomes and reduces the inequality in consumption between members of the next generation, as compared with the case when transfers are independent of endowments.

Equations (7a) and (8a) indicate that the effect of parental efficiency on both the magnitude and probability of receiving positive material wealth transfers is ambiguous when the recipient's human capital is held constant. However, when the scale of human capital investment is permitted to adjust (i.e., k is not held constant), greater parental efficiency is predicted to reduce both the magnitude and probability of receiving asset transfers.[16] Greater parental efficiency in the production of children's human capital reduces the cost of this mode of transfer and increases family resources. This produces both a substitution effect, increasing human capital investment and reducing material wealth transfers, and an income effect, increasing parental consumption, financed by reduced asset transfers.

A second set of predictions concerns the determinants of human capital investment in the two regimes—families making positive and zero material wealth transfers. Assuming all variables are measured in

[15] In the simple case in which $\gamma = \eta$, i.e., the human capital production function (2) is CRTS in x and e, the elasticity of material wealth transfers with respect to human capital transfers: k (holding β, I_p, and N constant) is given by: $\Lambda\ (d \ln a/d \ln k) = -(b_e(1 - b_c) + b_k\{1 - b_c[1 + (1 - \eta)\sigma]\})$, where $\Lambda = b_a(1 - b_c\sigma) > 0$, the b_i's are expenditure shares in family resources $S = I_p + \pi_c I_c$: $b_c = \pi_c z_c/S$, $b_a = \pi_c a/S$, $b_e = \pi_c e/S$, and $b_k = pNx/(1 - \eta)S$. Since $0 < 1 - \eta < 1$ and the elasticity of substitution $\sigma < 1$ (by the second-order conditions), a sufficient condition for the above expression to be negative is that the share of children's consumption (in present value terms) in family resources, b_c, not exceed ½.

[16] In the case considered in the previous footnote, the elasticity of material wealth transfers with respect to parental efficiency β, when human capital transfers are permitted to vary (holding I_p, e, and N constant) is given by: $\Lambda(d \ln a/d \ln \beta) = -b_k\eta^{-1}\{1 - b_c[1 + (1 - \eta)\sigma]\}$. This expression is negative if $b_c \leqslant$ ½. Further, it can be shown that in the reduced-form equation in which N is permitted to vary (obtained by substituting eq. [9a] into [7a]–[7b] and solving for a), greater parental efficiency reduces asset transfers, provided that the returns to parental expenditures on human capital do not exceed ½ (Tomes 1981a). Heckman's estimates of the returns to scale in the production of human capital do not differ significantly from ½ (Heckman 1976a, table 3A).

logs and given the assumptions concerning technology and the utility function, these predictions can be summarized as:

For $a > 0$:

$$k = \gamma_0 + \overset{(=0)}{\gamma_1} I_p + \overset{(+)}{\gamma_2} e + \overset{(+)}{\gamma_3} \beta + \overset{(=0)}{\gamma_4} N. \tag{9a}$$

For $a = 0$:

$$k = \rho_0 + \overset{(+)}{\rho_1} I_p + \overset{(?)}{\rho_2} e + \overset{(+)}{\rho_3} \beta + \overset{(-)}{\rho_4} N, \tag{9b}$$

$$\rho_1 > \gamma_1 = 0, \quad \gamma_2 > \rho_2, \quad \gamma_3 > \rho_3, \quad \rho_4 < \gamma_4 = 0. \tag{9c}$$

Since the financial liability constraint is not binding on families making positive asset transfers, the scale of human capital investment is independent of opportunity variables—implying the zero restrictions in (9a). For households at a corner solution making zero material wealth transfers on whom the financial constraint is binding, marginal transfers—in human form—depend both on parental income and family size.

An additional testable implication is that human capital investment is more responsive to parental efficiency among households making positive asset transfers. This follows from the prediction that, for households making positive asset transfers, the substitution effect on human capital transfers resulting from greater parental efficiency exceeds the sum of income and substitution effects experienced by families making no material wealth transfers (see Edwards and Grossman 1977; Tomes 1978). The predictions summarized in equations (7)–(9) are subject to empirical test in Section IV.

III. Empirical Specification

When we move from the theory to the empirical specification of the model, two points require discussion. First, the theoretical model assumed both perfect foresight and certainty. Under these conditions, individuals face a single allocation problem at the beginning of their parent status and have neither the desire nor the need to revise their decisions in the course of their lifetimes. However, in the real world both certainty and perfect foresight are lacking. Therefore, based on their future expectations, parents determine their fertility, the level of human capital investment, and material wealth transfers, with the possibility of revision if realized outcomes diverge from their expectations. Given that in the typical family life cycle completed fertility is determined prior to the completion of investment in the human capital of children and that material wealth transfers may occur at any time until the decease of the parents, these decisions are subject to revision to differing degrees. In addition, human capital investment may be completed before the child's income-earning ability becomes known to either generation, since that ability may be subject to stochastic influences such as the occurrence of ill health and disability. Given that the parents' fertility is predetermined and given the precommitment of human capital investment, no adjustment of these choice variables may be possible or desirable. However, the level of material wealth transfers may be adjusted in the light of such events. In the empirical specification of the model I view the dependent variables as jointly determined. However, uncertainty and the temporal ordering of events suggest the introduction of variables which measure the realization of events over the life cycle.

Second, the theory derives predictions concerning the total transfers of material wealth to the next generation which may take the form of gifts during the parental lifetime or bequests at the decease of parents. Data on gifts are notoriously difficult to obtain, and the data set I use does not contain this information. However, the omission of information on gifts presents less of a problem for the present study which employs data on small wealth leavers. In these data there is little tax incentive in favor of gifts over bequests.[17] In addition, the prospect of unanticipated changes in the lifetime incomes of children and parents creates an incentive to defer material wealth transfers until the parents' decease. The inheritance received by the child is, therefore, used as a measure of material wealth transfers.

