

Parental actions and sibling inequality

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Abstract

This paper presents a simple model of resource allocation within the family. The model is based on two main assumptions: there are nonconvexities in human capital investments and parents cannot borrow to finance their children's education. The model shows that poor and middle-income parents will often find it optimal to channel human capital investments into a few of their children, thus creating sizable inequalities among siblings. The paper shows that the predictions of the model are consistent with the available evidence for three Latin American countries.

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1. Introduction

There is a famous parable in the *Talmud* that tells the story of two men who, having lost their way in the desert, find themselves in a precarious situation: if they share their reserves of water, they both will die, but if one keeps the water for himself, he may survive the ordeal. The morale is clear and appalling: when too much is at stake, fairness considerations become secondary. Many poor parents, we shall argue, are confronted with a similar dilemma. If they divide equally their scant resources between their children, none of them will acquire enough human capital to escape poverty. But if they channel most of their resources into a few of their children, the lucky ones will be put in a much better position to escape a life of poverty. Parents, we shall also argue, often opt for the second option.

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In essence, we argue that parental decisions can increase inequality. A similar argument has been propounded by previous research dealing with the interplay between parental actions and educational outcomes of children.¹ It is argued, in particular, that parents reinforce the differences in ability of their children by investing disproportionately in the most skilled. Inequality-averse parents will also try to countervail the ensuing differences in earnings via financial transfers, but that's a different issue.

The theoretical framework presented in this paper is different from the previous literature in three major respects. First, we assume no differences in ability. Second, we assume that the returns to human capital investments exhibit increasing returns (e.g., there are indivisibilities). And third, we assume that parental decisions are driven mainly by efficiency considerations—fairness may still be present but it is certainly dwarfed by efficiency in our model. Given these assumptions, we show that parents have incentives to manufacture inequality.²

Our model has important implications about how the allocation of resources among children varies between rich and poor families. In the model, rich parents educate all their children, simply because they can afford it. Poor parents, for their part, educate none of their children, because even if they pool all their resources they will not be able to pay for the education of one of them. By contrast, moderately poor and middle-income parents educate some of their children at the expense of the others. The model predicts thus that sibling inequality of education and earnings will be greater in the middle of the income distribution than in the extremes.

We use changes in sibling inequality of schooling across income quintiles to test the relevance of our model. The empirical evidence considered is consistent with the predictions of our model. We find that, for three Latin American countries, sibling inequality is greater among middle-income families. This is by no means the first study to predict that welfare-maximizing families, in the face of nonconvexities and borrowing constraints, will treat their children differently. [Mirrlees \(1975\)](#) points out that poor families are often forced to divide food staples unequally among their members. Similarly, [DasGupta \(1993\)](#) argue that if nutrients are related to productivity in a nonconvex fashion, families will be likely to distribute nutrients unequally. The main difference between DasGupta's paper and ours has to do with the source of the nonconvexities. In our paper nonconvexities stem from the existence of increasing returns in the relationship between earnings and investments in education, in DasGupta's paper nonconvexities stem from increasing returns in the relationship between nutrition and productivity. Presumably, it is easier to measure, and ultimately easier to justify, the existence of nonconvexities in the context of education than in the context of nutrition. Simply put, establishing whether one well-educated child will command more earnings than two poorly educated children is easier than establishing whether one well-fed child will be more productive than two half-fed children.

¹ See [Becker and Tomes \(1976\)](#), [Behrman et al. \(1982\)](#), [Sheshinski and Weiss \(1982\)](#), and [Mulligan \(1997\)](#).

² The same general point is made by [Rosen \(1997\)](#). For him, "indivisibilities in labor market and other life choices. . . can create incentives for voluntary redistribution. . . people might willfully and *selfishly* create a kind of natural inequality among themselves."

2. The model³

Consider a small open economy inhabited by overlapping generations of altruistic individuals. In this economy, production of the same (and only) good is performed in either of two sectors. The first sector (S from hereon) uses both skilled labor and physical capital. The second sector (U from hereon) uses only unskilled labor. We shall assume, for the sake of simplicity, that technology in the S sector is described by a Cobb–Douglas production function and that technology in the U sector is described by a linear production function. Accordingly,

$$Y_s = AK^{\alpha}L_s^{1-\alpha}, \quad (1)$$

$$Y_u = w_u L_u. \quad (2)$$

Firms in this economy operate in perfectly competitive markets and can borrow and lend at the fixed world interest rate, r . Neither depreciation of capital nor adjustments cost of investments occur in the model. Wages in the S and U sectors can then be written as

$$w_s = A(1 - \alpha) \left(\frac{\alpha A}{r} \right)^{\frac{\alpha}{1-\alpha}}, \quad (3)$$

$$w_u = w_u. \quad (4)$$

It follows then that in this economy wages are completely determined by technological parameters and the world interest rate.

