The Impact of Bolsa Escola Program on Child's Grade Progression Rates in Brazil

Ana Paula de Andrade Verona
The University of Texas at Austin

Abstract

In the last decade Brazil implemented a set of social programs. Among them, the Brazilian government carried out the Bolsa Escola Program (BEP), which had three ambitious objectives: to reduce current poverty; to increase educational attainment among children; to reduce child labor. The aim of this study is to examine the impact of the BEP on child's education. One of the contributions of this paper is to employ the Grade Progression Rates (GPR). This measure is a decomposition technique of years of schooling. Using data from a sub-sample of the 2003 Brazilian National Household Sample Survey (PNAD), this paper employs as an econometric method the "Propensity Score Matching". It compares the mean difference in GPR of those who received the cash transfer to the GRP of those who did not.

1 - Introduction

In the last years, Brazilian governments have carried out programs to stimulate rapid growth and social progress. Among them, the Brazilian national Bolsa Escola Program (BEP) was created by law in April 2001, which had ambitious objectives. The first one was to reduce current poverty through transfer income to poor families; the second one was to increase educational attainment among children and hence reducing future poverty; and the third one was to reduce child labor by requiring children to have minimum attendance in school. In such program, very poor families received a stipend to send and to keep their children in school, who otherwise would have to work.

There were few rules that would be followed in order to receive the benefits of Bolsa Escola program. These rules were based on family income and age of child (or children) living in the household. Basically, only households with monetary income per capita below half the minimum wage and with children aged 6 to 15 qualified for participation in the Bolsa Escola program. If the family received the cash transfer, it was required to send its child (children) to school. The minimum rate of attendance was set at 85%. The monthly benefit was R$ 15 per child attending school, up to a maximum of R$ 45 per household. The cash transfer was paid to the mother, upon presentation of a magnetic card (Bourguignon at el, 2003).

Certainly, one of the most expected evaluations about the impact of Bolsa Escola is on educational outcomes of children. Among other things, education is a very

important part of human capital's stock. Investments in education are the principal agent in shaping the skills used by the future labor force. In addition, the levels of education that children reach (either in quality or in quantity terms) in the present, particularly for girls (who are one portion of future mothers) will greatly influence the health and survival of the next generations. Since BEP was implanted recently, very few studies and evaluations on this program have been conducted so far. Because of this lack of information about BEP's results, this study becomes still more important. On the other hand, for the same reason, the literature about this program is also scarce.

2- Objective

The aim of this paper is to examine the impact of the BEP on child's education. One of the contributions of this paper is to employ the Grade Progression Rates (GPR) as the dependent variable. This measure is a decomposition technique of years of schooling. Among other things, we want to investigate if this conditional cash transference program has contributed to improve the GRP of children from 7 to 14 years old.

It is important to take into account that child labour has a central role in this examination, since poor children would have to choose between going to school and working in labour market, or even doing both simultaneously[1]. When children need to work, they face an opportunity cost of school attendance, which is measured by the wage that they (would) earn in the labour market. If this opportunity cost is high, low school attendance and high participation of children in the labour market should be observed. Nevertheless, it is important to make clear that some authors do not consider children's earnings a good measure for the opportunity cost of schooling, since school attendance is a part-time activity and consistent with some amount of work (see Bourguignon at el, 2003; Cardoso & Souza, 2004; Janvry & Sadoulet, 2005). Therefore, it is very important to take into account the role of child labour in the analyses of the impact of the BEP on educational variables; however this will not be the focus of this research. This study will employ as dependent variables only educational outcomes.

This study can be divided into eight parts. The first is the introduction and the second is the objective. The third explores some theoretical ideas about the demand for

[1] Cardoso & Souza (2004) argues that the most part of children who work in Brazil are also enrolled in school.

child's education, and the fourth talks about Conditional Cash Programs. The fifth explains the problem behind the evaluation of social programs and the sixth brings an empirical discussion based on Brazil data. Finally, the seventh talks about the methodology employed in this paper and the last section presents some preliminary descriptive analyses and preliminary results.

The next section will present some theoretical issues developed in order to explain the demand for child's education. Considerations on credit constrain and child labor supply will be made.

3 - The Demand for Child's Education

The child's education is influenced by an ample set of variables that makes its analysis significantly complex. Taking into consideration the demand side, families have to make decisions about how much to consume and how much to investment in child's human capital. In order to elucidate this parent's choice, Gary Becker developed a model of investment in children's human capital. This model is presented by Rodrigo Soares[2], who explains that the value of investments in human capital depends on: the human capital productivity and its market value, the value of increased income for the children, and the parent's altruism.