The Data

The data used in this study derive from a 5 percent random sample of estates probated in the Cleveland, Ohio, area in 1964–65, yielding 659 estates (Sussman, Cates, and Smith 1970). Surviving kin and other heirs were interviewed, including 657 sons and daughters of the decedents. Information was obtained on the total estate, usual occupation, education, and other characteristics of the deceased and on the inheritance, income, education, and other characteristics of the surviving kin. The principal variables are briefly described here and defined, together with other variables, in table 1.

[17] The mean gross estate of decedents was $12,000, and less than 5 percent of decedents' estates in this sample exceeded $60,000 after deductions and were liable for Federal Estate Tax (Sussman et al. 1970, p. 188). Ohio had (in 1964–65) an inheritance tax which commenced at 1 percent on the inheritance of children in excess of $7,000—almost double the mean inheritance in the data I use. Information gleaned from Barlow, Brazer, and Morgan (1966) suggests that the omission of data on gifts may not be a serious problem in terms of omitted variable bias and that the income elasticity of gifts exceeds that of bequests (for details, see the earlier version of this paper). Menchik's study of large Connecticut estates supports this latter conclusion (Menchik 1979, table 4).

The inheritance received by the child is used as a measure of material wealth transfers. Theory suggests that inheritances will be zero for families where financial constraints are binding. In accordance with this prediction, the observed distribution of inheritances is truncated—41.5 percent of children (251 cases) received the lower-limit value of \$250[18] from the decedent's estate. The natural specification of the inheritance equation for the complete sample of children is a Tobit scheme:

$$\begin{aligned} a &= \beta X - u \quad \text{if} \quad \beta X - u > .250, \\ a &= .250 \qquad \text{if} \quad \beta X - u \leq .250, \end{aligned} \tag{10}$$

TABLE 1

DEFINITION OF VARIABLES

SAMPLE OF ALL CHILDREN

Theoretical Variable	Empirical Measure	Mnemonic
Material wealth transfers	Inheritance received by son/daughter (\$000s)*	INHR
Human capital investment	Annual family income of son/daughter (000s)†	INCOMER+‡
	Years of schooling of son/daughter	SCHR
Family size	Total number of kin of decedent	TNKIN
Parental income	Constructed measure of decedent's "permanent" income (000s)§	INCOMED+
Parental efficiency	Years of schooling of decedent	SCHD
Additional parent characteristics	Race of decedent (white = 1, nonwhite = 0)	RACE
	Sex of decedent (female = 1, male = 0)	SEXD
	Age of decedent	AGED
	Age of decedent squared	AGEDSQ
	Interaction between age and schooling of decedent	AGED · SCHD
	Marital status of decedent at death: married (omitted category: widowed, divorced, or single)	MARRIEDD
	Religion of decedent: Jewish, Protestant, Catholic (omitted category: no religion, Eastern Orthodox)	JEWD, PROTD, CATHD
	Origin of decedent: birthplace in U.S., Western Europe (omitted category: birthplace Eastern Europe or other)	ORIGINUS, ORIGINWE
	Number of kin of decedent, other than children	OTHERKIN

[18] Since the original data on inheritances are coded in \$1,000 intervals, we were unable to distinguish between small inheritances (< \$500) and zero inheritances (see table 1, §). In the discussion below we use the term "zero inheritance" to refer to children receiving an inheritance equal to the lower-limit value coded as \$250 and "positive inheritance" to refer to an inheritance in excess of \$250.

TABLE 1 (*Continued*)

Sample of All Children		
Theoretical Variable	Empirical Measure	Mnemonic
Additional recipient characteristics	Sex of recipient (female = 1, male = 0)	SEXR
	Age of recipient	AGER
	Age of recipient squared	AGERSQ
	Marital status of recipient: single, divorced, or separated (omitted category: married)	SINGLER DIV/SEPR
	Number of household members employed	NEMPLR
	Dummy variable for the presence of nonlabor income (1: positive nonlabor income; 0: zero nonlabor income)	NLABINC
	Sex of breadwinner in recipient's household	SEX
	Frequency of contact between the recipient and decedent‖	VISITS

* In the original data the child's inheritance is coded in $000 intervals. An inheritance of less than $500 is therefore coded as $250 (i.e., .250), following Brittain (1978, p. 42). Estimates of the model using a limit value of zero were virtually identical with those reported.

† The reported monthly family income, which was originally coded in categories, was recoded on an annual basis, using interval midpoints for the closed intervals and using the (estimated) mean of a Pareto distribution for the open-ended interval.

‡ $^+$ designates a variable entered in natural logarithm.

§ The income of recipients INCOMER (for those reporting a positive family income) was regressed on a set of "permanent" characteristics *of recipients*. The estimated coefficients were (R^2 = .216, N = 608):

$$\begin{aligned}\text{INCOMER}^+ = {} & 3.915 - .325\text{SCHR} + .01\text{AGER} \cdot \text{SCHR} - .104\text{AGER} \\ & + .0002\text{AGERSQ} + .266\text{OCCR} + .302\text{NEMPLR} - .093\text{SEX} \\ & + .627\text{RACE} + .494\text{ORIGINWE} + .658\text{ORIGINUS} + .320\text{ORIGINEE} \\ & + .668\text{PROT} + .539\text{CATH} + 1.278\text{JEW},\end{aligned}$$

where ORIGINEE = 1 if recipient's origin is Eastern Europe and 0 otherwise; OCCR is a seven-category occupation of breadwinner code (coded from 1: unskilled; to 7: executive). These coefficients, together with the corresponding characteristics of the decedent, were used to construct the income variable INCOMED (NEMPL was set equal to unity).

‖ The original data on the frequency of contact were coded in categories: daily, weekly, monthly, less often, varies. These categories were recoded in terms of the number of visits per year (÷ 100). The category "less often" was coded as .03, i.e., three visits per year. The category "varies" and missing values were coded at the mean of the nonmissing observations.

where X is the vector of right-hand-side variables and u is assumed normally distributed, independent of X, with zero expectation and variance σ^2. In addition, we also present estimates of the determinants of the probability that an heir will inherit an amount in excess of the lower-limit value.

