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INTERGENERATIONAL MOBILITY, SIBLINGS' INEQUALITY
AND BORROWING CONSTRAINTS

BY

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Intergenerational Mobility, Siblings' Inequality and Borrowing Constraints

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Abstract

This paper uncovers differences in social mobility between rich and poor families. The paper shows, in particular, that borrowing constraints retard social mobility among the poor by preventing poor parents from investing optimally in their children's human capital. This evidence contradicts several recent studies that argue that innate ability is the overriding determinant of socioeconomic success in the United States. The paper also shows that siblings' inequality seems to be independent of family wealth, which clearly contradicts the predictions of most economic models of resource allocation within the family.

I. Introduction

If one were to summarize the main message of the extensive scientific literature dealing with family influences, a single line would suffice: it pays to choose one's parents. This makes an obvious point: good parents are an unquestionable advantage in the quest for socioeconomic status. Less obvious is the question about what parental characteristics have the greatest effect on children's outcomes. Many have been mentioned. A short list will surely include parental wealth, family connections, parental teachings and attitudes, genetic traits, and a few others.

This paper studies the connection between parental wealth and children's earnings within the framework provided by Becker and Tomes (1986). These authors postulate an obvious mechanism through which parental wealth may influence children's earnings. The crux of the argument is well-known: if parents are not allowed to borrow against their children's earnings, poor parents will be often unable to invest optimally in their children's human capital. This inability will in turn depress the earnings of poor children vis-à-vis rich children with the same ability and will retard social mobility among the poor. Again, in the presence of borrowing constraints, family wealth matters and the fortunes of parents and children are more closely tied among the poor.

I show in this paper that –as predicted by the Becker-Tomes model– earnings regress to the mean at slower rates for those families who lack enough funds to optimally invest in human capital. This finding is specially important in light of Mulligan's (1997) claims that borrowing constraints do not appear to be an important determinant of intergenerational mobility in the United States. I show that Mulligan's empirical results are not robust to small changes in his empirical strategy. I also show that there is a myriad of additional empirical evidence indicating the importance of borrowing constraints in intergenerational relations. All in all, the results of this paper cast serious doubts on Mulligan's empirical results and policy recommendations.

The Becker-Tomes model, coupled with a few assumptions about parental preferences, also yields testable implications about the difference in siblings' earnings

inequality between rich and poor families. Wealthy parents in the model invest the wealth-maximizing amount of human capital in each child, which implies that human capital investments will be disproportionally concentrated on the ablest of the children. Although this will surely create large earnings' differences among children, no fairness issues will arise because wealthy parents can mitigate the differences in earned incomes with financial transfers. By contrast, poor parents –being unable to use transfers to alleviate earnings differentials– face a trade-off between equity and efficiency, which is to say that poor parents will take into account equity considerations when deciding how much to invest in each child. The Becker-Tomes model implies thus that poor parents will be –in general– more concerned about earnings inequality and thereby siblings' earnings inequality will be –on average– smaller among poor families.

I test the aforementioned prediction of the Becker-Tomes model using two different data sets. I find no differences in siblings' earnings inequality between rich and poor families. The causes of this alleged failure of the Becker-Tomes can be traced back to the specification of parental preferences toward their various children. The different options that will render the model consistent with the intragenerational evidence are thoroughly discussed in the last section of the paper.

The organization of this paper is as follows. Section II sketches the Becker-Tomes model and attempts a taxonomy of its different assumptions. Sections III and IV present the empirical evidence concerning the intergenerational and intragenerational predictions of the model, respectively. Finally, Section V discusses the most salient aspects of the results.

II. The Becker-Tomes Model

The Becker-Tomes model is the paradigmatic economic model of both the intergenerational transmission of inequality and the allocation of resources within the family. In this section, I first lay out the substantive assumptions of the model, and I then derive some of its more salient empirical implications.

The starting point of the model is the presence of parental altruism. Parents are assumed to derive satisfaction from the well-being of their children. More precisely, the utility function of the parents in the t th generation is assumed to be of the form

$$U_t = U(c_t, I_{t+1}), \quad (1)$$

where c_t denotes parental consumption and I_{t+1} denotes the income of a representative child.¹ Parental altruism is assumed to be independent of economic status and can be easily justified on biological grounds (Hamilton, 1964).²

The next assumptions of the model deal with three crucial aspects of intergenerational relations: the transmission of endowments from parents to children, the investments of parents in their children, and the economic constraints on these investments. Taken together the three groups of assumptions determine the constraints faced by parents when maximizing their utility. The division of the assumptions in three broad groups will be important later on when studying how the empirical implications of the model hinge on the different assumptions.

Endowments

Parents are assumed to pass on endowments to their children at no cost. Endowments include cognitive ability, physical appearance, attitudes, family “connections”, and in general all those traits (both genetic and cultural) that have an effect on children’s earnings. In the simplest version of the model, all relevant endowments are summarized in an one-dimensional magnitude (E) that is in turn transmitted from parents to children according to the following Markov process:

$$E_{t+1} = d + hE_t + v_t, \quad (2)$$

where E_t and E_{t+1} are the endowments of parents and children respectively, v_t is the random component of the transmission process, and h represents the “inheritability” of endowments. Equation (2) presupposes that the transmission of cultural and biological

¹ If parents care about their children’s utility rather than their income, one no longer can circumscribe the analysis to two generations. Becker and Tomes (1979) show, however, that even if children’s utility directly affects parental utility, the main implications of the model still hold.

