Economic and Mechanical Models of Intergenerational Transmission

Arthur S. Goldberger

The American Economic Review, Vol. 79, No. 3 (Jun., 1989), 504-513.

Stable URL:
http://links.jstor.org/sici?sici=0002-8282%28198906%2979%3A3%3C504%3AEAMMOI%3E2.0.CO%3B2-8

The American Economic Review is currently published by American Economic Association.

Economic and Mechanical Models of Intergenerational Transmission

By ARTHUR S. GOLDBERGER*

Modeling the economic family is a subject indelibly associated with Gary Becker. His remarkable work has opened up a new world of human behavior to the tools of microeconomic analysis, drawing economists into areas formerly reserved to anthropologists, demographers, and sociologists. The scope of this work is clearly reflected in his 1981 monograph, *A Treatise on the Family*, which exploits "the assumptions of maximizing behavior, stable preferences, and equilibrium in implicit or explicit markets to provide a systematic analysis of the family." (p. ix). The *Treatise* ranges over the allocation of time, marriage, fertility, divorce, inheritance, the division of labor, altruism, and nonhuman families.

I focus on Chapter 7 of Becker's *Treatise* (1981), in which he sets out to integrate the theory of income distribution (intragenerational differences) with the theory of mobility (intergenerational differences). This chapter, "Inequality and Intergenerational Mobility," is drawn in good part from an earlier journal article, Becker and Nigel Tomes (1979). I refer also to Chapter 6, "Family Background and the Opportunities of Children," and to a subsequent article, Becker and Tomes (1986), "Human Capital and the Rise and Fall of Families."

For years, of course, sociologists and economists have studied mobility and income distribution. But Becker's analysis promises to be distinctive, in that he will integrate the two topics. Naturally, the integration will rest upon utility-maximizing behavior: Parents allocate their resources optimally between consumer goods and investment in their children. When the children grow up, their rewards will depend on that investment, but also on their natural endowments and on their luck in the market. An equilibrium will emerge as this process is repeated one generation after another.

The assumption of optimizing behavior is, he says, crucial to his analysis. Without it, previous researchers had used models that were merely mechanical; consequently they were led to understate the influence of family background on inequality. With it—that is, using an economic model of the family—he cannot only provide integration, but can also announce surprising results. Example: raise my income, and you will, other things equal, lower my grandchild's income. And with optimizing behavior, he is able to explain why compensatory educational programs do not work, and to estimate key parameters from thin data sets.

Becker summarized Chapter 7 as follows:

> The analysis in this chapter firmly demonstrates that a theory of the distribution of income need not be a mixture of Pareto distributions, *ad hoc* probability mechanisms, and arbitrary assumptions about inheritance, but can be based on the same principles of maximizing behavior and equilibrium that form the core of microeconomics. The theory readily incorporates the effects of luck, family background, assortative mating, and cultural, biological,

*Arthur S. Goldberger, Department of Economics, University of Wisconsin, Madison, WI 53706. This paper is drawn from my 1985 W. S. Woytinsky Lecture, "Modeling the Economic Family," given at the University of Michigan. My work on this material began at the Center for Advanced Study in the Behavioral Sciences at Stanford in 1980–81, with financial support provided by the National Science Foundation grant nos. BNS-76-22943 and SES-80-08053. Preparation of this version was facilitated by funding provided by the William F. Vilas Trust and the Graduate School at the University of Wisconsin-Madison. I owe a special debt to my colleague at the Center, Adam Kuper, who taught me to think differently about the family in economics. I have benefited also from advice given by Gary Becker, Glen Cain, John Conlisk, Christopher Flinn, Bronwyn Hall, Robert Hauser, Charles Manski, and Ariel Pakes.

> and financial inheritance on the distribution of income. Furthermore, inequality within a generation and inequality across generations do not require separate economic and sociological approaches: both can be analyzed with a unified theory of the determination of the incomes of different families in different generations.
> [pp. 165–66].

I examine the claims of distinctiveness, integration, explanatory power, and surprise, and arrive at a rather skeptical view of the contribution that the core of microeconomics has made to this study of the family.