The level of schooling is the most frequently used measure of human capital investment. However, this variable corresponds to an input measure of human capital investment rather than the output measure suggested by the theory, which is the income of the child attributable to parental transfers. Also, schooling represents a decision variable determined early in the life cycle, whereas income represents the return to skills and other sources of income realized later in the life cycle. Life-cycle considerations suggest that family size may depend on children's schooling, whereas the inheritance received by the child may be more closely related to the child's realized income than the child's schooling. The empirical model incorporates these considerations and includes an equation relating the recipient's income to schooling and other characteristics.

The reported total number of kin of the decedent was used as a measure of family size. Since this measure includes kin in addition to children, the number of these more distant kin was included as a control variable.

No direct measure of the annual or lifetime income of the decedent is available. However, information on the "permanent characteristics" of the decedent is available. Given supplementary data on income and the same set of characteristics from another source, one can construct a predicted income variable for decedents. The subsample of the surviving kin of these estates was used for this purpose. First, the log of recipient's family income was regressed on his permanent characteristics; then the estimated coefficients, together with the corresponding permanent characteristics of the decedent, were used to construct a measure of the decedent's "permanent" income. The education of the decedent was used as a measure of parental efficiency. When parental income (and hence market efficiency) is held constant, a higher level of parental education is interpreted as implying a greater level of nonmarket efficiency. Additional characteristics of the decedent (age, sex, race, religion, origin [birthplace], and marital status) and of the recipient (age, sex, marital status, and number of individuals employed in recipient's family) were included. Some of these variables hold constant life-cycle factors (e.g., age), while others may be interpreted as crude measures of some dimensions of the child's endowment.

Several writers have proposed that parental bequests may represent a payment by parents in return for services, such as care during old age, provided by children[19] (e.g., Sussman et al. 1970; Parsons 1975*b*). If low-wage children possess a comparative advantage in the provision of such services, as seems plausible, an inverse relationship between inheritance and the recipient's income could be observed even in the absence of altruism. In order to account for this possibility and in an effort to test this alternative hypothesis, an additional variable—the frequency of contact between the recipient and the decedent (VISITS)—was included in the inheritance and income equations. If some children sacrifice market income in order to care for their aged

[19] E.g., Sussman et al. (1970) state: "Testators will their estates to designated children . . . according to their perception of their needs, emotional ties with them, and services exchanged among family members over the years." Children "generally accept the notion that the sibling who has rendered the greatest amount of service to an aged parent should receive a major portion of the inheritance" (p. 118).

parents in return for a larger inheritance, the VISITS variable should enter with a negative coefficient in the income equation and a positive coefficient in the inheritance equation.

The empirical model consists of four equations in which the dependent variables are the inheritance, income, and schooling of the child and the total number of kin of the decedent. Since the determinants of human capital investment are expected to differ according to whether financial constraints are binding, estimates of the complete model are presented separately for the two subsamples according to whether the recipient inherited in excess of the limit value or the minimum amount.

Finally, in accordance with the previous discussion, life-cycle factors suggest certain identifying restrictions. Thus the marital status of the decedent at death—the presence or absence of a surviving spouse—is assumed to influence only the inheritance and to have no independent effect on the remaining endogenous variables. Also, the marital status of the recipient (divorced or separated, married or single) enters the schooling, income, and inheritance equations but is excluded from the family size equation.

IV. Empirical Results

Table 2 reports estimates for the sample as a whole. Row 1 presents the Tobit estimate of the inheritance equation, while row 2 presents the corresponding two-stage least-squares (2SLS) estimate. The important qualitative results are the same, but since the latter does not take account of the truncation of the dependent variable, I shall concentrate on the Tobit estimate.

The important finding is that the amount inherited is inversely related to the recipient's income, with an elasticity of -0.92 when evaluated at the mean inheritance.[20] This result contrasts with the findings of previous studies using these data.[21] Before accepting this result as confirmation of the theoretical model, several alternative interpretations should be considered. First, since the right-hand-side

[20] The regression in row 1 omits parental education. When this variable is included, it is insignificant ($t = 0.628$), while the recipient's income is on the margin of significance at the 5 percent level ($t = 1.932$).

[21] Brittain (1978), in an analysis of these data designed to detect differences in inheritance by the sex of the recipient, reported that "'need' for bequests indicated by the prebequest economic status of the son and daughter was tested, but found to have no influence. This is . . . consistent with equal division among siblings" (p. 45, n. 47). However, Brittain's regression (pp. 42–45) included only the number of children and the gross estate of the decedent as regressors in addition to the recipient's sex. Adams (1980) also analyzed these same data to estimate the income elasticity of bequests, but since the income of children was used as a measure of the decedent's income, he did not separate the effects of child's income and parent's income on material wealth transfers.

TABLE 2

Inheritance and Income Regressions

Dependent Variable	Endogenous Variables: INHR[a]	INCOMER[b,c]	SCHR[c]	TNKIN[c]	INCOMED[b]	SCHD	VISITS	Other Variables	$\mathscr{L}$
1. INHR	...	−3.905 (2.080)	...	−8.087 (3.586)	3.581 (3.890)	...	−1.495 (2.347)	SEXD,* AGED,* ORIGINUS,* ORIGINWE, JEWD,* CATHD,* MARRIEDD,* OTHERKIN,* SINGLER,** AGER	Tobit 150.40
2. INHR	...	−3.993 (2.657)	...	−4.462 (2.654)	4.579 (3.058)	−1.004 (1.403)	−1.140 (2.286)	SEXD,* AGED,* ORIGINUS, ORIGINWE, JEWD,* CATHD, MARRIEDD,* OTHERKIN,* SINGLER, AGER	2SLS
3. INCOMER[b]	.021 (2.166)	...	.255 (4.286)	...	...	...	−1.102 (2.366)	AGER,* AGERSQ,** NEMPLR,* NLABINC, SEX, RACE, JEWD,* PROTD,* ORIGINUS,* DIV/SEPR	2SLS
4. INCOMER[b]	.018 (1.644)	...	(.166) (1.194)	−.033 (.385)	−.149 (.979)	.131 (2.072)	−1.192 (2.389)	AGER,* AGERSQ,** NEMPLR,* NLABINC, SEX, RACE,* JEWD,* PROTD,** ORIGINUS, DIV/SEPR	2SLS
5. P_b(INHR > \$250)	...	−.029[d] (2.127)	...	−.069[d] (4.186)	−.056 (1.119)	.064 (2.535)	.005 (.336)	SEXD,* AGED,* ORIGINUS,* ORIGINWE, OTHERKIN, MARRIEDD,* RACE,* JEWD, SEX	Logit 202.14
6. INHR	...	...	...	...	7.281 (4.698)	−1.962 (2.480)	...	SEX,* AGED, ORIGINUS, ORIGINWE, PROTD,* CATHD,** MARRIEDD,* OTHERKIN,* AGER,* AGERSQ,* NLABINC	Tobit 148.54

