

# **Income Inequality and Barriers to Human Capital Accumulation in Brazil**

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# Income Inequality and Barriers to Human Capital Accumulation in Brazil

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## Resumo

Este artigo sintetiza a literatura recente que analisa a ligação entre desigualdade de renda e a acumulação de capital humano. Os modelos teóricos discutidos aqui atingem a importante conclusão de que as características familiares e a distribuição de renda realmente se constituem em uma das principais barreiras à acumulação de capital humano, especialmente em países subdesenvolvidos, e os resultados empíricos apresentados parecem corroborar esta idéia. O caso do Brasil é muito ilustrativo e dá um alerta aos governos de países em desenvolvimento. A análise sugere que o desenvolvimento econômico só poderia ser efetivamente alcançado se o problema da desigualdade de renda fosse corrigido e se as oportunidades educacionais fossem mais bem divididas entre os indivíduos de um país ou região.

**Palavras-chaves:** Desigualdade de renda, capital humano

## Abstract

This paper surveys the recent literature that analyzes the link between income inequality and human capital accumulation. The theoretical models discussed here reach the important conclusion that family background and income inequality indeed constitutes one of the major barriers to the accumulation of human capital, especially in developing countries, and the empirical results presented seem to corroborate this idea. The case of Brazil is very illustrative and gives an alert to governments of developing countries. The analysis suggests that economic development would only be effectively achieved if income inequality could be properly corrected and educational opportunities become better distributed among individuals of a country or region.

**Key words:** Income inequality, human capital

## I. Introduction

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The importance of investments in human capital has increased considerably in recent years. Those investments are considered as primordial factors on the determination of the competitiveness of firms and the levels of economic development attained by nations in the modern stage of capitalism that is marked by the globalization of the world economy and by intense technological innovation.

The growing competition in world markets has stimulated the technological rivalry amongst companies and nations resulting in an increasing systematization of technology in productive activities. In this context, knowledge and formal education has become fundamental as they make research and development activities possible and more dynamic, which will allow the development of new products of better quality or lower prices as well as new production techniques.

In general, improvements in human capital are fundamental to the development process of a country or region because they enhance the capability of individuals to produce more and, as they increase their productivity levels, they tend to be rewarded in the labor market by receiving higher wages, i.e., “*the commitment of current resources to improving an individual’s health or education<sup>2</sup>, therefore, increases that person’s future productivity and income*” (BARDHAN & UDRY: 1999).

Furthermore, those investments are justified not only for their importance to the national economy but also because they strongly affect the quality of life of an entire population. The lack of those investments generates an enormous human and economic waste as it condemns a fraction of a population to a vicious cycle of low productivity levels and therefore low incomes, relegating these individuals to a situation of practically unchanging poverty.

One of the main factors that influence this accumulation is income inequality. More specifically, in poor countries income distribution is generally very asymmetric and the most visible manifestation of such phenomenon in those countries is the wide dispersion in the health and education attained by the people. The main consequence is that if it is assumed that there is a joint causation between income distribution and human capital, increasing returns to investments in human capital and imperfect credit markets, those who do not have resources to make such investments will be caught in a

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<sup>2</sup> Although human capital investments refer both to investments in education and in health, the emphasis of this paper will be in schooling.

*poverty trap*, which will negatively influence the development process of such countries. As Ray (1998, p. 237) points out, “*inequality has a built-in tendency to beget inefficiency, because it does not permit people at the lower end of the wealth or income scale to fully exploit their capabilities*”.

Thus, the main purposes of this paper will be to review the recent economic literature trying to identify which are the most important factors that negatively affect income distribution and then generate barriers to human capital accumulation in underdeveloped countries, and then confront the major results found with evidences from Brazil in recent years.

Besides this introduction this paper is composed by three additional sections. In section II, it will be made a brief survey of the literature regarding income inequality and human capital accumulation, while in section III the case of Brazil will be analyzed as an application. Finally, section IV concludes.

## **II. Income Distribution and Human Capital Accumulation: A Brief Survey**

The starting point of the modern human capital theory was the studies of Gary Becker and Theodore Schultz in the late 60s and early 70s. The basic idea of these studies was that human capital should be treated as other forms of capital and, therefore, such investments should be made until its private marginal benefits equal its private marginal costs. More specifically, it would be possible to construct for any individual marginal benefits and marginal cost curves and then determine the optimal amount that should be invested (when those curves intercept). And, if all markets function perfectly everyone should invest in education until the expected rate of return is equal to the next best investment alternative.

Normally, the marginal benefits curve is downward sloping, reflecting the fact that there are diminishing returns to human capital investments, while the marginal costs curve is upward sloping because education is costly and also because the longer the period somebody spends investing in human capital, the smaller is the period that it has to recover the amount invested as well as all of its forgone earnings.

Then, how could this theory be related to income distribution? According to this fairly simple framework, if private marginal benefits and costs are associated with family background and markets present some form of imperfection (e.g. imperfect credit markets), then different families would present different marginal benefits and/or marginal costs curves. In general, one could expect that higher private marginal benefits and lower marginal costs would be associated with higher-income households with better-educated parents (BEHRMAN, BIRDSALL & SZÉKELY: 2000).