Individuals live for two periods. In the first period they can either work for the U sector (earning w_u) or spend their time acquiring the skills that will later enable them to work in the S sector. We assume that all individuals have the same ability and that they all have to invest in human capital in the first period to be able to work in the S sector during the second period (i.e., there are no natural-born geniuses in our model).

Investments in human capital are indivisible and equal to h for everybody, and are paid at end of period one. Interestingly, this assumption entails the presence of increasing returns to scale in the accumulation of human capital and, as we shall see below, it underlies some of the key results of the model.

In the model, parents have two children and derive utility from their children's average lifetime income. We assume, in particular, that the utility function can be written as

$$U = U\left(C, \frac{I_1 + I_2}{2}\right) \quad (5)$$

where C is consumption in the second period and I_i is the lifetime income of child i . Eq. (5) implies that parents are not averse to inequality in that they will always favor efficiency

³ This section borrows its structure from Galor and Zeira (1993). While these authors are interested in the transmission of inequality, we are interested in resource allocation within the family. Empirical evidence regarding the transmission of inequality across generations can be found in Becker (1991) and more recently in Mulligan (1997) and Gaviria (1998).

over fairness when allocating resources between their children. It is worth noting, however, that the main conclusions below will still hold even if parents do take into account fairness considerations.⁴

We abstract away from demographic considerations in the model. It should be mentioned, however, that allowing fertility to vary across families is likely to bolster our argument to the effect that poor parents will treat their children differently. Since poorer parents have greater fertility, there would even be stronger incentives to produce or manufacture inequality.⁵ Indeed, one could build a model that combines two features: (i) it is more efficient for poor parents to invest in more children than to invest in human capital (see, for example, Becker et al., 1992; Tamura, 1994; Dahan and Tsiddon, 1998), and (ii) it is more efficient for parents to concentrate human capital investments in a few children than to distribute them equally across all children. Such a model, one can speculate, would yield similar results to the model of this section. If anything, the conclusions will be stronger.

Eq. (5) is maximized subject to the constraint that consumption plus financial transfers to both children must be equal to lifetime income:

$$I = C + b_1 + b_2, \quad (6)$$

where I is lifetime income in terms of consumption and b_i are financial transfers (bequests for short) to child i . Thus, each individual has to decide not only how much to consume and how much to bequest, but also how to distribute her estate. Here we will focus mainly on the latter decision.

We assume that parents make the bequest at the end of their lives. We also assume that parents decide in advance who will get the bequest, which precludes any uncertainty in this respect. We will get the same results in slightly different models in which parents live two periods and leave a bequest to a child whose life starts at the end of the second period right after her parents' death (Banerjee and Newman, 1993).

Parents transfer resources to their children, who in turn make the decision as to whether or not to invest in human capital. Of course, if parental transfers fall short of education expenses, children will have to borrow in order to invest in human capital. We will assume that individual borrowers pay an interest rate i that is higher than the world interest rate, r . This may result from either higher monitoring costs or the uncollateralizable nature of human capital investments. We will assume, in addition, that the following two inequalities hold:

$$w_u(2 + r) > w_s - h(1 + i) \quad (7)$$

$$w_u(2 + r) < w_s - h(1 + r) \quad (8)$$

The first inequality rules out the trivial case in which investing in human capital is always optimal, and the second rules out the likewise trivial case in which investing in human capital is never optimal.

⁴ The key assumption here is that efficiency outweighs fairness in parental preferences. We assume that utility is a simple function of mean income merely for convenience.

⁵ We thank an anonymous referee for pointing this out. Table 2 presents evidence on differential fertility across socioeconomic groups.

We can now study the decision as to whether or not to invest in human capital. Consider an individual who inherits b from her parents in the first period of her life. A first observation follows directly from the assumptions above: if bequests are greater than education expenses (i.e., if $b > h$), investing in human capital will be always optimal and lifetime income will be given by

$$I_s = w_s + (b - h)(1 + r) \tag{9}$$

If, on the other hand, parental transfers fall short of education expenses, individuals have to borrow in order to invest in human capital. They will do so only if the S–U wage differential is high enough to compensate the financial expenses and opportunity costs of human capital investments. More precisely, *poor* individuals will get an education if and only if the following inequality holds

$$w_s + (b - h)(1 + i) > w_u(2 + r) + (1 + r)b \tag{10}$$

where the left-hand-side term is the lifetime income of a person who borrows to finance her education and the right-hand-side term is the lifetime income of a person who does not invest in human capital. From Eq. (10), we can derive the minimal level of bequests that will compel an individual to invest in human capital, f :

$$f = \frac{1}{i - r} (w_u(2 + r) + h(1 + i) - w_s). \tag{11}$$

As shown, f increases with both the cost of education and the extent of capital market imperfections, and decreases with the S–U wage differential.