² Hamilton’s theory of kin selection is the conventional explanation of “instinctive” kin-directed altruism. The idea is simple: a gene that predisposes parents to love and nurture their children – or, generally, a gene that predisposes parents to adopt actions that raise children’s odds of survival– will be likely to be favored by natural selection since a typical child has a 50 percent chance to carry the same gene.

traits obey similar rules, a point forcefully made by Cavalli-Sforza, Feldman, Shen and Dornbush (1982). All the available evidence concerning both genetic and cultural transmission of endowments suggests a value of h much smaller than 1.0, and probably smaller than 0.6 (Erlenmeyer-Kimling and Jarvik 1963, Cavalli-Sforza et al. 1982, and Herrnstein and Murray 1994).

Parental Investment

While by assumption parents cannot invest in their children's endowments, they can purposefully affect the well-being of their children (income in the model) both by investing in their children's human capital and by transferring financial assets to them. Earnings and financial transfers from parents are the sole sources of income in the model. Consequently, the adult income of a representative child will be given by

$$I_{t+1} = H_{t+1} + (1 + r_t)B_t, \quad (3)$$

where H_{t+1} are earnings (the returns to human capital), B_t are financial transfers by parents, and r_t is the economywide rate of return on financial assets. Earnings, in turn, are assumed to obey a standard "earnings" function of the form

$$H_{t+1} = H(x_t, E_{t+1}) + w_t, \quad (4)$$

where x_t are parental expenditures in human capital, E_{t+1} are children's endowments, and w_t is market luck. The function H is assumed to exhibit diminishing returns to x_t , which reflects either bounded mental capabilities or the shorter "accruing lives" of additional human capital investments. Further, some of the implications of the model discussed below hinge on the presence of higher marginal returns to human capital for better-endowed children (i.e., $\partial^2 H_{t+1} / \partial x_t \partial E_{t+1} > 0$).³

Parents are assumed to provide all capital (human and financial) to their children. Returns on financial assets and marginal costs of human capital investments are assumed to be the same for everybody (i.e., they do not depend on endowments). In addition,

³ Alternatively, one can assume that while marginal earnings do not depend on endowments, better-endowed individuals face lower marginal costs of human capital investments. If this is the case, investments in human capital will also be increasing in endowments and the main implications of the model follow through (see Ashenfelter and Rouse, 1998).

parents are assumed to know the endowments of their children, and hence to know with certainty the marginal returns of all human capital investments. Parents will procure the welfare of their children when so doing does not interfere with their own consumption. So, barring financial constraints, they will invest the wealth-maximizing level of human capital in each child.

Borrowing Constraints

Transfers of debts from parents to children are barred in the model, which implies that parents will be unable to borrow against the future of earnings of their children in order to finance children's human capital accumulation. Two different types of families can then be distinguished in the model: non-capital-constrained families (or “rich” families) who invest the wealth-maximizing level of human capital and make financial transfers, and capital-constrained families (or “poor” families) who fall short of the optimal investments in human capital and do not make transfers. In empirical work “rich” families can then be identified as those who either leave (or expect to leave) bequests or make substantial intervivos transfers or both. Roughly, 40 percent of US families fall into this group (Blinder, 1974).

Intergenerational Transmission of Earnings

As noted above, “rich” parents will always invest the wealth-maximizing level of human capital ($\bar{x}_t$). More precisely, “rich” parents will invest in human capital until the marginal return equals the economywide rate on financial assets (r_t). The previous assumptions ensure that $\bar{x}_t$ is the unique solution to the following equation

$$H_{x_t}(\bar{x}_t, E_{t+1}) = 1 + r_t. \quad (5)$$

Clearly, for “rich” families $\bar{x}_t$ depends solely on endowments and on the economywide rate of return ($\bar{x}_t$ is independent of both parental wealth and parental altruism). In short,

$$\bar{x}_t = R(E_{t+1}, r_t), \quad (6)$$

where $R_{E_{t+1}}(\cdot) > 0$ and $R_{r_t}(\cdot) < 0$.

“Poor” parents, on the other hand, cannot separate the decision of how much to invest in human capital from their utility maximization problem, and thus parental wealth and parental altruism become instrumental in the determination of $\bar{x}_t$. Generically,

$$\bar{x}_t = P(E_{t+1}, r_t, I_t, \mathbf{z}_t), \quad (7)$$

where I_t is parental income, $\mathbf{z}_t$ is parental altruism and both partial derivatives are positive— $R_{I_t}(\cdot) > 0$ and $R_{\mathbf{z}_t}(\cdot) > 0$.

The implications of the model pertaining to the intergenerational mobility of earnings can now be derived. For “rich” families although earnings of parents and children are not directly related, they are indirectly linked through the inheritability of endowments. This is evident after substituting $\bar{x}_t$ into the earnings function:

$$H_{t+1} = H(R(E_{t+1}, r_t), E_{t+1}) + w_t = \Psi(E_{t+1}, r_t) + w_t. \quad (8)$$

Equation (8) can now be combined with equation (2.2) to derive the intergenerational transmission of earnings for “rich” families. If both equations are linear in logs, it can be easily shown that earnings will be transmitted across generations of “rich” families according to

$$\ln H_{t+1} = C + h \ln H_t + \mathbf{e}_t, \quad (9)$$

where C is a complicated constant, $\mathbf{e}_t$ is a first-order moving average process, and h is the degree of inheritability of endowments.

For “poor” families, on the other hand, there is a direct connection between parental income (equated here with parental earnings) and children’s earnings. This is obvious after substituting equation (7) into the earnings function:

$$H_{t+1} = H(P(E_{t+1}, r_t, H_t, \mathbf{x}_t), E_{t+1}) + w_t = \Phi(E_{t+1}, r_t, H_t, \mathbf{x}_t) + w_t. \quad (10)$$

Equation (10) can then be combined with equation (2) to derive the intergenerational transmission of earnings for “poor” families. Assuming log-linearity again, it follows easily that

$$\ln H_{t+1} = C + (\mathbf{b} + h) \ln H_t - \mathbf{b}h \ln H_{t-1} + \mathbf{e}_t, \quad (11)$$

where H_{t-1} are earnings of grand parents, and β is $\partial \ln \Phi / \partial \ln H_t$.⁴ A comparison of equations (9) and (11) reveals one of the central implications of the Becker-Tomes model; namely, earnings regress to the mean at slower rates for “poor” families than they do for “rich” families.