Why should this be the case? Basically, if there are imperfect credit markets then only higher-income households will be able to afford a better education for their children. Furthermore, since these families on average tend to be better-educated, then they could indirectly improve the performance of their children in school through tutoring and through investments in their health and nutrition.

As seen above, the existence of imperfect credit markets seems to play a very important role in the present discussion and, therefore, a brief comment about this feature would be desirable. In fact, low levels of income and poverty may completely jeopardize productive educational choices for the poor because of the failure of credit markets. Usually, educational loans are difficult to be obtained because human capital often cannot be offered as collateral for such loans, giving no guarantee for financial intermediaries in case of default. Therefore, the poor should be responsible for all costs during the educational process and most of the time marginal costs end up being greater than the marginal benefits of such investments (RAY:1998).

This problem could be even greater in countries where there is income inequality because of misguided educational policies. What usually happens is that governments spend most of their resources destined to education financing universities instead of primary and secondary education. The problem arises when students are selected to join some university. Students from higher-income households have a very good advantage compared to the others because they went to private schools that are on average much better than their public counterparts. At the same time, the best students often choose to go to public universities because their quality is usually superior. The result is that public resources end up financing the rich while the poor are kept with fewer educational opportunities, a result that is clearly inefficient for society. A good example

of a country where such phenomenon clearly exists is Brazil (BEHRMAN, BIRDSALL & SZÉKELY: 2000; FONSECA: 1997; RAY: 1998).

This phenomenon goes against the predictions of the model elaborated by Glomm and Ravikumar (1992). They present an overlapping-generations model of endogenous economic growth with heterogeneous agents. Their objective was to obtain predictions on the growth of per capita income and the evolution of income distribution according to the preferences, technologies, and income distribution functional forms assumed. Society is first faced with the choice between two different educational systems: one characterized by only public schools and the other by only private schools. In the latter, clearly the quality of education is chosen by each household when they decide how much they are going to pay for their children's education (the more they invest the better the quality of the education they receive). And, the quality of the public system is based on majority voting. The main result is that a system with only public education is able to reduce income inequality faster than the other system. This result seems to be intuitive since in the public system per capita investment is basically the same for every student and is independent from their family backgrounds, while in the private sector basically the richer would be able to afford better-quality schools. Another interesting result of the model is that the private system is able to generate higher per capita incomes provided initial income inequality is not large, a result that also seems to be compatible with the previous one. Finally, if the choice of the educational system is endogenized, the choice in favor of the public system is conditioned basically on the majority of agents in the economy according to their incomes, i.e., if the majority of individuals receive income below the average then the public system would be the best option.

After this brief digression about imperfect credit markets and educational policies, it is worth mentioning that according to Behrman, Birdsall, and Székely (2000) there are some other implications regarding income distribution and education that could be inferred from the basic framework presented on the beginning of this section.

First, if children's intellectual endowments are correlated with their parents' endowments that are usually related to their human capital stocks and earnings, then children from higher-income households will increase their probability of being successful in their educational endeavors. Additionally, if their parents are better related

(i.e., if they have good connections) then they would have more opportunities to find a good job after their schooling process is complete.

Finally, other important implication is related to informational issues. On average, better-educated parents often can assess with greater accuracy the risk involved in human capital investments because they are usually better prepared to deal with unpredicted events such as unexpected increase in the costs of education, for example. Therefore, those parents could afford to be less risk-averse than the others usually are.

So far, the basic ideas discussed here seem to indicate that income inequality heavily influences human capital accumulation. But, further analysis tends to indicate that human capital accumulation tend to increase inequality if there are unequal educational opportunities. This happens because, in general, better-educated people have greater ability to increase their income opportunities with time, which does not happen as often with people with low educational levels. Therefore, income inequality and human capital accumulation should be treated as a process with joint causality that has profound impacts on the level of social mobility of countries and regions (BIRDSALL & GRAHAM: 2000).

Some other models seem to confirm the basic conclusions that are discussed here. A more formal model that attempts to formalize with more details the basic framework developed by Becker and Schultz was presented by Bardhan and Udry (1999). The authors start from the perception of the existence of the two-way causality mentioned above and then they discuss evidences that would corroborate this hypothesis. Their most important objective was then to show that income and human capital investments can serve as a basis of the theory of income distribution. But, differently from before, because the model includes physical capital and is presented in a general-equilibrium framework, then the authors argue that there should actually be increasing returns in human capital investments or, otherwise, in the long run everybody in the economy would wind up with similar levels of education. And, this should be analyzed in conjunction with the hypothesis that there are capital market imperfections because, otherwise, incomes would tend to converge in the long run if everyone has access to the same investment opportunities.