Notes.—Sample: all sons and daughters ($N = 605$). Absolute value of asymptotic t-statistics reported in parentheses beneath each coefficient. All regressions included constant terms. Instruments in addition to the variables indicated above were SEXR, AGEDSQ, and AGED · SCHD (an age-schooling interaction term). 2SLS: two-stage least squares. Tobit: Tobit regression 251 observations occurred at the lower-limit value INHR = \$250. Logit: Logit regression dependent variable is coded 1 if INHR > \$250 ($N = 354$), 0 if INHR = \$250 ($N = 251$). The reported coefficients are the marginal effects on the right-hand-side variables on the probability of receiving an inheritance in excess of \$250, i.e., $\beta_i P(1 - P)$, where β_i is the coefficient of the logistic function and P is the mean probability of INHR > \$250 (i.e., $P = .585$). $\mathscr{L} = (-2)$ ln [likelihood ratio] distributed χ^2 with $k - 1$ degrees of freedom, where k is the number of regressors.

[a] Variable predicted from a Tobit regression on all exogenous variables.

[b] Variable entered in natural logarithm.

[c] Variable predicted from an OLS regression on all exogenous variables.

[d] Actual value rather than predicted.

* Significant at 5% confidence level for variables for which coefficients and t-statistics are not reported.

** Significant at 10% confidence level for variables for which coefficients and t-statistics are not reported.

variable is the recipient's income rather than wage rate, it may reflect the labor supply of family members. Since the receipt of an inheritance is predicted to increase the demand for leisure, the work-disincentive effects of inheritance also imply an inverse relationship between inheritance and family earnings[22] (Heckman 1976*a*). In order to evaluate this possibility, the inheritance and income equations were estimated simultaneously in rows 2 and 3, with the recipient's income permitted to depend on the amount inherited.[23] The inheritance enters the income equation with a significant positive coefficient, suggesting that the income variable (INCOMER) may represent a better measure of income gross of the inheritance rather than earnings (see n. 22). The income equation reported in row 3 constrains the family background variables (family size, decedent's income and schooling) to enter recursively via the recipient's schooling. This assumption is relaxed in row 4 to allow for the direct influence of these variables on recipient's income via lifetime gifts and other mechanisms. The conclusions are unchanged—inheritance continues to enter with a positive coefficient which is on the margin of significance at the 10 percent level. The available evidence does not support the work-disincentive hypothesis.

Second, as mentioned previously, an inverse relationship between children's income and inheritance may also arise if some children sacrifice market earnings in order to provide care for their parents, in return for a larger bequest. In order to test this possibility, the VISITS variable was introduced into both income and inheritance equations. This variable enters the income equation with a significant negative coefficient, suggesting that the opportunity cost of child-parent interaction is positive. Surprisingly, the VISITS variable enters with a significant negative coefficient in the inheritance equation.[24]

[22] In a single-period labor/leisure model the percent change in earnings (E) in response to a 1 percent change in nonlabor income (V) is given by $(d \ln E/d \ln V) = [K_V/(1 - K_V)](S_Z\eta_Z - 1) = [-K_V/(1 - K_V)]S_l\eta_l < 0$ if $\eta_l > 0$, where $K_V = V/I$, $S_l = wl/F$, $S_Z = P_Z Z/F$, where F is full income, I money income, l leisure, and Z consumption, and η_j is the income elasticity of demand for good j. The percent change in money income resulting from a 1 percent change in V is $(d \ln I/d \ln V) = K_V S_Z \eta_Z = K_V(1 - S_l\eta_l) > 0$ if $\eta_Z > 0$.

[23] In the income equation reported in row 3, the inheritance variable was predicted by using a Tobit regression to take account of the truncation problem. The results do not differ substantially when this variable is entered in the usual manner, ignoring the truncation at the lower limit. The income equation also contains a dummy variable for the presence/absence of nonlabor income (NLABINC) and the number of household members employed (NEMPLR), in order to hold constant differences in labor force participation between households. The estimated coefficient on schooling in the income equation is "large" in comparison with estimates of the rate of return to schooling. However, the dependent variable is (the log of) family income rather than individual earnings. If both the education levels and earnings of spouses are positively correlated, this could explain the large marginal effect of schooling.

[24] This conclusion differs from that reached by Sussman et al. (1970) based on the

This result presents prima facie evidence against the pure "child-services" model of inheritance (i.e., with no altruism), since the decedent as a monopsony demander of child services would never bequeath an inheritance such that the recipient located on the backward-bending region of the child-services supply schedule.[25] We therefore conclude that the negative relationship between the amount inherited and the recipient's income confirms the existence of an operative altruistic bequest motive and is consistent with the prediction that inherited material wealth serves as a means of redistributing resources among family members.

Other findings may be briefly summarized. The decedent parent's income enters the Tobit inheritance equation (row 1) with a significant positive coefficient, implying an income elasticity of 0.84 when evaluated at the mean inheritance. Last, the total number of kin (TNKIN)—the empirical measure of family size—enters the inheritance regression with a significant negative coefficient, consistent with the existence of substitution between family size (quantity) and the per capita bequest (quality).

