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Is Poverty the Main Cause of Child Work in Urban Brazil?

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SUMMARY

1. INTRODUCTION

2. THE CHILD LABOR FORCE PARTICIPATION DECISION

2.1. The Nature of the Decision Process
2.2. Aggregated Poverty Effect
2.3. Children's Education in the Household Objective Function
2.4. A Model for the Rational Allocation of Time of Children
2.5. The Microrelationship between Poverty and Child Word
2.6. The Relationship between Child Work and the Cost of Education
2.7 The Relationship between Child Work and Reduced Wage Differentials

3. CHILD WORK AND POVERTY: EMPIRICAL EVIDENCE

3.1. Evidence from Aggregated Data
3.2. Microevidence from Household Surveys

4. SUMMARY AND CONCLUSIONS

APPENDIX A

APPENDIX B

APPENDIX C

REFERENCES

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1. INTRODUCTION

In 1990 there were in Brazil around 16 million children aged 10 to 14 years. Close to million of them were either working or searching for a labor market activity, resulting in a labor force participation rate only slightly lower than 20%.

In urban Brazil the situation was better but still of enormous concern. Out of the 12 million minors aged 10 to 14 living in urban Brazil, 1.4 million were part of the economically active population. As a result, in urban Brazil, the labor force participation rate of minors in this age group was close to 12% in 1990.

Labor force participation rates of this magnitude, for this age group, are a structural phenomenon in Brazil. For instance, a comparison of the 1960 and 1980 demographic censuses conducted by Henriques, Silva, Singh and Wulf (1989) indicates only a modest decline (two percentage points) in the labor force participation of minors 10 to 14 years old over these two decades.

In consonance with the importance of the theme, a large literature has developed around the main determinants of high labor force participation rate of minors in Brazil. There exists an astonishing consensus in this literature. Essentially, all studies have reached the conclusion that poverty is the main cause of child work in Brazil.[1]

A few previous studies (Madeira (1986) and Barros and Mendonça (1990, 1991a,b), however, have already raised serious doubts about the validity of this traditional explanation for child labor in Brazil. In this study, we go one step further to investigate in greater detail the actual role of poverty in explaining the excessively high level of child labor in Brazil. To make this task more manageable, we focus our investigation on the Brazilian urban areas.

[1]See for example, Alves, Moura and Vogel (1991), Alvim (1984), Barreto (1940), Calsing (1985), Carvalho (1979), Chahad (1975), Dal-Rosso and Resende (1982, 1986), Fausto and Cervini (1991), Fausto Neto (1992), Gouveia (1982), Hermann (1940), Lima and Burger (1988), Machado Neto (1980, 1982), Martins (1991), Medeiros (1985), Moura (1977, 1982), Oliveira (1980, 1984), Pires (1988), Prado (1982), Resende and Dal-Rosso (1982), Rizzini et alii (1992), Rodrigues (1979), Silva et alii (1982), Souza (1975), Spindel (1983, 1985a, b, c, 1988), Velloso (1985), Violante (1981), Zylberstajn, Pagotto e Pastore (1985).

This study is organized in four sections. Section 2 describes theoretically how the decision of children to participate in the labor market is made by rational households. In addition, this section investigates how this household decision is affected by changes in prices and the level of household resources. In particular, this section investigates how the decision of children to work is affected by both the household specific level of poverty and the aggregated level of poverty of the society.

In Section 3, a variety of empirical facts about the relationship between poverty and child labor is presented. The section uses evidence based on (*a*) international comparisons, (*b*) regional and temporal comparisons of aggregated data for Brazil and (*c*) microdata from household surveys. Finally, Section 4 summarizes our main findings and presents some conclusions.

2. THE CHILD LABOR FORCE PARTICIPATION DECISION

2.1. The Nature of the Decision Process

The labor force participation of children is ultimately a household decision. In this study, we assume that households are rational decision units, in the sense that they make their decisions aiming to maximize their welfare level subject to a set of resources constraints and prices. Therefore, as all household decisions, the labor force participation of children is determined by the level of prices and household preferences and endowments;[2] the prices and household endowments are strongly influenced by the prevailing macro socioeconomic environment.

In a fundamental way, the main explanations for variations in the level of child work are variations in prices and household endowments. Accordingly, we concentrate our attention on the impact of prices and household endowments on child work. As a consequence, we ignore variation in household preferences as a

[2] Actually, preferences and endowments are attributes of individuals instead of households. So, a theory is necessary to describe how households aggregate the preferences and endowments of their members before we can talk about household rational decisions. The traditional economic theory of rational household behavior (see Becker (1991) ignores this aggregation problem completely. However, more recently, this question has been formally considered by Manser and Brown (1980), McElroy and Horney (1981), and in particular by Chiappori (1988).

potential explanation for differences in child work among households, regions and periods in time.

Although the child work decision is one of the many decisions household has to make, it is not very convenient to treat it symmetrically with all other decisions. On the contrary, it is more convenient to treat it simply as one of the aspects of the household decision about the overall time allocation of children.

Overall, the time of individuals can be allocated among four possible alternatives: leisure, learning, working in home activities and working in market activities. To simplify the analysis, we treat, leisure and time devoted to work in home activities jointly. We refer to them together simply as leisure.

Consequently, our goal is to investigate how rational households decide about the allocation of time of children between leisure, working and learning activities. We are particularly interested in knowing how these decisions are affected by the household specific level of poverty and the aggregated level of poverty of the society.

2.2. Aggregated Poverty Effect

Studies of the relationship between poverty and child work assume that the labor force participation of children is an increasing function of both (a) the household specific poverty level and (b) the society aggregated level of poverty. The effect of the aggregated level of poverty is assumed to affect the level of labor force participation of children over and above the household specific poverty effect. Therefore, to critically evaluate this literature we have to take into consideration both effects of poverty.

To consider these effects, however, we have to begin bybeing more precise about the notion of poverty itself. We define poverty based only on the level of monetary income. At the household level, poverty just means low levels of monetary income. At the aggregated level, poverty is determined by the distribution of monetary income, being a decreasing function of the average income level and an increasing function of the degree of income inequality. Therefore, as long as there exists

certain degree of income inequality, there will be poor households in rich societies and rich households in poor societies.

In general, poor households in poor societies would not face the same prices and resources constraints as poor households in rich societies. It is precisely due to this fact that it is so important to differentiate the impact of poverty at the household level from the impact of poverty at the society level.