Although the mechanics of the model brings some aspects not included in Becker's model, its conclusions are somewhat compatible. The authors basically

conclude that there could be persistent income inequality caused by inequalities in human capital due to imperfections in credit markets, allowing the rich to become richer while the others would remain caught in a poverty trap according to a mechanism similar to the one described before. Furthermore, as Bardhan and Udry (1999, p. 130) point out that,

*“it should be noted that the twin assumptions of an imperfect capital market and increasing returns to human capital investment (along with the variety of more specific technical assumptions that we have made) generate not only a theory of the distribution of income, but also a continuum of equilibria. We have seen that it is possible to have steady-state equilibria with an entire range of trained workers. Steady-state equilibria exist with large numbers of trained workers, a relatively low differential between skilled and unskilled wages, and a rate of return to education that just equals the return to investment in physical capital. Equilibria also exist with small numbers of trained workers, very large differences in the wages earned by skilled and unskilled workers, a very high rate of return to education, and a pool of untrained workers who cannot afford to reduce their consumption by enough to save up the funds required for training.”*

The basic advance of other types of models in the modern literature regarding income inequality and human capital investments was to endogenize fertility decisions. The most important models with this important feature are the ones from Becker, Murphy and Tamura (1990), Dahan and Tsiddon (1998), and Kremer and Chen (2000).

Although Becker, Murphy and Tamura's paper does not deal with income distribution directly, it has some important conclusions that could be added to the analysis done so far. According to the authors, the parents will decide simultaneously how many children they will have and how much education they will provide to each of them. They construct a dynamic OLG model trying to draw some important conclusions. Spillovers are included in their model in the sense that the amount of education that each child will get is intrinsically related to the amount of human capital that the parents have. So will be the decision of the number of children. More specifically, parents' welfare will depend basically on their consumption and on the discounted sum of the welfares of their children. If parents have lower education levels, then they will tend to have more children and provide them with low education levels as



well, because they discount heavily the sum of their children's welfare. But, instead if the parents have high human capital, then they will tend to have less children (the opportunity cost of rearing a child is too high if compared to the marginal benefit in welfare units provided by each additional child) and they will give them higher educational levels.

In their model, the government could stimulate higher levels of human capital accumulation on the families with low levels of human capital by subsidizing education or stimulating the emergence of credit markets that would finance these activities. This would generate more spillovers in the future because better-educated parents would have smaller families and they would educate their children more.

The link between Becker, Murphy and Tamura's conclusions with income inequality will be made through the discussion of the other two models that will be presented ahead.

Several earlier papers have discussed the impact of differential fertility on the distribution of income. But, any of them captured the other direction of causality. According to Birdsall (1988) there is a double causality between fertility and income inequality. The basic assumption is that fertility depends inversely on wages.

Dahan and Tsiddon, for example, first compare poor dynasties that don't invest in education with rich dynasties that do, which has direct implications to income distribution. The effects are magnified because of higher fertility rates among the poor. After inequality reaches a threshold, wage differentials are great enough for some poor to obtain education. Hence, the number of uneducated falls and the economy reaches the steady state (that is unique). This model is not particularly attractive because it suggests that this process is certain, i.e., history will basically determine when each economy will reach the unique steady state.

Kremer and Chen, on the other hand, deal with a model where multiple steady states are possible. Their starting point is the fact that in developing countries fertility falls with education, as Becker, Murphy, and Tamura emphasized. For example, according to the data from the United Nations in 1995, women with no education have three times as many children as women with ten or more years of education in Brazil.

The problem is that children of the uneducated are less likely to become educated themselves and the difference in fertility creates a major demographic force increasing

the proportion of unskilled workers. Hence, the authors will construct a model trying to examine the implications of combining three fundamental assumptions. They are:

[i] Skilled and unskilled workers are complements in production;

[ii] Children of unskilled workers are more likely to be unskilled; and

[iii] Higher wages reduce fertility because substitution effects outweigh income effects.

The authors assume that individuals have preferences that could be represented by a quasi-linear utility function that depends on the number of children and on the wage rate, in such a way that the first-order condition for optimal fertility yields a result that implies that higher wages lead people to have fewer children. Furthermore, they assume that

[iv] Educational decisions are responsive to the incentives provided by wage premia, and

[v] Children of unskilled parents face higher costs of education than children of skilled parents (due to differences in home environments and to the lack of access to capital markets).

Then, to incorporate [iv] and [v] in the model, they consider the existence of two different groups. Group 1 is formed by the children of skilled workers and a proportion  $\theta$  of children of unskilled parents who need  $\tilde{L}$  units of time to become skilled, while in Group 2 there is a proportion  $1 - \theta$  of children of unskilled parents who need  $\tilde{H}$  units of time to become skilled (total time is normalized to 1).

Let  $\tilde{L} < \tilde{H}$  and  $w_s \cdot (1 - \tilde{L}) > w_u$ , for Group 1, where  $w_s$  and  $w_u$  represent the wages of skilled and unskilled workers, respectively. Hence, in this model a steady state could be defined as a triplet composed by the ratio of skilled and unskilled workers at time  $t$  ( $R^*$ ), the wage differential ( $D^*$ ), and the proportion of children of unskilled workers who become skilled ( $\gamma^*$ ). Three types of solutions are then possible:

[i]  $R^*$  induces a wage differential of exactly  $1/(1 - \tilde{L})$ , and then among children of unskilled workers, those with high cost will choose no education; and some or all of those with low cost of education will choose education. It should be the case that  $\gamma^* \leq \theta$ .

