Five Randomized Impact Assessments of a Management and Resources Program for High Schools in Brazil

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Summary

We analyze the "Jovem de Futuro" (Youth with a Future) program, a field experiment implemented in 91 schools in five different Brazilian regions, attended by around 30,000 high school students. The program uses a set of specific actions to promote better management and provides financial assistance to schools, aiming at learning improvements and academic progress. The estimates indicate that the program has a positive impact on students' mathematics and portuguese test scores, ranging between 0.176-0.373 standard deviations. The results also show that treatment reduces dropout rates and grade repetition in some areas.

Keywords: Randomization, Impact Assessment, Education, High School.

JEL: I24, I25

1 Introduction

In recent decades, education in Brazil has experienced significant changes in terms of enrollment. According to data from the 2013 National Household Survey (PNAD), 98.5% of all children aged between 7-14 years and 84.2% of youths aged 15-17 years attended school. These values represent a major advance compared to attendance in 1992 when 86.6% of children aged between 7-14 years and only 59.7% of youths aged 15-17 years were in school.

Despite the increase in coverage, the challenges to be faced in education by Brazil and other developing countries are numerous, especially for the 15-17 year age group. First, a significant portion of these youths does not reach high-school at the proper age. According to INEP (Education Statistics Centre), in 2013, 36% of tenth-grade students in the public schools were the wrong age for their grade. This number is four times higher than in private schools (8%). Second, the age/grade gap combined with high grade-repetition rates generates another problem: school dropout. According to INEP, 9.2% of public-school students dropped out of high school in 2013. Finally, the students' learning as measured by external assessments have not improved significantly in recent years. This factor, combined with high repetition rates, caused the main quality of education index (*Índice de Desenvolvimento da Educação Básica*—IDEB, which ranges from 0 to 10)[1] of the public high schools in Brazil to stagnate at 3.4 between 2009 and 2013.

It is in this context that since 2008 the Unibanco Institute introduced the *Jovem de Futuro* program (Youth with a Future - PJF) focused on public high schools.[2] Its primary objectives are improving performance and reducing dropout rates. To achieve these goals, the program proposes actions aimed at improving school management and transferring financial resources to participating schools.

During the pilot phase of the program, schools from five different regions of the country were selected to participate. Each school was paired with a control and then randomization took place. Thus, it is possible to carry out impact evaluation exercises

[1] The IDEB is an Index that standardized the test scores and multiplies by the average grade promotion rate of the years related to the high school grades.

[2] The Unibanco Institute is the social branch of a major Brazilian comercial bank ("Unibanco") that has nowadays merged with another bank "Itau" to form "Itau-Unibanco", one of the largest commercial banks in the world.

to assess the causal impact of the program on the students' scores in Portuguese and mathematics tests and on the school evasion and drop-out.

The first paper to evaluate this program was Barros *et al.* (2012), that estimated the treatment effects for two regions (Porto Alegre and Belo Horizonte) showing that the program had a positive impact on students test scores in these two regions using the Institute own assessments. The treatment effects in the other regions (São Paulo, Vale do Paraíba and Rio de Janeiro), were only assessed by the Institute that manages the program, with the analysis showing that the program also had positive effect on the test scores in these regions (UNIBANCO, 2011).

The main contributions of this paper with respect to this previous analysis are: (i) we estimate the treatment impact on test scores for all five regions and present them together; (ii) we provide new results using independent data from Brazilian National High School Exams as outcomes; (iii) we investigate the possibility of heterogeneous treatment effects on test scores across a variety of pre-determined subsamples; (iv) we analyze the effects on dropout and retention probabilities.

This paper contributes to increasing the knowledge about the relationship between education policies and students outcomes. Glewee *et al* (2011) review educational policies in development countries and point out that "little is known about the impact of education policies on student's outcomes". Specifically, our analysis examines the impact of better management and increases in expenditures per pupil on test scores, which is aligned with the school resources literature discussed by Glewee *et al* (2011).

To anticipate our main results, we find that the program had a positive impact on the students' test scores measured by the institute own evaluations in four out of the five regions; it also impacted the students' scores in five different disciplines of the Brazilian national high schools exams in the same four regions; the impact was homogenous in terms of the students characteristics; but, students from better schools benefitted most from the program; the likelihood of students dropping out or repeating a grade was lower in regions where these goals were well defined, but higher in regions where these targets were not well defined.

This paper has six additional sections. Section 2 describes the *Jovem de Futuro* program, section 3 discusses the relevant literature on schools programs, section 4 presents the econometric models used in impact estimates. Section 5 describes the data and examines the pre-treatment characteristics of the students and schools. In

section 6, we present the impact estimates on student scores, dropout and grade repetition. This section also conducts the robustness checks and present the rate of return of the program. Finally, section 7 concludes and derives some policy considerations.

2 The Program[3]

Between 2008 and 2012, Unibanco Institute implemented pilots of the *Jovem de Futuro* Program (hereafter, PJF) in partnership with the boards of education of four states in the Southern regions of Brazil. The program focused on public high schools. In 2008, implementation started at state schools in the metropolitan regions of Porto Alegre (State of Rio Grande do Sul) and Belo Horizonte (State of Minas Gerais). In 2010, activities began in the city of Rio de Janeiro (Rio de Janeiro State), in the Paraíba Valley and in the metropolitan region of São Paulo (both in the State of São Paulo). In the whole period (2008-2012), 91 schools were treated and another 99 schools served as controls. To assess the program results, the Institute decided to randomize the participation in the program, so that the initial participant schools were chosen by lottery.

The selection process can be summarized as follows. Initially, the program was presented to the state boards of education, which defined the schools that would be eligible to participate, taking into account criteria such as the schools' locations and other indicators.[4] Once the restrictions were established, the second step was to invite a group of schools to participate in the selection process. The program structure was presented, and the units that applied for the program did so knowing that they would undergo a random selection process, *i.e.*, the interested schools were aware that participation in the PJF program was not guaranteed.

Once the applicants were defined, the Institute paired similar schools based on the following characteristics: location, size (number of enrolled students) and the share of students in high school.[5] Once this pairing was made, a random draw took place for

[3] The program descriptions are available (in Portuguese) from the institutional reports made available to the public by Unibanco Institute (UNIBANCO, 2007; 2008; 2009; 2010 and, 2011).
[4] According to the reports produced by the Institute, only the State Board of Education of São Paulo imposed average test scores as a criteria for school participation. In this state, the schools participating in the program should be those with the lowest Educational Development Index in the State of São Paulo.
[5] In São Paulo, the state assessment result was also a criterion.

each pair to define the units that would be treated and the ones that would form the control group.[6] Treated schools received treatment for three years. This timeframe enabled a cohort of students to be treat throughout its high school years in each of the regions. The program objective was to improve school performance and reduce student dropout rates at treated schools, which essentially would be achieved through the provision of technical and financial support for improving school management.

The basic principle was to provide support so that principals, coordinators and teachers would not only manage the physical and financial resources of the schools more efficiently but also make decisions based on assessments and planning so that at the end of the school term, students had better outcomes. This support would take place through two channels. First, training and technical support were offered to a managing group formed by the school. Second, during each year of the program, 100 Brazilian reals (BRL) were transferred per student enrolled in the unit.[7] These financial resources could be used in a flexible manner provided the following conditions were met: at least 20% should be used to provide incentives to teachers; at least 20% should be used to provide incentives to students and a maximum of 40% could be used for infrastructure.

The treated schools assumed some responsibilities. The initial commitment was to form a managing group representing the entire school community[8] and to create a strategic plan that would establish guidelines to achieve the results. In addition, throughout the participation period, the selected educational units had to render accounts to check the program development.

Another school follow-up mechanism consisted of the presence of supervisors linked to the Institute. Each supervisor was responsible for five schools, visiting them once a week. Their role was crucial in the program structure because it was their responsibility to offer schools both technical and administrative guidance, to check whether strategic plans were being accomplished and to collect information to check the schools' intermediate results. Therefore, the treatment included continuous monitoring of treated schools.

[6] The control schools were promised that they would also receive the program following the three-year cycle in the treated schools.
[7] The criteria for receiving financial resources have been changed over the years, as will be shown below.
[8] Principals, educational coordinators or PJF representatives at the school, representatives of teachers, students and parents or guardians, representatives of the Parent-Teacher Association (*Associação de Pais e Mestres*—APM)/School Fund/Circle of Parents and Teachers (*Círculo de Pais e Mestres*—CPM) or a similar body.

3 Literature Review—Possible Channels for the Program's Results

In the previous section, two points were raised as potential channels of the program's positive results: improved management and the transfer of financial resources to treated schools. However, the actions suggested by the program were not limited to these two items. A series of actions and orientations were proposed to the schools. Our aim is both to list these channels and to relate them to the economics of education literature. This literature attempts to find the causal relationships between actions adopted by schools (and school systems) and student outcomes. This section aims to analyze whether the actions implemented and suggested by the program are supported by the literature. Thus, it is intended to provide greater clarity about the expected effects, especially on student scores.

The PJF transferred financial resources directly to the schools. The amount of money provided was not entirely homogenous because differently sized schools received different amounts of total funds. Moreover, there was also no relative homogeneity (in term of Brazilian Reais per student) among the states because of changes over time in the Institute's criteria for distributing resources. In the regions of Porto Alegre and Belo Horizonte (the first regions to implement the program), it was agreed that the schools would receive BRL 100 per student enrolled at *any educational level*. A minimum amount was also established. If the schools had fewer than one thousand students in a particular year, they would receive BRL 100,000 per year. In 2010, the program was implemented in schools in the regions of São Paulo, Paraíba Valley and Rio de Janeiro subject to different rules for receiving funds. Each year, BRL 100 was transferred per *high school* student. Thus, a higher number of schools received the annual minimum amount of BRL 100,000.

The literature relationship between education expenditures and students' performance is quite controversial. Some authors question the effectiveness of more resources in the absence of incentives for agents within schools to change the behavior (HANUSHEK, 2003). Conversely, some studies indicate the importance of more resources, as Papke (2005) for example, whose results indicate that more resources improve schools' average performance and that among those schools showing improvement, those with worse initial performance tend to be more responsive to the provision of resources. According to this approach, it is possible that treated schools

show positive results with respect to the control group because of the additional financial resources provided to them. In addition, the differences in the financial resources provided across schools may generate some heterogeneity in the results of treatment.

Another strategy adopted by the Program was the introduction of accountability in schools. Accountability is a broad concept in the economics of education literature. In general, it refers to student outcomes as the responsibility of the schools, especially of principals and teachers. Figlio and Loeb (2011) divide the accountability system into two types: explicit and implicit. An example of an explicit sanction is one providing that directors can be removed if the school does not perform at a level deemed satisfactory. In contrast, implicit accountability measures occur for example, when a school's results are presented to the school community (parents and students) and no other measure is taken. In that case, the idea is that the measure would both generate external pressure and stimulate the school to seek improvements.

The literature indicates that explicit and implicit accountability actions have a positive impact on students' performance. With respect to the first type of action, for example, Rockoff and Turner (2010) analyze an accountability program in New York City schools. Sanctions were imposed on schools with low performance if they did not improve (including closing the school or dismissing the school manager) and awards were given to principals in schools with good performance. The results were both effective and positive for low-performance schools and also pointed towards greater satisfaction of the school community, especially of the students' parents. More recent studies, such as that of Ahn and Vigdor (2014), confirm this tendency. With respect to implicit actions, the simple fact of providing information about the school seems to change parent and student behavior. For example, according to Andrabi, Das and Khwaja (2014) disseminating information on school results can contribute to an increase in average student performance and change the level of enrollment in better schools. This change in choices is aligned with other empirical evidence (KONING; WIEL, 2013; HASTINGS; WEINSTEIN, 2007).

We can also establish some connections between the program expected results and its accountability actions. An incentive system was implemented to reward managers, teachers, classes and students from the schools with the best results each year. In addition, treated units were informed that they could be penalized (removal

from the PJF) if they did not comply with the established minimum standards.[9] Both cases are examples of explicit accountability. With respect to implicit accountability, one of the PJF's objectives was to increase both parents and students' awareness about the school performance. Thus, we should expect positive results of the treatment through these paths.

Beyond accountability strategies and continuous monitoring, the treatment schools had autonomy to use resources and to implement strategies that were aligned with their background. The schools participating in the PJF had the autonomy to achieve results by using financial resources and choosing educational methods. As mentioned above, with respect to the use of financial resources, the school needed only to respect some limits. With respect to educational methods, the PJF suggested that the schools used assessments as support for the actions adopted in the classroom. However, it did not interfere in how teachers taught their classes. Therefore, teachers also had autonomy to plan and manage their practices. In the economics of education literature, a good example of how autonomy can be positive for schools is the case of charter schools (FRYER, 2014; DOBBIE; FRYER ROLAND G., 2013). It is evident that the case of charter schools is different from that of the schools participating in the PJF. However, our point is to highlight that the freedom to use the additional resources, along with decision power regarding the choice of teaching methodologies, allows schools not only to be less rigid but also to explore methods they deemed suitable for both their environments and their students.