2.1. Intra-household allocation

Two remarks are in order before studying the allocation of resources within the family. First, it is impossible in this framework to separate the decision of how much to bequest ($b_1 + b_2$) from the decision of how to bequest (b_1 vs. b_2). Second, the main conclusions below should carry over to families with more than two children. More general cases, however, provide little extra insight at the expense of much greater complexity.

We use a backward induction argument to solve the intra-household allocation problem. The idea is simple: first, we substitute for total bequests ($B = b_1 + b_2$) with average children’s income ($f = (I_1 + I_2)/2$) in the budget constraint, and then we solve the optimization problem in the standard fashion. By doing this, we are able to separate the optimization problem in two stages while preserving the simultaneous nature of the consumption and intra-household allocation decisions.

Fig. 1a shows the average children’s income (f) as a function of total bequests (B) for two opposite allocation rules. The first rule depicts the case in which all parental transfers go to one child and the second case depicts the case in which parental transfers are split evenly between the two children. These two rules are important because they encompass all other cases in that no other allocation yields a higher (or lower) average children’s income (see Appendix A).

We distinguish three different segments in Fig. 1. In the first segment, total bequests are less than f and hence investments in human capital are not feasible. Here both children

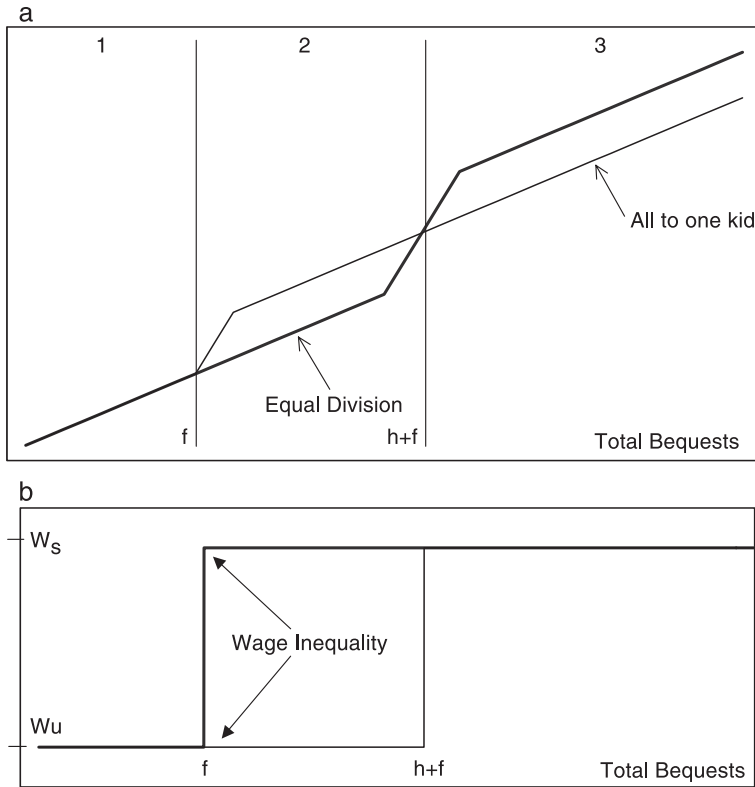


Fig. 1. (a) Average children's income vs. total bequests. (b) Wages vs. total bequests. A detailed analysis of (a) is included in Appendix A.

enter the U sector and both make w_u in the two periods of their lives regardless of how their parents distribute the bequests. In the second segment, B is greater than f but less than $h+f$. In this segment all optimal allocations (and it might be several of them for each value of B) entail an unequal distribution of earnings: one child gets an education and earns w_s , one child enters the U sector and makes w_u . The point here is that parents, realizing that equal splitting will deny both children the opportunity of “making it big”, will opt for transferring most resources to a single child. This is, of course, reminiscent of the parable of the desert that we presented in the Introduction. In the third segment, total bequests are greater than $h+f$, and optimal allocations (and here also it might be several of them for each B) entail both children getting an education and hence making w_s in the second period of their lives.