The independent effect of the aggregated level of poverty operates at least through two channels which are worthwhile to consider explicitly. First, richer societies can afford to offer more comprehensive free education and health services as well as to offer education and health services of better quality.[3]

Secondly, richer societies have greater stock of physical capital and technological knowledge, leading to greater labor productivity and consequently to higher wages. However, the wage increase which follows from a process of development is not necessarily homogeneously distributed among all categories of workers. Consequently, the structure of wages may also be substantially transformed during the development process.

To understand the changes in child work which take place during a process of economic growth, it is essential to know the nature of the transformations in the structure of wages which occur during such a process. In particular, it is essential to be able to predict the impact of economic growth on the wage differentials by age and level of education. Unfortunately, a simple relationship between these wage differentials and level of economic development (aggregated poverty) does not seem to exist. For instance, the wage differential between skilled and unskilled labor will, during the process of economic growth, be influenced by two forces operating in opposite directions. One the one side, accumulation of capital and technological progress tend to increase predominantly the demand for skilled labor.[4] This force tends to increase the wage gap between skilled and unskilled

[3] Note that richer societies tend to offer better social services despite of the fact that these services tend to be relatively more expensive in such societies. This is the case since education and health services tend to be extremely labor intensive and labor is relative more expensive in richer societies.

[4] This is correct as long as either (a) capital and skilled labor are complements or (b) the technological progress is biased towards skilled labor.

labor. On the other side, the universal provision of free education should increase the supply of skilled labor relative to unskilled labor. This force would, therefore, operate in the direction of reducing the wage gap between skilled and unskilled workers. The final result on the wage gap between skilled and unskilled workers will depend totally on the relative strength of these two forces.

In this paper we assume that reductions in aggregated poverty (economic growth) lead to concomitant reductions in all types of wage differentials. So, in particular, we are assuming that during a development process the expansion of education occurs at a very fast pace leading the supply of skilled workers to increase faster than the corresponding demand. As a result, the wage gap between skilled and unskilled workers is reduced. This assumption that development brings a generalized reduction in wage differentials is, to a great extent, corroborated by comparing the wage structure in Latin America with the one for the OECD countries.

In summary, reductions in poverty can affect child work through two channels. At the micro level, reductions in poverty mean higher family per capita income. At the macro level, reductions in poverty lead to reductions in the private cost of education and in a generalized increase in wages and reduction in wage differentials. In the following sections, we investigate how these changes are expected to impact on child work.

However, since the decisions about education and work are both part of the same decision process (the time allocation of children), we first describe briefly how households perceived the education of children.

2.3. Children's Education in the Household Objective Function

To describe how households decide about the time allocation of their children it is essential first to specify why parents care about their children's educational level. There are two non-exclusive possibilities: First, parents may care about children's education because extra education will increase children's earnings over their lifetime. When this is the only reason why parents are concerned about their children educational level, we say that education is a pure investment good.

Secondly, parents may care about children's education because either (a) they enjoy having better educated children even if education has no effects on children's earnings, or (b) because they know that their children enjoy being educated even if education has no impact on earnings. When this is the only reason parents care about children's educational level we say that education is a pure consumption good.

If we assume that education is a pure investment good and that there are no credit constraints (i.e., parents or children could borrow as much as they want for educational purposes), then there would be an optimal level of education for each child which would not depend on parents' income. At this optimal level of education, the rate of return to education would equal the rate of interest. So, parents who want to increase their children's future income would find it more efficient to make monetary transfers as opposed to make additional investments in their children education.

In this study, we are going to assume that education is a pure investment good but that poor parents are credit constrained. The credit constraint implies that poor parents will be underinvesting in the education of their children. As a result, any increase in parents income will alleviate the credit constraint and lead to extra investments in children's education, despite the fact that education is assumed to be a pure investment good.

2.4. A Model for the Rational Allocation of Time of Children

To investigate theoretically the effect of poverty on child work we consider a simple model for the household decision process.[5] In this model, decisions are made in two steps. First, parents decide how much income they want to transfer to each child. Secondly, parents decide how children should divide their time between leisure, education, and work.

We assume that education is a pure investment good which has a time and a monetary cost. In addition, we assume that parents are credit constrained, so that the total income of children is spent today with education and current

[5]Appendix A presents a formal illustration of this model.

consumption. In other words, no income savings for future consumption is ever used. All investments parents make concerning children's future consumption are in the form of education.

Given these assumption, the current consumption of children and their future earnings become completely determined once parents have decided about transfers and the time allocation of children. In fact, the child's current consumption equals to the income transfers from parents plus the child's own labor earnings minus the expenditures for education, while the level of future earnings is an increasing function of the amount of education acquired by the child.

We assume that the amount parents want to transfer to each child is increasing with the level of the family per capita income. Moreover, to simplify the analysis, we assume that the amount parents decide to transfer to each child is not a function of the cost of education, the wage the child would receive if he/she works, or the child's future wage as a function of the amount of education he/she could acquire.

Although parents do not take into consideration all this information when they decide about how much to transfer to each child, all this information is carefully taken into consideration when they decide about the time allocation of each child.

In making the time allocation decision, parents aim to maximize the child's level of welfare. The child welfare function is assumed to be an increasing function of three arguments: current consumption, leisure, and future earnings. Note that education, being a pure investment good, does not enter directly in the child welfare function. It enters indirectly, though, since it affects the level of future earnings.

The main reason for constructing this model was to obtain the optimum allocation of time for children as a function of the family per capita income, the monetary cost of education, and the structure of wages. In section 2.2 we showed how changes in poverty at the household level and at the aggregated level are related to changes in these variables. Hence, in the following sections we investigate, in turn, the effect of each of these three variables on the time allocation of children.

2.5. The Microrelationship between Poverty and Child Work

In this model, an increase in family per capita income would, at first, increase the amount parents want to transfer to their children. This increase in transfers has a double impact on the allocation of time of children. On the one hand, additional transfers represent extra resources to invest in education, which, in turn, require extra time from children. So, children increase the amount of time they devote to education.
On the other hand, as parents' transfers increase, parents want to increase their children's current consumption and level of leisure.As a result, the amount of time children devote to leisure increases.

In sum, following an increase in family per capita income the time children spend on both education and leisure should increase and, consequently, the amount of time left for working must decline. In other words, the model predicts an inverse relationship between family per capita income and the amount of time children spend working.

2.6. The Relationship between Child Work and the Cost of Education

As usual, a reduction in the cost of education has an income and a substitution effect. As far as the income effect is concerned, the decline in the monetary cost of education releases resources which are then used to increase the level of current consumption, leisure and education. As a result, children increase the time they devote to leisure and education.

As far as the substitution effect is concerned, the reduction in the price of education decreases the cost of education relative to leisure. As a result, time devoted to leisure declines and time devoted to education increases.