The economics of education literature devotes a significant effort to connecting teacher quality with student performance. Chetty, Friedman and Rockoff (2013) note the importance of good teachers for students' short- and long-term outcomes. In addition, factors such as frequent teachers turnaround appear to be detrimental to learning (HANUSHEK et al., 2005). Thus, actions to retain good teachers in schools and to reduce teaching-staff turnover may have contributed to improved student performance at the treated units because the program adopted incentives in that direction. For example, in the PJF, a portion of the financial resources should be used for teacher incentives. PJF proposed that schools direct resources to teachers in the form of awards (for punctuality, attendance and student outcomes), access to capacity

[9] However, it is worth mentioning that these sanctions do not appear to be effective: only one school was removed.

building and funds allocated to teacher-proposed educational projects. These types of incentive are supported by the literature. Muralidharan and Sundararaman (2011) assess a random experiment in India that paid teachers according to student performance; the incentives were either for individuals or for the group. In both cases, the results showed positive effects on the performance of students at schools that adopted these measures.

Non-financial incentives can also be effective to stimulate teachers. Loeb and Page (2000) analyze the importance of teachers' relative wages and non-financial factors. Their conclusions indicate the value of both in explaining student outcomes. In addition, actions that are beneficial for improving the school environment have repercussions for the teaching staff's behavior and therefore, can result in a higher educational level (LADD, 2011). Because one of the program's major goals was to improve the school environment, this is expected to be another element that leads to a positive impact on student outcomes at the treated schools.

With respect to actions taken inside of the school, students played a relevant role in the program. Some of them received training in the form of leadership mentoring, and they were expected to mobilize other students around the targets defined for the school. In this sense, it is reasonable to assume that the students who were excited about the changes would transmit that feeling to their classmates. Thus, some type of peer effects can also affect the program's potential impact (HOXBY, 2000). In addition, the PJF suggested that schools adopt actions to stimulate students, such as performance awards, tutoring or funds for complementary activities. These incentives could be another catalyst for the program's potentially positive result (FRYER, 2011).

We can conclude that the economics of education literature suggests different paths through which the program can lead to an increase in the test scores of students in the treated schools with respect to those in the control-group schools. Since different actions took place at each school because of the basic premise of autonomy advocated by the project, the channels used by the PJF were quite varied, thus suggesting that they may have been effective in several ways due to the varying profiles of schools or students.

4 Econometric Model

Despite the fact that the program was randomized, we use a differences-in-differences (DID) approach to estimate the effect of the treatment on test scores and also add pre-treatment controls to increase efficiency. Our main specification is:

$$Y_{ijt} = \beta_0 + \beta_1 D_i * t + \beta_2 D_i + \beta_3 t + \boldsymbol{\beta_4 X_i} + \boldsymbol{\beta_5 W_j} + \boldsymbol{\beta_6 G_j} + \varepsilon_{ijt} \qquad (1)$$

The results of the portuguese and mathematics tests scores of student i at school j in period t are represented by variable Y. Variable D_i has a value of 1 for the students in treated schools and zero for those in the control group. Variable t has a value of 1 in the final period and zero in the initial period. Matrix $\mathbf{X_i}$ combines variables related to pre-treatment student characteristics (gender, skin color and appropriate age), and matrix $\mathbf{W_j}$ combines schools' pre-treatment characteristics (total enrollment in high school, enrollment in nighttime high school, students per class in high school, grade retention rates, dropout rates and age-grade gap rates in high school). Matrix $\mathbf{G_j}$ controls for each school's stratum that was formed before randomization. Finally, ε is an error term, clustered per school and year. The parameter of interest in this first model is β_1, which measures the effect of the program on student scores.

Two paths were adopted to analyze heterogeneous effects. In some cases, the sample was divided, a different model was estimated for each group and the null hypothesis of equality of coefficients was tested. When we analyze heterogeneity defined in terms of a continuous variable, we interact this variable © with the treatment and period indicators:

$$Y_{ijt} = \alpha_0 + \alpha_1 C_j \times D_i \times t + \alpha_2 D_i \times t + \alpha_3 C_j \times t + \alpha_4 C_j \times D_i + \alpha_5 D_i + \alpha_6 t + \alpha_7 C_j + \boldsymbol{\alpha_8 X_i} + \boldsymbol{\alpha_9 W_j} + \boldsymbol{\alpha_{10} G_j} + \varepsilon_{ijt} \qquad (2)$$

In this model, the effect of treatment is given by $\alpha_1 + \alpha_{2*}$C.

We also examine the program impact on the probability of the student's dropout and grade repetition To analyze dropout, we use the approach defined by Oliveira and Soares (2012). According to the authors, from the school census data we can define dropouts as follows: student i at school j in period t is considered a dropout if that student

is not found at any other school in periods t+1 and t+2. That is, to be considered a dropout, the student cannot be found again in the census.[10]

We also examine the program impact on grade repetition. In this case, student i at school j in period t is considered to have failed a grade if in period t + 2 she is enrolled at any school in a grade other than grade twelve. In both cases, we use probit estimates based on the following model:

$$Y_{ij} = \gamma_0 + \gamma_1 D_i + \boldsymbol{\gamma_2 X_i} + \boldsymbol{\gamma_3 W_j} + \boldsymbol{\gamma_4 G_j} + \varepsilon_{ijt} \qquad (3)$$

In this model, Y_{ij} is a variable with a value of 1 if the student dropped out (or failed) and zero if otherwise. The students' characteristics in matrix $\mathbf{X_i}$ are those of the school census: gender and age. School characteristics refer to the characteristics used in previous analyses, all of which are related to the pre-treatment period. Coefficient of interest γ_1 indicates the effect of treatment under the probability of dropout (grade repetition).

5 Data and Descriptive Statistics

First, this section discusses the databases used in the impact analysis performed. Second, descriptive statistics for the treatment and control schools are presented, comparing them in several dimensions. The analyses used data from the PJF and INEP (through the school census). The NGO that manages the program provided individual data on students' performance and characteristics during the first and final years. This database contains data from students' scores in pre-treatment tests and at the end of the third year, along with answers to socioeconomic questionnaires.

The number of treated schools and the number of students who took the pre-treatment and final tests are indicated in table 1. In the pre-treatment period, approximately 18,000 students (table 1, column e) divided into five areas and 190 schools—took the exam to test their proficiency in Portuguese and mathematics. In the final period (table 1, column g), approximately 9,000 students of the twelfth-grade class took some new tests.

[10] The occurrence of attrition in the school census is recurrent. However, as noted by Oliveira and Soares (2012), this process can be deemed random.

The school census data were used to calculate the total number of students (table 1, column b), the total number of students in high school (column c), students in tenth grade (column d) and students in twelfth grade (column f). From these numbers, it is possible to determine whether the reduction in the sample between the pre-treatment and final tests was compatible with the evolution of the total number of students according to the school census data.

Approximately 27% of the students recorded by the school census in the first year took the pre-treatment tests (column "e/d"). Between the first and final years, the number of enrolled students dropped significantly, by approximately 50%. The number of students in the sample presented a similar path between these years. Therefore, the primary message of table 1 is that the attrition shown between the initial and final tests is not incompatible with the general movement in these schools that occurred during high school.

In addition to information on the test scores, the program databases contain socioeconomic data for the students: gender, skin color, age, academic history and household characteristics. All of these variables are self-reported, and therefore, the number of respondents varies for each question.[11]

The school census produced by INEP was also used to create variables with the characteristics of the schools in the pre-treatment period. We used data from the number of enrollments in the units (divided by educational stage and period), dropout rates, grade repetition rates and age/grade gap rates. These variables are also available from the educational indicators of INEP.

Finally, data from existing students in the school census in different years were collected to create a students' panel. This panel made it possible to define each student's status in the final year of the program, *i.e.*, if the student had repeated a grade, dropped out or if was enrolled in grade twelve. That enabled an analysis of the program's impact on grade repetition and dropout.

The characteristics of schools and students of treatment and control groups were compared in this section as well. Because this is a randomized experiment, it is

[11] The variables available and the number of individuals with that information can be viewed in table A1, which is attached.

expected that the mean differences between these groups are statistically equal to zero for most characteristics.

Table 2 compares the school characteristics in the pre-treatment period. For most characteristics, it is impossible to reject the null hypothesis that the means of the treatment and control schools are equal, considering a 10% significance level.

The characteristics of the districts in which the schools are located are also compared in table 2. In that table, we used data from the 2010 demographic census conducted by IBGE. The following characteristics of the districts were compared: population, average monthly income per capita, deaths of youths aged between 15 and 19 years and illiteracy rate. The null hypothesis of equality among the means cannot be rejected in any case, considering a 10% significance level.

It is possible to conclude that in most cases, there are no statistically significant differences between treated schools and control group schools. This is a first indication that the randomization was successful.

Comparisons between the student characteristics were separated into two parts. Table 3 compares individual and household characteristics. Next, table 4 shows the differences in the results of Portuguese and mathematics tests performed in the pre-treatment period.

The first part of table 3 compares the students' characteristics. In general, the characteristics of both groups are quite close and the differences are mostly negligible under the null hypothesis of equal to zero. Some points stand out if we consider a 10% significance level. For example, the percentage of individuals enrolled in a grade at the appropriate age is higher in treated schools in the regions of São Paulo, Paraíba Valley and Rio de Janeiro. Another case is related to the percentage of students that attended preschool. In this regard, differences between treatment and control schools occurred in almost all regions. It is worth noting, however, that the direction of these differences is not the same in all regions, which may indicate that it is not the students' choice. Finally, the metropolitan region of Belo Horizonte shows differences in several characteristics. In this region, the control group schools have higher percentages of black, brown or indigenous men who attended preschool, completed primary and junior high school through an equivalency program and worked.

The second part of table 3 compares the students' household characteristics. In most cases, the null hypothesis of equality among the means cannot be rejected, considering a 10% significance level. When analyzing the results per region, it is noted that in São Paulo, the mothers of students in treated schools have a lower education level. In Porto Alegre, the families of subjects in treated schools are smaller (on average) and have more computers. Finally, the Paraíba Valley is the region that contains more cases in which differences are significant, considering a 10% significance level. In this region, students from treated schools have smaller families, tend to live with their parents, and have parents that are better-educated and have more assets, such as cars and computers.

In general, it can be stated that for most cases, there are no statistically significant differences between students in treated schools and control schools. In addition, when these differences are statistically significant, their magnitudes are small, barely exceeding 10%. This result is another indication that the randomization was successful.

The baseline (or pre-treatment) tests were taken by approximately 25% of students enrolled in tenth grade in the schools participating in the program (table 1). The tests used the Item Response Theory (IRT); thus, it was possible to compare results from different years. In the results presented here, the absolute values of the SAEB scale were not used. To allow results to be compared with the literature, the student scores were standardized for this study. Normalization was performed for the control group to have a zero mean and a standard deviation equal to 1 in the pre-treatment period. The original averages and standard deviation, used to standardize the scores, are on SAEB scale (Brazilian National Assessment of Basic Education) and are presented in the appendices table A3.

Table 4 shows differences (in standard deviation) in the scores of students enrolled in treated schools compared to students in the control group. The differences are between -0.049σ and 0.152σ in the Portuguese test and between 0.037σ and 0.163 σ in the mathematics test. Despite those differences, the null hypothesis of equality among the means cannot be rejected in most cases, considering a 5% significance level.[12] Even though these differences are not statistically significant, major differences

[12] The analysis was also conducted by controlling this difference by stratum, school characteristics and student characteristics. The nature of the results remained the same.

are found in the Paraíba Valley region for both tests. As discussed above, these differences can be associated with the different socioeconomic profile of the subjects from the treated schools in this region.

In conclusion, the analyses of the school and student characteristics indicated that the randomization performed by the Institute was successful. In most comparisons, it is impossible to reject the null hypothesis of equality among the means, considering a 10% significance level. Moreover, the differences, if any, are not large, and among the regions, they do not follow the same direction.

6 Results

This section presents the results of the PJF's impact. In the first section, the overall impact of the program on students' performance in Portuguese and mathematics tests are initially presented. Next, the heterogeneity of these impacts is explored in addition to seeking to understand if the program effects varied for certain groups of students or schools. The second section analyzes whether the differences in the transfers of financial resources caused different impacts on treated schools. The treatment effects on dropout and grade repetition are analyzed in the third section. Finally, the fourth section analyzes the program impact on the IDEB of schools.

This is the first time in which all of the regions participating in the pilot phase are jointly analyzed and published. The results for the regions of Porto Alegre and Belo Horizonte have been explored by Barros et al. (2012) as we mentioned above. The overall results for the other regions have been summarized by the program managers themselves (UNIBANCO, 2011). In addition to presenting the results together for all regions, three other analyses render the results presented here different from those explored by other authors. First, in this study, the heterogeneity estimates comprise the dimensions of schools and students. Second, this study investigates the impact of financial resources aiming to analyze whether the variation in the resources received had different impacts on student outcomes. Third, and for the first time, an impact analysis is published on dropout and grade repetition, dimensions that initially were program targets. Finally, we provide two robustness checks to our main results on test scores. First, we estimate the treatment effects on an external assessment. Second, overall results were estimated again, this time pondering the probability of attrition of the students.

6.1 The Effect of Treatment on Test Scores

Table 5 shows the impact estimates of the program in all regions. The top table shows the results for Portuguese and the bottom table shows the results for mathematics using the methodology described in section 3. Each row shows the coefficient, β_1, which measures program impact. The standard deviation is in brackets, clustered in schools and period. The last row shows the total number of students (considering the Portuguese test). Each column introduces different control variables. The objective was to determine whether the estimates were sensitive to different model specifications. Given the stability found, the results shown in column (3)—considering the dummies of each stratum and schools' pre-treatment characteristics—were used as a reference for the discussion. That is because with this specification, we used all of the students who took the tests before and after treatment because a portion of the students did not answer the socioeconomic questionnaire.