The previous analysis makes it clear that, at least for some levels of total bequests, parental actions may bring about large differences in human capital and earned incomes between siblings. The analysis, however, is still incomplete because we are yet to model how parents choose the total level of bequests. This is not difficult because we can use the relationship between f and total bequests defined by Fig. 1a to rewrite the budget

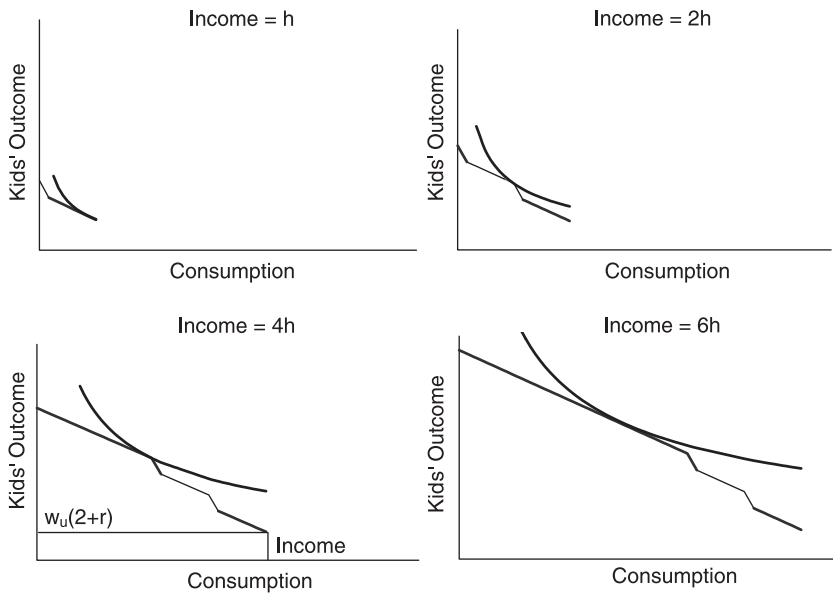


Fig. 2. Optimal choices for various levels of lifetime income.

constraint in terms of consumption and f . Once we do this, we can separate the problem of how much to bequest from the problem of how to allocate total bequests among the children and hence solve the optimization problem in the usual fashion.

Fig. 2 presents the budget constraint along with the optimal choice of consumption and average children’s outcomes for various levels of lifetime income (we use a Cobb–Douglas utility function but the argument below holds for any specification of Eq. (5)). Before looking at the sequence of graphs, there are some points to be made. First, all budget constraints are turned-around versions of Fig. 1a. Second, the thin segment of the budget constraint represents the areas where the implied level of total bequests is associated with unequal earnings and human capital (i.e., one kid goes to college, the other goes to work). And third, preferences are the same throughout the sequence: income is the only variable that is changing.⁶

We can now study the sequence of graphs of Fig. 2. Let us first focus on the upper left corner. Here lifetime income is low—barely enough to cover the education expenses of one kid. In this case, moderately altruistic parents will transfer a few resources to their children but these resources will be, in all likelihood, less than f , meaning that neither of the kids will invest in human capital. This is exactly the situation depicted in the first segment of Fig. 1a. We can turn now to the upper right corner. Here income is higher than before—twice the value of education expenses. The optimal point lies now on the thin segment of the budget

⁶ It is important to note that nonaltruistic parents will always consume all their income. Therefore, their children will have no choice but to enter the U sector. This situation corresponds to the rightmost point in the budget constraint.

constraint, meaning that parents will choose an unequal distribution of bequests that will in turn result in highly unequal education and earnings. This corresponds to the second segment of Fig. 1a. We can turn finally to the last two graphs. In both graphs, the optimal point lies on the bold segment of the budget constraint; parents have enough income (given their altruism) to put both kids through school and education and earnings are equal for both kids. This situation corresponds to the third segment of Fig. 1a.

A precise empirical implication concerning how sibling inequality varies with family wealth can be derived from the previous analysis. The model predicts that sibling inequality should be the highest among moderately poor and middle-class families. In these families, some children (those handpicked by the parents) will “make it big” while others will inevitably fall behind. This prediction differs from that of Becker and Tomes’ (1976) model. In this model, parents are inequality averse and children differ in ability, with the more able enjoying higher rates of return to human capital investments. Under these conditions, poor parents will tend to spread human capital investments more evenly among their kids because they dislike inequality and lack resources to compensate the ensuing differences in earnings that differential investments would produce. Wealthy parents, on the other hand, will disproportionately invest in human capital on the ablest kids and will compensate the others via financial transfers.

3. Nonconvexities in the returns to education

This section examines whether it is plausible to assume that the returns to investments in education exhibit increasing returns. As mentioned already, a positive answer would indicate that efficiency considerations could lead parents to concentrate their human capital investments in a few of their children.

Increasing returns to investments in education can happen for two reasons. First, higher levels of education have a higher rate of return than lower levels. For example, the return of higher education can be higher than that of secondary. This could be driven by a multitude of factors, including differences in school-quality across levels, barriers to entry, and differences in labor demand. Second, the rate of return of an additional year of schooling can be higher for the last year than for any other intervening years. That is, credentials are rewarded in their own right; a phenomenon known in the literature as the “sheepskin” effect.