In this model, Rodrigo Soares also shows that rich families invest more on their children than the poor families, even if they have the same amount of altruism. Hence, rich families generally have lower returns on the investments in human capital. It is explained by the marginal rate of return in human capital: each additional unit of investment in human capital will generate an increase each time smaller in its return. Since poor families invest less in human capital than rich families, their return will be higher. Rodrigo Soares argues that an efficient situation or Pareto would be observed if rich families transfer resources to poor families and let them take advantage of the larger returns. In the future, poor families would pay back this money to rich families.

Furthermore, according to Rodrigo Soares, the human capital has two important characteristics that make this credit less accessible to poor families. First, human capital is embodied (it is a bad collateral), it cannot be sold on the market. Actually, the

[2] Rodrigo Soares presents this model in his classes lecture available in 05/04/2006 at <http://www.econ.umd.edu/~soares/>

accumulation of human capital depends on the specific individual who obtains the investment. This characteristic implies in riskier loan and, hence in higher rates. Second, there is an intergenerational issue: children cannot be obliged to pay debts assumed by their parents. That is to say, parents would invest in their children, but children will not necessarily pay this investment back the parents. Therefore, after taking into considerations these two human capital's features, it is possible to say that the existence of a credit rationing will probably cause an underinvestment in human capital among poor families.

At this point, it is important to consider the labor child. Rodrigo Soares affirms that the basic forces which explaining the investment in child's human capital are the same those that play in the child labor problem. In order to explain the child labor issue, Rodrigo Soares employed a model built by Baland & Robinson (2000), where it is showed that child labor can exist in a general equilibrium even if parents are altruistic and child labor is socially inefficient. According to Baland & Robinson (2000), child labor is inefficient when it is used to transfer income from children to parents or when the capital market is imperfect. In such case, child labor is employed as a substitute for borrowing, which causes a transfers income from future to the present (Baland & Robinson, 2000: 678).

On implication of Baland & Robinson's model is that rich families do not send their children to work, while poor families do. In order to explain their model, these authors assume the imposition of a simple ban on child labor in which the objective is to see the results on the next generations' income. Rodrigo Soares argues, based on the Baland & Robinson's results on the general equilibrium, that a reduction in the labor supply of children causes an increase in the current wages. Consequently, an effective increase in the labor supply of adults will be observed, which will generate a reduction of the future wages.

Cardoso & Souza (2004) are also interested in explaining the child labor model. They also assume the existence of a multiple equilibria. Like in Baland & Robinson's model, they assume that child labor is banned. Hence, the demand for adult labor force will go up, which increases its wage rate too. Now, they say, it is expected that parents will not send their children out to work. In such context, if the law is changed and

children are allowed to work, they will not need to do it anymore, which maintains the high wage of adult. Cardoso & Souza (2004) take into consideration two potential equilibria. First, the inferior, where wages are low and child have to work, and second, the superior equilibrium, where wages are high and children do not have to work.

Undoubtedly credit constrains, child labor supply, and the relationship between them are very important to understand the demand for child's education. Cardoso & Souza (2004) explain that the access to borrowing may reduce the child labor in poor countries[3]. These authors also affirm that the impact of job loss and other shocks is more rigorous on poor household without savings and access to credit. In the same way Janvry & Sadoulet (2005) analyze human capital of children in vulnerable households. They observe that poor households are exposed to many shocks. Two of the responses to shocks include the increase in the use of credit and insurance and the increase in the children's drop-out of school. Janvry & Sadoulet (2005) conclude that short-term responses to shocks present long-term consequences on their educational attainment, "creating a source of new poor" (p. 16).

In conclusion, it is possible to ague that the model of investment in child's human capital should be taken into account when analyzing the poor families' decisions on these investments. Credit constrains and child labor can make (poor) parents to avoid short and long-term investments in children's human capital, which will affect the potential results of Bolsa Escola Program.

The next section discusses conditional cash programs. Basically, the short and long-term effects that should arise from those programs (or the income and price effects) will be analyzed.