The excess of sensitivity of children’s earnings to parental earnings in “poor” families can be interpreted as a measure of inequality of opportunity. If there were equal access to education, all families would invest the efficient level of human capital, and earnings would regress to the mean at similar rates for both “rich” and “poor” families. Without equal access, family wealth matters and children from “rich” parents enjoy a clear advantage in their quest for socioeconomic success. Interestingly, a policy aimed at increasing access to education not only will reduce inequality of opportunity, but also will increase efficiency by ensuring that “poor” families will come closer to their optimal human capital levels.

The connection between family wealth and equality of opportunity (and hence the rationale for policies procuring equal access to education) is lost when borrowing constraints are absent. If there are not borrowing constraints, earnings are exclusively determined by endowments, and thus the intergenerational transmission of earnings is driven solely by the inheritability of endowments. Interestingly, these are precisely the main premises of the model of intergenerational mobility recently proposed by Herrnstein and Murray (1994)—with perhaps the extra presumption that cognitive ability is the crucial endowment. In complete contrast to the Becker-Tomes model, in this model any policy aimed at increasing equal access to education will be inconsequential on both efficiency and equity grounds. In the gloomy words of Herrnstein (1971), “greater wealth, health, freedom, fairness, and educational opportunity are not going to give us the egalitarian society of our philosophical heritage.”

⁴ I have found through simulations that the log linearity of equation (8) and (10) is either correct or a very good approximation for most utility and production representations used in economics. None of the substantive implications of the model hinge on these assumptions.

The question as to which of the two alternative models above bears more resemblance to reality is, of course, an empirical matter. Mulligan (1997), for example, presents evidence that seems to indicate the empirical failure of the Becker-Tomes model. In particular, Mulligan argues forcefully that borrowing constraints do not appear to be an important determinant of intergenerational mobility in the United States. In the next section, I will reexamine Mulligan's evidence and I will show that, contrary to his claims, borrowing constraints play an important role in the transmission of inequality in the United States.

Intrafamilial Differences in The Becker-Tomes Model

While the previous discussion has bypassed any reference to intrafamilial relations, the Becker-Tomes model, coupled with a few assumptions about parental preferences, yields stark implications about the relative sizes of earnings and income differentials among siblings for rich and poor families. Since parental preferences toward their different children must now be made explicit, the parental utility function (equation (1) above) must be redefined as

$$U_t = U(c_t, I_{t+1}^1, I_{t+1}^2, \dots, I_{t+1}^n) \quad (12)$$

where I_{t+1}^i denotes the permanent income of the i th child.⁵ Parents are assumed to be indifferent to any permutation of their children's income (i.e., $U(c_t, X, Y) = U(c_t, Y, X)$). This assumption—equal concern in the terminology of Behrman, Pollak, and Taubman (1982)—precludes any differential treatment of children based on gender, appearance, or any other difference perceived or real. Parents are also assumed to be averse to inequality in that they will prefer, all else equal, a more egalitarian distribution of income among their children. This assumption excludes any form of parental preferences that will always favor efficiency over fairness (i.e., $U(c_t, I_{t+1}^1 + I_{t+1}^2 + \dots + I_{t+1}^n)$).⁶ Finally, equation (12) implies that parents do not care about earning differentials among their children as long as they can be compensated with financial transfers. This precludes any parental concern about non-

⁵ It is often assumed in the literature that *intergenerational* allocation issues can be separated from *intragenerational* ones. Formally, this amounts to assuming that parental consumption and children's outcomes are separable in equation (12).

⁶ Behrman, Pollak and Taubman (1982) and Pitt, Rosenzweig and Hassam (1992) offer compelling evidence indicating the presence of parental aversion to inequality.

pecuniary effects of both earnings (they may enhance self-respect) and financial transfers (they may cause guilt or jealousy).

Consider first the implications of the previous assumptions pertaining to the inequality of earnings and income among children of rich parents. “Rich” parents (slightly redefined here as those that make financial transfers to *all* of their children) will invest the optimal amount of human capital in each child, which, given the assumption of higher marginal returns to human capital for better-endowed children, implies that human capital investments will be disproportionally concentrated on the ablest of the children. Although this strategy will create large earnings differences among children, “rich” parents can avoid equity concerns by using financial transfers to compensate differences in earned incomes. Thus, generally speaking “rich” parents will both reinforce endowments differences and compensate the resulting earnings disparity by means of financial transfers.

On the other hand, “poor” parents (redefined here as those that do *not* make assets transfers to *any* of their children) cannot alleviate earnings differentials via transfers and hence face a trade-off between equity and efficiency. “Poor” parents face then a dilemma of sorts. Should they reinforce endowments differentials by efficiently investing their scarce resources in their better-endowed children? Or, should they instead try to offset the vagaries of the endowment lottery by investing more in the unlucky children? In general, inequality-averse parents will opt for a compromise, meaning that they will sacrifice some efficiency to achieve some fairness. So unlike “rich” parents, “poor” parents will rarely reinforce their children’s endowments differences. As a result, sibling’s earnings inequality should be –in general– smaller among the “poor.”