The results in column (3) indicate that the impact of the program (measured in standard deviation units) on the scores of students enrolled in the schools that received the treatment ranged between 0.091σ and 0.623σ in Portuguese and between 0.012σ and 0.373σ in mathematics. The largest impact occurred in the metropolitan region of Rio de Janeiro. In this location, students at the treated schools exceeded students at the control schools in 0.623σ in Portuguese and 0.373σ in mathematics. The next-largest impact were in Porto Alegre (0.324σ and 0.326σ), Paraíba Valley (0.248σ and 0.273σ), São Paulo (0.158σ and 0.176σ) and Belo Horizonte (0.091σ and 0.012σ). This last region is the only region in which the null hypothesis of equality between students' performances in the treated and the control schools cannot be rejected, considering a 5% significance level. Furthermore, chi-square tests for equality across the regions are shown. There is evidence of differences in treatment effects on language scores. Nevertheless, the null hypothesis of equality of the impact of the treatment on math scores cannot be rejected.

The effects, in addition to being significant, have non-negligible magnitudes. For example, the difference between white students and non-white students was approximately 0.2σ in the pre-treatment period. Thus, the program would have an effect capable of nullifying this difference, considering a three-year period. From another perspective, the gain of a student between tenth and twelfth grade in the treated schools was (on average) 0.6σ. Assuming linearity in this gain, we can say that the impact

corresponded to approximately one additional year of study for students participating in the program.

A valid comparison is with Fryer (2014), who also analyzes a high school program. That article estimates the impact of the introduction of charter school management measures in traditional schools and finds that the impact on mathematics was 0.438σ in three years. This value is higher than that found in the PJF. However, it is worth noting that the measures adopted by the experiment analyzed by Fryer (2014) were deeper and the context in which schools were included was completely different. Thus, the comparison in this study tends to show that PJF results will approach other empirical evidence.

6.2 Heterogeneity across students

Table 6 explores the heterogeneity of the treatment effects on some samples, differentiating them by student characteristics. In general, the differences in the results are not statistically significant when we compare the following groups: whites and nonwhites (columns 2 and 3) and students who were among the 25% best performers in the pre-treatment test (columns 5 and 6 for Portuguese and columns 8 and 9 for mathematics).

We test if there are different effects in the treatment effect on white and non-white. There is a growing literature investigating the gaps between races in Brazil (FLORES and SCORZAFAVE, 2014; BOTELHO et al., 2015). This research has pointed out that non-whites have poor performance after adding other control variables. Thus, if the program helps to deal with this gap would be positive.

Columns (2) and (3) indicate that treatment was positive for whites and non-whites. Although sometimes different, we cannot reject the equality hypothesis between the effects for these two groups if we consider a 10% significance level (p-values in column 6).

A second analysis investigates the heterogeneous effect regarding initial performance. This test was based on the broad literature that indicates the importance of equality in students' performance and external factors to the inequality within schools (SOARES, 2006; BARROS et al., 2001; SCORZAFAVE and FERREIRA, 2011). Ideally, we expect that the effect of the treatment on tests scores is higher in poor performance's students.

The heterogeneous effect on student performance was done as follow. In relation to the initial performance on the Portuguese test, the students were divided into two groups: students who performed among the top 25% in their school and students who performed below the top 25% in their school. The difference of the program impact on those who performed better on the Portuguese test is small compared to those who obtained scores below 75% in the pre-treatment test. In addition, the difference is statistically insignificant for all regions. This analysis was repeated for the mathematics test and once again, the majority of results are not different, except for Rio de Janeiro, where students with better math scores also had higher final scores in Portuguese.

In summary, the results indicate that the effects were similar for the various groups.

6.3 Heterogeneity across schools

We investigate the heterogeneity of the treatment effects on tests scores according with characteristics of schools. We selected these characteristics based on performance predictors. Provide better education to pupils seems easier when a school is litter, receives students with better performance and enrolled students are in in the correct age to a specific their grade. In a perverse path, a school seems to have more chance to perform better if has a higher repetition and dropout rates, since it can select better students (FERNANDES et al., 2014).

Table 7 shows the coefficients of the impact difference on treated schools according to some characteristics. The coefficients presented in this table refer to α_1, which is presented in equation 2. The overall impact of the program and its relationship to the characteristics analyzed in table 7 can be observed in figures 1-10. There, in addition to the mean impact, we present the 95% confidence interval.

Columns (1) and (2) analyze the relationship between the schools' average score before the program's beginning and the impact of treatment. The results presented indicate that for most estimates, students in schools with higher average scores in the pre-treatment test in Portuguese did not have a higher impact on treated subjects with lower scores, except for Belo Horizonte and São Paulo. In Belo Horizonte, the impact on Portuguese was higher for students at treated schools with higher scores in that subject during the pre-treatment period. In São Paulo, the impact on the mathematics results was higher for students from schools with higher scores in Portuguese during the pre-

treatment period.

The results follow the same direction with respect to the relationship between the mathematics scores for treated schools and the program impacts. In São Paulo, the impact on mathematics was higher for students from treated schools with higher scores in this subject. In the region of Belo Horizonte, students enrolled in treated schools who had previous higher scores in mathematics achieved better results on the final tests in Portuguese and mathematics.

The number of enrollments was another school characteristic that was analyzed (column 3). The results are shown in hundreds of enrollments. Accordingly, in Rio de Janeiro (the only region in which the result is statistically significant), to be enrolled in a treated unit with 100 students more than another treated unit results in an impact that is 0.03σ lower in Portuguese and 0.06σ lower in mathematics. Although in most cases the results are statistically equal to zero, it draws attention to the direction of the coefficients. The number of enrollments does not seem to affect the impact on Portuguese. However, the same does not occur with mathematics. In this case, there is a negative relationship between the number of enrolled students and performance. Figures 2 (b), 4 (b), 6 (b), 8 (b) and 10 (b) depict this relationship.

With respect to schools with a higher ratio of students that had aged out of the ideal during the pre-treatment period (column 4), it can be noted that when statistically significant, the relationship tends to be negative. For example, in the regions of São Paulo and Porto Alegre, worse age-grade gap rates result in lower treatment impacts. In these regions, treated schools with a 10% higher age-grade gap rate had performance that was 0.2σ lower in the Portuguese test. In Porto Alegre, this result is repeated for the mathematics test. Figures 1(c)-10(c) illustrate this discussion.

Finally, the last two columns of table 7 explore heterogeneity in pre-treatment grade repetition and dropout rates. The results show that the impact was lower for students of treated schools with higher grade-repetition or dropout rates. For example, in the Paraíba Valley region, students in treated schools with a dropout rate equal to 30% had performance 0.3σ lower than treated schools with a 20% dropout rate in the pre-treatment period.

In summary, the results indicate that the impact on students enrolled in treated schools tends to be lower when these schools have bigger problems in the pre-treatment period, *i.e.*, initial performance below the median, higher age-grade gaps, and higher

grade repetition and dropout rates.

6.4 Impact of Additional Resources

Another relevant point in the analysis is related to the impact of financial resources on student performance at the treated schools. As discussed in sections 1 and 2, these schools received resources that were to be invested in infrastructure, teacher incentives and student incentives. Table 8 shows the average resources received per school in various regions.

The schools in the regions of Porto Alegre and Belo Horizonte received more resources. This was due to changes in the program rules over time. In these two regions, the rule provided for the transfer of BRL 100 per enrolled student regardless of grade level. In the other regions, the contribution was BRL 100 per student enrolled in high school.

To analyze whether the financial resources are associated with better performances, we divided the treated schools according to their position in relation to the median resources received per student in high school. Thus, column (2) of table 9 estimates the impact on student performance in schools in which resources per enrolled student are above the median in their region. Column (3) estimates the impact on the scores of students who attended schools where resources per student were below the median in their region. Because the program conducted randomization in pairs, it was possible to maintain both a control unit and a treatment unit. The same was done with respect to infrastructure spending and spending on teachers and students.

In general, the results shown in table 9 indicate that it is not possible to claim that the program impact was higher in schools with resources per student above the median. The differences in most cases are not statistically significant, except for São Paulo. In this region, students from schools receiving fewer resources per enrolled student had better results in the Portuguese test compared to students in schools receiving more resources per student. However, this result does not remain true when the impact on the mathematics score is analyzed.

6.5 Dropout and Grade Repetition

One of the initial objectives of the program was to reduce dropout rates. A dropout

and grade-repetition analysis seems important from a public policy perspective because high-school rates are quite high. According to INEP, in 2013, the grade repetition rate in public high schools was 12.8% and the dropout rate was 9.2%.

To determine whether the program was effective in reducing the likelihood of dropout and grade repetition, an impact analysis was conducted with student data from the school census. Table 10 estimates these results using as its reference the model discussed in section 3, equation 3.

Column (1) of table 10 explores the impact on dropout. In the regions of São Paulo and Rio de Janeiro, the dropout probability of a student enrolled in a treated school is higher than that of a student in the control schools. However, the opposite situation occurs in Porto Alegre and in the Paraíba Valley, where the program reduced the dropout probability. Finally, in Belo Horizonte, the null impact hypothesis on dropout students cannot be rejected.

Column (2) explores the program's effects on grade repetition. In the regions of the Paraíba Valley, Porto Alegre and Belo Horizonte, the program was effective in reducing the probability of grade repetition, whereas in São Paulo and Rio de Janeiro, the program increased this probability.

Put into perspective, these results are in line with some qualitative evidence analyzed in institutional reports for the program. These documents indicate that the program had goals with respect to dropout during its first cycle, *i.e*., in Porto Alegre and Belo Horizonte. In the second cycle, which incorporated São Paulo, Rio de Janeiro and Paraíba Valley, these goals did not appear in the reports.

In this regard, the program was effective in reducing the chances of dropout and grade repetition in the first two regions, whereas in the regions of São Paulo and Rio de Janeiro, the directions of results indicate that the program increased these probabilities. Thus, there is support for the argument that guidelines and goals established for a particular purpose, in this case dropout and grade repetition, may both guide schools' actions and contribute to the achievement of better results.

The results in table 10 may also help explain regional differences in the effect on scores. In the region of Rio de Janeiro, for example, the effect was greater than in other regions. However, the probability of treated students failing or dropping out was also higher. This may indicate that those who took the test in the program were the most likely

to have better performance. In contrast, the impact on dropout and grade repetition in the region of Belo Horizonte can help explain the lack of an effect on students' scores.

In short, the program has affected the probabilities of dropout and grade repetition differently in the regions that participated in the pilot phase. For students from areas in which the dropout targets were established, the program reduced the probability of dropout or grade repetition. The opposite occurred where targets were not established. Finally, these results may contribute to understanding the various magnitudes of the effects in participating regions.

6.6 Robustness Checks

Students' Scores—ENEM

The Institute, which handle the PJF, managed the Portuguese and Mathematics tests used to analyze the above treatment effects on test scores. Aiming to analyze whether the positive results occurred due to the type of test performed, we also made estimates using the National High School Exam (*Exame Nacional do Ensino Médio*—ENEM). Thus, an attempt was made to determine whether the conclusion is maintained when subjected to analysis using tests not administered by the program.

First, the National Exam is not mandatory for the high school students. Thus, better students could be more motivate to take this test. Therefore, this is the main reason to avoid using ENEM as our main results and using them as a robustness check.

In this check, we first compare individual characteristics from students enrolled in treatment and control schools using the socioeconomic survey filled by pupils in the ENEM. As presented in the appendices Table A4 indicates that, excepted by Sao Paulo city, students seems to be different according to the treatment status. A hypothesis is that the different attendance rates can drive these differences in the test. In order to justify our approach, the magnitude of the differences is not large and has no specific direction.

Following the aim of compare treatment effects using another source, the students' scores in the ENEM exam were normalized to a zero mean and 1 standard deviation for the students in the control group. Next, a simple regression was performed with a treatment dummy by controlling for pre-treatment school and student characteristics. Four results were explored: scores on languages and codes, mathematics, natural sciences and the humanities.

Table 11 presents that students enrolled in treated schools outperformed the control group students. When comparing estimates of these exercises with those shown in table 5, the effects have the same direction, but with lower magnitude. Rio de Janeiro stands out, where the effects on "languages and codes" and mathematics (0.078σ and 0.072σ) were lower than the results for Portuguese and mathematics (0.62σ and 0.37σ) analyzed in table 5.

In this exercise, however, the direction of the results deserves more attention than the difference in magnitude. The ENEM exam is not mandatory; therefore, a selection bias is possible that, in principle, would not exist in the exams used by the program. For example, if the program created positive expectations about students' futures and a higher ratio of those students decided to take the exams, then a higher ratio of students with lower expected performance may have taken the ENEM exam at treated schools. Conversely, it can be assumed that only control school's students with higher expected performance took the ENEM exam. Thus, the ENEM results could underestimate the program's effect. If this actually happened, it is interesting to note that the effects remain positive.