4 - Conditional Cash Transfers

Conditional cash transfers (CCT) have been implemented in many developing countries as an approach to social programs. In general, these programs "provide money directly to poor families via a social contract with the beneficiaries" (Lindert, 2005: 67). The Bolsa Escola program is a conditional cash transfer. Basically, this program provide low-income families with a monthly stipend, which is conditioned on behaviors such as children's school attendance, use of health assistance, food and cooking gas subsides, and

[3] These authors cite Dehejia and Gatti (2002).

others social services. However, conditionality is not always required or employed when a social program is implemented. That is to say, in same social programs, only a cash transfer (CT) is observed. Generally, the unconditional cash transfer is desired in regions where poverty is extreme and where this transference will allow immediate survival (Janvry & Sadoulet, 2005).

After comparing CCT and CT, Janvry & Sadoulet (2005) argues that conditional cash transfer should be employed, in stead of an unconditional cash transfer, when the income effect is not able "to induce the action required by the condition" (p.3). In their work, these authors examine which one (CCT or CT) brings more efficiency gains in inducing children's school attendance. For their specific study, they conclude that conditional cash transfer is the most efficient approach, since the efficiency gains can be some 16 times larger per dollar received with CCT compared to CT.

Social programs based on conditional cash transfer present two objectives, at least. The first one is to reduce current poverty through income transfer, which not necessarily requires any behavioral condition. The second objective is to improve the accumulation of human capital of the beneficiates' children. In such context, it is possible to expect two different effects when a conditional cash transfer is employed. Both depend on the beneficiaries' behavior before and after receiving the transfer.

If beneficiaries would have met the behavioral condition without the transfer, the program will generate a pure cash transfer. This effect should decrease the poverty immediately; however, it should not "induce a change in the child welfare". The second effect is observed among those beneficiaries who have to change their behavior without receiving the conditional cash transfer. That it to say, for those that would have not faced the condition without the transfer, such obligation will produce a price effect (Janvry & Sadoulet, 2005). It is not difficult to explain both effects for education-oriented social program cases. Thus, taking into consideration the explanation in Janvry & Sadoulet (2005), if children would attend classes even without the conditional transfer, the social program will only provide them money and, hence, it will make them less poor. On the other hand, if children only attend school if they meet the conditionality, the social program will make them substitute any other activity for schooling, increasing their stock of human capital.

Concluding, if the conditional cash transfer causes a change in the beneficiaries' behavior, the social program will generate short and long-term benefits. That is to say, poverty will decline instantaneously (among those that have a low cost of condition) and the gains of education, health, nutrition, etc will increase the accumulation of children's human capital, reducing future poverty levels.

Skoufias (2001) also explains both effects. Basically, he employs a microeconomic model in order to show the effect of conditional cash transfer on children's school attendance and work. This author argues that an exogenous increase in the household income, such as the conditional cash transfer, does not affect the shadow prices of child and mother's time of schooling and work (however, it affects the household production and the reservation wage). That is to say, they will not substitute leisure or household actives for work, after an exogenous increasing of income. In this context, only a pure income effect of conditional cash transfer will be observed. Nevertheless, it is important to highlight that since human capital is a normal good (human capital and income present a positive relationship), an increase in the exogenous income would elevate the demand for human capital measured in terms of schooling.

On the other hand, according to Skoufias (2001), the condition that the beneficiates' child must be enrolled at school and attend classes (generally it is required at least 85% of frequency) leads to a price effect. The marginal cost of children's time in human capital production depends positively on the wage rate children could earn in the labor market, that is, on the opportunity cost of attending school. The conditionality of minimum school attendance will result in a reduction of the shadow price or marginal cost of investment in human capital (that is, we do not have only the income effect). This reduction represents a lower price of schooling. Therefore, the conditionality of attending school will decline the price of education, inducing an increasing in the demand for educational achievement of children, which would diminish the future levels of poverty through the accumulation of human capital. Finally, the conditional cash transfer tends to change the beneficiaries' behavior, stimulating the substitution of some activities, such as work, for school attendance. Again, potential short and long-term effects of conditional cost transfers are being taken into account in the literature on social program evaluation.

In the follow section some considerations on evaluation of social programs will be presented. Basically, the counterfactual problem, the statistical bias that arises from this problem and, two potential solutions for it will be discussed.

5 - Some Considerations on Program Evaluation

There is a fundamental evaluation problem that arises from a counterfactual question or a hypothetical unobserved value: how would individuals who participated in the program have fared in the absence of the program? In other words, the impossibility of knowing what would happen with the same person[4], in the both situations (receiving the benefit or not receiving it), generates the fundamental problem of evaluation of social programs. In order to deal with this problem, the literature on social program evaluation assumes that it is essential to establish a credible comparison group in which the "absence of the program would have had outcomes similar to those who are exposed to the program" (Duflo & Kremer, 2003: 4)[5]. Otherwise, a selection bias will be observed due the fact that non-participants differ from participants in the non-participants state.