Overall, the income and substitution effects lead to greater time devoted to education. The overall impact on time devoted to leisure will depend on the price elasticity of the demand for education. If the demand for education is elastic the substitution effect dominates and time devoted to leisure declines. On the other hand, if the demand for education is inelastic the income effect dominates and time devoted to leisure increases.

Hence, if demand for education is inelastic the fraction of time devoted to both leisure and education increase and as a result time devoted to work must decline. However, if demand for education is elastic the impact on time devoted to work is uncertain. It depends on whether education increases more or less than leisure declines.

As a matter of fact, as our illustrative example in Appendix A shows, it is perfectly possible for a decline in the cost of education to lead to an increase in the fraction of time children devote to work. In this case, the reduction in the cost of education makes education accessible to poor families, inducing children to reduce leisure to work more and study more. The increase in time devoted to work is necessary to help to pay for the increase in expenditures in education caused by the decision to increase education substantially.

In summary, a reduction in the cost of education would certainly reduce time devoted to work if the demand for education is price inelastic. However, if the response of education to a reduction in its cost is very strong, it is possible to observe an increase in time devoted to work.

2.7. The Relationship between Child Work and Reduced Wage Differentials

As we discuss in Section 2.2, with economic growth, the level of wages increases as wage differentials tend to decrease. As far as child work is concerned, three specific transformations in the wage structure are particularly important: (a) the increase in the wage of unskilled adult workers, (b) the decline in the wage gap between educated and uneducated adult workers, and (c) the increase in child's wage. In the following paragraphs, we discussed the impact of each of these transformations on child work using our theoretical model.

Higher wages for unskilled adult workers: An increase in the wage of unskilled adult workers will reduce the incentives for parents to invest in the education of their children. Since wages in the future will be higher, parents become more concerned about the current level of consumption and leisure of their children than about their future consumption. As a consequence, an increase in the wage of adult unskilled workers leads children to devote less time to education and more time to

leisure. The result is also a reduction in the fraction of time devoted to work, because declining investments in education releases monetary resources and so reduces the need for child work.

Reduction in the wage gap between educated and uneducated workers: The reduction in the wage gap between educated and uneducated workers has an identical effect on children's time allocation as the increase in the wage of unskilled adult workers, which we have just finished analyzing above. Incentives for poor parents to invest in their children's education are reduced. As a consequence time devoted to leisure increases as time devoted to education declines. Since monetary resources have been released due to the reduction in investments in education, the need for child work diminishes and so does the fraction of time devoted to work.

Increase in children's wages: An increase in the wage paid to children should encourage children to work more. The extra labor income should, at least in part, be invested in education. As a result, the fraction of time devoted to education increases. In summary, the prediction of the model is that an increase in child wage would increase child work and child education with the fraction of time devoted to leisure declining.

In summary, the model predicts, on the one hand, that an increase in the level of the wages of adults and a reduction in their wage differentials reduces the time children devote to work and education, increasing the fraction of time they devote to leisure. On the other hand, the model predicts that an increase in the wage of children increases the time they devote to work and education and decreases the fraction of time they devote to leisure. Therefore, the model cannot predict the overall impact on the time allocation of children which results from the transformations in the wage structure which follow a process of economic growth. Everything will depend on the relative magnitude of the three effects we have investigated.

3. CHILD WORK AND POVERTY: EMPIRICAL EVIDENCE

In this section we use a variety of data sources to evaluate the empirical validity of the hypothesis that greater poverty is the leading cause of child work.

We begin by considering the macro evidence based on three sources: (*a*) comparisons among Latin American countries, (*b*) comparisons among Brazilian metropolitan areas, and (*c*) time series for metropolitan Brazil. By its own nature, the macro evidence does not permit the disentangling of the effect of the household specific level of poverty from the independent effect of the aggregated level of poverty. So, the macro evidence has to be considered simply as evidence of the total effect of poverty on child labor.

Later in this section we use data from household surveys to investigate the micro-relationship between child work and family per capita income. The fact that we are able to estimate this relationship for poor and rich areas in Brazil, enables us to separate the microeffect of poverty on child work from its macro counterpart.

3.1. Evidence from Aggregated Data

3.1.A. International Comparisons

Information from Cepal (1992) reveals that the labor force participation rate (LFPR) of minors (children 10-14 years-old) varies substantially among countries in Latin America. In fact, while in Honduras 13% of minors are in the labor—force, in Chile the labor— participation of minors is lower than 2%. This information is summarized in Figure 1. This figure presents, for 14 Latin American countries, the deviation of each country LFPR from the average for the group (6.3%).[6] This figure clearly reveals the considerable degree of variation in LFPR of minors among these Latin American countries. On the one hand, Brazil, Guatemala and Honduras all have LFPR more than 3 percentage points above average. On the other hand, Chile, Venezuela and Uruguay have LFPR more than 3 percentage points below average.

If poverty is the main reason for child labor, then a large fraction of the differences in LFPR shown in Figure 1 should be explainable by differences in per capita income. To verify this possibility we pursue the following procedure: First, we regress the LFPR of minors on the level of per capita income. Secondly, we compute the deviation of the actual LFPR in each country from what would be

[6] See Appendix B for details about the data discussed in this section.

predicted by the regression line given the country per capita income. The results of this procedure are presented in Figure 2. If child work is to a large extent explained by lower levels of per capita income, then these deviations adjusted by per capita income would be substantially smaller than the original deviations in Figure 1. Figure 2 reveals that, although the deviations for all countries except Brazil and Mexico declined, the reduction was not as dramatic as one would expected if poverty were the fundamental explanation for child work [7]

Most importantly, as far as the Brazilian case is concerned, the results in Figures 1 and 2 combined indicate that the high LFPR of minors in Brazil cannot be explained by greater poverty. In fact, these two figures reveal that the LFPR in Brazil was almost 4 percentage points higher than the average for the 14 countries, and more than 6 percentage points greater than that of countries with similar per capita income. In other words, greater poverty can not explain the greater LFPR in Brazil at all. In fact, adjusted for the level of per capita income, Brazil is by far the country in this group with the highest LFPR. The Brazilian deviation from the predicted value (6 percentage points) is almost twice the value for Guatemala which is the country with the second largest deviation from the regression line.