There are hundreds of empirical studies that attempt to identify differences in the rate of return of schooling across levels (see Psacharopoulos, 1994 for a review). Most studies find convexity in the relationship between market wages and education, as well as sizeable sheepskin effects. For the case of Brazil, for example, Lam and Schoeni (1993) and Strauss and Thomas (1996) find overwhelming evidence in favor of nonconvexities in the relationship between wages and education.

To look carefully at this issue, we estimate an earnings function for Brazil using data from the household survey described in the next section. We first restrict our sample to individuals age 20 or older who earned wages in the period under consideration and then estimate the average log wages for various levels of schooling, controlling for gender and experience. The results of such exercise are presented in Fig. 3.

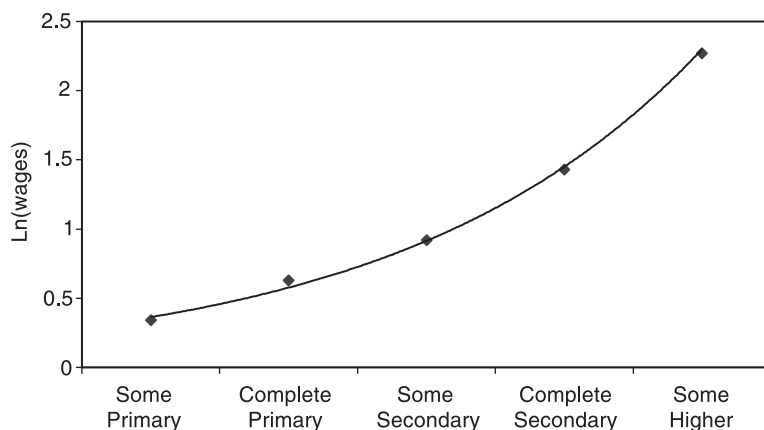


Fig. 3. Returns to education in Brazil.

The results show clearly that rates of return grow at increasing rates as we move from primary to secondary and from second to tertiary, thus suggesting that the returns to education may in fact be increasing. Although tuition costs and other expenses must be considered to study this matter in earnest, the evidence appears to be consistent with our assumption to the effect that the “bunching” of educational investments makes sense from an efficiency viewpoint.

It is worth noting that most Latin American public universities charge no tuition (the only exceptions are found in Chile and Costa Rica). Although nearly 40% of Latin American students are in private institutions and most public universities charge fees, it is still the case that a high percentage of the total costs of going to college are the opportunity costs of high-school graduate earnings (see IADB, 1997). This fact notwithstanding, the main reason why the poor do not pursue higher education lie much more with the weakness of the lower educational level than with financial policies affecting higher education (see IADB, 1997).

4. Empirical methodology and data

In this section, we use data from three Latin American countries to test the predictions of the model about the relationship between sibling inequality and family income. As mentioned earlier, our model predicts that parental actions will cause sibling inequality to be higher among moderately poor families. We use differences in schooling among teenage siblings living with their parents to examine the validity of this prediction.

The first step in our methodology is to compute an indicator of sibling inequality in schooling. This is a bit more complicated than it might seem at first glance. Consider, for example, the case of two hypothetical families. In the first, the eldest sibling is 18 years old and has 12 years of schooling and the youngest is 16 and has 10 years of schooling. In the second, the oldest sibling is also 18 and also has 12 years of schooling and the youngest is 14 and has 8 years of schooling. Although differences in actual years of

schooling are greater in the second family, it would be a mistake to say that sibling inequality is greater in this family. One could avoid this problem by restricting the data to siblings of the same age, but this will cause samples to shrink to a few observations. We tackle this problem by constructing an indicator of schooling inequality within the family that takes into account differences in age between siblings.

We first restrict our sample to teenagers between 14 and 18 years of age who are still living with their parents. This restriction reflects a compromise between two counter-vailing factors: narrower age groups reduce sample sizes but allow a more accurate calculation of sibling inequality. Going above this age would imply substantial losses of information and probably biases: young adults may leave their parental households selectively in a way that is related to within-family inequality. We do not include children under 14 because schooling differences start becoming apparent precisely around this age (see *Attanasio and Székely, 2001*).⁷ We also restrict the sample to families with two or more children in the specified age range. For families with more than two teenage children, we keep only the two oldest. After applying these restrictions, we end up with a sample of pairs of teenage siblings.

Next, we compute the schooling gap for each member of the sample. We define schooling gaps as the difference between the years of education that a child would have completed had she entered school at six and advanced a grade each year and her actual years of education. Then, we classify families in two types: unequal families (defined as those in which the absolute value of the difference in schooling gaps between siblings is greater than 4) and equal families (defined as those in which the opposite is true). The main results below do not change if we use marginal different thresholds to split the sample in unequal and equal families.