Among the possibilities of address this problem, there are, at least, two different approaches that can be employed in evaluation programs: the experimental approach and the non-experimental or econometric approach. The first one is based on the random assignment, composed by a treatment and a control group. The random assignment allows that individuals exposed to treatment be chosen in an unsystematic way, and consequently the treatment assignment is uncorrelated with the outcomes and with the attributes of treated subjects (Cameron, 2005). It allows a trustworthy comparison between control and treatment groups. This is the key advantage that stems from randomizes trials.

As explained above, random social experiments attempt to "solve the selection bias for means by creating an experimental control group composed of persons who would have participated but who were randomly denied access to the program or treatment" (Heckman & Smith, 1995: 88). However, according to Heckman & Smith (1995), it is important to highlight that random assignment does not solve the selection bias; actually it balances the bias between the participant and non-participant samples. Of

[4] It could be another unit of analysis, such as the household or the state.
[5] In this perspective, a treatment and a control group should be employed.

course, not all programs can be evaluated with randomized evaluations. When it is not possible, it is fundamental to take into account other alternative methodology in order to evaluate a program impact. In such case, the non-randomized evaluation methods can be employed in order to attempt to control for the selection bias arisen from the counterfactual problem.

The second alternative approach to policy evaluation, the non-experimental or econometric test, is observed when no systematic methods of experimental design are used to maintain a control group. In contrast to the randomized experiment, in a non-experimental setting, the treatment and control groups are either drawn from different groups or are nonrandom samples from a common population (Dehejia & Wahba, 2002). In such case, an econometric method should be used in order to model the casual relationship[6].

One example of econometric method used in social programs evaluations is the propensity matching score. Basically, it "pairs each program participant with a non-participant, where pairs are chosen based on the degree of similarity in the estimated probabilities of participating in the program (the propensity scores)" (Smith & Todd, 2004: 5). In this method, the mean difference in the outcomes of the matched pairs is the estimative of the mean impact of the program. Most of the recent evaluation literature has focused on matching estimators.

Next section will show some empirical evidence on social program evaluation in Brazil. Two works will be specially emphasized: Cardoso & Souza, (2004) and Schwartzman (2005).

6 - Empirical Evidence from Brazil

Some authors have attempted to examine the impact of education-oriented social programs in Brazil, especially the impact of Bolsa Escola (Schwartzman, 2005; Cardoso & Souza, 2004; Bourguignon et al 2003). Cardoso & Souza (2004) estimate the impact of conditional cash payments on child labor and school attendance in Brazil. According to them, the best way for preventing child labor is the compulsory education. Besides schooling is desirable in itself and it is compatible with part-time work, the obligation of

[6] Cameron (2005) presents a full set of identification strategies in which non-experiment research can be conducted.

going to school avoids full-time work. These authors also consider other important variables that affect child labor, such as household size and composition, the education and employment status of parents, and poverty. Among other things, these authors review four programs of income transfer to poor families on the condition that children should attend school: PETI (Child Labor Eradication Program), Bolsa Escola, Renda Mínima, and Bolsa Escola Federal. Moreover, they employed in their study two of those programs: Minimum Income and Bolsa Escola.

Some preliminary results found by Cardoso & Souza (2004) showed that the decline in child labor and the increase in the school attendance were closely associated in Brazil, between 1992 and 2001. In addition, they observed that this trade-off is mostly due to changes inside each group under analysis. In order to show this result, they employed the decomposition method.

Cardoso & Souza (2004) observed that the reduction in the probability of child labor and the increase in the probability of child to attend school do not rely on the gender of the head of the household or on the size of the family (both for girls and boys). Nevertheless, the age of the child (if children aged 14 to 17), the residence area (if rural or urban), and the schooling of the head of household are important characteristics to explain changes in probabilities of child labor and attendance school between 1992 and 2001, in Brazil. Moreover, they highlighted that the proportion of children who both worked and studied was much higher than the proportion of children who just worked.

In their investigation, they consider the existence of the counterfactual problem, and also explain that due their data limitation, they can not conduct an experimental research. Thus, Cardoso & Souza (2004) employ a non-randomized approach, the propensity matching score, to construct their counterfactuals (the comparison group of those children in families that could have received the income transfers but did not). More specifically, these authors employed matching on the probability of participation in the program.