I. Integration

To provide perspective, go back one century to Francis Galton's article, "Regression Towards Mediocrity in Hereditary Stature," published in the 1886 volume of the *Journal of the Anthropological Institute of Great Britain and Ireland*.

Galton had collected data on the heights of some thousand adults and their parents, cross-tabulated them, plotted the regression of child height on parental height, and found the regression slope to be 2/3. He said it more colorfully: "The deviates of the children are to those of the midparent as 2 to 3." Since the slope was less than unity, and since "mediocre" meant average, he could dramatize his results with the caption

> When mid-parents are taller than mediocrity, their children tend to be shorter than they.... When mid-parents are shorter than mediocrity, their children tend to be taller than they.

Galton's model of the underlying stochastic process was this: My height is determined by a mixture of the height of my parents and the heights of my more distant ancestors. Since my distant ancestors were presumably mediocre, my height will, up to random error, be a weighted average of the height of my parents and the population mean height. Galton wrote without the benefit of modern knowledge of genetic transmission, but his story can be represented in a currently acceptable form as

$$e_t = (1-c)k + ce_{t-1} + v_t,$$

where e_t is my height, e_{t-1} is my parent's height, k is population mean height, c is the inheritability parameter, and v_t is the disturbance (assumed to be independent of past e's).

I have condensed Galton's story considerably. Actually, he worked with two-parent families, found that there was virtually no assortative mating for heights, converted female heights into male equivalents, and then used the midparent height rather than a single parent's height, as I have done. Ignoring these refinements, suppose that the successive v's are independent and identically distributed with expectation zero and variance σ_v^2, and that the parameter c lies between zero and unity. Then the simple stochastic model—a first-order autoregression—implies a steady-state equilibrium expectation, variance, and autocorrelations for heights. In Galton's words,

> the process comprises two opposite sets of actions, one concentrative and the other dispersive, and of such a character that they necessarily neutralize one another, and fall into a state of stable equilibrium.

The steady-state expectation, variance, and autocorrelations of heights e are:

$$\mu_e = k, \quad \sigma_e^2 = \sigma_v^2/(1-c^2),$$

$$\rho_j = c^j \quad (j=1,2,\dots;\ \rho_0 = 1).$$

Evidently, the expectation and variance describe inequality within a generation, while the autocorrelations describe mobility (or rather immobility) across generations. So it seems fair to say that Galton in 1886 provided a single model that integrated the theories of inequality within a generation and mobility across generations. Of course, Galton's theory for heights was not derived from utility-maximizing behavior. It would be characterized as a merely mechanical model.

II. Optimization

I proceed to Becker's model. In presenting it, I take the liberty of revising his notation, and ignoring some variants that he develops.

The parent allocates his income X between C, his consumption, and I, investment in his child:

$$X = C + I. \tag{1}$$

The investment will produce child's income Y with a rate of return r. There will also be a "luck" component E in the child's income. Let $m = 1 + r$. Then

$$Y = mI + E. \tag{2}$$

I say "income" for convenience; conceptually X and Y are wealth, or permanent income, or lifetime income, variables. The time unit is a generation; correspondingly the return factor $m = 1 + r$ will be large, 1.5 or more, say, rather than 1.05.

The parent, having full knowledge of the child's E, allocates his own income X, to maximize his own utility, which I take to be Cobb-Douglas in Y and C:

$$U = a \log Y + (1 - a) \log C. \tag{3}$$

The parameter a, which lies between 0 and 1, reflects relative preference for child income as against own consumption. (Becker actually works with a CES utility function, but often specializes to the Cobb-Douglas case. For present purposes, nothing will be lost if we specialize from the outset).

Maximizing (3) subject to (1) and (2) gives the optimal allocation of the parent's income:

$$I = aX - (1 - a)E/m, \tag{4}$$

$$C = (1 - a)X + (1 - a)E/m. \tag{5}$$

Substituting back into (2) gives the income transmission rule:

$$Y = bX + aE, \tag{6}$$

where $b = am$. The parameter a is the "fraction of family income spent on children"; the parameter b is the "propensity to invest in children."