Although from the Latin American evidence there is no indication that poverty could be an important explanation for the high LFPR of minors in Brazil, the evidence indicates that for the Latin American countries as a group there is a negative relationship between child work and per capita income. The estimated relationship is presented in Figure 3. How sensitive is child work to per capita income based on this relationship? To answer this question, we computed the growth in per capita income which would be necessary to decrease the LFPR of minors from 10% to 5%. By the Latin American norm (see Figure 3) the LFPR of minors should be 10% and 5% for countries with per capita income of US$ 1,650 and US$3,680 respectively. So, to go from a LFPR of 10% to one of 5% the per capita income must increase by approximately 120%. At a rate of growth in per capita income of 3% per year, a continuous period of growth over 27 years would be required. If the growth rate were increased to 5% per year, the period of growth

[7] That is not to say that there was not a considerable reduction in the magnitude of the residuals. In fact, as shown in Appendix B, the R^2 of the regression was 0.47, indicating that almost one half of the variation in child work among these countries can be explained by differences in per capita income.

could be reduced to 16 years. Since the current LFPR of minors in Brazil is 10% and a decline to 5% would be a reasonable goal, the sensitivity of the LFPR of minors to the level of per capita income seems to be too weak to make growth the most effective way for Brazil to reduce its LFPR of minors.

It could be argued that what matters for child work is poverty, and not the level of per capita income per se. To verify this possibility, we redo the procedure including a measure of inequality (the Gini coefficient) in the regression. The results are presented in Figure 4. This figure reveals that the inclusion of the degree of income inequality reduced most deviations from the regression line, except for Panama. But the magnitude of the changes were small, in particular for Brazil.[8] In fact, after the controls for the level of per capita income and the degree of inequality, the actual LFPR in Brazil remained 5 percentage points above the regression line, indicating, therefore, that neither lower per capita income nor greater income inequality were capable of explaining the greater LFPR of minors in Brazil.

In summary, from an aggregated international perspective there is absolutely no evidence that the greater LFPR of minors in Brazil is caused by greater poverty. Given potential problems with the comparability of international data on per capita income, income inequality and LFPR, we investigate in the following section the connection between poverty and child work using a series of national household surveys for Brazil which are very comparable across time and regions.

3.1.B. Regional and Temporal Variations in Metropolitan Brazil

There exist large regional disparities in poverty among metropolitan areas in Brazil (see Rocha (1991)). Moreover, over the 1980s poverty has fluctuated considerably, being lower between 1986 and 1988 and greater at the beginning and end of the decade (see also Rocha (1991)). Therefore, if poverty is a major determinant of child work, we would expect to see higher LFPRs for minors in areas and time periods with greater poverty. In this section, we investigate this hypothesis based on evidence from regional disparities and temporal variations on poverty and child work for metropolitan Brazil. The information on the LFPR of minors was obtained from a series of Brazilian Annual Household Surveys

[8]The R^2 of the regression increased only slightly from 0.47 to 0.52.

(PNADs), whereas the information on time and region specific poverty is from Rocha (1991).[9]

Regional Disparities: Figure 5 plots, for eight metropolitan areas, the LFPR of minors against the proportion of the population living in families with per capita income below the poverty line. All data are unweighted averages for the period 1981-1989.[10] If poverty were a major determinant of child labor, the eight points in Figure 5 would all lie along an increasing line. But the results in Figure 5 do not reveal such a pattern to any extent. Actually, the LFPR of minors tends to be smaller in the poorer metropolitan areas in the Northeast of Brazil and larger in the richer areas in the South. The contrast between Recife (the poorest metropolitan area) and Curitiba (the area with the smallest degree of poverty) is striking. Despite the fact that the proportion of poor is more than 40 percentage points greater in Recife than in Curitiba, the labor force participation of children is more than 4 percentage points lower in Recife. In other words, Figure 5 indicates that the hypothesis that poverty is the main cause of child work encounters no support at all from the nature of the regional disparities in metropolitan Brazil.

Temporal Variations: Figures 6 and 7 present the evidence from the temporal variations. Figure 6 plots, for selected years in the 1980s, the LFPR of minors against the level of poverty for metropolitan Brazil. All data are unweighted averages for the eight major metropolitan areas investigated above.[11] If poverty were the leading cause of child work, the points in this figure would be align along an increasing line. The evidence in Figure 6 reveals no indication of such a pattern. On the contrary, Figure 6 indicates that the LFPR of minors not only reached its smallest level in 1983 when poverty reached its largest value, but also that it was 1.5 percentage points smaller in 1983 than in 1986, the year the degree of poverty reached it smallest value.

[9] All information used in this section is presented in Appendix C.

[10] The average actually excludes the years of 1982 e 1984 because we did not have information on poverty for these years.

[11] The eight metropolitan areas are: Fortaleza, Recife, Salvador, Belo Horizonte, Rio de Janeiro, São Paulo, Curitiba e Porto Alegre.

To confirm the lack of any positive relationship between poverty and child labor over time in metropolitan Brazil, Figure 7 plots, for the eight metropolitan areas, the LFPR in 1983 (the year with the greatest degree of poverty) against its level in 1986 (the year with the lowest degree of poverty). If poverty and child work were positively related, all points would be above the 45 degree line. In consonance with the findings in Figure 6, the evidence in Figure 7 does not support any positive association between poverty and child labor. All metropolitan areas (except Rio de Janeiro) are below the 45 degree line, indicating that in all, but one metropolitan area, the LFPR of minors were higher in 1986 when the degree of poverty were smaller and smaller in 1983 when the degree of poverty were greater.

In summary, the analysis of the regional disparities and temporal variations in Brazil reveal no evidence in favor of the hypothesis that child labor is caused by poverty. We have not encountered greater LFPR of minors either in the poorer metropolitan areas or during the time period of greater poverty. It remains, however, to investigate the evidence within metropolitan areas (i.e., the differences in child work between poor and rich households living in the same area). The investigation of the microrelationship between the level of family per capita income and the LFPR of their children is the objective of the following section.

3.2. Microevidence from Household Surveys

Barros and Mendonça (1991a) investigated the microrelationship between family per capita income and the LFPR of minors. The main findings are presented in Figures 8 to 10. These figures present the relationship estimated in Barros and Mendonça (1991a) for males 12 years old for the São Paulo and Fortaleza metropolitan areas. These figures indicate that in the two metropolitan areas the LFPR of minors is declining with the level of household per capita income.

Figure 8 reveals that in São Paulo per capita income has to increase 120% for the labor force participation to decline from 10% to 5%. Notice that this is precisely the same sensibility we obtain when we estimate this relationship at the macro level using Latin American international data. The similarity between the micro and the macrorelationship is rather surprising. This similarity may indicate that the independent effect of the aggregated level of poverty on child work is insignificant. As a consequence of the similarity, our previous impression that the relationship

seems to be too weak to be the fundamental instrument to reduce child work applies here as well. As we have already discussed, for economic growth alone to reduce the LFPR of minors in Brazil from 10% to 5% would require 16 (27) years of steady growth in per capita income at a rate of 5% (3%) per year. Therefore, other policies besides pure economic growth must be at least as important in reducing child work.