Cardoso & Souza (2004) worked with data from Brazilian Census 2000. They selected a sample of all children between 10 and 15 years of age with valid information on child labor and school attendance. They used a treatment (children living in families that received income transfers) and a control group (children in families that could have

received the income transfers but did not), which built the dependent variable. Their model was controlled for a set of children characteristics, parents characteristics, municipality characteristics, political party of the mayor, and others.

The main results found by Cardoso & Souza (2004) show the cash transfer has an impact on the increase of school attendance. More specifically, these authors perceived that cash transfer program send to school children who earlier only worked and children who previously did not work and did not go to school. However, they also perceived the absence of a net effect of the cash transfer on the decrease of child labor. The results are similar for boys and girls.

Schwartzman (2005) is also interested in the effect of Bolsa Escola program. One of his objectives is to investigate "the education and equity impact of education-oriented social programs" (p.1). More specifically, this author attempted to measure the impact of Bolsa Escola on school enrollment and attendance and on child labor. Schwartzman (2005) affirms that the public opinion, governments and international agencies had a good impression on Bolsa Escola program, since they saw this program as a way to improve education outcomes of poorer population. However, Schwartzman (2005) argues for the inexistence of an empirical and efficient evaluation on impact of Bolsa Escola on school attendance and learning. In an general way, Schwartzman (2005) concluded that Bolsa Escola and the federal minimum income program increased the chance of a poor child going to school but do not reduce their labor activity.

Before presenting his final results, Schwartzman (2005) showed some preliminaries ones on the impact of this program on school attendance and enrollment and child labor. This author affirmed that the fact of receiving or not a cash transfer do not make any significant difference on school attendance for children, between 7 and 13 years of age. He explained that these results were expected due the almost universalism of basic education, that is, those children are enrolled in school anyways. However, among those children who are younger than 7 years old and older than 13 years old, the stipend could bring more significant results, since it could help the maintenance and the return of them to school. Schwartzman (2005) also affirmed that preschool is not universal while children older than 13 years of age start dropping out school. Therefore,

in both cases, the cash transfer would bring results more efficient than those among children between 7 and 13 years old.

Schwartzman (2005) also examined the effects of Bolsa Escola on school attendance controlling for the monthly family income per capita (income deciles). Comparing children who were participating in Bolsa Escola and those who were not, he found some differences in the percentage of enrolled children. However, he considered these differences are not very large, mainly for children in income deciles up to the fifth.

Schwartzman (2005) also considered in his analysis a supplementary variable on child labor, which the question is about how many days of school the student have missed in the last two months previously to the survey. Using this variable, according to Schwartzman (2005), he estimated the overall effect of Bolsa Escola on school attendance. In order to make it, he again compared those who participated in this program with those who did not. For example, among children who did not miss any day of class in the two months previously to the survey, the difference was 7%. That is to say, 56.7% of children who participated in Bolsa Escola and 49.4% of children who not participated in this program did not miss any day of class two months before the survey.

One of Schwartzman's conclusions is that Bolsa Escola was not well focused in terms of its impact on school enrollment. According to him, the age differences are the most important variations in school participation. Therefore, according to Schwartzman, the Bolsa Escola program should be focused on age groups at the highest risk. In an opposite way, as Schwartzman (2005) had explained, that most of the stipends are for children between 7 and 11 years old.

Taking into consideration the child labor, Schwartzman (2005) affirmed it does not matter if the child works or does not; the impact of Bolsa Escola on attending class is the same and small, mainly when the child is younger. Furthermore, this author found a positive correlation between Bolsa Escola program and child labor, that is, "those receiving the stipend are the ones who work more" (p. 10). He concluded that this result was expected, since the programs were focused on poorer people and the transfers are too small to replace the child labor income. Controversially, Schwartzman (2005) found a distinct result when he took into account the differences of the impact of Bolsa Escola in the child labor by family income level. In the lower income brackets, the fact of receiving

cash transfer decreased the chance of children working. Again Schwartzman (2005) compared children who received support with those who did not participate in any program, controlled by family income deciles.

Schwartzman (2005) drew some conclusions about the way how Bolsa Escola was focused on. He highlighted the existence of some distortions, such as towards the regions and towards the rural sector. Moreover, he explained that Bolsa Escola is out of focus since the most of families who received the benefices would send their children to school anyways. In such case, Bolsa Escola failed as an education policy instrument (Schwartzman, 2005).