Our empirical analysis is based on the distribution of unequal families across quintiles of income. To this effect, we use the following empirical model

$$Y_i = c + \delta_2 q_{i2} + \delta_3 q_{i3} + \delta_4 q_{i4} + \delta_5 q_{i5} + X_i \beta_i + \varepsilon_i, \quad (12)$$

where Y_i is a dummy variable that equals 1 if family i is an unequal family, q_{ij} is another dummy that equals 1 if family i belongs to quintile j , X_i is a set of controls and ε_i is an error term. Quintiles were defined on the basis of total income per capita for each household. All sources of income and all household members, whether related or not to the household head, were used in the calculation. Our model predicts that unequal families will be disproportionately concentrated in the lower middle part of the income distribution. That is, $\delta_2 > 0$, $\delta_2 > \delta_3$, $\delta_2 > \delta_4$ and $\delta_2 > \delta_5$.

We test the predictions of the model using data for three Latin American countries: Brazil, Peru and Mexico. We pick these countries because of their high levels of income inequality and the good quality of data of their household data.⁸ For Brazil, we use the 1996 round of the *Pesquisa Nacional por Amostra de Domicilios*, for Mexico the 1996

⁷ This may explain why no discernable pattern between socioeconomic groups and intra-family inequality is apparent for children younger than 14.

⁸ See *IADB (1998)* for a detailed description of Latin American household surveys.

Table 1
Means of schooling gaps and percentage of unequal families by quintile

	Brazil		Mexico		Peru	
	Mean gap	% of unequal families	Mean gap	% of unequal families	Mean gap	% of unequal families
All families	4.5	8.0%	2.4	8.3%	1.9	5.0%
First quintile	6.1	8.6%	3.7	13.2%	2.6	1.0%
Second quintile	4.9	10.4%	2.8	10.2%	2.4	8.2%
Third quintile	3.9	7.4%	1.7	4.5%	1.4	3.3%
Fourth quintile	3.0	6.6%	1.4	5.9%	1.3	3.9%
Fifth quintile	2.1	3.6%	0.9	3.8%	0.9	4.1%

round of the *Encuesta Nacional de Ingreso y Gasto de los Hogares*, and for Peru the 1997 round of the *Encuesta Nacional sobre Medición de Niveles de Vida*.

Several remarks are in order at this point. Although we use income to define quintiles, the quintiles defined based on dwelling characteristics and household possessions are often very similar.⁹ We use quintiles instead of, say, a quadratic function of income because the model suggests abrupt discontinuities rather than smooth transitions in sibling inequality as one moves from poor to rich families. Finally, retentions are unlikely to change the results, if only because we focus on unequal families where, arguably, sibling inequality is driven mainly by drop-outs.

Table 1 presents the schooling gaps and the fraction of unequal families by income quintiles for the countries under study. Average schooling gaps are similar in Mexico and Peru and much larger in Brazil. In all countries, gaps decrease steadily as one moves from bottom to top quintiles. The pattern of variation is steeper in Brazil than in Peru and Mexico, which is consistent with the higher observed correlation between family characteristics and education attainment observed in Brazil.¹⁰ Table 2 shows that fertility (measured by the number of children living at home) declines steadily from the lower to the upper quintiles. For all countries under analysis, poor families have two more children than rich families. Overall, fertility is higher in Mexico and Peru than in Brazil.

The proportion of unequal families is about 8% in Brazil and Mexico and about 5% in Peru. In Brazil and Peru, the percentage of unequal families is the highest in the second quintile, lending support to our model. In Mexico, such percentage is the highest in the first quintile, but it is also very high in the second. The low fraction of unequal families in Peru's lowest quintile is puzzling. In Peru, mean differences in schooling between siblings are 1.3 years in the first quintile, 1.7 in the second and 1.3 in the upper quintiles, which indicates that the mean differences between quintiles are parsimonious; differences in the variance are larger but the small number of observations hampers precise

⁹ See, for example, Filmer and Pritchett (2001).

¹⁰ See, for example, Behrman et al. (2001). They show that the correlation of schooling between parents and children is 20% greater in Brazil than in Mexico and Peru. This indicates that social mobility is slower in the latter country, which can, in turn, explain some of the differences in Table 1.

Table 2
Number of children by quintile (all ages)

Quintile	Brazil	Mexico	Peru
1	4.1	4.8	4.6
2	3.2	4.0	4.0
3	2.8	3.4	3.7
4	2.5	3.0	3.4
5	2.2	2.5	2.8

Only children living at home are considered.

inferences. In general, caution is required in interpreting the Peruvian results because of the size of the sample.

The latter results are roughly consistent with the predictions of our model. But these results can be driven by gender biases that are assumed away in the model. Evolutionary psychologists have long argued, for example, that low-status families will tend to favor daughters because they are more likely to produce healthier offspring.¹¹ One could also argue, on the contrary, that if gender discrimination is prevalent in the workplace, poor parents will tend to favor boys. Regardless of which view is right, it is important to control for gender differences among siblings and other household characteristics. This is what we do in the next section.