Since the parent optimizes, the child's income Y will be determined by parent's income X and child's luck E. The income transmission rule is linear, with zero intercept. The slopes depend on the preference parameter a and on the market rate of return r (via m).

Suppose that there is a dollar increase in the child's luck E. Will this increase child's income Y by a dollar as (2) suggests? No, because the parent will partially offset the increased luck by reducing investment (see (4)) and increasing consumption (see (5)). The upshot (see (6)) is that the child's income increases by only the fraction a of one dollar.

We have arrived at one of Becker's main themes: offsetting effects. For him, the practical implication is immediate:

> public education and other programs to aid the young may not significantly better them because of compensating decreases in parental expenditures. [p. 153]

The implication may be immediate, but it is also fragile. Suppose that the effect of luck on child's income is multiplicative rather than additive. That is, replace (2) by

$$Y = mIE, \tag{2'}$$

and redo the calculation. The optimizing parent will allocate his income into

$$I = aX, \tag{4'}$$

$$C = (1 - a)X, \tag{5'}$$

an allocation that is independent of E. The income transmission rule will be

$$Y = bXE. \tag{6'}$$

No offsetting will occur.

What generates the new result is that (2′) has the rate of return to parental investment increasing with luck. Earlier in the *Treatise*, Becker had explicitly recognized this possibility, only to dismiss it out of hand:

> Parents might reduce, and could even raise, their expenditures on participating children if these programs raised rates of return on parental expenditures. Still, however, the main effect of the programs is probably a redistribution of family expenditures away from the children participating in the program, with a small net increase in the *total* expenditures on these children.... Thus the failure of compensatory programs can be explained without assuming that compensated children are inferior in ability or motivation: they could be above average. [p. 126]

Evidently, it was a specific technological assumption (2), rather than Becker's optimization framework, that produced his striking compensating effect. Those who lack faith in (2) will have to look elsewhere to explain the failure (or success) of educational programs.

III. Dynamics

Becker's next step is to decompose the child's luck variable E into two components:

$$E = e + u, \tag{7}$$

where e is endowment and u is market luck. Endowment e represents the capital that the child receives automatically and effortlessly from his parents—genes, reputation, culture, learning, skills, and goals that his parent provides at no cost. Market luck u, on the other hand, is not transmitted at all from parent to child.

Proceeding to dynamics, I shift to a more convenient notation. Let t index generations, and let y be the general symbol for income. Rewrite (6)–(7) as

$$y_t = by_{t-1} + ae_t + au_t. \tag{8}$$

As for endowment, suppose that it, rather than height, is transmitted according to Galton's rule:

$$e_t = (1-c)k + ce_{t-1} + v_t. \tag{9}$$

Here k is the population mean endowment and v is the disturbance. Suppose finally that u and v are mutually and temporally independent with zero expectations and variances equal to σ_u^2 and σ_v^2.

This is Becker's dynamic model for the random variable y, income, or rather lifetime earnings. This system is certainly more elaborate than Galton's. But it is not unprecedented.

For example, John Conlisk (1974) formulated and studied this model of the intergenerational transmission of (lifetime) income y and IQ z:

$$\begin{aligned} y_t &= b_0 && + b_1 y_{t-1} + b_2 z_t + u_t, \\ e_t &= (1-c)k + ce_{t-1} && + v_t, \\ z_t &= d_0 && + d_1 y_{t-1} + d_2 e_t + w_t. \end{aligned}$$

The disturbances u, v, w have zero mean and are temporally uncorrelated; e is referred to as "genetic IQ potential." Conlisk (1977, 1984) elaborated his model and applied it to assess the equity and efficiency of educational subsidies.

Evidently, the structure of Becker's system is a special case of Conlisk's. Becker (p. 138) says that Conlisk's model is "interesting," but hastens to add that since it is not derived from utility-maximizing behavior, it does not incorporate the relations among the parameters that his own model has. As far as I can see, the only such relation is $b = am$: the coefficient on parental income y_t and the coefficient on the compound disturbance $e_t + u_t$ are linked together by the market rate of return factor $m = 1 + r$. I will have more to say about that link later.