Another interesting fact is that the ENEM exam enables observation of the effect on other subjects. Students in treatment schools performed better in areas not evaluated by the program (*i.e.*, natural sciences and the humanities). This impact may constitute evidence in the sense that there was no recommendation for the treatment schools to focus their efforts to teach to the test but instead to seek improvements in several areas.

In short, the ENEM results reinforce the findings of the previous section and suggest that the PJF has served to improve the education delivered to students. Because the ENEM exam was not subject to any program interference, it can be argued that the results found in section 3 were not targeted by the manipulation of evidence in favor of the treated schools.

Attrition

To determine whether there was a selection of students by treatment schools that could overestimate the results, the profiles of students who took the tests during both periods were analyzed in terms of whether they were similar to the pre-treatment period.

Thus, the comparisons made in section 4 were repeated. The results[13] did not change, *i.e.*, the characteristics of students who took the pre- and post-treatment tests are similar.

Subsequently, to determine whether the probability of attrition during the test taken by the treated student was different from those in the control school, a regression analysis was performed considering the treatment dummy and interactions with the student characteristics. The results are shown in table 13 and indicate that the probability of attrition is lower for treated subjects, although that is not correlated with the student characteristics.

Finally, according to Baulch and Quisumbing (2011), the overall results were estimated again, this time pondering the probability of attrition of the students. The coefficients of interest are shown in table 14 and indicate that the impact estimates do not change radically. Thus, the above findings discussed are not changed.

6.7 Cost-Benefit Analysis

We confine our evaluation to the costs and benefits of earnings. Our estimated rate of return likely understates the true rate of return, since we estimated the rate of return only the student that finished the high school (or at least took the last test).

Program Cost

Schools receive money according to each student enrolled. Therefore, the cost of the program to an additional high school student is equal to BRL 100 (one hundred reais) by year.

All principal and teachers' training can be considered other cost. Nonetheless, there is no available values to estimate this value by pupils. Managers of the program express that training cost are lower than the money given to an additional student enrolled.

Based on that we will present two rates of return, one considering the there year cost of an additional student, i.e., BRL 300 (three hundred reais), and another considering a cost two times higher, this can be viewed as a upper bound of the cost by student.

Program Benefits

[13] Available in table 12.

Curi and Menezes-Filho (2014) indicates that a 10% increase in math proficiency increases wages by about 3%. Our estimates show that the effect of the treatment on math test scores varies according to region. Table 15 indicates the increase in test scores by area ranging from 2% to 5%.

The other parameters were defined as follow: (i) the 2013 average wage to high school degree workers was used as our benchmark, BRL 1,581.04; (ii) we assume students finish the high school at age 20 and retire after 40 years, thus our assumption consider no different income after the retirement; (iii) we use the Brazilian inflation target of 4.5% to discount the values.

Rate of return

Table 15 presents the rate of return by region. We do not show any rate of return to Belo Horizonte, since there are no statistically significant results to the tests.

Considering the cost of the BRL 300 the minimum rate of return is equal to 5.9%, in Sao Paulo. The maximum rate of return is equal to 12.7%, in the region of the Paraíba Valley. If the cost is doubled, the rate of return ranging between 2.4% and 7.4%.

7 Conclusions

Educational outcomes in Brazil, especially in high schools, have evolved slowly. In 2013, the mean scores of public schools on the Brazil exam (*Prova Brasil*) were 256.62 in Portuguese and 261.06 in mathematics (out of a maximum of 500). These values are slightly higher than those recorded in 2005, when the mean scores were 249.27 in Portuguese and 260.81 in mathematics. At the same time, the academic progress of high school students remains a problematic factor in public schools. In 2013, the pass rate was 80%, a modest improvement compared to that recorded in 2005 (73.2%). Thus, the IDEB of this educational level has been virtually stagnant: from 3.1 in 2005 to 3.4 in 2013.

The stagnation of high school results requires auxiliary measures to ensure that boards of education and schools act to guarantee learning by youths who are entering adulthood. The PJF is an action aimed at achieving these goals. Working directly with schools, it seeks to promote better management of existing resources so that it directly reflects young people's education. Moreover, numerous program actions aim to improve the school climate so that schools become attractive environments for principals, teachers and, especially, students.

Concern about taking effective action led to the choice of a randomization approach to selecting schools to participate in the PJF. This decision, which several participants in public policy decisions in Brazil continue to resist, was instrumental for a thorough assessment of the intervention. The scale decision can be made in a more assertive manner as the limits of the results become clearer.

The program results were encouraging with regard to the test scores. In four of the five regions, the results were statistically significant and in such cases, the program impact on the scores of treated students was at least 0.15σ in Portuguese and 0.17σ in mathematics. Considering that a student gains approximately 0.6σ during high school, the minimum result is equivalent to almost an additional year of study.

Another important point is that the results did not indicate that the program has had a different result with respect to reaching students whose scores were lower during the pre-treatment period. Ideally, it would be interesting if all students' scores increased, but the performance of students with lower scores increased at a higher rate, thus promoting greater equity.

Furthermore, throughout the program the results indicated that it would be important to carefully monitor schools with the worst educational indicators in the pre-treatment period. That is because the heterogeneity analysis showed that in some regions, these schools benefitted less from the treatment.

Finally, an impact analysis of the program related to dropout and grade repetition was published for the first time. Estimates indicated that students from treated schools located in areas that were dropout targets were less likely to drop out or repeat a grade than were students enrolled in control schools. The same did not occur in two of the three regions in which the targets were not well defined. There, the probability of dropout or grade repetition increased.

This is a very important point about the direction of public policies because the established targets may have created incentives for schools to keep students in the classroom. Furthermore, the results may indicate that treated schools' performance can be related to the selection of students, given that higher dropout and grade-repetition rates can be a mechanism that retains only the best students in the educational system.

In short, the PJF was effective on many fronts and in different regions. The randomized selection of schools enabled the identification of positive results and points

that are worthy of attention for the continuity of a larger-scale intervention. In addition to this relatively successful experience, the implementation of the program provides important indications for public policies with respect to how to conduct interventions aimed at improving student achievement in high school.

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Tables

Table 1 - Summary Statistics - Number of Schools and Students by treatment Status

		Schools	Students								
			Pre-treatment					Post-Treatment			
			Total	High School (HS)	HS - First grade	HS - First grade with test results		HS - Third grade		HS - Third grade with test results	
		(a)	(b)	(c)	(d)	(e)	(e)/(d)	(f)	(f)/(d)	(g)	(g)/(e)
Treatment	**Total**	**91**	**136,783**	**75,287**	**32,747**	**9,030**	**28%**	**17,875**	**55%**	**4,620**	**51%**
	S. Paulo	17	29,516	12,261	5,041	2,189	43%	3,298	65%	977	45%
	V. Paraíba	20	23,465	12,175	4,780	2,701	57%	3,476	73%	1,305	48%
	R. Janeiro	12	15,631	13,381	6,321	871	14%	2,794	44%	439	50%
	P. Alegre	22	34,219	15,729	7,792	1,431	18%	3,021	39%	783	55%
	B. Horizonte	20	33,952	21,741	8,813	1,838	21%	5,286	60%	1,116	61%
Control	**Total**	**99**	**157,328**	**86,406**	**37,644**	**9,644**	**26%**	**19,741**	**52%**	**4,447**	**46%**
	S. Paulo	17	30,444	14,190	6,287	2,183	35%	3,825	61%	746	34%
	V. Paraíba	20	26,566	11,984	4,794	2,508	52%	3,296	69%	1,079	43%
	R. Janeiro	12	21,931	17,100	7,585	1,081	14%	3,529	47%	461	43%
	P. Alegre	22	31,919	14,037	7,012	1,504	21%	2,549	36%	773	51%
	B. Horizonte	28	46,468	29,095	11,966	2,368	20%	6,542	55%	1,388	59%

Notes: This table displays the number of schools and students by treatment status. The reported numbers are from The Ministry of Education (MEC) and Unibanco Institute. Columns (b)-(e) refereed to enrollments and test takers before the treatment (baseline). Columns (f) and (g) referred to enrollments in the last year of treatment and students who take test after the treatment. Column (a) reports the number of schools in the sample. Column (b) reports the total of students enrolled in the schools sampled before treatment began. Column (c) indicates the students enrrolled in the high school. Column (d) reports the number of students enrolled in the schools sampled and in the first grade of the high school before the treatment. Column (e) presents the sample of students enrolled in the first grade of the high school that took baseline tests. Column "(e)/(d)" reports the share of first grade students who take the baseline test. Column (f) indicate enrolled students in the third grade of the high school. Column "(f)/(d)" divides column (f) by column (d) and indicates the share of students enrolled in the first grade that follow to the third grade of the high school. Column (g) reports the number of third grade students that take the baseline and final tests. Column "(g)/(e)" divides cells in column (g) by cells in the column (e) and indicates the share of students that take both tests.

Table 2 - Schools and District Statistics

	S. Paulo		V. Paraíba		R. Janeiro		P. Alegre		B. Horizonte	
	Treated	Diff and p-value	Treated	Diff and p-value	Treated	Diff and p-value	Treated	Diff and p-value	Treated	Diff and p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
School - Summary Statistics										
Enrollment	1742.8	-57.176	1241.3	-152.550	1316.8	-555.167	1635.9	142.273	1698.8	-4.579
		0.737		0.216		0.059		0.390		0.967
Share in High School (HS)	41.2	-2.326	49.8	4.778	86.9	6.955	47.2	-0.948	70.2	2.720
		0.553		0.449		0.452		0.870		0.610
HS - students enrolled in night shift	584.8	7.529	313.0	-151.150	437.6	-54.917	469.5	57.182	554.0	-42.821
		0.908		0.027		0.621		0.402		0.550
HS - Pupils by class	38.1	-1.341	36.2	0.040	37.9	-2.225	32.8	-1.332	38.3	-0.059
		0.176		0.967		0.307		0.469		0.955
HS - Retention rates	18.4	-3.494	17.1	-0.885	25.8	3.025	22.7	-1.855	19.6	1.713
		0.348		0.749		0.497		0.514		0.401
HS -Dropout rates	5.9	-0.753	3.6	-1.430	13.0	-1.975	21.4	2.191	12.8	-1.197
		0.707		0.443		0.596		0.449		0.614
HS - rate of stud. with incorrect age/grade	26.7	-1.876	17.2	-2.080	50.9	7.258	50.2	-3.418	41.3	0.783
		0.576		0.366		0.157		0.391		0.851
Distric - Summary Statistics										
Population (1,000 individuals)	313.9	-20.486	436.5	31.882	4878.1	1073.798	689.8	-6.743	677.5	172.245
		0.795		0.583		0.370		0.971		0.267
Average Monthly Income	661.9	-11.620	940.4	36.821	984.0	24.022	934.2	-11.644	904.5	123.471
		0.903		0.467		0.872		0.923		0.356
Mortality rate of younger (15-19 y.o.)	24.1	-1.588	28.3	2.100	561.0	119.750	74.8	-0.136	75.5	12.343
		0.765		0.521		0.381		0.994		0.328
Rate of iliteracy	4.1	0.420	2.9	-0.098	3.4	0.066	2.8	0.046	3.6	-0.148
		0.219		0.488		0.878		0.792		0.674
Number of Schools		34		40		24		44		48

Notes: This table report and compare characteristics of students in treatment and control schools. The reported numbers are from Brazilian Ministry of Education (Schools) and Brazilian Institute of Geography and Statistics (IBGE). The year of reference to Sao Paulo, Vale do Paraiba and Rio de Janeiro is 2010 and in Porto Alegre and Belo Horizonte is 2008. Since IBGE's Census is from 2010, district data is based in same year for all districts. Columns (1), (3), (5), (7) and (9) report means for Treatment schools. First row of the columns (2), (4), (6), (8) and (10) report differences between Treatment and control schools and the second row report a p-value from a test of equal means. Definitions of each row can be found in the appendix.