As recognized by Behrman, Pollak, and Taubman (1995), the Becker-Tomes model does not yield unambiguous predictions for “moderately rich” families (those that make financial transfers to *some but not all* of their children). This observation notwithstanding, the model still predicts a more egalitarian distribution of earnings among siblings for poor families regardless of whether or not they are defined to include “moderately rich” families. For example, if “rich” and “moderately rich” families are lumped together as a group (say, they cannot be distinguished in empirical work), the

model will still predict higher earnings differentials among siblings for this group vis-à-vis “poor” families. A similar statement will apply if, alternatively, “moderately rich” families are lumped together with “poor” families. Moreover, I have found through extensive simulations that for a wealth of parental preferences and earnings functions siblings’ earnings inequality always increase with parental wealth. In sum, the Becker-Tomes model does predict a more egalitarian distribution of earnings among siblings for poor families—defined either inclusive or exclusive of “moderately rich” families.

The previous analysis makes it clear that the Becker-Tomes model, along with a few assumptions about parental preferences, predicts that inequality of earnings among siblings will tend to be greater in rich families while inequality of income will tend to be greater in poor families. The empirical evidence in this respect is sparse and ambiguous. Thus, Wilhelm (1990) and Behrman, Pollak, and Taubman (1995) argue that financial transfers appear to be too small to even slightly compensate the large observed differences in earnings among siblings. On the contrary, Tomes (1981), Cox and Rank (1992), and McGarry and Schoeni (1995) show that—as predicted by the model—siblings with smaller earnings receive, on average, larger gifts and bequests. To my knowledge, no previous study has compared siblings’ earnings inequality between rich and poor families. In section 4 of this paper I show that the available evidence is at odds with the predictions of the model in this respect.

III. Intergenerational Relations

In this section I estimate the rates of intergenerational earnings mobility for “poor” and “rich” families using a sample of parents and children drawn from the PSID. The PSID began in 1968 with a stratified sample of approximately 5,000 families. The sample has been followed annually with small changes in the questionnaire and some attrition losses. More important, all individuals who “split off” from their original family units to form their own families are automatically added to the sample, which obviously permits the study of a wealth of intergenerational relations.

The original PSID sample was the result of the juxtaposition of two independent samples: the first was a nationally representative sample drawn by the Survey Research

Center (SRC sample henceforth) and the second was a sample of low-income families drawn by the Bureau of the Census (SEO sample henceforth). Below I use both the SRC sample and the full PSID sample (SRC and SEO combined), with the understanding that the latter includes a larger share of poor families than the general population.

To start, I link children with their “fathers” (original male household heads). Then, I break the sample into “poor” and “rich” families according to a set of criteria that I shall explain below. Last, I estimate the following simple intergenerational model for “rich” and “poor” households separately:

$$\ln H_{t+1}^i = \mathbf{b}_1 + \mathbf{b}_2 \ln H_t^i + X_{t+1}^i + \mathbf{e}_{t+1}^i, \quad (13)$$

where H_{t+1}^i and H_t^i are earnings of the child and father respectively, X_{t+1}^i is vector of covariates comprising the age of the child in 1986, the square of the age of the child, and dummies for daughters and marital status, and $\mathbf{b}_2$ is the degree of regression to mean of earnings. The earnings of a typical father were computed as the average of his annual labor income for the period 1968-72. Earnings of a typical child were computed in the same fashion for the period 1985-89. Both values were converted to 1984 dollars using the consumer price index.

A word of caution is necessary before moving ahead. I do not attempt in this paper to recover the structural parameters of equations (9) and (11). Any attempt to do so will be marred by at least two problems: first, information on earnings for several generations is necessary, and second, equations (9) and (11) are difference equations with autocorrelated errors and hence no proper regressions (see Goldenberg, 1989 for a discussion). My goal here is somewhat more modest; I use a mechanical model to uncover differences in the degree of intergenerational mobility between “rich” and “poor” families. Although strictly speaking equation (13) is misspecified, it can still be used to detect differences in earnings mobility between “rich” and “poor” families, and thus it can still be used to test the predictions of the model in this respect.⁷

There were three criteria for inclusion in the various samples used in the paper: (1) fathers must be members of the original PSID families and must have at least three

⁷ Han and Mulligan’s (1997) simulations are a good illustration of this claim.

available income entries in the period 1968-72, (2) children must be members of the original PSID families, must have at least three income entries in the period 1985-89 and must have left home by 1989, and (3) children must have been born some time between 1951 and 1961—this restriction guarantees that fathers and children are compared at somewhat similar ages.

Likewise, there were two criteria for inclusion in the “rich” families sub-sample: (1) children must have reported in 1989 that did receive, any time during the previous five years, inheritances of money or property worth 10,000 dollars or more, or (2) they must have parents who reported a net worth over 100,000 dollars in 1988.

Some comments about the latter criteria are in order. The reader should recall that “rich” families are defined here as those who invest optimally in their children’s human capital, and that the theoretically sound way to identify them is by looking at gifts and bequests. Since *intervivos* transfers in the PSID are negligible, I focus here exclusively on bequests. This, of course, explains criterion (1). Unfortunately, criterion (1) hardly applies to children with living parents. Criterion (2) attempts to fill this void and so aims at identifying those parents who invested optimally in their children’s human capital but haven’t reported large assets transfers and haven’t left any bequests. The problem with criterion (2), however, is that according to the Becker-Tomes model wealth alone is not enough to determine whether or not parents invest the efficient level of human capital. In fact, wealthy parents –if not altruistic enough– may fail to invest optimally in their children. Likewise, wealthy parents of very able children may be unable to invest the optimal level of human capital in each child (they just cannot afford to send the whole bunch to Harvard). These problems notwithstanding, if parental wealth varies much more across families than parental altruism and children’s endowments do, criterion (2) won’t entail many misclassifications. Moreover, as argued below, this criterion certainly beats the alternatives.