Observe that both Conlisk and Becker are working within a unisex framework. Each parent produces one child, who in turn produces one child, etc., all without benefit of marriage. Elsewhere in the *Treatise*, Becker does analyze marriage and multi-child families, but it is fair to say that that analysis is not integrated into his intergenerational system. For richer intergenerational schemes—ones that allow for two parents, several children, several observable variables (say IQ and socioeconomic status), and also take account of assortative mating—one may turn to the biometrical-genetics literature: see N. E. Morton and D. C. Rao (1979), C. R. Cloninger, J. Rice, and T. Reich (1979), and M. W. Feldman and L. L. Cavalli-Sforza (1979).

Of course, none of those models is based upon utility-maximizing behavior, and all would be viewed as merely mechanical.

IV. Equilibrium

What happens when a reproducing population is governed by Becker's system (8)–(9)? Provided that both b and c lie between 0 and 1, the dynamic process will be stationary. Following Becker, we can then calculate the expectation and variance of y, and also its autocorrelation function.

The equilibrium expectation, variance, and autocorrelations of income are:

$$\mu = ak/(1-b), \tag{10}$$

$$\sigma^2 = f(\sigma_u^2 + g\sigma_e^2), \tag{11}$$

$$\rho_j = b\rho_{j-1} + c^j d, \tag{12}$$

where $j = 1, 2, \dots;\ \rho_0 = 1$; and

$$f = a^2/(1-b^2), \tag{13a}$$

$$g = (1+bc)/(1-bc), \tag{13b}$$

$$\sigma_e^2 = \sigma_v^2/(1-c^2), \tag{13c}$$

$$d = (1-b^2)\sigma_e^2 \div \left[(1+bc)\sigma_e^2 + (1-bc)\sigma_u^2\right]. \tag{13d}$$

The expectation μ and variance σ^2 describe inequality within a generation. The autocorrelations—of child with father ρ_1, with grandfather ρ_2, with great-grandfather ρ_3, etc.—describe mobility (or rather immobility) across generations. So the integration that Becker promised has been accomplished.

Consider the income variance in (11). It is a linear combination of the market luck variance σ_u^2 and the endowment variance σ_e^2. (For convenience here and in what follows, I have reparameterized from σ_v^2 to σ_e^2). The income variance is increasing in f and g, that is to say, it is increasing in a, b, and c. Or, going back one more step, it is increasing in a, r, and c. The higher the rate of return r, the higher the preference for child income a, and the higher the inheritability of endowments c, the higher will be the steady-state dispersion in income σ^2.

Becker looks more closely at the composition of the income variance. In the term in parentheses in (11), the weight on endowment variance, namely, $g = (1+bc) \div (1-bc)$, exceeds the weight on market luck variance, namely, 1. Further, he maintains that endowment variance probably exceeds market luck variance, because the former lasts a lifetime, while the latter may wash out from year to year.

This leads to another key message. What his model of utility maximization does is reinforce the role of endowment differences in the determination of income differences:

> The effect of utility maximization... can be seen from a comparison with the inequality when parents do not maximize. ...[T]he contribution of endowed inequality to income inequality would be greatly reduced.... Therefore, mechanical models of the intergenerational transmission of inequality that do not incorporate optimizing responses of parents to their own or to their children's circumstances greatly understate the contribution of endowed inequality and thereby understate the influence of family background on inequality. [p. 142]

This is a sweeping indictment of an extensive scholarly literature. I do not see that it is justified. What Becker must be arguing is that if parents did not maximize utility, then the coefficient b would be zero, so g (the weight on endowment variance) would fall to 1 (the weight on market luck variance). If