Table 3 - Students and Household Statistics

	S. Paulo		V. Paraíba		R. Janeiro		P. Alegre		B. Horizonte	
	Treated	Diff and p-value	Treated	Diff and p-value	Treated	Diff and p-value	Treated	Diff and p-value	Treated	Diff and p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Students characteristics										
Female	50.2	1.693	48.3	0.552	54.2	1.034	51.0	-3.294	54.8	4.014
		0.363		0.740		0.692		0.081		0.012
Non-white	69.8	-0.183	50.2	-4.297	71.6	0.634	37.6	-1.358	75.8	-2.438
		0.915		0.010		0.789		0.462		0.070
Correct age to the grade	64.3	3.350	72.8	5.402	51.0	4.689	54.0	-2.407	65.0	-1.530
		0.038		0.000		0.039		0.202		0.312
Attend Kindergarten	83.0	-3.702	88.4	4.554	94.8	1.555	66.6	3.360	83.1	-3.063
		0.006		0.000		0.220		0.066		0.008
Students who were retained	32.6	-0.743	26.9	-4.887	41.5	-0.641	60.2	2.000	44.5	1.708
		0.672		0.001		0.807		0.287		0.281
Dropout at least one year during elementary education	10.3	-0.614	9.1	0.189	12.9	2.120	17.1	0.392	13.2	0.913
		0.594		0.843		0.215		0.784		0.391
Finished elementary level by supplementary education	33.7	1.948	34.5	0.203	36.3	2.437	36.7	-1.068	32.0	-8.611
		0.268		0.898		0.339		0.574		0.000
Work	24.2	0.446	22.3	-1.722	16.5	-0.174	25.9	-0.797	21.4	-4.199
		0.780		0.221		0.930		0.638		0.002
Households										
Live with more than 5 people	16.7	0.211	15.2	-2.176	11.4	0.399	10.5	-4.736	16.9	1.741
		0.880		0.077		0.810		0.000		0.137
Live with both parents	57.1	1.162	61.6	4.582	48.5	-3.805	51.8	-2.430	59.4	1.865
		0.531		0.005		0.150		0.207		0.240
Mother Education - At least Elementary level	51.3	-4.094	67.6	7.533	64.2	-4.255	58.0	0.252	53.7	1.085
		0.042		0.000		0.119		0.900		0.529
Father Education - At least Elementary level	49.7	-3.346	66.7	3.047	67.4	-3.102	62.2	1.728	56.5	1.007
		0.122		0.097		0.278		0.407		0.583
Car	48.7	3.818	68.7	8.311	39.5	-3.210	47.9	2.535	42.7	-0.972
		0.040		0.000		0.215		0.181		0.539
Computer	59.1	0.265	73.3	8.665	76.8	3.861	57.8	3.170	86.2	0.215
		0.885		0.000		0.092		0.094		0.846
Computer and Internet	17.8	0.981	17.4	-0.910	14.2	0.884	17.3	-0.293	47.0	0.283
		0.487		0.476		0.626		0.840		0.859

Notes: This table report and compare characteristics of students in treatment and control schools. The reported numbers are from Unibanco Institute. Each line has a different number of answers, since students could or not answer the survey (Table A1 indicates the number of answers by item). The survey was done before the treatment. In Sao Paulo, Vale do Paraiba and Rio de Janeiro its means 2010 and in Porto Alegre and Belo Horizonte the baseline year was 2008. Columns (1), (3), (5), (7) and (9) report means for students enrolled in Treatment schools in first grade of the high school. First row of the columns (2), (4), (6), (8) and (10) report differences between students in treatment and control schools and the second row report a p-value from a test of equal means. Definitions of each row can be found in the appendix.

Table 4 - Baseline Tests Scores

	Language		Mathematics	
	Difference	p-value	Difference	p-value
	(1)	(2)	(3)	(4)
S. Paulo	0.027	0.748	0.037	0.67
V. Paraíba	0.152	0.166	0.163	0.156
R. Janeiro	-0.035	0.81	0.104	0.463
P. Alegre	0.115	0.411	0.085	0.463
B. Horizonte	-0.049	0.624	0.053	0.645

Notes: This table present differences of the student test scores enrolled in treatment and control Schools. Test scores are standardized to have mean zero and standard deviation one in the baseline test and control students. Tests were applied by Institute Unibanco. We compared all students that took tests before the treatment. The year of reference in Sao Paulo, Vale do Paraiba and Rio de Janeiro is 2010 and in Porto Alegre and Belo Horizonte is 2008. Columns (1) and (2) report the difference between both groups. Columns (2) and (3) report p-values from a test of equal means. Language means test in Portuguese Language and Mathematics means Test in Mathematics.

Table 5 - The Effect of Treatment on Test Scores

	Differences in Differences			
	(1)	(2)	(3)	(4)
Portuguese Language				
S. Paulo	0.158	0.158	0.158**	0.180***
	(0.143)	(0.098)	(0.074)	(0.067)
V. Paraíba	0.248	0.248***	0.248***	0.250***
	(0.155)	(0.082)	(0.070)	(0.071)
R. Janeiro	0.623***	0.624***	0.623***	0.660***
	(0.185)	(0.140)	(0.106)	(0.116)
P. Alegre	0.324	0.324**	0.324**	0.366**
	(0.198)	(0.150)	(0.143)	(0.145)
B. Horizonte	0.091	0.091	0.091	0.091
	(0.146)	(0.119)	(0.101)	(0.101)
Chi-Square Test	5.818	10.014	16.708	16.582
P>Chi-Square	0.213	0.040	0.002	0.002
Mathematics				
S. Paulo	0.176	0.176**	0.176**	0.163**
	(0.125)	(0.087)	(0.073)	(0.068)
V. Paraíba	0.273*	0.273***	0.273***	0.271***
	(0.165)	(0.094)	(0.081)	(0.086)
R. Janeiro	0.373*	0.373**	0.373**	0.356**
	(0.212)	(0.167)	(0.149)	(0.148)
P. Alegre	0.326*	0.326**	0.326***	0.348***
	(0.175)	(0.134)	(0.125)	(0.124)
B. Horizonte	0.011	0.012	0.012	0.021
	(0.161)	(0.136)	(0.102)	(0.104)
	2.783	4.385	6.609	6.435
	0.595	0.356	0.158	0.169
Lottery Pair Dummies		Yes	Yes	Yes
School Characteristcs			Yes	Yes
Students Characteristics				Yes
N	8661	8661	8661	7805

Notes: This table presents estimates of the effects of attending a treatment school on test scores. Tests were applied by Institute Unibanco in 2010 and 2012 in Sao Paulo, Vale do Paraiba and Rio de Janeiro and in 2008 and 2010 in Porto Alegre and Belo Horizonte. We used a differences in differences approach to estimate these effects. Each row present the effect to a specific area. The first part presents the effect in Language test scores. The second part presents the effects in Mathematics test scores. Column (1) compares means without any control. Column (2) add dummies of pair, since lottery to receive treatment was done by pairs. Column (3) includes schools secondary level characteristics (pupils by class, retention rate, dropout rate, age/grade distortion, total enrolment, enrolment in night shift). Column(4) adds controlled to student characteristics (dummies of sex, race and correct age to grade). Column (5) uses a fixed effect approach. Each row has a different number of observations, we use the total to language test in the last line. The N by row is available in the tale A3. Standard errors (clustered at the school and year level) are reported in parentheses.

*, **, and *** denote significance at the 90%, 95%, and 99% confidence levels, respectively.

Table 6 - The Impact of Treatment on Test Scores Within Various Students Subgroups

	Whole Sample	Race			Baseline Test Score - 75th Percentile					
		Not-white	White	p-value	Language			Mathematics		
					Above	Below	p-value	Above	Below	p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Portuguese Language										
S. Paulo	0.158**	0.139*	0.274***		0.248**	0.131*		0.281**	0.123	
	(0.075)	(0.071)	(0.102)	0.468	(0.100)	(0.076)	0.246	(0.110)	(0.079)	0.312
V. Paraíba	0.248***	0.247***	0.255***		0.246***	0.250***		0.298***	0.235***	
	(0.071)	(0.086)	(0.076)	0.943	(0.074)	(0.081)	0.969	(0.106)	(0.071)	0.605
R. Janeiro	0.623***	0.743***	0.436***		0.656***	0.605***		1.251***	0.454***	
	(0.107)	(0.126)	(0.156)	0.121	(0.107)	(0.129)	0.805	(0.174)	(0.115)	0.003
P. Alegre	0.324**	0.195	0.451***		0.507***	0.263*		0.440**	0.287**	
	(0.145)	(0.164)	(0.151)	0.145	(0.184)	(0.148)	0.15	(0.214)	(0.135)	0.404
B. Horizonte	0.091	0.104	0.058		-0.079	0.142		0.016	0.116	
	(0.102)	(0.110)	(0.114)	0.78	(0.104)	(0.108)	0.033	(0.135)	(0.109)	0.53
Mathematics										
S. Paulo	0.176**	0.146**	0.200		0.295*	0.141*		0.198*	0.171**	
	(0.074)	(0.064)	(0.131)	0.77	(0.148)	(0.080)	0.419	(0.119)	(0.079)	0.852
V. Paraíba	0.273***	0.231**	0.312***		0.201**	0.296***		0.230**	0.288***	
	(0.082)	(0.102)	(0.095)	0.519	(0.090)	(0.086)	0.408	(0.108)	(0.088)	0.68
R. Janeiro	0.373**	0.362**	0.308*		0.465***	0.342**		0.484***	0.339**	
	(0.151)	(0.170)	(0.175)	0.797	(0.168)	(0.162)	0.618	(0.163)	(0.160)	0.473
P. Alegre	0.326**	0.286*	0.389***		0.361**	0.316**		0.400**	0.303**	
	(0.126)	(0.148)	(0.136)	0.539	(0.176)	(0.129)	0.816	(0.190)	(0.122)	0.591
B. Horizonte	0.012	0.056	-0.098		-0.089	0.044		-0.067	0.039	
	(0.103)	(0.103)	(0.135)	0.313	(0.139)	(0.102)	0.322	(0.139)	(0.100)	0.391
N	8,661	4,740	3,106		2,102	6,559		1,983	6,678	

Notes: This table presents estimates of the effects of attending a treatment school on test scores. Tests were applied by Institute Unibanco in 2010 and 2012 in Sao Paulo, Vale do Paraiba and Rio de Janeiro and in 2008 and 2010 in Porto Alegre and Belo Horizonte. All estimates use the DD estimator described in equation (1). Each row presents the treatment effect to a specific area. Each row has a different number of observations, we use the total to language test in the last line. The N by row is available in the tale A3. We added schools characteristics and dummies to the pairs as control variables to all regressions, these controls were defined in table 3. Columns (4), (7), (10) report p-values resulting from a test of equal coefficients between the race and previous year test score subgroups, respectively. Standard errors (clustered at the school and year level) are reported in parentheses. *, **, and *** denote significance at the 90%, 95%, and 99% confidence levels, respectively.

Table 7 - The Impact of Treatment on Test Scores for Various Schools Subgroups

	Schools' Average Test Score		Enrolment	High School Indices		
	Language	Mathematics	Total	Distortion Age/Grade	Retention Rate	Dropout Rate
	(1)	(2)	(3)	(4)	(5)	(6)
Portuguese Language						
S. Paulo	0.054	0.119	0.009	-0.020**	-0.009	-0.035***
	(0.199)	(0.226)	(0.010)	(0.009)	(0.007)	(0.012)
V. Paraíba	0.106	0.194	0.004	-0.004	0.003	-0.025***
	(0.183)	(0.182)	(0.016)	(0.009)	(0.006)	(0.009)
R. Janeiro	0.212	0.100	-0.030*	-0.002	-0.031***	0.002
	(0.186)	(0.252)	(0.016)	(0.009)	(0.007)	(0.023)
P. Alegre	-0.019	0.346	0.017	-0.020**	-0.016	0.036**
	(0.219)	(0.287)	(0.024)	(0.008)	(0.014)	(0.015)
B. Horizonte	0.362*	0.387*	0.017	-0.006	-0.003	-0.008
	(0.200)	(0.208)	(0.024)	(0.007)	(0.014)	(0.014)
Mathematics						
S. Paulo	0.579**	0.506**	-0.010	-0.001	-0.008	-0.022*
	(0.276)	(0.246)	(0.011)	(0.010)	(0.008)	(0.012)
V. Paraíba	-0.013	0.220	0.000	0.006	0.008	-0.029**
	(0.212)	(0.185)	(0.019)	(0.013)	(0.008)	(0.011)
R. Janeiro	0.204	-0.068	-0.060**	0.025**	-0.017	0.032
	(0.323)	(0.352)	(0.029)	(0.012)	(0.015)	(0.029)
P. Alegre	0.277	0.297	-0.009	-0.021**	-0.031**	0.030**
	(0.271)	(0.278)	(0.022)	(0.009)	(0.012)	(0.013)
B. Horizonte	0.292	0.316**	0.020	-0.005	0.010	-0.003
	(0.203)	(0.147)	(0.026)	(0.007)	(0.014)	(0.016)
N	8,661	8,661	8,661	8,661	8,661	8,661

Notes: This table presents estimates of the effects of attending a treatment school on test scores by different school characteristic. Tests were applied by Institute Unibanco in 2010 and 2012 in Sao Paulo, Vale do Paraiba and Rio de Janeiro and in 2008 and 2010 in Porto Alegre and Belo Horizonte. All estimates use the DD estimator described in equation (2). Each row presents the treatment effect to a specific area. Each row has a different number of observations, we use the total to language test in the last line. The N by row is available in the tale A2. We added schools characteristics and dummies to the pairs as control variables to all regressions, these controls were defined in table 3. Standard errors (clustered at the school and year level) are reported in parentheses. *, **, and *** denote significance at the 90%, 95%, and 99% confidence levels, respectively.

Table 8: Average School's Expending (BRL)

	Expenditures in:			
	Total	**Inputs**	**Teachers**	**Students**
	(1)	**(2)**	**(3)**	**(4)**
S. Paulo	322,598	129,039	71,933	121,626
V. Paraíba	326,665	130,666	80,289	115,710
R. Janeiro	388,202	155,281	104,470	128,451
P. Alegre	429,201	175,091	112,540	141,569
B. Horizonte	438,766	179,456	117,880	141,430
Total	**383,446**	**155,071**	**97,976**	**130,400**

Notes: This table displays school-level summary statistics for average expenditures during the treatment. Column (1) reports means of money received by schools. Columns (2)-(4) report the money expenditures by type: Expenditures in inputs, teachers and students. These averages make reference expenditures throughout 2010 and 2012 in Sao Paulo, Vale do Paraiba and Rio de Janeiro and throughout 2008 and 2010 in Porto Alegre and Belo Horizonte. In Sao Paulo, Rio de Janeiro and Vale do Paraiba, since we have no values by type, we used the cutoffs the Unibanco Institute declares in official reports, i.e., maximum of 40% to inputs and at least 20% to teacher and students (each).