Another of Schwartzman's conclusions is that Bolsa Escola is based on a wrong hypothesis, which is: poor families do not send their children to school because they need to work (Schwartzman, 2005: 14). In fact, Schwartzman believed that the lack of accessible of schools is the principal explanation of low level of children's school attendance. He also believed that instead of spending money on this program, better results would be reached if higher investments were done to improve the Brazilian public education, and to resend to schools the adolescents who had left schools. Therefore Schwartzman believes that the education problem in Brazil is explicated by the supply side, and not by the demand one.

Finally, Schwartzman (2005) concluded by justifying that Bolsa Escola would be policies of income distribution. Clearly, he believes those programs should be provided unconditionally or universally. The next section presents the methodology employed in this study.

7 - Methodology

We employ an econometric method, the "Propensity Score Matching", in order to try to measure the impact of education-oriented social program in Brazil on child's education. Basically, this method pairs treatment and comparison groups which are similar in terms of their observable variables.

We use as the dependent variable the Grade Progression Rates (GPR). This is a decomposition technique of years of schooling that was developed by Rios-Neto (2004)[7].

[7] Rios-Neto (2004) explains that Grade Progression Rates was inspired by the demographic method called Parity Progression Ratios (Preston, Heuveline, and Guillot, 2000).

According to this author, for a given cohort, we have the following Grade Progression Rate:

$$e_i = \frac{P_{i+1}}{P_i}$$

Where:

e_i = grade progression rate from the school year *i* to the school year *i* +1;

P_{i+1} = number of persons in the cohort who completed at least the school year *i* +1;

P_i = number of persons in the cohort who completed at least the school year *i*.

This cohort measure is usually calculated for cohorts who have completed their school attendance, that is to say, the GPR usually employ data from order cohorts[8]. Nevertheless, this requirement can be smoothed if the objective is to use lower levels of education or a limited number of years of schooling in order to examine child's education.

One contribution of this paper is to employ the GPR as an outcome variable. According to Rios-Neto (2004), the literature shows that the years of schooling are widely employed in order to investigate the impact of a social program on education. However, this author affirms that GPR allows a more reliable evaluation of the changing in the years of education, since it decomposes such variation in series progression parameters (p. 156).

The independent variables employed in this paper are a set of children, father and mother characteristics such as, age, education, and income. Moreover, this work uses household variables such as the household condition (if urban or rural). This study employs information about children who at the time of the study were between 7 and 14 years of age. Then the GPR's are calculated to the 7-14 years-old cohort.

8 - Data

This article uses data from a sub-sample of the Brazilian National Household Sample Survey (Pesquisa Nacional por Amostra de Domicílios - PNAD), conducted by the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e

[8] The same is true for calculating the Parity Progression Ratios. In this case the cohort measure is estimated to cohorts who have completed their childbearing (Preston, Heuveline, and Guillot, 2000).

Estatística - IBGE). I will employ information from 2003, because this PNAD gathers information on the transfer income received by the individual from an official education-oriented social program in Brazil. Among the interviewed household, 92,230 children and youths between 5 and 17 years old were receiving monetary benefits of an education-oriented program in 2003.

This data was separated into three different income levels: household with per-capita income lower than R$50,00 (*reais*), household with per-capita income lower than R$100,00, household with per-capita income lower than R$200,00. In such separation, the goal is to observe if the impact of education-oriented social programs differ by poorer families which report per-capita income lower than R$200,00.

8.1 - Descriptive Analysis

Using data from the sub-sample of 2003 PNAD, Table 1 shows the age distribution of children from 7 to 14 years old. Next Table 2 presents the percents (by age and sex) of those children who were receiving monetary benefits of BEP in 2003.

Table 1 –Distribution of children from 7 to 14 years of age, Brazil, 2003.

Age	Frequency	Percent
7	7,423	12.62
8	7,542	12.82
9	7,431	12.63
10	7,323	12.45
11	7,265	12.35
12	7,116	12.09
13	7,276	12.37
14	7,466	12.69
Total	58,842	100.00

Source: 2003 PNAD

Table 2 -Beneficiaries of BEP, by sex and age (children from 7 to 14 years of age), Brazil, 2003.