TABLE 1—OBSERVATIONAL EQUIVALENCE OF ALTERNATIVE PARAMETER SETS

	(1) True	(2) Pseudo
a	.5	.31
m	1.6	1.6
b	.8	.5
c	.5	.8
σ_u^2	1.0	1.6
σ_e^2	4.0	22.93
k	.4	1.6
d	.23	.52
f	.69	.13
g	2.33	2.33
μ	1.00	1.00
σ^2	7.18	7.18
ρ_1	.92	.92
ρ_2	.79	.79
ρ_3	.66	.66
ρ_4	.54	.54

so, the contribution of endowment variance would indeed be reduced. Now, to say that b vanishes is to say that there is no direct link between parent's income and child's income. However, even mechanical and sociological models of intergenerational transmission, even Conlisk's model, allow a direct effect of parental income on child's income: they have a nonzero b. (Suppose for example that the proportion of income devoted to investment in the child were randomly rather than optimally chosen; would the path b vanish?)

Omission of that path altogether, not mere neglect of its optimality, is what it would take to sustain Becker's indictment. There is really no justification for his claim that mechanical models understate the role of endowments, or for that matter, the role of family background, in the determination of income inequality.

Turning briefly to mobility, consider the steady-state autocorrelations in (12). The parameters b and c lie between zero and one, as does the weighted variance ratio d. So the correlations die down as we go back to more distant ancestors of the child. But the correlations with recent ancestors may be quite high. Throughout the chapter, Becker emphasizes the strength of the ties that bind one utility-maximizing generation to the next, by suggesting high values for b, c, and d. A numerical example may serve to fix ideas. For the first column of Table 1, I choose a set of parameter values which lie in the ranges suggested by Becker in his chapter. I set $a = c = .5$, $m = 1.6$ (so $b = am = .8$), $\sigma_u^2 = 1$, $\sigma_e^2 = 4$, and $k = .4$. I generate the rest of the column by the formulas developed above. The autocorrelations are high: in this model economy, the intergenerational ties are strong. The second column of the table will be explained later.

V. Identification

Imagine that we had data for several generations on a large number of families, all under constant conditions. Could we infer the values of the structural parameters, when only incomes y and not endowments e are observable? To avoid unnecessary complications, suppose that the number of families is sufficiently large that the sample moments coincide with the population moments.

Equation (8) might suggest that we regress child's income y_t on parent's income y_{t-1} to estimate b. As Becker shows (p. 168), that will not do. For (8) is a first-order autoregression with autocorrelated errors. The regression slope will not estimate b, but rather the first autocorrelation coefficient of y. From (12) this equals $\rho_1 = b + cd$, which clearly overstates b.

So Becker suggests (p. 147) that we rearrange equations (8) and (9) to obtain an equation which relates child's income to the incomes of his parent and grandparent:

$$(14) \quad y_t = (b+c)y_{t-1} - bcy_{t-2} + a(v_t + u_t - cu_{t-1}).$$

He observes that the coefficient on grandparent's income, $-bc$, is negative. So it appears that *ceteris paribus* increases in my income, say, would cause a reduction in my grandchild's income:

> This negative relation between the incomes of grandparents and grandchildren is surprising in view of the fact that an increase in the income of

> grandparents would raise the income of parents, which in turn would raise the income of grandchildren. [p. 148]

Now equation (14) is a second-order autoregression with autocorrelated errors, so just like (8), it is not a proper regression. That is to say $-bc$ represents neither a regression coefficient nor a meaningful causal effect. The surprising apparition is simply an artifact. And indeed, Becker immediately points out that his *ceteris paribus* condition implicitly offset the induced increase in y_{t-1} by a decrease in u_{t-1}. Thus he explains away the anomaly that he himself had introduced. What he has done here is somewhat analogous to the following: Take the simplest Keynesian macromodel: (*i*) $C = a + bY$, (*ii*) $Y = C + I$. Rewrite (*ii*) as $C = Y - I$, and observe that it appears that *ceteris paribus* increases in investment lead to decreases in consumption. Express surprise, then explain that appearances are deceiving, because Y is endogenous.