Call this steady state  $R_{unequal}^*$ , because the equilibrium is reached with a lower proportion of educated people in the country, increasing inequality.

[ii]  $R^*$  Induces a wage differential of exactly  $1/(1-\tilde{H})$ . It should be the case that  $\gamma^* \geq \theta$ . Call this steady state  $R_{equal}^*$ . And, finally

[iii]  $R^*$  Induces a wage differential between  $1/(1-\tilde{L})$  and  $1/(1-\tilde{H})$ . It should be the case that  $\gamma^* = \theta$ . All the children with a low cost will become educated, and all the children with high cost will not. Call this steady state  $R_+^*$ .

Hence, this model admits some level of mobility in equilibrium, and according to this inequality would remain high or it will decrease. Other important remarks about the model are the following:

[a] If the proportion of children of unskilled workers with low cost of education is low, then the economy converges to  $R_{unequal}^*$ .

[b] For high proportions, the economy converges to  $R_{equal}^*$ . The proportion of skilled adults in the population will rise and it will help reduce inequality.

[c]  $R_+^*$  is admissible, but generically unstable.

[d] If the cost of education falls, or as the proportion of output that goes to skilled workers decreases, wage differentials fall and the basin of attraction to the unequal steady state shrinks (it could be eliminated).

[e] The model also suggests that countries with  $R_0$  just under  $R_+^*$  may face a brief window of opportunity to move to  $R_{equal}^*$ . If time passes by and the opportunity is not seized, then the chances decrease substantially.

[f] More generally, if educational opportunities are expanded, then they may induce a shift into the basin of attraction of the more equal steady state and reduce inequality.

[g] If a country wishes to reduce the steady-state wage differential at its current steady state, the model suggests reducing  $\tilde{L}$  or  $\tilde{H}$ , i.e., the cost of education for different segments of the population.

Thus, as a final conclusion for this section it should be mentioned that, in despite of differences in the mechanics and overall assumptions of the theoretical frameworks

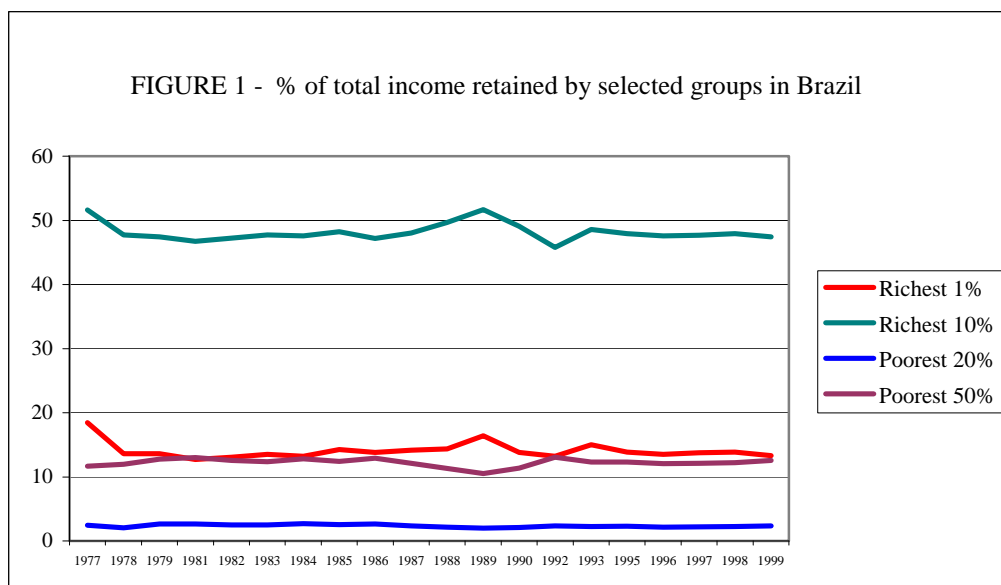
analyzed, two basic conclusions could be reached. First, it is admitted a two-way causality between income inequality and human capital investments. And, finally all frameworks seem to infer that schooling is heavily influenced by family background, and this has serious repercussions to income inequality. More specifically, higher-income and better-educated households will tend to have fewer children and provide them with more of high-quality education. This will give greater advantages to these individuals in terms of possibilities that they could have during their lives, increasing inequality in a country where initial inequality is already high. This result is often magnified because of credit market imperfections.

Hence, after this brief survey of the modern theories regarding the theme in question, in the next section it will be given the example of Brazil, a country where inequality is very high, constitute a serious barrier to human capital accumulation, especially among the poor.