I estimate equation (13) for four different samples: the SRC sample for sons only and for sons and daughters, and the full PSID sample (SRC and SEO combined) for sons only and for sons and daughters. Table 1 reports summary statistics on age and income of

fathers and children for “rich” and “poor” families. Lower mean earnings of children vis-à-vis fathers surely reflects life cycle effects—roughly, parents are observed in their 40s and children in their 30s. On the other hand, SRC families have, on average, higher earnings, which should not be surprising since average earnings are brought down in the full PSID sample by the oversampling of low-income families in the SEO sample.

Table 2 displays OLS estimates of the elasticity of children’s earnings with respect to their father’s earnings (b_2). The results are shown first for all families pooled together and then for “rich” and “poor” families separately. The estimates for the entire sample (“poor” and “rich” families combined) are just a restatement of Solon’s (1992) results; namely, the degree of regression to the mean of earnings is about 40 percent for sons and about 30 percent for sons and daughters taken together. More important, estimates for “poor” families are greater than the corresponding for “rich” families in each of the four samples—the difference between the two estimates is roughly ten percentage points. To test if the observed differences are statistically significant, I reestimate equation (13) for “rich” families constraining b_2 to estimated coefficient for “poor” families. The results show that the null hypothesis of equal coefficients can be rejected at the 10 percent level of significance in two of the four samples. By and large, these results suggest that—as predicted by the Becker-Tomes model—earnings are more persistent across generations among the poor.

Table 1. Sample Characteristics

Sons	SRC		Full Sample	
	Poor	Rich	Poor	Rich
Mean Father's Age 1967	40.8	40.5	40.9	40.0
Sd Father's Age	7.2	5.6	6.9	5.8
Mean Father's Earnings	23,020	36,468	19,593	34,321
Sd Father's Earnings	13,304	23,112	11,326	21,942
Mean Children's Age 1986	29.4	29.2	29.2	29.2
Sd Children's Age	3.1	3.1	3.1	3.0
Mean Children's Earnings	21,999	28,470	18,905	27,498
Sd Children's Earnings	13,270	18,443	12,988	17,485

All Children	SRC		Full Sample	
	Poor	Rich	Poor	Rich
Mean Father's Age 1967	40.4	40.6	40.7	40.2
Sd Father's Age	7.2	5.8	7.0	5.9
Mean Father's Earnings	23,448	36,754	19,341	34,769
Sd Father's Earnings	13,348	23,448	11,324	22,422
Mean Children's Age 1986	29.3	29.2	29.2	29.2
Sd Children's Age	3.1	3.2	3.1	3.1
Mean Children's Earnings	16,866	22,484	14,780	22,045
Sd Children's Earnings	12,534	16,747	11,421	16,066

Notes: Earnings are given in 1984 dollars. Sample sizes are shown in Table 2.2

Table 2. OLS Estimates of Intergenerational Mobility

Sample	N	All Families	N	Poor Families	N	Rich Families	Difference [p-values]
SRC-Sons Only	392	0.350 (0.049)	182	0.363 (0.070)	209	0.223 (0.086)	0.14 [0.10]
Full Sample-Sons Only	620	0.372 (0.036)	368	0.342 (0.049)	251	0.255 (0.078)	0.09 [0.27]
SRC-All Children	750	0.284 (0.056)	360	0.267 (0.078)	389	0.135 (0.098)	0.13 [0.18]
Full Sample-All Children	1243	0.333 (0.036)	788	0.300 (0.045)	454	0.161 (0.086)	0.14 [0.10]

Notes: Standard-error estimates are in parentheses. P-values of a test on the difference between rich and poor families are in square brackets.

Now, to the extent that average earnings over a short period of time are a noisy measure of long-run earning potential, OLS estimates will underestimate the degree of intergenerational mobility (Solon, 1992 and Zimmerman, 1992). It is unclear, however, whether this problem may also lead to an underestimation of the earnings mobility differential between “rich” and “poor” families. To shed some light on this issue, I reestimate equation (13) using father’s education as an instrument to father’s earnings. This instrument is not exempt from problems of its own. In particular, if parental education has an independent effect on children’s earnings, the IV estimates will –under a few plausible assumptions– overestimate the degree of earnings mobility (Solon, 1992). Nevertheless, the IV estimates provide yet another way to examine the rich-poor differential of earnings mobility–again, it remains unclear how the bias of the point estimates will affect the estimated difference in earnings mobility between “rich” and “poor” families.

Table 3 displays IV estimates of the degree of intergenerational mobility. The point estimates are consistently greater this time around. More important yet, the difference in estimates between “rich” and “poor” families is now as large as 40 percent and no smaller than 13 percent. Further, these differences are statistically significant at all standard levels in three of the four samples considered. As before, these results underscore the crucial role

of family wealth in intergenerational mobility and suggest that capital constraints may in fact retard social mobility among the poor by hampering human capital investments.

Errors in variables are not the only source of bias of the previous estimation. As first pointed out by Mulligan (1997), selection bias may also arise when the sample is broken into “rich” and “poor” families. The reason is simple: according to the Becker-Tomes model, most children from wealthy families will always receive the optimal amount of human capital (the borrowing constraints don’t bind for most wealthy families). By contrast, children from less affluent families won’t receive the optimal amount of human capital unless their ability is quite low (human capital investments will be exiguous then). Consequently, if all children for whom the wealth-maximizing amount of human capital was invested are lumped together, the least able children in this group are more likely to come from less affluent families. As a result, family income will be positive correlated with ability and estimates of earnings mobility will be biased upward. This observation notwithstanding, the results reported by Mulligan (1997, chapter 8) and the evidence presented in the next section of this paper strongly suggest that this source of bias is unimportant in most practical applications.