To compound matters, Becker takes this as an occasion that illustrates the power of economic theory. Sociologists, he suggests, who estimate dynamic models of income and wealth "but fail to consider the underlying behavior," would be misled into giving a causal interpretation to the negative coefficient on grandparental income (p. 148). His suggestion is itself misleading, since those who fail to consider the underlying behavior would presumably be fitting (14) by least-squares regression and hence not be estimating $-bc$.

We return to the main task, identification of the structural parameters. The regression approach, as we have seen, is awkward, and a more direct attack via equations (10)–(13) will be preferable. Suppose that we know μ, σ^2, and all the ρ_j. Can we deduce unique values of all the structural parameters, namely, k, a, b, c, σ_u^2, and σ_e^2? Becker's answer is yes, provided that a direct observation on the market rate of return is also available. He says that

> all the information required to understand the determinants of inequality and intergenerational mobility would be available without information on endowments: the propensity to invest, the degree of inheritability, the fraction of income spent on children, and the inequality in market and endowed luck. [p. 149]

Let us see. We can set aside equation (10) which will solve for k once the other parameters are known. We can also set aside autocorrelations beyond the third for, as Becker recognizes, they do not add to identification in his model. This leaves us with

$$(15)\quad \rho_1 = b + cd, \quad \rho_2 = b\rho_1 + c^2 d, \quad \rho_3 = b\rho_2 + c^3 d.$$

Suppose we solve these three equations for b, c, d. Then from (11) and (13a, b, d) we can deduce the product $a^2\sigma_e^2 = d(1-bc)\sigma^2$. But we cannot without an additional piece of information separate a^2 from σ_e^2. The additional piece of information is provided by the observed market rate of return r (which gives $m = 1 + r$) in view of the utility-maximization implication (which gives $a = b/m$). At this point identification appears complete.

However, the situation is actually more tenuous. In the preceding paragraph, I presumed that the three autocorrelations in (15) suffice to uniquely determine b, c, and d. But they do not. Rewrite (15) as

$$(16)\quad \rho_1 = b + cd, \quad \rho_2 = (b+c)\rho_1 - bc, \quad \rho_3 = (b+c)\rho_2 - bc\rho_1.$$

Observe that the first equation in (16) merely determines d once b and c have been determined. The second and third equations in (16) determine the sum $b + c$ and the product bc, but cannot sort out which is b and which is c. Thus the propensity to invest, b, and the inheritability coefficient, c, are interchangeable, emerging as the two roots of a quadratic equation. Becker presumes that the propensity to invest is larger than the inheritability coefficient, and so takes the larger root to be b and the smaller root to be c (pp. 148–149). He offers no basis for that presumption. I see none myself, and conclude that there is an inherent indeterminacy between b and c in his model.

The indeterminacy filters through to the remaining parameters, as the second column of Table 1 illustrates. To construct the column, I interchanged the b and c values of column (1) and then adjusted the values of the other parameters so as to preserve all the observables: the return factor m, the mean μ, the variance σ^2, and the autocorrelations ρ_j. Those two quite different parameter sets are observationally equivalent.

There are at least two lessons to be drawn from this analysis. First, the structural parameters are not identified, and hence are not estimable with ideal family income data. Second, the crucial implication of utility maximization, namely, $b = am$, which in a sense distinguishes Becker's model from mere mechanical models, is at best an identifying relation, not an over-identifying relation. It is thus not a testable implication, at least with family income data.

VI. Rise and Fall

What happens when Becker's model is confronted with more detailed empirical material, namely micro-data on the incomes of parents and children? For some guidance I go beyond the *Treatise* to Becker and Tomes (1986). This article, entitled "Human Capital and the Rise and Fall of Families," opens on a familiar note:

> Sociologists...have presented considerable empirical evidence on the occupations, education, and other characteristics of children and parents. ...The many empirical studies of mobility by sociologists have lacked a framework or model to interpret their findings. We try to remedy this defect and to fill a more general lacuna in the literature by developing a systematic model that relies on utility-maximizing behavior by all participants, equilibrium in different markets, and stochastic forces with unequal incidence among participants. [pp. S2–S3]