### III. Inequality and Barriers to Human Capital Formation: The Case of Brazil

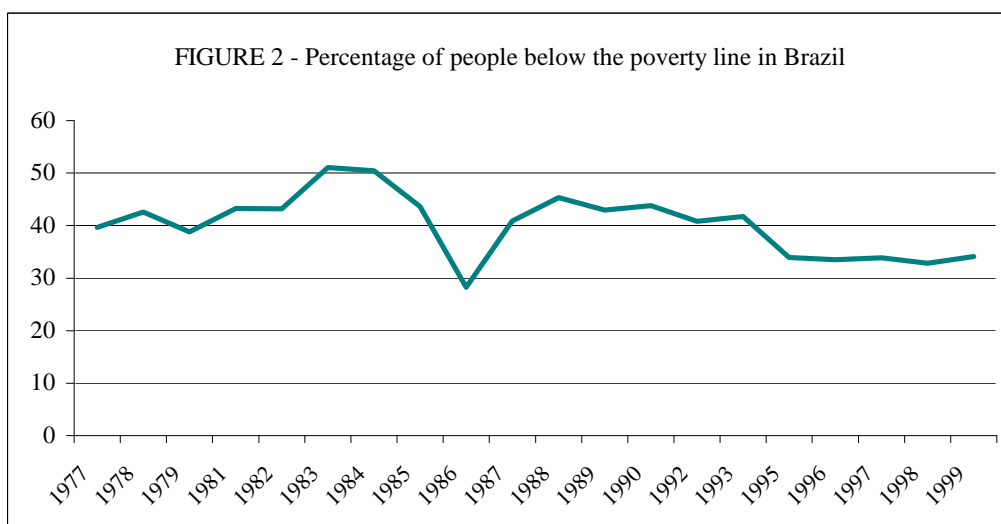
Brazil is the largest and most populated country in Latin America and it also has the highest GDP and one of the highest per capita incomes of the region. In contrast, its income inequality is one of the worst in the world. Since the main objective of this section is to analyze the implications of such phenomenon to the accumulation of human capital in that country in recent years, then the first step will be to provide further evidence of income inequality as well as a plausible explanation for such phenomenon.

As Figure 1 indicates, income is highly concentrated in Brazil and there are no signs of a dramatic change during the years in consideration (from 1977 to 1999, with the exception of 1980, 1991, and 1994 when data were not available). Additionally, the percentage of the income appropriated by the richest 1% is on average greater than the amount received by the poorest 50% (14.08% against 12.23% of the total on average during the period analyzed). The average received by the poorest 20% is proportionally lower reaching only 2.35% of the total.



Source: IBGE (1997, 2000).

As a consequence, the percentage of people that are below the poverty line (defined in Brazil by those individuals who receive at most an equivalent to 50% of a minimum wage<sup>3</sup> per month) is still extremely high, as Figure 2 indicates.



Source: IBGE (2000).

Although this graph shows a decedent trend on this index since 1988, the proportion of people that are considered extremely poor in Brazil is still very high, representing more than 30% of the Brazilian population. This gives further evidence of the high degree of inequality in that country.

Another relevant remark about income inequality in Brazil is to consider that there are considerable discrepancies throughout the country. The richest regions tend to present more equal distributive systems, while the in the poorest regions the situation is much worse, i.e., much more asymmetric. An illustration of this is given by Table 1.

As that table shows, just a small percentage of families in Brazil has monthly incomes superior than 20 minimum wages, while more than 50% of families receive at most 5 minimum wages per month in practically all locations considered. Noticeably, the Southeast and the South (the richest regions) present a distribution much more symmetric than the poorest one, the Northeast. In this region nothing less than 47.5% of the families have incomes lower or equal to two minimum wages per month while only 2.7% are on top of the distribution.

TABLE 1  
*Brazil and regions: Families according to monthly average of earnings (mae), 1999\* (in %)*

	$0 < mae \leq 2$	$2 < mae \leq 5$	$5 < mae \leq 10$	$10 < mae \leq 20$	$mae > 20$
<i>Brazil</i>	27.6	32.2	18.6	9.9	5.9
North	29.2	34.9	17.0	8.6	4.3
Northeast	47.5	29.7	9.2	4.4	2.7
Southeast	17.7	32.2	23.5	13.0	7.8
South	22.2	34.5	21.7	11.3	6.4
Center-West	26.7	35.0	17.9	9.2	6.5

Note. \* Monthly earnings measured in number of minimum wages received per family.

Source: IBGE (1997).

After this brief analysis about income inequality in Brazil, then it is possible to assess and quantify the repercussions of such phenomenon in relation to human capital formation. For that purpose, an overview of Brazilian educational indexes in recent years would be very illustrative.

As Table 2 indicates, literacy rates of adults have increased during the period 1970-1996 from 67.0% to 85.3% in Brazil. This result is important, but if it is considered the performance of the Northeast Region even though the literacy rate has

<sup>3</sup> The minimum wage in Brazil is nowadays around US\$ 100.00.

increased twice as fast as the Brazilian average, in absolute terms it is still far from the desirable level.

TABLE 2  
*Brazil and Regions: Literacy rate of adults in selected years (in %)*

	1970	1980	1991	1996
<i>Brazil</i>	67.0	74.7	80.6	85.3
North	63.0	69.4	75.9	79.2
Northeast	46.1	54.1	63.5	71.3
Southeast	77.1	83.5	88.2	91.3
South	76.5	84.2	88.7	91.1
Center-West	67.5	76.5	83.9	88.4

Source: UNDP. IPEA. IBGE. (1998).

In terms of the total enrollment rate, however, the results are more equal if the regions are compared, as Table 3 indicates. But, they are still not quite acceptable. A country with such an educational deficit as Brazil should have enrollment rates closer to 100% to have more expressive improvements in educational indexes over time and to compensate for poor performances in previous years.