Figure 9 presents the corresponding micro-relationship for Fortaleza. This figure indicates that in Fortaleza the LFPR of minors is more sensitive to household per capita income than in São Paulo. In fact, in Fortaleza to reduce the labor force participation from 10% to 5% only a 90% increase in per capita income is necessary (i.e., 13 years of economic growth at a constant rate of 5% per year).

The contrast between the micro-relationship in these two metropolitan areas is presented in Figure 10. Since, relative to Fortaleza, São Paulo is a better developed and wealthier society in all possible respects, the comparison of these two areas offers a unique opportunity to evaluate the effect of greater aggregated poverty on households with identical per capita income.

If aggregate poverty has an impact on child work over and above the impact of the household specific level of poverty, the LFPR of minors would be larger in Fortaleza than in São Paulo, when we compare households with identical levels of per capita income. Figure 10, however, does not constitute any evidence in this direction. On the contrary, Figure 10 indicates that, holding the household level of per capita income constant, the aggregated level of poverty tends to reduce child work. This is the case, since the curve for Fortaleza is everywhere below the curve for São Paulo.

As we discussed in Section 2.2, a reduction in the aggregate poverty level, holding the household per capita income constant, has two impacts on the household. First, richer societies tend to provide better public education at a reduced private cost, in particular for poor households. Some evidence in this direction can be found in Barros, Mendonça and Shope (1993:Figura 3). As they show, the expenditures of state and municipal schools are three to seven times higher in the State of São Paulo than in the Northeastern States. So, the private cost of education should be lower and the quality higher in São Paulo than in the Brazilian Northeast.

Secondly, the wage structure is profoundly influenced by the level of economic development. Economic growth not only increases the level of wages, but also has important consequences on the wage differentials. The direction of this impact, however, is theoretically undetermined. Nevertheless, the available empirical evidence seems to indicate that economic growth tends to decrease most wage differentials. So, in particular we should expect a decline in the wage gap between adults and children and between educated and uneducated workers.

The evidence from a regional comparison between the South and Northeast of Brazil also corroborate the hypothesis that wage differentials tend to be greater in the poorer areas. On the one hand, there is evidence that the wage gap between adults and children is greater in the poorest areas.[12] On the other hand, there is plenty of evidence (see Almeida Reis and Barros (1990, 1991) and Barros and Ramos (1992)) indicating that the wage gap between educated and uneducated workers is higher in the poorer areas. Notice that these differences in wage structure reduce the incentives for education (lower wage differentials between educated and uneducated workers) and concomitantly increase the incentives for child work (relatively higher wage for children) in richer areas. So it seems that the observed differences in the structure of wages offer a consistent explanation for the greater LFPR of minors in the more developed metropolitan areas in the South.

Thus, at the aggregate level the better educational system in the South is encouraging children to spend more time in school and less time in the labor market. On the other hand, the smaller wage differentials in the South is discouraging investments in education and attracting children to the labor market. It is quite surprising, however, to accept the idea that the better labor market conditions in the South provide a stronger attraction than the better school system also offered by this region.

[12]In fact, on the one hand, Barros and Mendonça (1990:Tables 2 and 7) showed that the earnings and the quality of jobs held by working children in the South are substantially better than in the Northeast. On the other hand, Savedoff (1989) and Barros and Mendonça (1994) showed that, adjusted for differences in the cost of living, unskilled adult orkers in metropolitan areas receive similar wages in the Northeast and South of Brazil. Therefore, the wage gap between unskilled adult workers and children must be larger in the Northeast than in the South.

4. SUMMARY AND CONCLUSIONS

The labor force participation rate of minors 10 to 14 years old in Brazil is only slightly lower than 20%. This high labor force participation rate is a structural phenomenon in Brazil. Accordingly, a large literature has been developed around this question, in particular, to investigate its main determinants. The great majority of studies reached the conclusion that poverty is the main cause of child work in Brazil.

In this study we investigated in greater detail the actual role of poverty in explaining the excessively high level of child labor in Brazil. Based on a variety of empirical sources we conclude that:

a) From an aggregate international perspective, the high LFPR of minors in Brazil cannot be explained by greater poverty. Even adjusting for the level of per capita income, Brazil is by far the country in Latin America, with the highest LFPR.

b) The regional disparities and temporal variations in LFPR of minors in Brazil also offer no evidence that child labor is caused by poverty. If poverty were a major determinant of child work we would expect to see higher LFPRs of minors in areas and time periods with greater poverty. The evidence, however, does not indicate greater LFPR of minors either in the poorer metropolitan areas or for time period of greater poverty.

c) Analyzing the differences in child work between poor and rich households living in the same metropolitan area in Brazil, we found a negative relationship between child work and the level of household per capita income. However, the magnitude of the sensitivity of child work to family income was too small for poverty to be considered a main cause of child work in Brazil.

Therefore, we conclude that there is no hard evidence supporting the hypothesis that poverty is the main cause of the excessively high level of child labor in Brazil. The main cause of child work in Brazil must be sought elsewhere.

Figure 1 | Child Work in Latin America

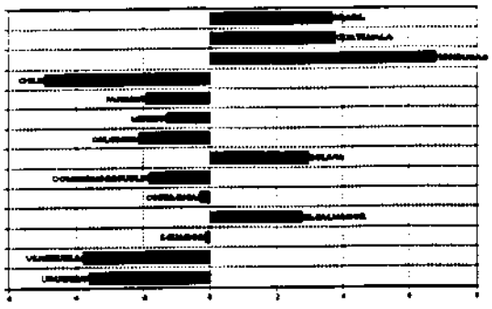


Figure 2 | Child Work in Latin America

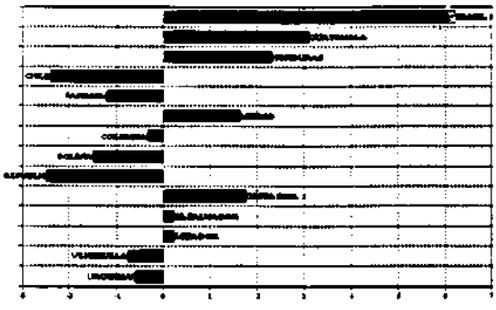


Figure 3 | Child Work (10-14 years-old) in Latin America versus per capita income