Table 9 - The Impact of Treatment on Test Scores Within Schools Per Student Expenditures Subgroups

	Whole Sample	Average Expenditures			Inputs Expenditures			Teachers Expenditures			Students Expenditures		
		Above Median	Below Median	p-value	Above Median	Below Median	p-value	Above Median	Below Median	p-value	Above Median	Below Median	p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Portuguese Language													
S. Paulo	0.158**	0.025	0.253***		0.025	0.270***		0.181**	0.138*		0.018	0.299***	
	(0.075)	(0.076)	(0.082)	0.079	(0.074)	(0.084)	0.068	(0.068)	(0.076)	0.767	(0.066)	(0.092)	0.045
V. Paraíba	0.248** *	0.157**	0.338***		0.157**	0.338***		0.215**	0.277***		0.157**	0.338***	
	(0.071)	(0.075)	(0.093)	0.195	(0.075)	(0.093)	0.195	(0.091)	(0.093)	0.659	(0.075)	(0.093)	0.195
R. Janeiro	0.623** *	0.497**	0.703***		0.497**	0.703***		0.521***	0.754***		0.696***	0.557***	
	(0.107)	(0.197)	(0.096)	0.362	(0.197)	(0.096)	0.362	(0.156)	(0.097)	0.243	(0.168)	(0.095)	0.498
P. Alegre	0.324**	0.465**	0.214		0.277	0.393**		0.260	0.435**		0.231	0.448**	
	(0.145)	(0.221)	(0.167)	0.396	(0.211)	(0.179)	0.689	(0.179)	(0.204)	0.562	(0.196)	(0.192)	0.448
B. Horizonte	0.091	-0.032	0.221*		0.028	0.165		0.087	0.099		0.118	0.059	
	(0.102)	(0.125)	(0.130)	0.206	(0.130)	(0.136)	0.488	(0.119)	(0.125)	0.952	(0.123)	(0.122)	0.769
Mathematics													
S. Paulo	0.176**	0.243**	0.127		0.206**	0.147*		0.122	0.203***		0.234***	0.131	
	(0.074)	(0.092)	(0.083)	0.432	(0.091)	(0.084)	0.691	(0.091)	(0.070)	0.559	(0.065)	(0.094)	0.469
V. Paraíba	0.273** *	0.234**	0.314***		0.234**	0.314***		0.277**	0.269***		0.234**	0.314***	
	(0.082)	(0.092)	(0.088)	0.627	(0.092)	(0.088)	0.627	(0.120)	(0.081)	0.965	(0.092)	(0.088)	0.627
R. Janeiro	0.373**	0.382	0.362***		0.382	0.362***		0.198	0.558***		0.512**	0.258**	
	(0.151)	(0.234)	(0.115)	0.94	(0.234)	(0.115)	0.94	(0.158)	(0.171)	0.207	(0.222)	(0.111)	0.359
P. Alegre	0.326**	0.445**	0.237*		0.284	0.394**		0.348**	0.339**		0.194	0.499***	
	(0.126)	(0.196)	(0.134)	0.417	(0.178)	(0.166)	0.668	(0.168)	(0.156)	0.972	(0.157)	(0.170)	0.218
B. Horizonte	0.012	-0.063	0.092		0.018	0.019		-0.023	0.051		0.005	0.025	
	(0.103)	(0.125)	(0.126)	0.453	(0.130)	(0.115)	0.997	(0.119)	(0.131)	0.719	(0.119)	(0.123)	0.924
N	8661	4220	4384		4220	4384		4252	4352		4181	4423	

Notes: This table presents estimates of the effects of attending a treatment school on test scores by different groups of expenditures. Tests were applied by Institute Unibanco in 2010 and 2012 in Sao Paulo, Vale do Paraiba and Rio de Janeiro and in 2008 and 2010 in Porto Alegre and Belo Horizonte. All estimates use the DD estimator described in equation (1). Each row presents the treatment effect to a specific area. Each row has a different number of observations, we use the total to language test in the last line. The N by row is available in the tale A2. We added schools characteristics and dummies to the pairs as control variables to all regressions, these controls were defined in table 3. Column (1) shows the treatment effect to the whole sample. Columns (2), (5), (8), (11) estimate the treatment effects to students attending treatment schools that received above the median cutoff by each expenditure type. Columns (3), (6), (9), (12) estimate the treatment effects to students attending treatment schools that received below the median cutoff by each expenditure type. Columns (4), (7), (10), (13), (16) report p-values resulting from a test of equal coefficients between the expenditure status. Standard errors (clustered at the school and year level) are reported in parentheses. *, **, and *** denote significance at the 90%, 95%, and 99% confidence levels, respectively.

Table 10 - The Effect of Treatment on Dropout and Retention

	Dropout	Retention
	(1)	(2)
S. Paulo	0.114***	0.122***
	(0.009)	(0.003)
V. Paraíba	-0.082***	-0.139***
	(0.023)	(0.053)
R. Janeiro	0.248***	0.174***
	(0.005)	(0.028)
P. Alegre	-0.061*	-0.154**
	(0.033)	(0.076)
B. Horizonte	0.043	-0.122***
	(0.038)	(0.035)
Lottery Pair Dummies	Yes	Yes
School Characteristcs	Yes	Yes
Students Characteristics	Yes	Yes
N	70760	60997

Notes: This table presents estimates of the effects of attending a treatment school on dropout and retention probabilities. Student data is available in Brazilian Ministry of Education. We use data from 2010 up 2013 to estimate effects on students from Sao Paulo, Vale do Paraiba and Rio de Janeiro and data from 2008 up 2010 to estimate effects on students from Porto Alegre and Belo Horizonte. We report probit coefficients from equation (3). Each row presents the effect to a specific area. Each row has a different number of observations, we use the total to language test in the last line. The N by row is available in the tale A2. All models include as control variables: dummies of pair, since lottery to receive treatment was done by pairs; schools high school characteristics (pupils by class, retention rate, dropout rate, age/grade distortion, total enrolment, enrolment in night shift); student characteristics (dummies of sex, correct age to grade and indicator of attending school in the evening). Column (1) reports the coefficient of interest in equation (3) to dropout rates. Column (2) reports the coefficient of interest in equation (3) to retention rates. Standard errors (clustered at the school and year level) are reported in parentheses. *, **, and *** denote significance at the 90%, 95%, and 99% confidence levels, respectively.

Table 11 - The Effect of Treatment on National Test Scores

	Language	Math	Natural Science	Social Science
	(1)	(2)	(3)	(4)
S. Paulo	0.219***	0.164***	0.069	0.147***
	(0.046)	(0.052)	(0.069)	(0.035)
V. Paraíba	0.223***	0.215***	0.173***	0.175***
	(0.048)	(0.041)	(0.039)	(0.041)
R. Janeiro	0.077***	0.071***	0.133***	0.122***
	(0.022)	(0.023)	(0.037)	(0.025)
P. Alegre	0.227***	0.198***	0.096***	0.143***
	(0.043)	(0.046)	(0.034)	(0.047)
B. Horizonte	0.062	0.059*	-0.003	0.002
	(0.042)	(0.034)	(0.043)	(0.036)
Lottery Pair Dummies	Yes	Yes	Yes	Yes
School Characteristcs	Yes	Yes	Yes	Yes
Students Characteristics	Yes	Yes	Yes	Yes
N	17641	17641	17915	17915

Notes: This table presents estimates of the effects of attending a treatment school on Brazilian national high school test scores. Tests are applied by Brazilian Ministry of Education. We use student data from 2012 to estimate coefficients from Sao Paulo, Vale do Paraiba and Rio de Janeiro and 2010 to Porto Alegre and Belo Horizonte. We used a linear regression approach to estimate these effects. Each row has a different number of observations, we use the total to language test in the last line. The N by row is available in the tale A3. All models include as control variables: dummies of pair, since lottery to receive treatment was done by pairs; schools secondary level characteristics (pupils by class, retention rate, dropout rate, age/grade distortion, total enrolment, enrolment in night shift and share of students that took tests); student characteristics (dummies that indicates: Sex, Non-white, Correct age to the grade, Father Education - At least Elementary level, Mother Education - At least Elementary level, Income - More than 3 Minimum Wages, Live with more than 3 people). Column (1) estimates treatment effects on language test scores. Column (2) estimates treatment effects on mathematics test scores. Column (3) estimates treatment effects on Natural Sciences (Physics, Chemistry and Biology) test scores. Column (4) estimates treatment effects to Social Sciences (History, Geography, Sociology and Philosophy). Standard errors (clustered at the school and year level) are reported in parentheses. *, **, and *** denote significance at the 90%, 95%, and 99% confidence levels, respectively.

Table 12 - Students and Household Statistics (Students that take baseline and final tests)

	S. Paulo		V. Paraíba		R. Janeiro		P. Alegre		B. Horizonte	
	Treated	Diff and p-value	Treated	Diff and p-value	Treated	Diff and p-value	Treated	Diff and p-value	Treated	Diff and p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Students characteristics										
Female	53.0	0.460	50.8	0.867	53.9	0.775	53.8	-4.714	60.0	4.344
		0.860		0.690		0.838		0.067		0.031
Non-white	68.2	-1.196	46.8	-4.179	72.2	3.923	38.2	1.268	76.1	-0.254
		0.623		0.055		0.261		0.615		0.884
Correct age to the grade	83.5	0.411	88.3	2.641	68.1	0.430	68.1	-2.677	76.1	-4.094
		0.821		0.056		0.890		0.261		0.015
Attended Kindergarten	85.2	-2.310	90.8	3.607	95.2	0.736	69.9	3.985	83.9	-5.571
		0.202		0.008		0.667		0.102		0.000
Students who were retained	18.6	3.671	15.7	-2.874	33.0	6.132	49.7	5.630	32.7	3.869
		0.062		0.079		0.082		0.031		0.040
Dropout at least one year during elementary education	6.5	0.908	4.3	0.056	10.5	3.754	11.8	-1.058	8.1	2.835
		0.470		0.949		0.082		0.539		0.005
Finished elementary level by supplementary education	34.5	2.562	35.8	0.914	34.6	-1.182	36.8	0.818	31.7	-10.372
		0.301		0.662		0.750		0.751		0.000
Work	19.2	1.561	17.0	-0.718	12.9	1.992	19.3	-1.863	16.3	-2.251
		0.444		0.663		0.425		0.376		0.149
Households										
Live with more than 5 people	15.5	1.213	14.6	0.235	12.4	2.796	10.5	-2.912	14.7	2.418
		0.517		0.878		0.243		0.085		0.083
Live with both parents	64.6	2.646	67.8	2.635	51.9	-4.796	56.8	-0.913	62.1	-1.225
		0.296		0.200		0.210		0.726		0.538
Mother Education - At least Elementary level	51.1	-4.136	69.9	8.294	65.8	-8.221	60.1	1.124	53.5	-2.857
		0.141		0.000		0.033		0.678		0.191
Father Education - At least Elementary level	51.2	-2.646	68.8	0.884	66.3	-7.124	63.1	4.339	55.4	-3.908
		0.377		0.701		0.080		0.125		0.089
Car	48.5	7.371	69.9	6.790	39.6	-2.852	48.9	1.301	42.6	-5.715
		0.005		0.001		0.449		0.616		0.005
Computer	61.7	3.053	77.8	6.667	78.8	4.555	60.9	4.526	86.1	1.764
		0.234		0.000		0.161		0.078		0.226
Computer and Internet	17.9	1.271	17.5	-2.312	14.7	3.595	17.1	-1.707	45.7	5.093
		0.522		0.171		0.162		0.395		0.012

Notes: This table report and compare characteristics of all students in treatment and control schools that answered the survey and take both tests (baseline and final tests). The reported numbers are from Brazilian Ministry of Education (Schools) and Brazilian Institute of Geography and Statistics (IBGE). The year of reference to Sao Paulo, Vale do Paraiba and Rio de Janeiro is 2010 and in Porto Alegre and Belo Horizonte is 2008. Since IBGE's Census is from 2010, district data is based in same year for all districts. Columns (1), (3), (5), (7) and (9) report means for Treatment schools. First row of the columns (2), (4), (6), (8) and (10) report differences of students in the treatment and Control schools and the second row report a p-value from a test of equal means.