A new model is developed. While the endowment transmission equation (9) remains the same, the new model departs in some respects from that of the *Treatise*. Capital markets are perfect: parents can borrow freely to finance expenditures on their children, and they can impose the debt on the children. So the budget constraint (1) is no longer effective:

> Access to capital markets to finance investments in children separates the transmission of earnings from the generosity and resources of parents. [p. S10]

Investment I and child's income Y are no longer dependent on the parent's income X. With capital markets perfect, there will be no direct path b from parent's income X to child's income Y. Incomes of parents and children will be correlated, but only because of their association with the autocorrelated endowment stream. At this point, the new model amounts to the old (8)–(9) with b set at zero.

Then imperfections in the capital market are reintroduced; they are said to apply to less wealthy families. Along with them the path b returns, now interpreted as a measure of the restraint on access to funds. In this manner, Becker and Tomes arrive at a model that is formally identical to (8)–(9). The interpretations are somewhat different. For example, the new model with imperfect capital markets leads again to the *Treatise*'s stochastic relation between the incomes of child, parent, and grandparent:

$$y_t = (b+c)y_{t-1} - bcy_{t-2} + a(v_t + u_t - cu_{t-1}). \tag{17}$$

This time the negative coefficient on y_{t-2} is taken seriously: it arises because of the "constraints on financing investment in children." [p. S13] For another example, with b nonzero, the new model leads again to the income autocorrelation pattern of the *Treatise*. This time, the fact that $\rho_1 = b + cd$ exceeds b means that the slope of the regression of y_t on y_{t-1} provides an upper limit on "the effect of capital market constraints on the propensity to invest in children." [p. S14]

A more positive stance on government compensatory and redistributive policies emerges. But still

> Compensatory responses of parents apparently greatly weaken the effects of public health programs, food supplements to poorer pregnant women, some Head Start programs, and Social Security programs. [pp. S16–S17]

Becker and Tomes (1986) then assemble a dozen or so studies that report correlations between fathers and sons in earnings or income in the general population. The raw data refer to single years, or to averages over a few years. The correlations are all weak: they run in the range of 0 to .3. Recalling that these are estimates of $\rho_1 = b + cd$ (and presuming that d is not negligibly small), the authors infer that both b and c must be small.

Readers of the *Treatise* might expect that this would occasion the tearing of hair and the gnashing of teeth. After all, in the *Treatise*, Becker had emphasized the *strength* of the parent-child linkage, using illustrative values like $b = .7$ and $c = .5$. He should have been expecting values of ρ_1 in the neighborhood of .75, say, rather than in the neighborhood of .15.

But the new model has laid the groundwork for a proper interpretation of the low empirical parent-child correlations. To paraphrase somewhat, the argument is that while both b and c must be small, b can be zero (capital markets might well be perfect), but c cannot (some automatic transmission of endowments must occur).

Thus, the empirically appropriate model reduces to

$$y_t = e_t + u_t, \tag{18}$$

$$e_t = (1-c)k + ce_{t-1} + v_t. \tag{19}$$

If so, we might say that, up to white noise, Galton's rule for heights applies directly to incomes. And since the resulting estimate of c is so low, the authors conclude that:

> Aside from families victimized by discrimination, regression to the mean in earnings in the United States and other rich countries appears to be rapid.... Almost all earnings advantages and disadvantages of ancestors are wiped out in three generations. Poverty would not seem to be a "culture" that persists for several generations. [p. S32]

One recalls Galton's language. Interpreting his mechanical representation of the law of hereditary transmission of heights he wrote:

> This law tells heavily against the full hereditary transmission of any gift.... The more exceptional the amount of the gift, the more exceptional will be the good fortune of a parent who has a son who equals and still more if he has a son who overpasses him in that respect. The law is evenhanded; it levies the same heavy succession-tax on the transmission of badness as well as of goodness. If it discourages the extravagant expectations of gifted parents that their children will inherit all their powers, it no less discountenances extravagant fears that they will inherit all their weaknesses and diseases. [1886, p. 253]

We have come a long way from the *Treatise*. One obvious conclusion is that the sociologists had not, after all, been led astray by their neglect of utility maximization.