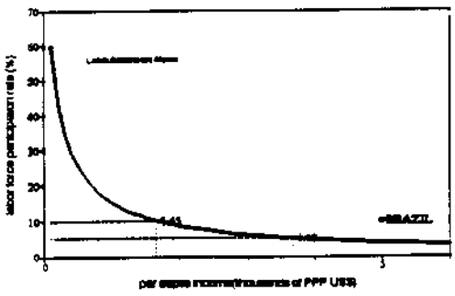


Figure 4 | Child Work in Latin America

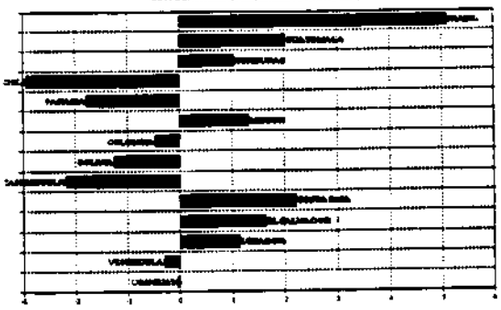


Figure 5 | Child Work (10-14 years-old) versus Poverty: Metropolitan Brazil - 1981-89

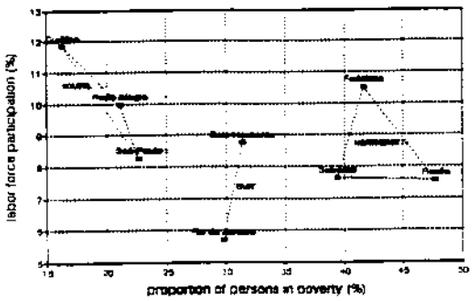


Figure 6 | Child Work (10-14 years-old) versus Poverty: Metropolitan Brazil

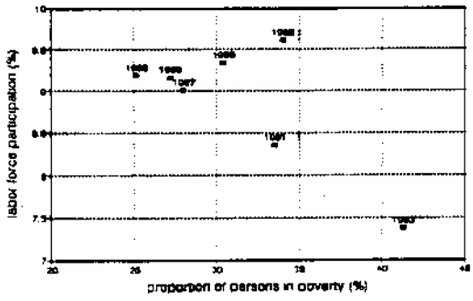


Figure 7 | Child Work (10-14 years-old) in Brazil Metropolitan Areas: 1983 versus 1986

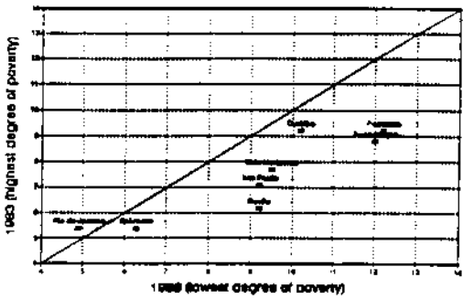


Figure 8 | Labor Force Participation of males, 12 years old, São Paulo Metropolitan: 1987

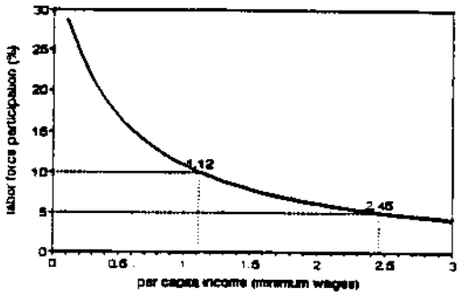


Figure 9 | Labor Force Participation of males, 12 years old, Fortaleza Metropolitan: 1987

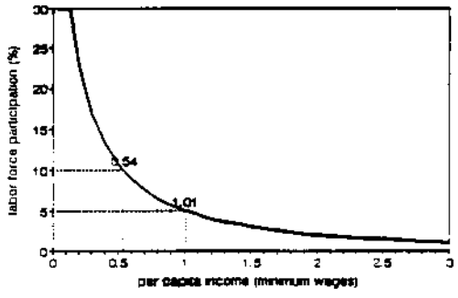
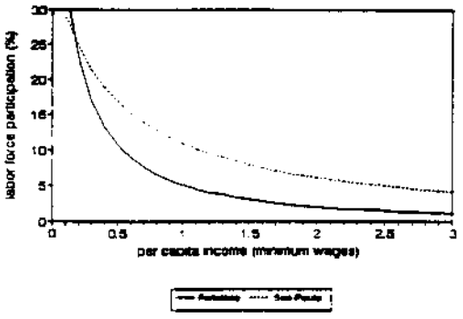


Figure 10 | Labor Force Participation of males 12 years old: 1987



Appendix A
A Model for the Rational Allocation of Children's Time

A.1. Model Setup

We assume decisions are made in two steps. First, parents decide how much income (I) they want to transfer to each child. The model developed in this appendix does not consider this decision. So, it is treated as exogenous. Secondly, parents decide how their children should divide (a) their time between leisure (l), education (e), and work (h) and (b) their current income between current consumption (c) expenditures in education, and savings for future consumption (t).[13]

The unit used to measure time is chosen such that there exist exactly one such unit of time available to each child. So, each child time budget is given by

$$l + e + h = 1$$

Education is assumed to be a pure investment good which costs one unit of child's time and A monetary units to be produced, i.e, education is produced using a Leontief production function. As a result, we can refer to the amount of education produced using the amount of time used in production. In this case the monetary cost of producing e units will be A.e, the expenditures in education.

Denoting by W the child's wage, we obtain that the child's total current income will be given by I+W. h. Since this income can be used for three competing purposes: child's current consumption (c), educational expenditures (A.e), and savings for future consumption (t), the child monetary budget constraint is given by

$$c + A \cdot e + t = I + W \cdot h$$

[13]Throughout the model we use italic capital letters to indicate exogenous variables and script capital letters to indicate exogenous functions. Endogenous (choice) variables are denoted by italic lower-case letters. The optimal level of the endogenous variables are denoted by gothic lower-case letters.

The future child's labor earnings will be an increasing function, φ , of its education. So, the child's total future income (f) will the sum of the labor earnings and current savings. Future income are expressed in current values, therefore,

$$f = \varphi(e) + t$$

In making the time allocation decision, parents aim to maximize the child level of welfare. The child welfare function is assumed to be an increasing function of three arguments: current consumption, leisure, and future income. Note that education, being a pure investment good, does not enter directly in the child welfare function. It enters indirectly, though, since it affects the level of future labor earnings. The welfare function is assumed to be time-separable and will be denoted by

$$U(c,l) + V(f)$$

In summary, we assume that the child time allocation is the solution of the following optimization problem:

$$MAX \{ U(c,l)+V1(f): 1 + e + h = l;\ c + A.e + t = I + W.\ h;\ f = \varphi(e) + t \}$$