5. Empirical results

Table 3 presents the estimation results of Eq. (1). We use a Probit model and report the marginal effects evaluated at the sample means. Besides the covariates shown in the table, we control for the total number of siblings in the family. The results are very similar regardless of whether or not these covariates are included. On the whole, the results confirm the results of Table 1. In Brazil, unequal families are disproportionately concentrated in the second quintile. The proportion of these families is 1.3 percentage points higher in the second quintile than in the first and 6.1 percentage points higher in the second quintile than in the fifth. Unequal families are also more common in mixed-gender families than in the rest, which indicates that parents tend to favor girls when manufacturing inequality. In Brazil, schooling gaps among teenagers living in unequal families are almost 3 years higher for boys than for girls.¹²

In Peru, unequal families are also more common in the second quintile. Here the differences are large: the percentage of these families is 5.9 percentage points higher in

¹¹ Wright (1994) argues that “for a poor family with a pretty girl and a handsome but not otherwise specially gifted boy, the daughter is more likely to produce children who begin life with material advantages; girls more often marry up on the socioeconomic scale than boys.” In violent areas, parents also tend to prefer girls because boys are much more likely to be murdered. In Colombia, for example, the homicide rate is 10 times higher for boys than for girls (see, for example, World Bank, 2002).

¹² Overall, years of schooling are higher for girls than for boys in Brazil. The opposite is true for Mexico and Peru. See, for example, Behrman et al. (2001).

Table 3
Unequal families and family characteristics

	Brazil	Peru	Mexico
Second quintile	0.013 (1.70)	0.070 (2.11)	0.008 (0.53)
Third quintile	−0.011 (1.20)	0.030 (0.79)	−0.025 (1.41)
Fourth quintile	−0.018 (1.82)	0.054 (1.50)	−0.015 (0.77)
Fifth quintile	−0.048 (3.92)	0.033 (0.73)	−0.053 (1.87)
Urban	−0.003 (0.40)	0.020 (0.93)	−0.028 (2.19)
Boy and girl	0.041 (5.58)	0.005 (0.25)	0.019 (1.28)
Girl and girl	0.014 (1.56)	−0.010 (0.37)	0.039 (2.26)
Age of oldest sibling	0.014 (7.70)	0.003 (0.28)	0.033 (4.68)
Number of observations	7190	437	1707
Pseudo R^2	0.033	0.058	0.050

Absolute value of z statistics in parentheses.

Other controls include number of siblings and place of residence of the household.

the second quintile than in the first and 3.9 percentage points higher in the second quintile than in the fifth. No gender effects are apparent in this case. In Mexico, unequal families are much common in the first and second quintile than in the top quintiles—the difference is above 5 percentage points. Unequal families are also more common in rural areas than in cities. Unlike in Brazil and Peru, no differences are apparent in this case between the first and second quintile in the percentage of unequal families. Overall, our results are consistent with the predictions of the model. Unequal families (i.e., families in which large differences in schooling attainment among siblings are observed) appear to be more common among moderately poor families. These results are robust to the inclusion of several controls, including differences in gender, age and household location.

A caveat is in order at this point. Because we focus solely on differences in *schooling* among teenage children living with their parents, we might be missing an important part of the story. For one thing, sibling inequality could be driven by differential parental investments in school quality and extra-curricular activities. For another, sibling inequality—especially among upper middle-income families—could be driven by differential investments in higher education and by differences in the quality of education. In short, the magnitude of sibling inequality (and hence the relevance of our model) can be even greater than what is suggested by the evidence at hand.

There have been several previous attempts to study the allocation of resources within the family. Many have focused on developed countries and most have looked mainly at financial transfers from parents to children (bequests and *intervivos* transfers).¹³ The evidence in this regard is inconclusive and suffers from the inherent difficulties of

¹³ Cox and Rank (1992), and McGarry and Schoeni (1995) found that children with smaller earnings received larger gifts and bequests. Menchik (1980) and Wilhelm (1996) found that equal division is by far the dominant allocation of gifts and bequests. By contrast, Tomes (1981) found much lower rates of equal sharing—around 50%—in a sample of Cleveland families.

observing financial transfer from parents to children. Interestingly, only a few studies have looked at sibling inequality for clues about the underlying logic of parental decisions. This is unfortunate because it could be argued that one can better discern among the various theories of resource allocation within the family by studying differences among siblings than by digging probate records seeking for elusive clues about who got this and who got that.¹⁴

6. Concluding remarks

Although the role of the family in the transmission of inequality has long been emphasized in the economic and sociology literature, the role of the family in the creation of inequality has received less attention. In this paper, we present a model in which families play a central role in the creation of inequality. In the model, efficiency considerations lead poor families to channel their scarce resources into a few of their children. The empirical evidence presented is consistent with this idea. But a definite test is difficult because we do not directly observe all parental investments in their children.