Age	Beneficiaries of BEP		
	Total	Male	Female
7	7.3	7.24	7.35
8	14.34	14.43	14.24
9	30.62	29.85	31.41
10	34.43	33.61	35.29
11	34.63	35.14	34.10
12	34.36	33.90	34.83
13	31.96	32.18	31.73
14	27.52	27.76	27.27
Total	26.77	26.61	26.94

Source: 2003 PNAD

Table 3 shows the GPR for these children. Since the GPR are calculated to the 7-14 years old cohort, it is possible to observe that GPR vary from 0 to 8 (*e*0 - *e*8). For example, e1 is the probability of reaching two years of education, since the child has already completed 1 year of education. This sub-sample shows that the GPR decreases when the age is increasing.

Table 3 - Years of education and GPR (e) to children from 7 to 14 years of age, Brazil, 2003.

Years of education	7-14 years old cohort	GPR	7-14 years old cohort
0	10,281	e0	0.8251
1	9,150	e1	0.8114
2	8,878	e2	0.7745
3	8,079	e3	0.7350
4	8,148	e4	0.6363
5	6,335	e5	0.5557
6	4,644	e6	0.4139
7	2,833	e7	0.1360
8	399	e8	0.1054
9	47		
Total	58,794		

Source: 2003 PNAD

Among the GPR's showed in Table 3, e4 (the probability of reaching five years of education, since the child has already completed 4 year of education) was chosen for being utilized in this paper when employing the Propensity Score method. This choice was based on the fact that the transition from the fourth grade to the fifth one has been considered as an important phase in the historical progress of elementary school in Brazil. This probability (e4) is a categorical variable, which is equal (1) if the child has 5 or more years of education and equal (0) if he/she has 4 years of education.

Table 4 shows the percentage of children who has 4 years of education in the control and treatment groups, separately. This table also present preliminary descriptive analysis regarding the covariates used to estimate the propensity score method. These variables are: child's sex (1 if child is a girl), color (0 if child is white), rural (0 if child lives in a rural area), age (from 7 to 14 years old), and years of education (the two latter are continuous variables). The variable that indicate if child takes part of the control or treatment group is a categorical variable (1 if child received any benefit associated to education).

Table 4 – e4 and covariates in the control and treatment groups

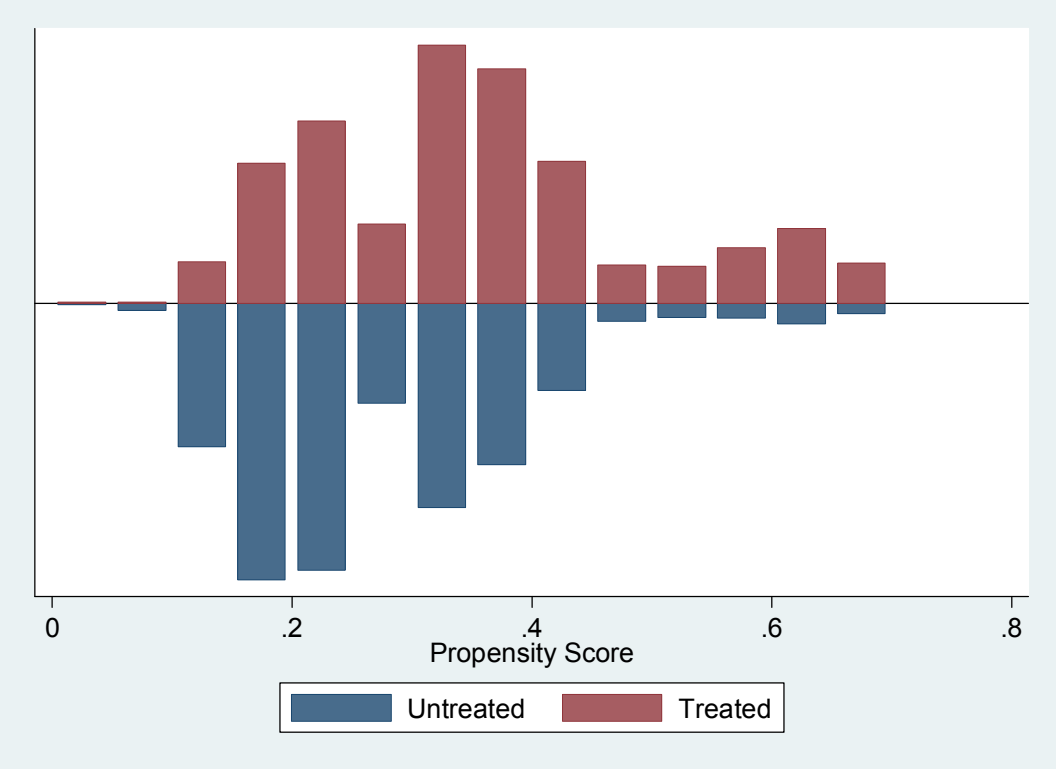
Variables	Treatment	Control
Sex (girls)	51%	51%
Color (white)	48%	31%
Rural	27%	27%
e4 (4 years of education)	32%	24%
Age	11.04 (1.95)	10.29 (2.40)
Years of Education	4.04 (1.86)	3.77 (2.27)
Total	15,670	42,855