Table 3. IV Estimates of Intergenerational Mobility

	N	All Families	N	Poor Families	N	Rich Families	Difference [p-values]
SRC-Sons Only	384	0.426 (0.076)	179	0.494 (0.114)	204	0.144 (0.124)	0.35 [0.00]
Full Sample-Sons Only	609	0.569 (0.056)	363	0.629 (0.080)	245	0.145 (0.107)	0.48 [0.00]
SRC-All Children	737	0.516 (0.092)	355	0.458 (0.132)	381	0.333 (0.158)	0.12 [0.43]
Full Sample-All Children	1231	0.614 (0.054)	785	0.598 (0.071)	445	0.346 (0.119)	0.25 [0.04]

Notes: Standard-Error estimates are in parentheses. P-values of a test on the difference between rich and poor families are in square brackets. Father's education was used as instrument to father's earnings.

The results of Tables 2 and 3 above stand in sharp contrast with a similar set of results reported by Mulligan (1997). Using the same data set and a similar empirical strategy, Mulligan does not find consistent differences in earnings mobility between “rich”

and “poor” families.⁸ For him, the practical implications of his results are immediate; “rather than reducing inequality, government subsidization of schooling may only have the effect of transferring resources from taxpayers to (a) educators and (b) richer families who are more likely to choose many years of schooling for their children.” This is, of course, a familiar point in Herrnstein and Murray (1994)—the futility of a policy aimed at removing financial barriers to educational attainment.

The question in order now is: why are Mulligan’s results different from the results of this paper? The answer to this question lays mainly on the procedure he used to break the sample into “rich” and “poor” families. Mulligan used actual and, specially, expected inheritances as reported by adult children in 1984. I see at least three problems with Mulligan’s procedure. First, in the PSID it is impossible to know whether or not inheritances –actual or expected– came or will come from the children’s parents (the theoretically relevant concept). Second, it is also unknown whether or not inheritances come from the husband’s or the wife’s side. Third, expected inheritances are rather inconsistent with actual inheritances for those who received inheritances after 1984.⁹ Moreover, Mulligan used wages instead of earnings which is problematic since errors in hourly earnings are disturbingly high in the PSID (see Hill, 1992, p. 29).¹⁰ In sum, the difference between this paper’s results and Mulligan’s can be traced back to two simple facts: my use of family wealth instead of expected inheritances to designate “rich” families and my use of earnings instead of wages to study intergenerational earnings mobility.

Appendix 1 sheds some additional light on the sources of the difference between Mulligan’s results and the results of this paper. The appendix shows estimates of earnings mobility for “rich” and “poor” families using Mulligan’s splitting criteria. This exercise

⁸ In addition, Mulligan does not find any consistent differences between “rich” and “poor” families in the “inheritability” of consumption. It is difficult, however, to interpret this finding because the predictions of the Becker-Tomes model in this respect hinge heavily on auxiliary assumptions concerning assortative mating and fertility (Becker, 1991, p. 259-61).

⁹ PSID members were asked in 1984 about future inheritances. Then they were asked in 1989 if they received any inheritance during the previous five years. This information permits a preliminary evaluation of the accuracy of people’s perception of future inheritances. The correlation coefficient between expected and actual inheritances in the PSID is either -0.05 or 0.08 depending on whether or not inheritances smaller than \$25,000 are taken into account.

¹⁰ The ratio of error-to-total variance for hourly wages in the PSID oscillates between 0.67 and 0.69 (Hill, 1992).

closely reproduces the most important results of Mulligan's analysis; first, neither substantial nor significant differences in intergenerational mobility between "rich" and "poor" families are apparent; and second, the differences are very sensitive to sample changes (i.e., whether or not daughters are included). These results stand in sharp contrast with the results of Tables 2 and 3. Differences in the criteria used to break the sample into "rich" and "poor" families seem then to be responsible for much of discrepancy between Mulligan's results and the results of this paper. An important conclusion emerges: estimating differences in social mobility between capital-constrained and non-capital-constrained families hinges heavily on the criteria used to separate the former from the latter, and hence one should exercise extreme caution when interpreting the estimates.

As noted above, the results of Tables 2 and 3 strongly suggest that intergenerational mobility is influenced by family wealth. The Becker-Tomes model offers a expeditious explanation: capital constrains retard social mobility among the poor by precluding poor parents from investing optimally in their children. Of course, parental investment in human capital can take many different forms. Parents can, for example, pay for their children's college education. Alternatively, they can invest in their children's human capital by moving to neighborhoods with better schools and better peers (see Durlauf, 1993, Benabou, 1994, and Fernandez and Rogerson, 1994 for a formalization of this idea). The previous analysis, however, cannot discriminate between these (and others) alternative mechanisms by which parental wealth influences investment in children.

Alternative evidence highlighting the importance of family wealth in general and borrowing constraints in particular abounds. First, Tomes (1981) and Mulligan (1997) provide an alternative way to test the predictions of the Becker-Tomes model. Instead of looking at intergenerational mobility, they directly estimate the parental demand for schooling (equations (6) and (7) above). They find that –as predicted by the model– schooling is much more sensitive to family income in "poor" families than in "rich" families. Second, Behrman, Pollak and Taubman (1989) use a sample of World War II veterans to assess the educational benefits of so-called GI Bill. Their results strongly indicate that "unequal access to financing for college education is an important source of

differences in educational attainment.” According to their estimates, unequal access to education may explain as much as 20 percent of the observed income inequality in the United States. Finally, credit constraints remain the most expeditious explanation for many empirical findings in the consumption literature (Deaton, 1992). Indeed, a quick inspection of the consumption literature makes it hard to avoid the conclusion that some people some of the time are unable to obtain as much credit as they would wish.¹¹ This has an immediate bearing on intergenerational relations. Obviously, if a fraction of the population find it impossible to borrow against *their* future earnings, it stands to reason that it will be even more difficult for them to borrow against *their children’s* earnings. Given this, it is difficult to believe Mulligan’s claim that borrowing constraints do not have an appreciable impact on intergenerational relations.