A.2. Simplifying Assumptions

To both simplify the analysis and focus it on low income households, we assume that parents are poor and credit constrained, so that there are no savings (t=0) and, consequently, the entire child income is spent today with education and current consumption. In this case, all investments parents make concerning children's future consumption are in the form of education. In addition we assume that children work (t=0). Given these simplifying assumptions, the household decision problem simplifies to:

$$MAX \{ U(c,l) + V(e) : c + Wl + (A - W).e = I \cdot W \}$$

Note that in this case, the current consumption of children and their future earnings become completely determined once parents have decided about the time allocation of children. In fact, the child current consumption equals to the income transfers

from parents plus the child own labor earnings minus the expenditures on education.

$$c = I + W \cdot h - A \cdot e$$

while the level of future earnings is an increasing function of the amount of education acquired by the child.

$$f = \varphi(e)$$

Given the separability of the objective function, it is useful to decompose the problem into two stages. To obtain this decomposition, let the current total expenditure be denoted by z. So that

$$z = c + W \cdot I$$

Moreover, let H(Z,W) denote the maximum current utility the child could obtain when W is the price of leisure and Z is the value of total current expenditure. In this case,

$$H(Z,W) = \text{MAX} \{ U(c,I) : c + W \cdot I = Z \} \qquad (A)$$

and the household decision problem simplifies to

$$\text{MAX} \{ H(z,W) + \overline{V}(\varphi(e)) : z + (A+W)e = I + W \} \qquad (B)$$

This is the final expression for the model we use to investigate how the household decision about the allocation of time of children is affected by exogenous changes. For most of the analysis, it will be useful to rewrite Problem B as

$$\text{MAX} \{ H(z,W) + V(e) : z + (A + W) \cdot e = I + W \} \qquad (B1)$$

where $\overline{V}(e) \equiv V(\varphi(e))$.

We consider, in turn, how changes in (a) parents' transfers (I), (b) monetary cost of education (A), (c) child's wage, W, and (d) the earnings function (φ), affect the optimum allocation of children's time.

A.3. The Impact of Parents' Transfers on the Time Allocation of Children

An increase in parents' transfers (I) will be a pure income effect in Problem B1, leading to an increase in the optimum level of both education and current expenditures, i.e., $\frac{\partial e}{\partial I} > 0$ and $\frac{\partial \varepsilon}{\partial I} > 0$. In Problem A, an increase in current expenditures is also a pure income effect, leading to an increase in the optimum level of both consumption and leisure, i.e., $\frac{\partial c}{\partial Z} > 0$ and $\frac{\partial I}{\partial Z} > 0$. As a result, time spent in education and leisure increase with parents' transfers, so, from the time budget, it follows that time spent at work must decline, i.e., $\frac{\partial h}{\partial I} < 0$

A.4. The Impact of the Monetary Cost of Education on the Time Allocation of Children

An increase in the monetary cost of education in Problem B1 will be a pure price effect with the familiar compensated and income responses. So, the optimum level of education will decline due to both the compensated and income effects. With respect to the level of current expenditures, these two effects will have opposing effects: The income effect will induced a reduction in expenditures with the compensated price effect leading to an increase in current expenditures. The net effect will depend on the price elasticity of the demand for education. If the demand for education is price elastic (inelastic) the current expenditures will increase (decrease). As a result, the optimum amount of leisure and consumption will be increase (decrease) if and only if the demand for education is price elastic[14] (inelastic). Hence, from the time budget constraint, it follows that, as long as the demand for education is price-inelastic, the amount of time spent working must increase.[15] However, if the demand for education is price-elastic, the optimum

[14]Own price elasticity greater than one in absolute value.

[15]Since in this case the optimum amount of time spent in leisure and education will decline.

amount of time spent working could increase or decrease, depending on whether the increase in time spent on leisure is smaller or greater than the decline in time spent in education. In summary, only when the demand for education is price-inelastic can we be sure that an decrease in the cost of education would decrease time spent working.

A.5. The Impact of Child's Wage on the Time Allocation of Children

As we can see in Problem B1, child's wage (W) enters in three different positions in the model specification and, so, it effects on the optimum allocation of time can be decomposed into three components. In Problem B1, child's wage enters twice in the budget constraint and once in the objective function.

Its two effects through the budget constraint have been already studied above. On the one hand, an increase in child's wage has the same effect as an increase in parents' transfer (I) (see Section A.3). On the other hand, an increase in child's wage has the same effect as an increase in the cost of education (A) (see Section A.3).

The third effect of child's wage changes the objective function of Problem B1. This effect will depend on whether an increase in the wage would increase (decrease) the marginal utility of current consumption, i.e., whether

$$\frac{\partial}{\partial W}\left(\frac{\partial H}{\partial z}\right) > (<) 0$$

When an increase in child's wage increases (decreases) the marginal utility of current expenditures, time spent in education declines (increases) and current expenditures increases (declines). The effect on time spent on leisure is always negative. So, time spent working would certainly increase when child's wage increases the marginal utility of current expenditures. Otherwise, however, hours worked could increase or decrease depending on whether leisure declines to a greater or lesser extent than time spent in education increases.

Table A.1 summarizes all three effects. From this table it is clear that the effect of an increase in child's wage on the allocation of time if completely undetermined.

However, we present below, an illustrative example where an increase in child's wage increases time spent in education and working and reduces time spent on leisure.

Table A.1
Decomposition of the Effect of an Increase in Child's Wage on the Optimum Allocation of Children's Time

Effect	Leisure	Education	Working
Income	increase	increase	decrease
Cost of Education			
elastic demand	increase	decrease	undetermined
inelastic demand	decrease	decrease	increase
Marginal Utility			
$\frac{\partial}{\partial W}\left(\frac{\partial H}{\partial z}\right) > 0$	decrease	decrease	increase
$\frac{\partial}{\partial W}\left(\frac{\partial H}{\partial z}\right) < 0$	decrease	increase	undetermined

A.6. The Impact of Adult's Wage on the Time Allocation of Children

For this section, let the future wages be given by

$$\varphi(e) = D \cdot \bar{\varphi}(e) + E$$

where $\bar{\varphi}$ is a baseline earnings function and D and E are constants. We normalize $\bar{\varphi}$ such that $\bar{\varphi}(0)=0$. In this case, an increase in E represents an increase in the earnings of adult workers which does not affect the wage gap between education levels. A change in D holds the wage of uneducated adult workers constant but increase the wage gap between education levels.

We begin investigating the effect of changes in E. As E increases, the marginal utility of future income declines. As a result, time spent in school declines and time spent on leisure increases. The impact on time spent working depends on the relative magnitude of these two effects.

An increase in D has a double effect on the marginal utility of education ($\partial \bar{V} / \partial e$). On the one hand, an increase in D increases wages and so reduces the marginal utility of future earnings and, as a result, also reduces the marginal utility of education. On the other hand, an increase in D increases the impact of education on future wages and so the marginal utility of education. The total effect of D on the marginal utility of education depends on the magnitude of the elasticity of the marginal utility of future earnings with respect to future earnings (ε).