Source: 2003 PNAD

8.2 – Preliminary Results

This section presents some preliminary results for the Propensity Matching estimates. As explained below, e4 will be the outcome variable. The four variables that were chosen to match the control and treatment groups are: child's sex, color, rural, and years of education. Graph 1 shows the common support of propensity scores between the treated and untreated observations.

Graph 1



9 - Reference:

BALAND, J. & ROBINSON, J. Is Child Labor Inefficient? *Journal of Political Economy, Vol. 108, No. 4, 2000*

BOURGUIGNON, F. at el 2003. "Conditional cash transfers, schooling, and child labor: microsimulating Brazil's Bolsa Escola program." *World Bank Economic Review* 17:229-54.

CAMERON, A. TRIVEDI, C. *Microeconometrics – Methods and Applications*, New York: Cambridge University Press. 2005.

CARDOSO, E., A. P. SOUZA The Impact of Cash Transfers on Child Labor and School Attendance in Brazil. Vanderbilt University. Working Paper N 04-W07. 2004.

CURRIE, J. "When Do We Really Know What We Think We Know? Determining Causality". UCLA and NBER, *working paper*. 2003.

DEHEJIA, R., S. WAHBA, Propensity Score Matching Methods for Non-Experimental Causal Studies. *Review of Economics and Statistics*, 84(1): 151-161. 2002.

DUFLO, E., & KREMER, M. "Use of Randomization in the Evaluation of Development Effectiveness". The World Bank Operations Evaluation Department Conference on Evaluation and Development Effectiveness. 7-15-2003. Washington, DC.

HECKMAN, J. & SMITH, J. Assessing the Case for Social Experiments. *Journal of Economic Perspectives*, 9 (2): 85-110. 1995

JANVRY, A & SADOULET, E. Conditional Cash Transfer Programs for Child Human Capital Development: Lessons Derived from Experience in Mexico and Brazil. Paper for presentation at the GRADE 25th anniversary Conference, "Investigación, Politicas y Desarrollo", Lima, November 15-17, 2005.
Available in http://siteresources.worldbank.org/INTISPMA/Resources/Training-Events-and-Materials/PRMPR-CCT.pdf in 05/09/2006.

LINDERT, K. Brazil: Bolsa Família Program – Scaling-up Cash Transfers for the Poor. Available in http://www.mfdr.org/sourcebook/6-1Brazil-BolsaFamilia.pdf in 02/16/2006

MOFFIT, R. 2003. The Role of Randomized Field Trials in Social Science Research: A Perspective from Evalutations of Reforms of Social Welfare Programs. *Discussion Paper,* No 1264-03. Institute for Research on Poverty.

RIOS-NETO, E. 2004. O Metodo Probabilidade de Progressao por Serie. In: Introducao a Demografia da Educacao. (ORG) Eduardo Rios-Neto and Juliana Riani. P. 145-158.

SCHWARTZMAN, S. Education-oriented social programs in Brazil: the impact of Bolsa Escola. In: Global Conference on Education Research in Developing Countries (Research for Results on Education), Global Development Network, 2005, Prague. 2005.

SKOUFIAS, E. (2001). *PROGRESA and its impacts on the welfare and human capital of adults and children in rural Mexico: A synthesis of the results of an evaluation by the International Food Policy Research Institute.* Washington, DC: International Food Policy Research Institute, Food Consumption and Nutrition Division.

SMITH, J., & . TODD P. Does Matching Overcome Lalonde's Critique of Non-experimental Estimators? Forthcoming, Journal of Econometrics. 2004.

WINSHIP, C., & SOBEL, M. Causal Inference in Sociological Studies. *In M. Hardy and A. Bryman (Eds.), Handbook of Data Analysis.* Sage Publications 2004.