Row 5 reports a logit regression in which the dependent variable is the probability of receiving an inheritance in excess of the lower-limit value.[26] This equation represents a test of the ability of the model to

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study of various cases: "The data indicate general agreement that the child who performs the greatest amount of service should receive the greatest part of the estate" (p. 119). The results reported here do not invalidate this explanation of estate distribution in specific cases. Post hoc explanations of this finding are (i) that contact with aged parents is a time-intensive and inferior commodity or (ii) that children reporting the greatest frequency of contact are compensated during the parental lifetime (e.g., by living rent free in the parental home). A more complete model would include VISITS as an endogenous variable. Along these lines a simple OLS "supply of visits" equation was estimated (t-statistics in parentheses; † = ln):

$$\begin{aligned}
\text{VISITS} = 2.593 &- \underset{(2.831)}{.097\text{INCOMER}\dagger} - \underset{(1.021)}{.004\text{INHR}} + \underset{(2.743)}{.356\text{NLABINC}} \\
&+ \underset{(3.950)}{.790\text{SINGLER}} + \underset{(4.786)}{.560\text{SEXR}} + \underset{(3.528)}{.314\text{NEMPLR}} \\
&- \underset{(.078)}{.008\text{INCOMED}\dagger} - \underset{(.481)}{.025\text{SCHD}} - \underset{(4.059)}{.138\text{TNKIN}} \\
&- \underset{(1.670)}{.561\text{RACE}} - \underset{(2.169)}{.282\text{MARRIEDD}} + \underset{(2.456)}{.700\text{JEWD}}; \\
&R^2 = .162, \qquad N = 605.
\end{aligned}$$

The recipient's income enters with a significant negative coefficient, while the inheritance coefficient is negative but not significant. These results are subject to possible simultaneous-equations bias.

[25] However, this finding *is* consistent with a child-service model which incorporates parental altruism.

[26] The logit procedure assumes the distribution of u is Sech^2 rather than normal. However, the cumulative distribution of the logistic function closely approximates the normal except in the tails (Nerlove and Press 1973). As expected, a probit regression produced similar results.

assign individuals to the alternative regimes[27] (see eq. [8a]). As predicted by the theory, the recipient's income and the number of kin enter with significant negative coefficients.[28] In contrast to the Tobit results (row 1), neither the decedent's income nor the VISITS variable is significant in the logit regression, while the decedent's schooling enters with a significant positive coefficient.

The final row of table 2 reports a reduced-form Tobit inheritance equation. This regression allows us to determine the effects of parental income and education on inheritance when family size and the recipient's income are permitted to vary. In this equation, the income elasticity of inheritance is 1.71, evaluated at the mean of the dependent variable—a value significantly different from unity at the 6 percent level. This estimate is considerably larger than the estimate in row 1, a result consistent with the prediction of Becker and Tomes (1976) that, because of the effects of quality-quantity interaction, the "observed" income elasticity of child quality will exceed the underlying "true" elasticity. The decedent's schooling enters the reduced-form inheritance regression with a significant negative coefficient. This confirms the prediction that more educated parents invest more in their children's human capital (see table 3) and as a consequence make smaller bequests of material wealth.[29] The parameter estimate implies that each additional year of decedent's schooling reduces the child's inheritance by almost $2,000—a sizable effect in relation to the average inheritance of $4,257.

Estimates of the Complete Model

Table 3 presents estimates of the four-equation model. In these regressions the sample is partitioned into two categories according to whether children inherit in excess of the limit value or not. Since the self-selection of households into either category results in the possibility of sample-selection bias, the correction procedure outlined by Heckman (1976*b*, 1979) was implemented. This procedure involves initially computing Mills ratios from the probit equation of the selection rule and including these "omitted" variables—designated "λ_a"

[27] As an intuitive test of ability of the logit equation to assign individuals to regimes, recipients were assigned to 0,1 categories according to the predicted $\hat{P} \lesseqgtr .5$. This resulted in the "correct" assignment of 73.12 percent of recipients as compared with a 50 percent "correct" assignment based on random assignments using the population proportions.

[28] This first result confirms the finding of Sussman et al. (1970) that "those most likely to inherit were persons with the smallest monthly incomes" (p. 155). However, those authors also state that "the percentage of survivors who inherited did not vary greatly among [survivor] income categories" (ibid.).

[29] Additional empirical evidence in support of this prediction is reported in Tomes (1981*b*), where it is found that the total estate of the decedent is inversely related to the decedent's education, holding the decedent's income and other characteristics constant.

TABLE 3

ESTIMATES OF THE MODEL

Dependent Variable	Endogenous Variables: INHR	INCOMER[a]	SCHR	TNKIN	INCOMED[a]	SCHD	VISITS	λ_a	Other Variables
	Children Receiving an Inheritance in Excess of the Limit Value (N = 354), λ_a								
1. INHR	...	−5.233 (3.228)	...	−6.499 (4.516)	5.847 (3.202)	−2.289 (2.144)	−.499 (.830)	9.572 (1.442)	AGED,* MARRIEDD, JEWD,** OTHERKIN,* SINGLER
2. INCOMER[a]	−.009 (.453)	...	.292 (3.443)	...	...	...	−.098 (1.540)	.385 (1.452)	AGER, AGERSQ, NEMPLR,* NLABINC, DIV/SEPR, SEX, RACE, JEWD**
3. SCHR	...	...	...	−.335 (1.508)	.281 (1.355)	.249 (2.220)	...	−.231 (.536)	OTHERKIN, RACE, ORIGINUS, ORIGINWE, JEWD,* SINGLER,* AGER,* AGED*
4. TNKIN	−.056 (4.031)	...	−.208 (2.336)	...	.448 (2.484)	−.160 (1.771)	...	.718 (2.453)	OTHERKIN,* RACE,** CATHD,* JEWD, AGED,* ORIGINUS,* AGER*
5. INHR[a]	...	−.197 (2.042)	...	−.294 (3.625)	.363 (3.764)	−.142 (2.468)	−.041 (1.155)	.891 (2.311)	AGED,* MARRIEDD, JEWD, OTHERKIN,* SINGLER
6. INCOMER[a]	−.054[a] (.148)	...	.259 (2.768)	...	...	...	−.111 (1.721)	.432 (.990)	AGER, AGERSQ, NEMPLR,* NLABINC, DIV/SEPR, SEX, RACE, JEWD**