TABLE 3  
*Brazil and Regions: Total enrollment rate in selected years (in %)*

	1970	1980	1991	1996
<i>Brazil</i>	49.2	61.2	67.8	76.8
North	44.0	55.6	63.0	74.5
Northeast	37.8	56.0	60.3	71.7
Southeast	56.3	65.7	72.9	79.9
South	53.3	60.8	76.4	78.7
Center-West	49.2	62.9	73.2	81.1

Source: UNDP. IPEA. IBGE. (1998).

Table 4 shows that the number of years of schooling for selected groups in Brazil is also somewhat asymmetric. This table shows that, on average, women have a greater number of years of schooling than men, as well as whites tend to be more educated than non-whites. In regional terms, once again the Northeast Region presents results below the Brazilian average for all groups, and far more inexpressive than the richest regions (Southeast and South).

TABLE 4  
*Brazil and Regions: Average number of years of schooling for selected groups (1999)*

	<i>Total</i>	<i>Men</i>	<i>Women</i>	<i>White</i>	<i>Non-white</i>
<i>Brazil</i>	5.7	5.6	5.9	6.6	4.6
North	5.7	5.5	5.9	6.7	5.4
Northeast	4.3	4.0	4.7	5.3	3.9
Southeast	6.5	6.4	6.5	7.1	5.2
South	6.2	6.2	6.3	6.5	4.7
Center-West	5.9	5.7	6.2	6.8	5.3

Source: IBGE (1997).

It is not totally a surprising that the worst educational indicators in Brazil are the ones of the Northeast Region that is the poorest region with the worst distribution of income in the country. According to the discussion made in the previous section of this paper, it is expected that countries (or regions) where disparities in income are greater, so would be the differences in educational attainment. But, as also indicated by the models discussed previously, an asymmetric income distribution could be a barrier to human capital accumulation because basically it is assumed throughout the analysis that education attainment depends heavily on family background. Parents with lower education levels tend to have more children and invest less on their children's education, and, even if they wanted to, it could not be totally possible because of imperfect credit markets. Hence, the next step will be to present empirical evidences for Brazil that would corroborate this point of view.

TABLE 5  
*Schooling gaps as percentage of expected schooling conditional on age for ages 10-21 overall and schooling gaps in years overall and by parental schooling quintiles, by country, selected years, 1980-96.*

Country	Year	Avg. Schooling gap						
		<i>Years</i>	<i>Percent of Expected Schooling For age</i>	<i>Schooling gaps in years, by Parental schooling quintiles</i>				
				<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
Argentina (Greater Buenos Aires)	1980	2.0	19.2	3.4	2.2	2.1	1.5	0.6
	1996	2.5	27.2	3.1	2.2	1.9	1.2	1.4
Bolivia (urban)	1986	1.6	16.3	2.4	1.4	1.5	1.5	1.2
	1995	1.4	15.8	2.2	1.7	1.3	1.0	1.0
Brazil	1981	5.5	57.5	7.7	6.3	5.6	4.6	3.2
	1995	4.6	48.0	6.9	5.6	4.4	3.7	2.6
Chile	1987	1.7	17.4	2.9	2.0	1.4	1.3	0.9
	1994	1.5	14.7	2.3	1.9	1.3	1.1	0.8
Colombia	1995	3.3	36.8	4.7	3.5	2.9	2.6	2.7



Costa Rica	1981	3.2	30.2	4.6	3.7	3.0	2.6	1.9
	1995	3.1	30.6	4.6	3.6	3.2	2.6	1.7
Ecuador	1995	2.7	26.5	4.3	3.5	2.4	2.0	1.2
El Salvador	1995	4.1	43.1	6.0	5.4	4.1	3.1	1.7
Honduras	1989	5.2	50.9	6.8	5.8	4.9	4.6	3.6
	1996	4.7	45.2	6.3	5.4	4.7	3.9	3.0
Mexico	1984	3.4	37.5	4.7	3.7	3.3	3.1	2.3
	1989	3.1	33.7	4.8	3.3	2.7	2.4	2.2
	1992	2.9	32.7	4.6	3.5	2.5	2.3	1.6
	1994	2.9	32.9	4.6	3.5	2.7	2.0	1.9
Nicaragua	1993	4.6	44.9	5.7	5.2	4.6	4.2	3.5
Panama	1995	2.1	20.5	3.7	2.4	1.7	1.4	1.0
Paraguay	1995	3.5	36.3	5.0	4.2	3.3	2.7	2.2
Peru	1985	2.7	28.1	4.7	3.1	2.1	1.9	1.5
	1996	2.6	31.8	4.0	3.0	2.6	1.8	1.3
Uruguay (urban)	1981	2.3	23.4	3.6	2.9	2.3	1.7	1.2
	1995	2.0	18.9	3.2	2.5	2.0	1.5	1.0
Venezuela	1981	3.6	35.5	5.1	4.1	3.4	3.0	2.4
	1995	2.7	26.9	4.0	2.6	2.6	2.5	2.0
<i>Average*</i>	-	3.0	31.5	4.5	3.5	2.9	3.4	1.8

Source: BEHRMAN, BIRDSALL & SZÉKELY (2000, p.146).