Table 13 – Attrition – Linear Regression

	São Paulo			Vale do Paraíba			Rio de Janeiro			Porto Alegre			Belo Horizonte		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Treatment	-0.101***	-0.068***	-0.080	-0.068***	-0.070***	-0.048	-0.091**	-0.124***	-0.017	-0.037*	-0.047**	-0.050	-0.020	-0.035*	-0.053
	(0.023)	(0.012)	(0.051)	(0.023)	(0.010)	(0.039)	(0.036)	(0.041)	(0.076)	(0.021)	(0.022)	(0.046)	(0.027)	(0.018)	(0.043)
Female		0.019	0.012		0.013	0.019		0.045**	0.051		-0.021	-0.041*		-0.073***	-0.079***
		(0.019)	(0.031)		(0.015)	(0.024)		(0.020)	(0.031)		(0.017)	(0.023)		(0.015)	(0.021)
Not-white		0.005	-0.018		0.028	0.026		-0.004	0.021		-0.032	-0.015		-0.005	0.022
		(0.018)	(0.027)		(0.017)	(0.023)		(0.028)	(0.039)		(0.019)	(0.026)		(0.016)	(0.021)
Correct age to the grade		-0.388***	-0.386***		-0.376***	-0.368***		-0.316***	-0.294***		-0.299***	-0.290***		-0.263***	-0.283***
		(0.020)	(0.035)		(0.017)	(0.024)		(0.032)	(0.046)		(0.020)	(0.029)		(0.018)	(0.022)
Live with more than 5 people		0.020	0.052		0.004	0.051		-0.018	0.010		0.019	0.043		0.060**	0.069**
		(0.025)	(0.033)		(0.027)	(0.041)		(0.047)	(0.057)		(0.025)	(0.037)		(0.023)	(0.030)
Car		0.043**	0.057**		-0.016	-0.024		0.028	0.046		-0.004	-0.013		-0.025	-0.050**
		(0.018)	(0.024)		(0.018)	(0.025)		(0.022)	(0.028)		(0.020)	(0.026)		(0.016)	(0.023)
Baseline Language Test Score		-0.055***	-0.058***		-0.068***	-0.076***		-0.035***	-0.054***		-0.067***	-0.070***		-0.061***	-0.052***
		(0.009)	(0.014)		(0.009)	(0.012)		(0.011)	(0.016)		(0.009)	(0.015)		(0.010)	(0.013)
Treatment X Female			0.011			-0.013			-0.015			0.043			0.011
			(0.038)			(0.031)			(0.039)			(0.035)			(0.029)
Treatment X Not-White			0.045			0.002			-0.051			-0.031			-0.057*
			(0.034)			(0.034)			(0.056)			(0.036)			(0.033)
Treatment X Correct Age to the grade			-0.002			-0.016			-0.050			-0.018			0.046
			(0.040)			(0.033)			(0.061)			(0.043)			(0.036)
Treatment X Live w/ more than 5			-0.062			-0.097*			-0.066			-0.058			-0.018
			(0.049)			(0.051)			(0.087)			(0.047)			(0.044)
Treatment X Car			-0.028			0.019			-0.039			0.019			0.057*
			(0.036)			(0.035)			(0.046)			(0.038)			(0.031)
Treatment X Baseline Language Score			0.005			0.016			0.039			0.007			-0.019
			(0.018)			(0.018)			(0.023)			(0.019)			(0.020)
Lottery Pair Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
School Characteristcs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3370	2677	2677	3989	3352	3352	1909	1417	1417	2881	2570	2570	4161	3845	3845

Notes: This table estimates attrition using a linear regression model. We used data available by Unibanco Institute. Attrition is equal 1 if a student took the baseline test and he/she didn't take the final test. We use data from 2010 and 2013 to estimate attrition of students from Sao Paulo, Vale do Paraiba and Rio de Janeiro and data from 2008 and 2010 to estimate on students from Porto Alegre and Belo Horizonte. Columns (1), (4), (7), (10), (13) estimate the attrition probability without any student characteristic as control. Columns (2), (5), (8), (11), (14) estimate the attrition probability adding student characteristics as control variables. Columns (3), (6), (9), (12), (15) estimate the attrition probability adding student characteristics as control variables and also estimate if there is different attrition probabilities if students enrolled in treatment schools has a specific characteristic. All columns use lottery pairs and schools' characteristics as control variables. Standard errors (clustered at the school and year level) are reported in parentheses. *, **, and *** denote significance at the 90%, 95%, and 99% confidence levels, respectively.

Table 14 - The Effect of Treatment on Test Scores - Using inverse-probability-of-attrition weights

	Withouth Weights	With Weights
	(1)	(2)
Portuguese Language		
S. Paulo	0.158**	0.136*
	(0.075)	(0.076)
V. Paraíba	0.248***	0.252***
	(0.071)	(0.079)
R. Janeiro	0.623***	0.655***
	(0.107)	(0.110)
P. Alegre	0.324**	0.323**
	(0.145)	(0.142)
B. Horizonte	0.091	0.087
	(0.102)	(0.112)
Mathematics		
S. Paulo	0.176**	0.165**
	(0.074)	(0.076)
V. Paraíba	0.273***	0.269***
	(0.082)	(0.090)
R. Janeiro	0.373**	0.398**
	(0.151)	(0.149)
P. Alegre	0.326**	0.355***
	(0.126)	(0.128)
B. Horizonte	0.012	-0.009
	(0.103)	(0.105)
Lottery Pair Dummies	Yes	Yes
School Characteristcs	Yes	Yes
Students Characteristics	Yes	Yes
N	17322	17322

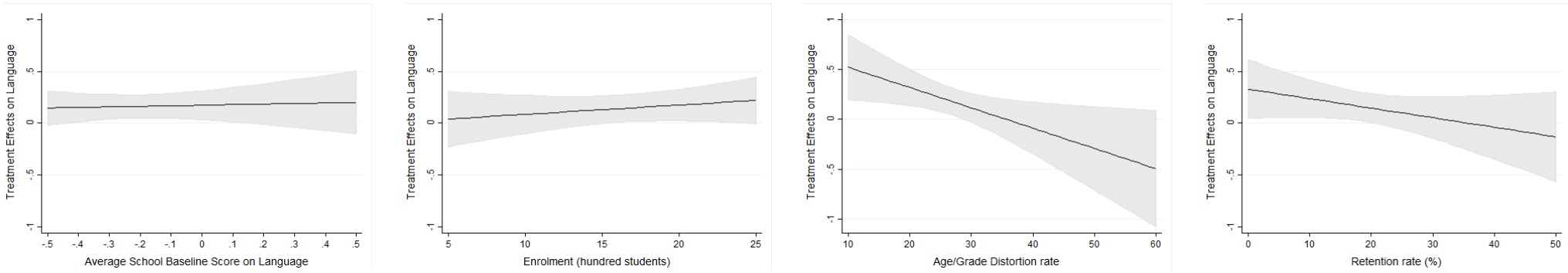
Notes: This table presents estimates of the effects of attending a treatment school on test scores. Tests were applied by Institute Unibanco in 2010 and 2012 in Sao Paulo, Vale do Paraiba and Rio de Janeiro and in 2008 and 2010 in Porto Alegre and Belo Horizonte. We used a differences in differences approach (equation 1) to estimate these effects and we added inverse probability of attrition weights following Baulch e Quisumbing (2011). Each row present the effect to a specific area. The first part presents the effect in Language test scores. The second part presents the effects in Mathematics test scores. Column (1) presents the results of table (5). Column (2) repeats the estimation adding inverse probability of attrition weights. Each row has a different number of observations; we use the total to language test in the last line. The N by row is available in the tale A2. Standard errors (clustered at the school and year level) are reported in parentheses. *, **, and *** denote significance at the 90%, 95%, and 99% confidence levels, respectively.

Table 15 - Rate of Return of the Treatment

	Score Increases	IRR	
		Cost BRL 300	Cost BRL 600
	(1)	(2)	(3)
S. Paulo	2.0%	5.9%	2.4%
V. Paraíba	5.2%	12.7%	7.4%
R. Janeiro	2.5%	7.1%	3.3%
P. Alegre	3.5%	9.4%	5.0%

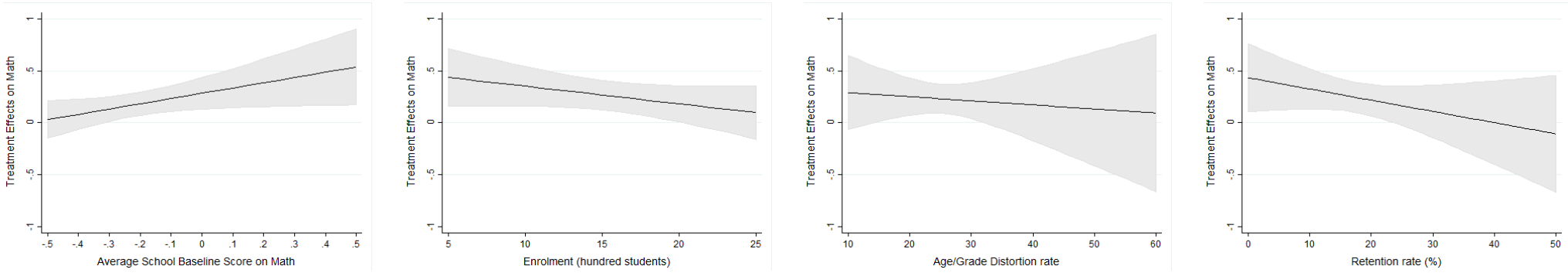
Notes: Notes: Column (1) presents the increase in math scores of the students enrolled in treatment schools. Column (2) presents the IRR considering the three year costs of an additional student considering duration of three years (BRL 300,00). Column (3) double this cost as an assumption about the principals and teachers' training cost. The follow parameters were used in both IRR columns: (i) The 2013 average wage to high school degree Brazilian workers (BRL 1,581,04); (ii) Benefit duration equal to 40 years; (iii) Brazilian inflation target of 4.5% to discount the values; (iv) elasticity of wage and math proficiency equal 0,003.

Figures



(a) (b) (c) (d)

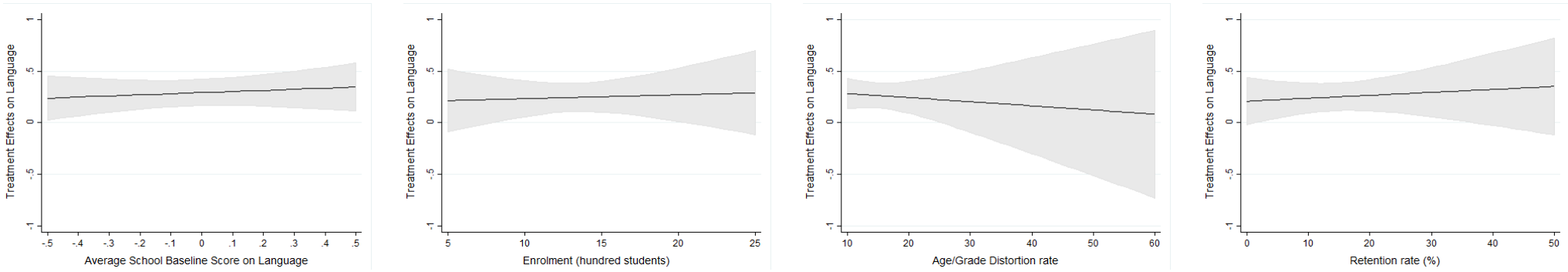
Figure 1 – São Paulo – The Impact of Treatment on Language Test Scores Within Various Schools Subgroups – Coefficient and 95% Confidence Interval



(a) (b) (c) (d)

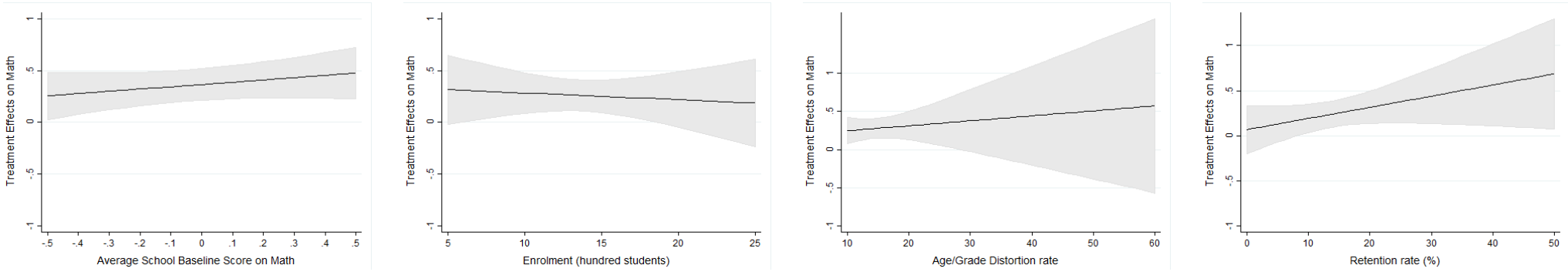
Figure 2 – São Paulo – The Impact of Treatment on Math Test Scores Within Various Schools Subgroups – Coefficient and 95% Confidence Interval

Note: These graphs display coefficients of the difference-in-differences regressions showing treatment effects of attending schools according specific characteristic. Figure (a) shows treatment effects by average school score in the baseline test. Figure (b) shows treatment effects by school total enrolment. Figure (c) presents treatment effects by school age/grade distortion rates. Figure (d) reports treatment effects by school retention rate.