7. SCHR	...	...	...	−.360 (1.627)	.286 (1.377)	.251 (2.231)	...	−.234 (.543)	OTHERKIN, RACE, ORIGINUS, ORIGINWE, JEWD,* AGED,* SINGLER,* AGER*
8. TNKIN	−.457[a] (1.459)	...	−.177 (1.716)	...	.264 (1.405)	−.108 (1.024)	...	1.049 (2.157)	OTHERKIN,* RACE,** CATHD,* JEWD, ORIGINUS,* AGED,* AGER
	Children Receiving a Zero Inheritance (N = 251), λ_b								
9. INCOMER[a]	...	...	.415 (5.553)	...	...	...	−.134 (2.008)	.670 (2.127)	AGER,* AGERSQ,** NEMPLR, NLABINC,* SEX,** RACE, JEWD
10. SCHR	...	...	...	−.273 (1.060)	.791 (2.232)	.077 (.423)	...	.068 (.123)	OTHERKIN, RACE, ORIGINUS,** ORIGINWE, JEWD, SINGLER,* AGER,* AGED
11. TNKIN	...	...	−.252 (2.464)	...	−.262 (1.297)	.258 (2.681)	...	.007 (.019)	OTHERKIN,* RACE,* PROTD, CATHD,* ORIGINUS, AGED,* AGER

NOTE.—All equations estimated by three-stage least squares. Asymptotic t-statistics reported in parentheses beneath coefficients: λ_a, λ_b: Mills ratios computed from a probit regression on all exogenous variables (see text). See notes to table 2.

[a] Variable entered in natural logarithm.

and "λ_b" in table 3—in subsequent regressions using the selected sample.[30] Table 3 reports the results obtained using 3SLS, which allows the error terms of the equations to be correlated.

Rows 1–8 report results for children who received a bequest in excess of the limit value. The estimates of the inheritance and income equations duplicate quite closely those obtained for the whole sample (table 2, rows 1–3) and require little additional discussion. Recipient's income and parents' income enter the inheritance equation with the predicted negative and positive signs, with elasticities (at the mean) of -0.74 and $+0.82$, respectively.[31] In contrast to the results in table 2, inheritance is not significant in the income equation (row 2), and the VISITS variable is not significant in line 1 or 2.[32]

Although the semilog specification of the inheritance equation may be preferred on the a priori grounds that it embodies the prediction of a decreasing income elasticity, the constant elasticity formulation was also estimated (row 5). The estimates show that the major qualitative results are not dependent on the use of the semilog functional form.

The results reported in table 3 represent a direct test of the two-regime model. The major question to be addressed is whether the

[30] If eq. (10) represents the inheritance equation, the expected values of variables Z_j for the censored samples can be shown (see Willis and Rosen 1979) to be

$$E(Z_j \mid a > .250) = \gamma_j X + E(\epsilon_j \mid \beta X > u) = \gamma_j X + \frac{\sigma_{ju}}{\sigma_u}\lambda_a,$$

$$E(Z_j \mid a = .250) = \gamma_j X + E(\epsilon_j \mid \beta X \leqslant u) = \gamma_j X + \frac{\sigma_{ju}}{\sigma_u}\lambda_b,$$

where

$$\lambda_a \equiv E\left(\frac{u}{\sigma_u} \,\middle|\, \frac{u}{\sigma_u} < \frac{\beta X}{\sigma_u}\right) = -f(\beta X/\sigma_u)/F(\beta X/\sigma_u) \leqslant 0,$$

$$\lambda_b \equiv E\left(\frac{u}{\sigma_u} \,\middle|\, \frac{u}{\sigma_u} \geqslant \frac{\beta X}{\sigma_u}\right) = f(\beta X/\sigma_u)/[1 - F(\beta X/\sigma_u)] \geqslant 0,$$

where F is the cumulative normal density and f is its probability density function. The estimation procedure employs the estimated values $\hat{\lambda}_a$ and $\hat{\lambda}_b$ from a probit regression including all the exogenous variables except VISITS—because of the dubious exogeneity of this variable (see n. 24). The presence of the selection rule introduces heteroscedasticity into the equation residuals, resulting in upward-biased t-statistics. However, in the present context, there is a presumption that the bias is small. Applying the appropriate correction procedure to the t-statistics from the 2SLS estimates resulted in only marginal changes in the t-statistics.

[31] The significant positive coefficient on λ_b in row 9 indicates that individuals who inherit zero receive higher incomes than individuals with the same income-earning characteristics in the whole sample. This also supports the compensation hypothesis.

[32] The income equation (row 2) constrains the background variables (family size, decedent's income and schooling) to enter recursively via the recipient's schooling. When these variables are entered directly (results not reported here), the major conclusions are unaffected.

determinants of human capital investment differ among households according to whether material wealth transfers are positive or zero. A comparison of the schooling regressions for the two subsamples (rows 3 and 10) indicates differences which are in the predicted direction. For children receiving an inheritance in excess of the limit value, the level of schooling is unrelated to either parental income or family size but is positively related to parental education. In contrast, for children who received a zero inheritance, the level of schooling depends on parental income (with an income elasticity of 0.07) but is unrelated to parental education. Thus opportunities (parental income) are important for households making zero material wealth transfers, while parental education (one determinant of ability) is more important for households making positive material wealth transfers. However, contrary to the theoretical prediction, the family size variable—a determinant of opportunities—is not significant in the school equation for children who inherit zero (row 10) upon whom financial constraints are expected to be binding.