In fact, when E=0,

$$\frac{\partial}{\partial D}\left(\frac{\partial \bar{V}(e)}{\partial e}\right)=\frac{\partial V}{\partial f}\cdot\frac{\partial \varphi}{\partial e}\cdot(e+l)$$

where

$$\varepsilon=\frac{\partial \ln(\partial V / \partial f)}{\partial \ln(f)}$$

Thus, on the one hand, when ε <-1, the marginal utility of education will decline and consequently time spent in education will also decline while the time spent on leisure will increase. The effect on hours worked will again be undetermined. On the other hand, when ε >-1, the marginal utility of education will increase and consequently time spent in education will increase and time spent on leisure will decline. Again, the effect on hours worked will be undetermined.

A.7. An Illustrative Example

To illustrate the allocation of time of children in a rational household, let

$$U(c,l) = \ln(\ln(1+c))+l)$$

$$V(f) = \ln(f)$$

and

$$\varphi(e) = D\cdot e + E$$

In this case, it follows that :

$$H(Z,W) = \ln((Z+1)/W-1 + \ln(W-1))$$

Moreover, the optimum time allocation of children is given by,

$$I(I,A,W,D,E) = \frac{I-1-W\cdot ln(W)}{2\cdot W} + \frac{E\cdot(A+W)}{2\cdot D\cdot W}$$

$$e(I,A,W,D,E) = \frac{I-1-W\cdot ln(W)}{2\cdot(A+W)} - \frac{E}{2\cdot D}$$

and

$$h(I,A,W,D,E) = 1 - \frac{(I-1)\cdot(A+2\cdot W) - A\cdot W\cdot ln(W)}{2\cdot W\cdot(A+W)} - \frac{E\cdot A}{2\cdot D\cdot W}$$

Furthermore, let I=2, A=1, W=1, D=4 and E=1. In this case:

$$I(2,1,1,4,1) = \frac{3}{4}$$

$$e(2,1,1,4,1) = \frac{1}{8}$$

$$i(2,1,1,4,1) = \frac{1}{8}$$

When these are the values for the exogenous variables, the sensitivity of the allocation of time to all exogenous parameters is presented in Table A.2.

Table A.2

Sensitivity of the Time Allocation of Children to Variation in the Exogenous Parameters

Parameter	Leisure	Education	Working
Parents' transfer (I)	+1/2	+1/4	-3/4
Cost of Education (A)	+1/8	-1/8	0
Child wage (W)	-9/8	+1/8	1
Earnings function			
slope (D)	-1/16	+1/32	+1/32
intercept (E)	+1/4	-1/8	-1/8

Appendix B
International Comparisons

B.1. International Data

Table B1

International Comparisons

Country	Child Work	Per Capita Income	Gini Coefficient
Uruguay	2.7	5.8	0.42
Venezuela	2.5	5.9	0.44
Ecuador	6.2	3.0	0.45
El Salvador	9.1	1.9	0.45
Costa Rica	6.0	4.4	0.46
Dominican Republic	4.5	2.5	0.50
Bolivia	9.3	1.5	0.53
Colombia	4.2	4.1	0.53
Mexico	5.0	5.7	0.55
Panama	4.4	3.2	0.57
Chile	1.4	5.0	0.57
Honduras	13.1	1.5	0.59
Guatemala	10.1	2.5	0.60
Brazil	10.0	5.0	0.63
Average	6.0	3.7	0.52

Notes: a) Child work is measured by the labor force participation of minors 10 to 14 years old.

b) Per capita income is measured in thousands of PPP US$.

c) The Gini coefficient is for the distribution of individuals according to their per capita family income circa 1989

Sources: a) Child work → Cepal (1992:34).

b) Per Capita income → UNDP (1992:127-8).

c) Gini coefficient → World Bank (1993:16).

B.2. Regressions

The two regressions used in Section 3.1 are

$$ln\left[\frac{p}{1-p}\right] = -1.73 - 0.93 \cdot ln(y) \qquad R^2 = 0.47$$

$$ln\left[\frac{p}{1-p}\right] = -2.95 - 0.89 \cdot ln(y) + 2.24 \cdot G \qquad R^2 = 0.52$$

where p denotes the LFPR of minors 10 to 14 years-old, y is the per capita income and G is the Gini coefficient.

Appendix C
Temporal and Regional Variations in Metropolitan Brazil

Table C1
Labor Force Participation Rate of Minors 10 to 14 years-old

Region	Metropolitan Area	1981	1982	1983	1984	1985	1986	1987	1988	1989	Average
Northeast	Fortaleza	9.3	10.0	9.2	9.5	12.7	12.2	9.7	12.9	9.0	10.5
	Recife	7.3	8.5	6.2	7.0	8.5	9.2	7.8	7.2	6.3	7.6
	Salvador	7.5	8.1	5.4	7.6	8.8	6.3	6.8	8.7	9.6	7.6
East	Belo Horizonte	8.7	9.8	7.7	6.6	8.3	9.5	10.0	8.9	9.4	8.8
	Rio de janeiro	5.8	6.0	5.4	4.9	6.6	4.9	6.7	5.0	6.0	5.7
South	São Paulo	7.4	7.7	7.1	7.9	10.1	9.2	8.2	7.2	9.6	8.3
	Curitiba	12.0	12.3	9.2	11.8	12.3	10.2	11.8	12.6	14.4	11.8
	Porto Alegre	8.8	9.4	8.8	8.7	9.6	12.2	11.1	10.8	10.4	10.0
Average		8.4	9.0	7.4	8.0	9.6	9.2	9.0	9.2	9.3	8.8

Source: Pesquisa Nacional por Amostra de Domicílios, IBGE.

Table C2

Proportion of Individuals Bellow the Poverty Line

Region	Metropolitan Area	1981	1982	1983	1984	1985	1986	1987	1988	1989	Average
Northeast	Fortaleza	54	na	56	na	37	30	38	36	41	41
	Recife	56	na	57	na	48	40	43	44	47	47
	Salvador	43	na	44	na	40	38	39	34	39	38
East	Belo Horizonte	31	na	44	na	36	26	28	29	27	30
	Rio de janeiro	27	na	35	na	37	23	26	25	33	32
South	São Paulo	22	na	34	na	27	17	20	18	21	22
	Curitiba	17	na	30	na	24	11	11	11	14	12
	Porto Alegre	18	na	30	na	23	16	19	21	21	21
Average		34	na	41	na	34	25	28	27	30	30

Source: Rocha (1991).

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