Interestingly, the model suggests that differences between rich and poor families are not limited to average incomes: the structure of within-family inequality also appears to change from low- to high-status families. Although more research is needed to confirm the patterns sketched in the paper, the evidence shows that differences among siblings in socioeconomic outcomes are an important element in the structure of overall inequality.

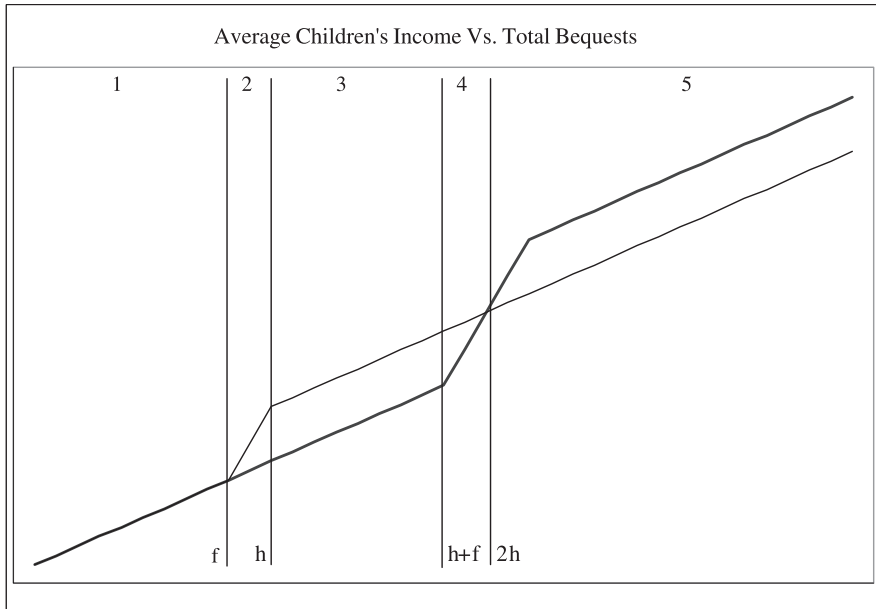
At first glance, the policy recommendations of this paper seem remote. If the family itself is an agent in the generation of inequality, policy options are rather limited. The main message of the models is, however, positive; namely, policy interventions aimed at easing capital constraints and increasing access to education can have multiplier effects. Not only will they close the gap between rich and poor families, but they will also close the gap between siblings of poor families. Besides, if increasing returns in the accumulation of human capital are relevant, big gains from the same type of policies are also likely. In short, family *intermediation* notwithstanding, public policy can still play a fundamental role in the reduction of inequality.

¹⁴ As a curiosity, our model may help rationalize the practice of primogeniture in medieval times. Primogeniture, a law requiring the full inheritance of the father's land by the eldest son, was common in England and other European countries during the Middle Ages. Historians have long argued that primogeniture served a valuable purpose because it guaranteed that nobles could keep their lands whole (Lehmberg, 1992). Nobles in medieval times were very reluctant to divvy up their lands. Their reasons were hardly whimsical. Since land was used mainly as a way to access political power, individuals who allowed their lands to be divided were likely to lose political clout (Stephenson, 1942). Under these circumstances, a whole estate was much more valuable than a parceled one (i.e., the whole was greater than the sum of the parts) and primogeniture could be viewed as an efficient way to bequest land in the presence of increasing returns.

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Appendix A



This graph reproduces Fig. 1a in the text. We identify five different segments (instead of the three segments identified earlier). Below we comment on the optimal allocations of total bequests (B) in each segment—optimal in that they maximize the average lifetime income of the children.

Segment 1: ($B < f$) all allocations yield the same average children’s outcome in this segment. This is a trivial case because total bequests are everywhere below the level necessary to induce one child to invest in human capital.

Segment 2: ($f < B < h$) giving everything to one child is the unique optimal allocation in this segment.

Segment 3: ($h < B < h + f$) giving everything to one child is optimal in this segment, as is giving h to one child and the rest to the other (or vice versa). Equal division is not optimal here. Note that an allocation that would induce both children to get an education (say, by giving f to one child and the rest to the other) may be feasible in this segment but is not optimal. This is a direct consequence of inequalities (7) and (8).

Segment 4: ($h + f < B < 2h$) equal division is optimal in this segment, as is giving at least h to one child and the rest to the other (or vice versa).

Segment 5: ($B < 2h$) equal division is optimal in this segment, as is any allocation giving at least h to each child.

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