Note. \* Equally weighted country averages (not population weighted).

The best evidences regarding family background and schooling were presented by Behrman, Birsall, and Székely (2000). These authors use twenty-eight household surveys from Latin America countries taken between 1980 and 1996. Four basic age groups are considered: 10-12, 13-15, 16-18, and 19-21 years old. And, since schooling decisions are likely to depend on the position of a child's family within the economy, then five quintiles of households are categorized by parental schooling.

In Table 5 it is presented schooling gaps as a percentage of expected schooling conditional on age for ages 10-21 and schooling gaps in years and by parental schooling quintiles, by country, in selected years. Schooling gaps are defined as the schooling that would have been attained at age when surveyed if a child has begun schooling at age 6 and progressed one grade every subsequent year minus actual number of completed grades (BEHRMAN, BIRDSALL & SZÉKELY:2000).

Clearly, the size of the schooling gap in Latin America is on average large (3.0 years). And, the gap ranges widely across countries. Brazil is indeed one of the worst cases. Although the gap tended to shrink in that country from 1981 to 1995, the results still look pretty unsatisfactory. And, as the models discussed previously predicted, the schooling gap tends to be wider according to parental schooling quintiles, i.e., in the first quintile (parents with the lowest educational level) the schooling gap is extremely

high (7.7 years in 1981 and 6.9 years in 1995). This reflects the fact that about 50% of the population living in extreme poverty fails to enroll in school every year in Brazil (FONSECA:1997). The results seem to improve in both years as higher quintiles are analyzed, but even in the 5<sup>th</sup> one the gaps are still high if compared to other Latin American countries, revealing the negative effects of the extreme income inequality in Brazil.

In Table 6, it is shown that schooling gaps tend to increase with age in Latin America. Once again, Brazil presents the worst results. While in 1981 the schooling gap of individuals in age 10-12 was 3.1 years, for the age group 19-21 was not less than 8.0 years! In 1995, the results generally improved but they are still frustrating. These numbers show the extent of the waste of educational opportunities in Brazil that has clear implications to the stage of economic development of that country.

TABLE 6  
*Schooling gaps in years for age groups 10-12, 13-15, 16-18,  
and 19-21, by country, selected years, 1980-96.*

Country	Year	Schooling gaps by age group			
		10-12	13-15	16-18	19-21
Argentina (Greater Buenos Aires)	1980	0.7	1.2	2.3	3.9
	1996	1.4	2.8	2.0	3.9
Bolivia (urban)	1986	0.7	1.1	1.7	3.1
	1995	0.8	1.1	1.6	2.8
Brazil	1981	3.1	4.5	6.0	8.0
	1995	2.5	3.6	5.1	7.1
Chile	1987	0.5	1.1	2.1	3.8
	1994	0.5	0.9	1.7	3.2
Colombia	1995	2.2	2.7	3.5	5.3
Costa Rica	1981	1.1	1.8	3.7	6.0
	1995	1.3	1.9	3.4	5.7
Ecuador	1995	1.1	1.8	3.1	4.8
El Salvador	1995	2.3	3.2	4.6	6.3
Honduras	1989	2.5	3.6	5.7	8.0
	1996	2.0	3.2	5.2	7.6
Mexico	1984	1.8	2.6	3.9	6.5
	1989	1.7	2.3	3.5	5.5
	1992	1.6	2.3	3.4	5.4
	1994	1.6	2.2	3.5	5.6
Nicaragua	1993	2.0	3.2	5.1	7.4
Panama	1995	0.8	1.3	2.3	4.0
Paraguay	1995	1.7	2.5	3.9	6.1

Peru	1985	1.3	2.0	3.0	4.7
	1996	2.2	2.3	2.8	4.2
Uruguay (urban)	1981	0.9	1.6	2.6	4.4
	1995	0.7	1.2	2.2	3.8
Venezuela	1981	1.6	2.4	3.9	6.3
	1995	1.1	1.8	3.0	5.1
<i>Average*</i>	-	1.5	2.2	3.4	5.3

Source: BEHRMAN, BIRDSALL & SZÉKELY (2000, p.148).

Remark. \* Equally weighted country averages (not population weighted).

Behrman, Birdsall, and Székely (2000) then tried to verify how strongly these schooling gaps are associated with family background. For that purpose, they estimated the following regression for each country:

$$SGAP = a_0 + a_1.S_f + a_2.S_m + a_3.Y_h + a_4.CON + \varepsilon$$

where,

$SGAP$  = Schooling gap.

$S_f$  = Father's schooling.

$S_m$  = Mother's schooling.

$Y_h$  = Household income.

$CON$  = Controls (e.g., whether the household is rural or urban, or if it is headed by a woman, etc.).

$\varepsilon$  = Disturbance term.

The results are presented in Table 7. The authors are particularly interested in the poorest households in the bottom quintile, and they also anticipate that there could be nonlinearities in the associations between the indicators of family background and schooling gaps for each age group. Differences are also expected among the various age groups analyzed. And, to make the results comparable, the authors transformed the income units into 1985 U.S. dollars (PPP).