The family size regressions also differ between the two subsamples (rows 4 and 11), although concerning these differences we have no predictions. For families making asset transfers in excess of the limit value (row 4), parental income has a positive and significant coefficient—the only evidence in these data of a positive income elasticity of family size. Parental education enters with a negative coefficient which is significant at the 10 percent level. In contrast, for the sample receiving a zero inheritance (row 11), the parental income variable is negative and not significant, while parental education enters with a significant positive coefficient. These results underline the complexity and ambiguity of the relationships among family size and parental income and education. The one result common to both subsamples is that measures of child quality (the child's inheritance and/or schooling) enter with significant negative coefficients in the family size equations, consistent with the existence of a quality-quantity trade-off.[33]

Additional Results

A major finding of the foregoing analysis is that, when parental income and education are held constant, children with higher incomes receive a smaller inheritance of material wealth. This is consistent with the theoretical prediction that parents respond to dif-

[33] The significant positive coefficients on λ_a in rows 4 and 8 imply that those who receive a positive inheritance are more likely to come from a smaller family than random individuals with the same characteristics. This also implies a quality/quantity trade-off.

ferences in the ability of children by reducing transfers to children in order to finance greater parental consumption. In this way, parents share in the returns to greater child endowments. However, an alternative interpretation is that the observed inverse relationship between inheritance and children's income reflects (partly or entirely) the role of inheritance in compensating for differences *among* siblings rather than between parents and children. Thus, if parents bequeath a larger share of the estate to the child with the lowest income and a smaller share to his advantaged sibling, this also implies an inverse relationship between inheritance and the recipient's income.

This issue can be addressed using data on 137 families for whom information is available on more than one child. In this subsample, 41.6 percent of heirs (siblings) received exactly equal shares. However, this figure includes cases in which all heirs received the limit value of zero and therefore, by definition, inherited equally. Excluding such cases, 21.1 percent of heirs inherited exactly equal shares, and the vast majority of heirs (78.9 percent) received unequal shares in the parental estate. However, some of these between-sibling differences are small: 50.4 percent of heirs received approximately equal shares—within $500 of the average inheritance received by children. Nevertheless, the incidence of equal division is dramatically lower than that found by Menchik (1980) in his sample of large Connecticut estates. Menchik found that "equal sharing among children is the rule" (p. 299). For example, among two-child families, in 62.5 percent of cases both children received exactly equal bequests and in 70.5 percent of cases approximately equal bequests (Menchik 1980, p. 310). The corresponding figures for two-child families in the present sample are 22.2 percent and 44.4 percent.[34] The fact that strictly equal division is *not* the rule in this sample suggests that the possibility that inheritance is equalizing between siblings warrants investigation.

Table 4 reports the results of Tobit regressions for various subsamples of children from families with information on multiple heirs. The availability of multiple observations per family also permits the inclusion of an unobserved family component in the income prediction equation. The constructed measure of the decedent's income em-

[34] Two possible explanations of this difference are: (i) In large estates donors may make sizable transfers in the form of inter vivos gifts in order to avoid estate and inheritance taxes. Thus, unequal lifetime gifts by wealthy donors may serve the same functions as unequal bequests by less wealthy donors. (ii) Apparent equal division in probate records is consistent with de facto unequal division when estates are redistributed among heirs. Sussman et al. (1970) report that, in 27 percent of intestate cases (i.e., the decedent left no will) for which the law prescribed equal division among siblings, ex post redistribution among siblings occurred resulting in unequal shares (pp. 143–44). Thus probate records may underestimate the incidence of unequal division.

TABLE 4

ADDITIONAL RESULTS FOR FAMILIES WITH MULTIPLE HEIRS

DEPENDENT VARIABLE	$\overline{\text{INCOMER}}$[a,b]	DINCOMER[a,c]	TNKIN[b]	INCOMED[a]	SCHD	OTHER VARIABLES	$\mathscr{L}$	N	N Limits
1. INHR	−8.053 (3.009)	−1.077 (1.467)	−1.855 (1.695)	6.870 (4.536)	.887 (1.266)	SEXD,* ORIGINUS, ORIGINWE, JEWD,* MARRIEDD, $\overline{\text{SEX}}$,* AGER*	71.85	250	60
2. INHR	−9.196 (2.678)	−1.237 (1.377)	−2.113 (1.373)	8.211 (4.612)	.784 (.905)	SEXD,* ORIGINUS, ORIGINWE, JEWD, MARRIEDD, $\overline{\text{SEX}}$,* AGER*	64.91	196	60
3. INHR	−14.092 (2.882)	−1.998 (1.611)	−4.056 (2.109)	9.652 (3.509)	1.524 (1.168)	SEXD,* ORIGINUS, ORIGINWE, JEWD,* MARRIEDD, $\overline{\text{SEX}}$, AGER*	46.08	119	23

NOTE.—Tobit regressions, asymptotic t-statistics reported in parentheses, $\mathscr{L} = (-2)$ ln (likelihood ratio), N limits: N limit observations (INHR = \$250). $\overline{\text{INCOMER}}$[a] is the mean predicted (ln) income of children in the same family. DINCOMER is the deviation of the child's income from the mean income of children (i.e., DINCOMER[a] = INCOMER[a] − $\overline{\text{INCOMER}}$[a]). $\overline{\text{SEX}}$ is the mean sex of the family breadwinner in the siblings' families. The INCOMED[a] variable in these regressions contains an unobserved family component. The weight attached to this unobserved component in constructing INCOMED was determined by minimizing the standard error of the regression. The weights used in the reported regressions in rows 1–3 were .5, .7, and .5, respectively (see text for details). Samples: (i) row 1, multiple heirs where at least one child received an inheritance in excess of the limit value; (ii) row 2, same as (i), excluding cases where siblings inherited exactly equal shares; (iii) row 3, same as (i), excluding cases where siblings inherited within \$500 of the average inheritance of children (i.e., cases of approximately equal division). See table 2 notes.

[a] Variable entered in natural logarithm.

[b] Predicted value of variable from OLS regression on all exogenous variables, using whole sample (N = 605).