Likewise, several other studies have uncovered evidence of non-linearities in the transmission of inequality across generations. Lillard (1998), for example, shows that intergenerational earnings persistence is –as predicted by the Becker-Tomes model– greater among the lowest quintiles of the earnings distribution. Interestingly, he further shows that this result vanishes once one controls for family wealth. In the same vein, Cooper, Durlauf and Johnson (1993) show that intergenerational mobility seems to be greater for those families who reside either in very affluent or very poor neighborhoods. Last, Featherman and Hauser (1976) show that the connection between years of schooling and family background dropped substantially in the United States during the sixties. This evidence –coupled with the dramatic increase of the public expenditures in education during those years– underscores –once again– the practical relevance of borrowing constraints in the transmission of inequality in the United States.

11 See, for example, Hall and Mishkin (1982) for an interesting analysis of borrowing constraints using PSID families.

IV. Siblings Inequality

In this section I study the connection between siblings' earnings inequality and family wealth. The main goal of this section is to test the prediction of the Becker-Tomes model of greater siblings' earnings inequality among "rich" families.

The same sample selection criteria mentioned above were used in this section with two important exceptions. First, families with only one child were excluded for obvious reasons. Second, the rule used to designate "rich" children was slightly modified: "rich" children now also include those children that did not receive inheritances themselves but that have a sibling who reported receiving an inheritance over 25,000 dollars. In other words, the sample of "rich" families also include here "moderately rich" families in the sense defined above and formerly introduced by Behrman, Pollak, and Taubman (1995).¹²

Table 4 displays the average across families of the coefficient of variation of siblings' earnings.¹³ The results are shown for all families pooled together and for "rich" and "poor" families separately. As shown, inequality of earnings within families is almost identical in the three samples. Similar results were obtained using different measures of inequality (i.e., the Gini coefficient and the standard deviation of log earnings), and using the residuals of a regression of earnings on several personal characteristic (i.e., sex, age, age squared and a dummy for marital status). Clearly, these results lend little support to the theoretical prediction of greater earnings inequality among siblings for "rich" families.

Given the previous assumption of higher marginal returns to better-endowed children and provided that schooling constitutes a good proxy for human capital investments, the Becker-Tomes model also predicts that siblings' inequality of schooling should be greater for "rich" families than for "poor" families. Table 2.4 shows that – contrary to the theoretical predictions– siblings' inequality of schooling is greater for "poor" families. As before, the same result obtains regardless of the measure of inequality

¹² Specifically, "moderately rich" families are those in which *at least one but not all* of the children receive significant financial transfers from their parents (see the discussion in Section II).

¹³ Averages were weighed using the number of siblings for each family. Arithmetic and geometric averages yield the same qualitative conclusions.

and regardless of whether or not schooling is orthogonalized with respect to some personal characteristics.

I use a sample of adult children drawn from the Health and Retirement Study (HRS) to reevaluate the predictions of the model concerning intrafamily differences in earnings and schooling. The HRS begun in 1992 with a random sample of 13,500 individuals distributed in 8,000 households. The survey focuses mainly on individuals making the crucial transition from work to retirement. There are two features of the HRS that are specially important for the purposes of this paper. First, individuals were asked about the likelihood of *leaving* inheritances to their children (note the contrast with the PSID where people were asked about the likelihood of *receiving* future inheritances). Second, respondents with children provide fairly detailed information for each child, including schooling and income.

**Table 4. Average of Coefficient of Variation Across Families
PSID (SRC and SEO combined)**

	Number of Families	Average Sibship Size	Earnings	Schooling
All Families	583	2.61	50.65%	9.39%
Poor Families	163	2.23	50.82%	9.67%
Rich Families	440	2.64	50.47%	8.78%

Notes: Only families with two or more children were used. Averages were weighted using sibship size.

There were two criteria for inclusion in the sample: (1) respondents must have at least two adult children, and (2) children must be at least 24 years old and must be out of school. On the other hand, children were assigned to the “rich-families” sub-sample only if their parents report almost absolute certainty that they will leave a sizable inheritance. Because it is unknown whether or not all children will be named heirs, these classification

is similar to the one used above to identify the set of “rich” and “moderately rich” families in the PSID.

Table 5 reproduces the results of Table 4 for the HRS samples. Income was computed here on the basis of three income brackets reported by their parents, which should explain the smaller values vis-à-vis the PSID results.¹⁴ Once again, siblings’ income inequality appears to be greater among “poor” families. The same is true for schooling inequality. Undoubtedly, these results cast even more doubts upon the intragenerational predictions of the Becker-Tomes model.

Table 5. Average of Coefficient of Variation Across Families

	Number of Families	HRS		
		Average Sib Size	Income	Schooling
All Families	3494	3.17	29.53%	10.29%
Poor Families	2555	3.25	31.51%	10.87%
Rich Families	939	2.95	26.07%	10.18%

Notes: Only families with two or more children were used. Averages were weighted using sibship size. Results are based on parental responses.