The results presented in Table 7 are indeed compatible with the expectations of the authors. The income coefficients are negative, showing that as income increases the schooling gap is reduced. Furthermore, the more negative the coefficient, then the poorer the quintile and the older the child. Similar patterns hold for father and mother's schooling. In particular, mother's schooling seems to be a very important variable in

this analysis.

The coefficients for Brazil once again reveal that the situation is indeed worse in that country if compare to other Latin America countries. Inequality seems to largely affect human capital accumulation. As the authors point out (p.151),

*“For the lowest quintile and oldest age group in Brazil, at average education and household income for that group, the predicted total schooling gap is 6.8 years. This is sizable given that in the past three decades the average education of the labor force in the region increased by only 1.5 years.”*

TABLE 7  
*Average coefficient estimates for father's schooling, mother's schooling and household head's income in estimates for schooling gaps for ages 10-21, by surveys, parental schooling quintiles, and age groups.*

Country	Year	Average coefficient estimates		
		Father's Schooling	Mother's schooling	Household Income
Argentina (Greater Buenos Aires)	1980	-0.084	-0.145	-6.51E-05
	1996	+0.046	+0.386	-1.28E-04
Bolivia (urban)	1986	-0.100	-0.144	-1.27E-06
	1995	-0.090	-0.094	-1.13E-04
Brazil	1981	-0.171	-0.222	-2.35E-04
	1995	-0.214	-0.220	-2.01E-04
Chile	1987	-0.055	-0.082	-6.42E-05
	1994	-0.040	-0.071	-2.64E-05
Colombia	1995	-0.116	-0.203	-3.35E-05
Costa Rica	1981	-0.086	-0.152	-1.71E-04
	1995	-0.265	-0.261	-1.26E-04
Ecuador	1995	-0.110	-0.182	-5.02E-05
El Salvador	1995	-0.161	-0.192	-2.94E-04
Honduras	1989	-0.077	-0.179	-2.98E-04
	1996	-0.139	-0.299	-3.70E-04
Mexico	1984	-0.202	-0.212	-5.47E-05
	1989	-0.169	-0.195	-8.13E-05
	1992	-0.122	-0.210	-9.53E-05
	1994	-0.120	-0.144	-8.52E-05
Nicaragua	1993	-0.124	-0.184	-2.90E-04
Panama	1995	-0.070	-0.134	-1.18E-04
Paraguay	1995	-0.169	-0.221	-1.84E-04
Peru	1985	-0.124	-0.094	-1.09E-04
	1996	-0.063	-0.106	-1.29E-04
Uruguay (urban)	1981	-0.028	-0.115	-1.08E-04
	1995	-0.083	-0.113	-1.00E-04
Venezuela	1981	-0.153	-0.204	-7.80E-05
	1995	-0.185	-0.143	-5.87E-05
<i>Quintile</i>				
1	-	-0.170	-0.214	-3.034E-04
2	-	-0.081	-0.149	-1.764E-04
3	-	-0.137	-0.197	-1.235E-04
4	-	-0.073	-0.115	-6.965E-05
5	-	-0.036	-0.062	-2.635E-05
<i>Age group</i>				
10-12	-	-0.065	-0.098	-8.98E-05
13-15	-	-0.105	-0.160	-1.35E-04
16-18	-	-0.115	-0.176	-2.12E-04
19-21	-	-0.210	-0.303	-2.61E-04
<i>Overall Average</i>	-	-0.098	-0.148	-1.30E-04

Source: BEHRMAN, BIRDSALL & SZÉKELY (2000, p.150-151).

As a conclusion, Fonseca (1997, p. 200) properly points out that

*“From an economic viewpoint, the main consequences of this situation in Brazil are its harmful effects on the professional ability, initiative, and productivity of large segments of the population. These effects take place when the absolute deprivation or lack of competence in poor families causes them to forgo any investment in the formation of human capital for younger generations. Therefore, a great number of children and adolescents who are receiving an insufficient quality and quantity of food and education exhibit precarious academic performance and hence enter the labor market prematurely. Their economic horizon is blocked, and the cycle of poverty and incompetence is ready to begin anew.”*

This indicates that only through effective economic policies that would reduce inequality or that would stimulate human capital investments for the poor is that Brazil would be able to achieve a desirable level of economic and human development compatible with the modern stage of capitalism.

#### IV. Concluding Remarks

It would be indeed counterproductive to list all the results obtained during this study. The empirical findings seem to be in accordance with the predictions of the theoretical models and frameworks discussed before, i.e., schooling is linked to family background and income inequality constitutes one of the major barriers to the accumulation of human capital in developing countries. The case of Brazil is important to illustrate these points and it gives an alert to governments of developing countries as this analysis suggests that economic development would only be effectively achieved if income inequality could be properly corrected and educational opportunities become better distributed among individuals of a country or region.

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- Ensaio 2: Medidas de Pobreza e Desigualdade: Uma Análise Teórica dos Principais Índices.
- Ensaio 3: Discriminação Como Fonte de Desigualdade de Rendimentos no Mercado de Trabalho das Regiões Nordeste e Sudeste do Brasil.
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