[c] Actual rather than predicted value.

ployed in table 4 includes this family component.[35] In these regressions, both the mean income of children and the deviation of the child's income from the family mean are introduced as determinants of inheritance. The latter variable is predicted to enter with a negative coefficient if disadvantaged children receive larger shares in the parental estate. This variable enters with the predicted negative sign but never attains statistical significance. In contrast, the mean income of children enters consistently with a highly significant negative sign. Estimates of the elasticity of inheritance with respect to the mean income of children cluster closely around -1.8, evaluated at the mean of the dependent variable. Thus, when we hold income inequality among children constant, the higher the average income of children, the lower the inheritance received by children. These results suggest that the inverse relationship between recipient's income and inheritance reflects for the most part a reallocation of resources between the generations of the family rather than simply the redistribution among siblings of a given total bequest to children.

These results for the subsample for which information is available on multiple heirs and also those for the subsample with information on both the decedent and surviving spouse[36] (not reported here) confirm the results reported earlier for the whole sample.

V. Summary and Conclusions

I have presented an empirical model of the intergenerational transmission of inequality within the altruistic family. This paper adds

[35] Adams (1980) employed a conceptually similar, but less appealing, technique using the mean income of recipients in a family to measure the decedent's income. The procedure employed here was to estimate an income prediction equation similar to that in table 1, §, for the subsample for whom information is available for two or more survivors—either children or the surviving spouse ($N = 431$). The mean residual was then computed for each family and entered in a subsequent income equation. The estimated coefficients from this second regression, together with the decedent's characteristics and the family mean residual, were used to construct the measure of the decedent's income. The weight attached to the family residual depends on the extent to which the unobserved family component is correlated between spouses and transmitted from parents to children. In the absence of information on this parameter, weights were used in the unit interval (0.0, 0.1, . . . , 1.0). The reported results employ the weight which minimized the standard error of the regression (see note to table 4). In practice, the measure of the decedent's income used in tables 2–3 performed almost as well as the measure used in table 4. (See the results reported in the earlier version of this paper.) The estimated income elasticity of inheritance did not differ in a systematic fashion using the two alternative income measures.

[36] For this subsample ($N = 191$), the effects of mother's and father's education, ages, and incomes were analyzed; also, a measure of the predicted bequest from the surviving spouse to children was constructed and used in the subsequent regressions. The results, which confirm the basic conclusions of this study, were reported in the earlier version of this paper.

empirical content to the theoretical models of Becker, Blinder, and Ishikawa in which bequests of material wealth and investment in children's human capital are simultaneously determined and represent substitute modes of parent-child transfers.

Empirical tests of the model were performed using a unique data set containing information on the inheritance, income, and schooling of the surviving kin of a random sample of estates probated in the Cleveland, Ohio, area in 1964–65.

The empirical results strongly confirm the equalizing role of inheritance and the existence of substitution between human capital investment and inherited material wealth. The inheritance received by the child was found to be inversely related to the child's income. Material wealth transfers are therefore "compensatory"—in that (other things being equal) children with low incomes receive greater bequests of material wealth than their better-endowed contemporaries. Our estimates imply that, for individuals in the sample who received a positive inheritance (table 3, row 1), the compensatory component of bequests reduced the variance of inherited wealth by 30 percent and reduced the correlation between inheritance and income from 0.53 to 0.12. This result confirms the prediction of the altruism model of intergenerational transfers that an increase in the income of recipients leads the donor to reduce transfers in order to redistribute family resources in favor of his own consumption. The data do *not* support the alternative explanations of this inverse relationship—that the receipt of an inheritance has a work-disincentive effect, that low-income children inherit more in return for the greater child services they provide for their aged parents, or that the observed relationship reflects the reallocation among siblings of shares in a given parental estate. Differences across families in parental education were found to result in variations in inherited wealth. Greater parental education is associated with more schooling and higher incomes of children and lower bequests of material wealth—results consistent with the theoretical predictions of the altruism model.

There is evidence that the financial constraints faced by families differ across households. Families who make positive material wealth transfers appear less constrained financially when it comes to investing in their children's human capital—and ability variables are the major determinants of children's schooling. Conversely, families making zero bequests to children appear more constrained financially, so that opportunity variables are the major determinants of children's schooling. For both categories of households, there is evidence of a trade-off between family size (quantity) and per capita parent-child expenditures (child quality).

The first result is important for a number of reasons. Previous empirical work (Brittain 1978; Menchik 1980) has failed to find any evidence of compensatory bequests among siblings. In contrast, the present study provides strong evidence that within the family—between parents and children—and among families in the same income/education stratum, the distribution of inherited wealth is equalizing. This supports the recent suggestion of Griliches (1979), that the family contributes less to the intergenerational transmission of inequality than is commonly supposed, since it operates as a force for equality between successive generations (parents and children).

Appendix

MEANS OF VARIABLES FOR VARIOUS SAMPLES

Variable	All Sons/Daughters Reporting Positive Family Income (N = 605) (1)	Sons/Daughters in col. 1 Receiving an Inheritance in Excess of the Limit Value (N = 354) (2)	Sons/Daughters in col. 1 Receiving an Inheritance Equal to the Limit Value (N = 251) (3)
INHR ($000s)	4.257	7.099	.250
INCOMER ($000s)	11.518	11.922	10.973
SCHR	12.570	12.517	12.645
AGER	42.828	44.384	40.633
SEXR (% female)	49.3	48.6	50.2
NEMPLR	1.190	1.184	1.199
NLABINC (% reporting the receipt of nonlabor income)	29.8	31.4	27.5
SINGLER (%)	9.6	9.0	10.4
DIV/SEPR (%)	.3	.3	.4
INCOMED ($000s)	6.085	5.559	6.906
SCHD	9.102	9.054	9.171
AGED	70.630	72.056	68.618
SEXD (% female)	41.7	52.5	26.3
MARRIEDD (%)	58.8	39.5	86.1
TNKIN	4.134	3.791	4.618
OTHERKIN	1.020	.743	1.410
RACE (% nonwhite)	3.3	2.7	5.6
CATHD (%)	44.1	44.9	43.0
PROTD (%)	43.6	41.5	46.6
JEWD (%)	5.1	6.2	3.6
ORIGINUS (%)	51.6	45.2	60.6
ORIGINWE (%)	16.2	18.1	13.5
VISITS	1.443	1.550	1.292
λ_a	−.696	−.506	−.965
λ_b	1.068	1.319	.713

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