Table 6 displays another noteworthy difference in intrafamily relations between “rich” and “poor” families. This table shows, for both the PSID and the HRS samples, the intrafamily correlation coefficient (ρ_i) of earnings.¹⁵ Roughly, ρ_i represents the portion of the total variance of earnings attributable to between-family differences in means—the stronger the link among siblings’ earnings, the higher the value of ρ_i . As shown, the correlation of siblings’ earnings is greater among “poor” families in both the PSID and the HRS, meaning that earnings differentials between families appear to be relatively more

¹⁴ Respondents reported whether their child annual income is under \$10,000, between \$10,000 and \$25,000, or over \$25,000. I assigned an income of \$8000 to the first group, \$16,000 to the second, and \$30,000 to the third. All reported results are robust to changes in these arbitrary values.

¹⁵ ρ_i is the appropriate generalization of the correlation coefficient for correlation analysis involving kin groups with two or more members (see Kendall and Stuart, 1958. Vol. II).

important among the poor. Note that this finding is, on one hand, unrelated to the inequality findings shown in Tables 4 and 5; and, on the other, perfectly consistent with the higher persistence of earnings among “poor” families uncovered in the previous section.

Getting back to the earnings’ inequality results, there is a lingering question; how does the previous finding of greater siblings’ earnings inequality among “poor” families compare with the existing literature in family transfers? As noted earlier, the evidence on family transfers offers all but a neat picture: whereas some studies find that transfers are used by parents to mitigate inequality, others find that transfers are either evenly distributed among children or non-important (see Mulligan, 1997, p. 294 for an overview of this literature). This evidence, however, is tainted by the inherent difficulties of observing parental transfers in general and intervivos transfers in particular.¹⁶ The evidence on siblings’ inequality provides then a much-needed complement to the evidence on transfers. The results of this section strongly suggests that transfers are not systematically used by parents to mitigate earnings differentials, and so they lend some credence to those studies that do not find a clear-cut connection between children’s earnings and parental transfers.

**Table 6. Intra-Class Correlation Coefficient
Sibs’ Earnings**

	PSID	HRS
All Families	0.199	0.341
Poor Families	0.172	0.330
Rich Families	0.130	0.287

Notes: the sample sizes are the same given above.

¹⁶ McGarry and Schoeni (1995), for instance, compare reported transfer behavior in the PSID and in the HRS. Their analysis suggests that reported intervivos gifts from parents to children are very sensitive to survey design.

V. Discussion

The empirical results of the previous two sections suggests that whereas the predictions of the Becker-Tomes model concerning intergenerational relations seems to be borne out by the data, the predictions concerning intragenerational relations do not. How to explain this? A natural way to reconcile the model with the evidence is by changing some of the extra assumptions introduced earlier to study resource allocation within the family. One may drop either the assumption of equal concern or the assumption of parental aversion to inequality. Alternatively, one may argue –as in Behrman, Pollak and Taubman (1982)– that children’s earnings and financial transfers enter the parental utility function separately. Any of these three options can render the model capable of explaining both the intergenerational and the intragenerational evidence.

Also, one may assume that the differences in endowments as perceived by parents do not have much bearing on their marginal decisions concerning human capital investments (i.e., whether or not to send a child to college). For example, parents may be reluctant to pass judgment on their children’s abilities. Or, similarly, they may perceive high returns to additional human capital investments irrespective of ability. Once again, these new assumptions will reverse the intragenerational predictions of the Becker-Tomes model and may well account for the alleged failure of the Becker-Tomes model.

The previous discussion makes an important point: there are many different stories that can explain the intragenerational evidence presented above. Certainly this makes a definitive interpretation of this evidence very difficult. Again, while the results of section IV cast serious doubts on the joint hypothesis of equal concern, parental aversion to inequality, borrowing constraints and a few others, they offer little insight as to the validity of each individual hypothesis.

This, I believe, reflects a more fundamental problem of the economic analysis of resource allocation within the family; most theoretical propositions dealing with intragenerational relations hinge heavily on *ad hoc* assumptions about parental preferences

and attitudes.¹⁷ Intergenerational propositions, on the other hand, are much more robust to assumptions about parental preferences and attitudes, and hence a definitive interpretation of the evidence is more likely in this case. All in all, I believe that the intergenerational evidence of this paper strongly suggests the importance of borrowing constraints in the transmission of inequality in the United States.

Needless to say, the positive connection between family wealth and social mobility uncovered above merits more research. On one hand, the policy applications and social repercussions are wide-ranging; on the other, there is still much uncertainty concerning the size of the effects as well as the mechanisms of transmission of inequality. Moreover, the empirical analysis does not seem robust to small methodological changes (i.e., the identification of capital-constrained families). Evidence from other countries (both developed and developing) and from other data sets will surely shed much-needed light on these outstanding and fundamental issues.

¹⁷ The economic analysis of the family has been recently criticized by E.O. Wilson (1998) on the grounds that it offers little more than folk psychology disguised in economic language. In Wilson's words, "typically the predictions arise from the commonsense intuition of the modeller, that is, from folk psychology, and following a series of analytical steps, confirm commonsense beliefs."

Appendix

**Appendix 1. OLS Estimates of Intergenerational Mobility
Mulligan's Splitting Criteria**

Sample	N	All Families	N	Poor Families	N	Rich Families	Difference [p-values]
SRC-Sons Only	392	0.350 (0.049)	333	0.346 (0.048)	47	0.446 (0.275)	-0.10 [0.72]
Full Sample-Sons Only	620	0.372 (0.036)	530	0.383 (0.038)	75	0.379 (0.128)	0.00 [0.98]
SRC-All Children	750	0.284 (0.056)	636	0.292 (0.058)	92	0.108 (0.226)	0.18 [0.42]
Full Sample-All Children	1243	0.333 (0.036)	1068	0.341 (0.038)	141	0.241 (0.124)	0.10 [0.42]

Notes: Standard-error estimates are in parentheses. P-values of a test on the difference between rich and poor families are in square brackets.

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