VII. Conclusion

I have taken a close look at one component of Becker's model of the economic family. By focusing on the details, I have arrived at a skeptical attitude toward specific results and interpretations.

This skepticism should not (nor will it) detract from the value of Becker's work or from the merit of the lines of investigation that he has opened up. Research on mobility, inequality, and the family will benefit from increased participation by economists. And apparently it is necessary to establish a utility-maximization framework before many economists are willing to participate in the study of the family.

Other social scientists are less inhibited, but function effectively nonetheless. Consider the main line of sociological research on family background and socioeconomic achievement: P. M. Blau and O. D. Duncan (1967); Duncan, D. L. Featherman, and B. Duncan (1972); Jencks et al. (1972, 1979); W. H. Sewell and R. M. Hauser (1975); Hauser and Featherman (1977); Featherman and Hauser (1978). It would be misleading to view those empirical analyses as mechanical, framework-lacking, exercises. And it would be wasteful to treat them merely as convenient sources of data which await the economist's masterful hand.

The structural relationships to be found there may not rest on utility maximization, but are nonetheless "behavioral," being interpretable in terms of general principles of human behavior. Naturally enough the sociologists' models incorporate outcomes other than income or earnings. Now suppose that intergenerational links are stronger for occupation or socioeconomic status than for income or earnings. Then restricting attention to the monetary measures could lead an economist to understate the influence of family background on inequality.

REFERENCES

Becker, G. S., *A Treatise on the Family*, Cambridge, MA: Harvard University Press, 1981.

______ **and Tomes, N.**, "An Equilibrium Theory of the Distribution of Income and Intergenerational Mobility," *Journal of Political Economy*, December 1979, *87*, 1153–89.

______ **and** ______, "Human Capital and the Rise and Fall of Families," *Journal of Labor Economics*, July 1986, *4*, S1–S47.

Blau, P. M. and Duncan, O. D., *The American Occupational Structure*, New York: Wiley & Sons, 1967.

Cloninger, C. R., Rice, J. and Reich, T., "Multifactorial Inheritance with Cultural Transmission and Assortative Mating, III, Family Structure and the Analysis of Separation Experiments," *American Journal of Human Genetics*, May 1979, *31*, 366–88.

Conlisk, J., "Can Equalization of Opportunity Reduce Social Mobility?," *American Economic Review*, March 1974, *64*, 80–90.

______, "A Further Look at the Hansen-Weisbrod-Pechman Debate," *Journal of Human Resources*, Spring 1977, *12*, 147–63.

______, "Four Invalid Propositions About Equality, Efficiency, and Intergenerational Transfers Through Schooling," *Journal of Human Resources*, Winter 1984, *19*, 3–21.

Duncan, O. D., Featherman, D. L. and Duncan, B., *Socioeconomic Background and Achievement*, New York: Seminar Press, 1972.

Featherman, D. L. and Hauser, R. M., *Opportunity and Change*, New York: Academic Press, 1978.

Feldman, M. W. and Cavalli-Sforza, L. L., "Aspects of Variance and Covariance Analysis with Cultural Inheritance," *Theoretical Population Biology*, June 1979, *15*, 276–307.

Galton, F., "Regression Towards Mediocrity in Hereditary Stature," *Journal of the Anthropological Institute of Great Britain and Ireland*, 1886, *15*, 246–63.

Hauser, R. M. and Featherman, D. L., *The Process of Stratification*, New York: Academic Press, 1977.

Jencks, C., et al., *Inequality*, New York: Basic Books, 1972.

______, *Who Gets Ahead?*, New York: Basic Books, 1979.

Morton, N. E. and Rao, D. C., "Causal Analysis of Family Resemblance," in C. F. Sing and M. Skolnick, eds., *Genetic Analysis of Common Diseases*, New York: Alan R. Liss, 1979, 431–52.

Sewell, W. H. and Hauser, R. M., *Education, Occupation, and Earnings: Achievement in the Early Career*, New York: Academic Press, 1975.