(a) (b) (c) (d)

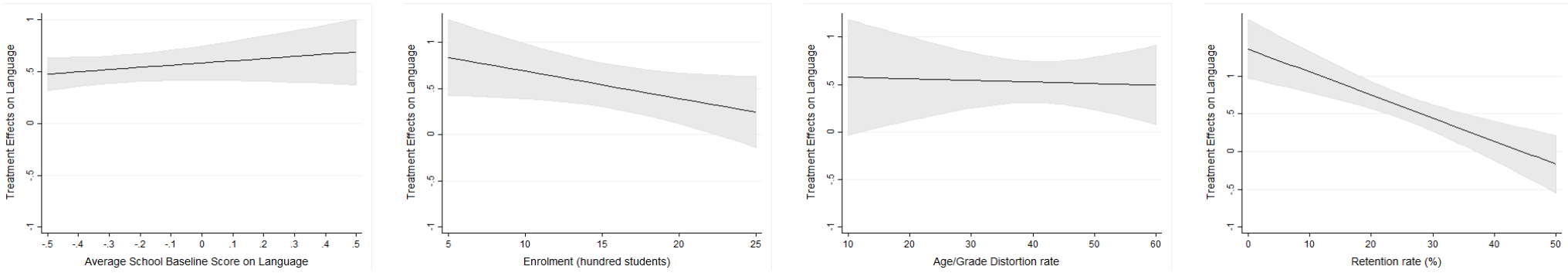
Figure 3 – Vale do Paraíba – The Impact of Treatment on Language Test Scores Within Various Schools Subgroups – Coefficient and 95% Confidence Interval



(a) (b) (c) (d)

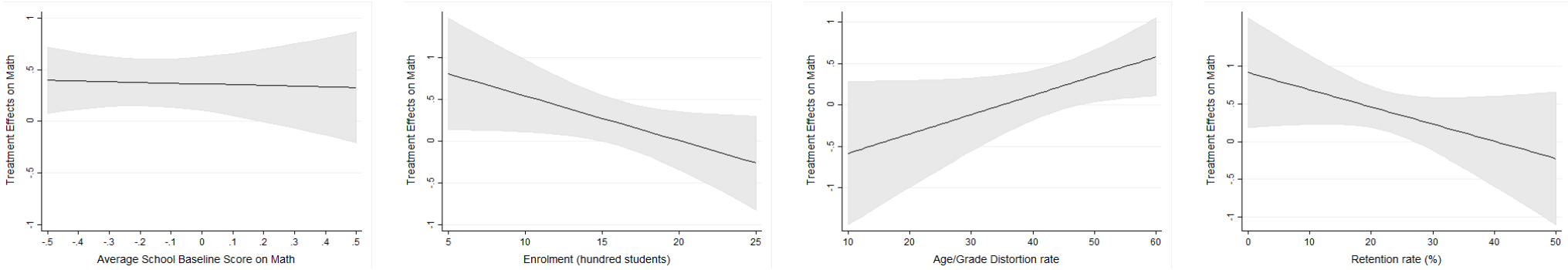
Figure 4 – Vale do Paraíba – The Impact of Treatment on Math Test Scores Within Various Schools Subgroups – Coefficient and 95% Confidence Interval

Note: These graphs display coefficients of the difference-in-differences regressions showing treatment effects of attending schools according specific characteristic. Figure (a) shows treatment effects by average school score in the baseline test. Figure (b) shows treatment effects by school total enrolment. Figure (c) presents treatment effects by school age/grade distortion rates. Figure (d) reports treatment effects by school retention rate.



(a) (b) (c) (d)

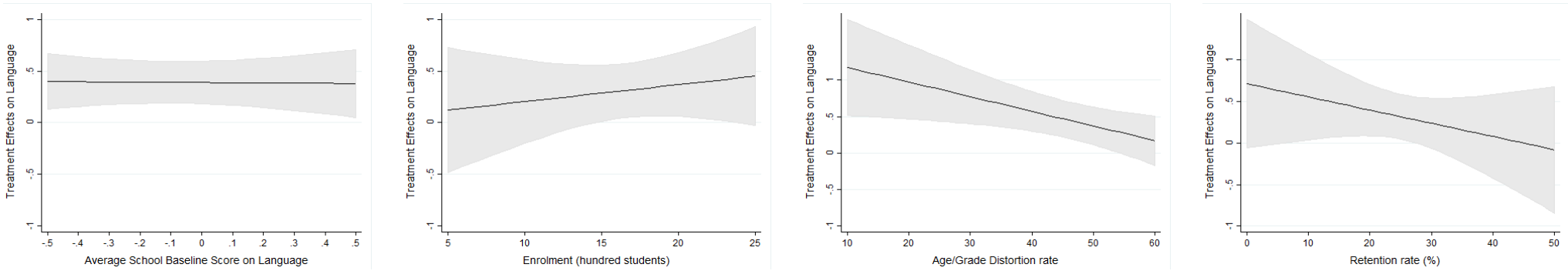
Figure 5 – Rio de Janeiro – The Impact of Treatment on Language Test Scores Within Various Schools Subgroups – Coefficient and 95% Confidence Interval



(a) (b) (c) (d)

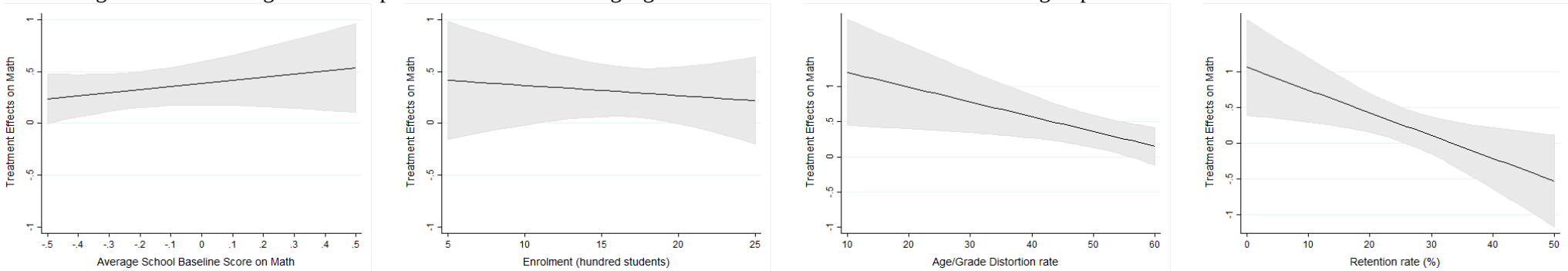
Figure 6 – Rio de Janeiro – The Impact of Treatment on Math Test Scores Within Various Schools Subgroups – Coefficient and 95% Confidence Interval

Note: These graphs display coefficients of the difference-in-differences regressions showing treatment effects of attending schools according specific characteristic. Figure (a) shows treatment effects by average school score in the baseline test. Figure (b) shows treatment effects by school total enrolment. Figure (c) presents treatment effects by school age/grade distortion rates. Figure (d) reports treatment effects by school retention rate.



(a) (b) (c) (d)

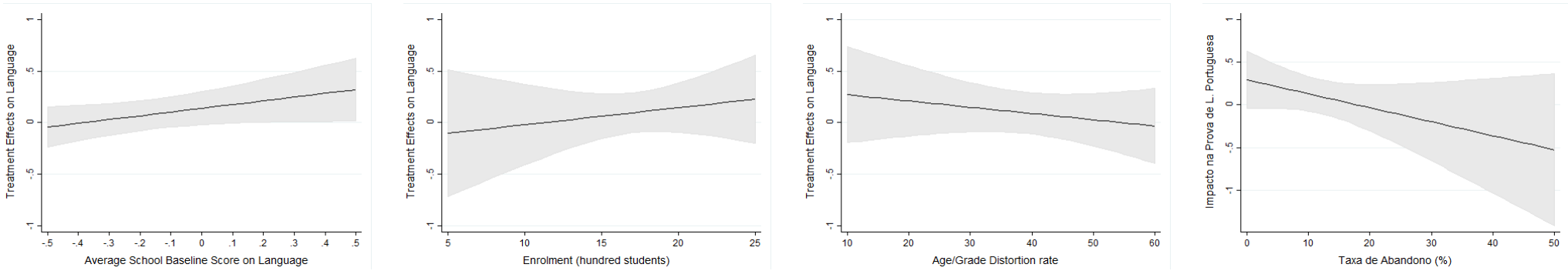
Figure 7 – Porto Alegre – The Impact of Treatment on Language Test Scores Within Various Schools Subgroups – Coefficient and 95% Confidence Interval



(a) (b) (c) (d)

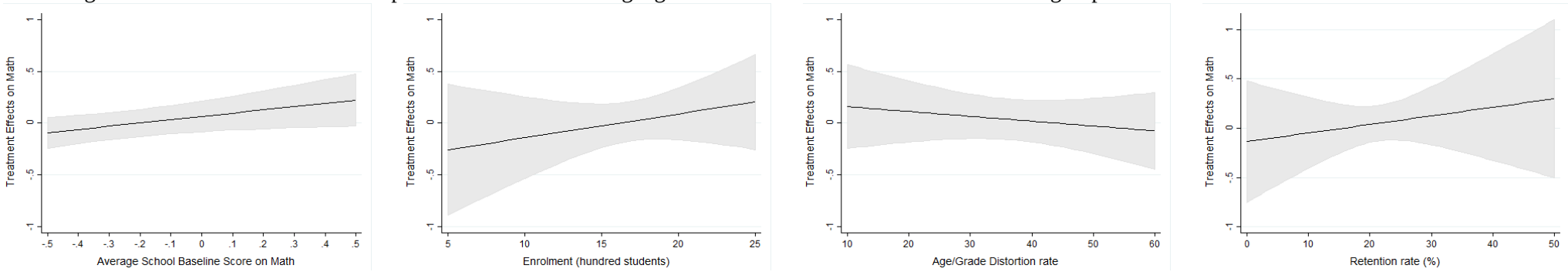
Figure 8 – Porto Alegre – The Impact of Treatment on Math Test Scores Within Various Schools Subgroups – Coefficient and 95% Confidence Interval

Note: These graphs display coefficients of the difference-in-differences regressions showing treatment effects of attending schools according specific characteristic. Figure (a) shows treatment effects by average school score in the baseline test. Figure (b) shows treatment effects by school total enrolment. Figure (c) presents treatment effects by school age/grade distortion rates. Figure (d) reports treatment effects by school retention rate.



(a) (b) (c) (d)

Figure 9 – Belo Horizonte – The Impact of Treatment on Language Test Scores Within Various Schools Subgroups – Coefficient and 95% Confidence Interval



(a) (b) (c) (d)

Figure 10 – Belo Horizonte – The Impact of Treatment on Math Test Scores Within Various Schools Subgroups – Coefficient and 95% Confidence Interval

Note: These graphs display coefficients of the difference-in-differences regressions showing treatment effects of attending schools according specific characteristic. Figure (a) shows treatment effects by average school score in the baseline test. Figure (b) shows treatment effects by school total enrolment. Figure (c) presents treatment effects by school age/grade distortion rates. Figure (d) reports treatment effects by school retention rate.

Appendice Tables

Table A1 -Individual Answers to the socioeconomic survey

	Total		S. Paulo		V. Paraíba		R. Janeiro		P. Alegre		B. Horizonte	
	Treatment	Control	Treatment	Control	Treatment	Control	Treatment	Control	Treatment	Control	Treatment	Control
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Full Sample	9030	9644	2189	2183	2701	2508	871	1081	1431	1504	1838	2368
Female	7137	7657	1488	1408	1887	1733	672	798	1350	1443	1740	2275
Non-white	7115	7594	1482	1401	1882	1728	672	795	1352	1428	1727	2242
Correct age to the grade	8026	8558	1851	1746	2221	2025	870	1081	1346	1441	1738	2265
Attended Kindergarten	7061	7553	1478	1393	1882	1717	650	781	1331	1408	1720	2254
Students who were retained	7065	7568	1477	1396	1877	1714	650	780	1331	1418	1730	2260
Dropout at least one year during elementary education	7060	7555	1476	1393	1878	1715	651	779	1332	1417	1723	2251
Finished elementary level by supplementary education	6921	7413	1466	1389	1866	1708	644	767	1257	1338	1688	2211
Work	7048	7530	1476	1390	1880	1716	654	779	1315	1403	1723	2242
Live with more than 5 people	7076	7570	1482	1398	1879	1724	666	790	1325	1412	1724	2246
Live with both parents	7018	7508	1468	1393	1875	1717	660	786	1306	1384	1709	2228
Mother Education - At least Elementary level	7018	7508	1468	1393	1875	1717	660	786	1306	1384	1709	2228
Father Education - At least Elementary level	6082	6436	1237	1225	1588	1416	550	659	1197	1249	1510	1887
Car	7117	7618	1482	1403	1887	1731	668	791	1342	1428	1738	2265
Computer	7091	7584	1482	1402	1883	1724	667	786	1326	1423	1733	2249
Computer and Internet	7091	7584	1482	1402	1883	1724	667	786	1326	1423	1733	2249

Table A2 - Observations by area

		Língua Portuguesa					Matemática				
Table	**Columns**	**São Paulo**	**Vale do Paraíba**	**Rio de Janeiro**	**Porto Alegre**	**Belo Horizonte**	**São Paulo**	**Vale do Paraíba**	**Rio de Janeiro**	**Porto Alegre**	**Belo Horizonte**
5 and 7	(1), (2), (3) e (5)	3180	4452	1700	3050	4940	3054	4304	1626	3062	4912
5	(4)	2738	3978	1294	2854	4746	2744	4014	1258	2884	4778
6	(2)	1908	1928	916	1092	3636	1904	1944	886	1106	3666
6	(3)	830	2052	384	1810	2034	840	2072	378	1824	2058
6	(5)	1444	2014	696	1646	2774	1458	2038	690	1658	2782
6	(6)	1304	1978	606	1282	1136	1298	1990	578	1300	1138
6	(8)	2686	3918	1156	2042	3754	2582	3780	1128	2060	3778
6	(9)	494	534	544	894	1034	472	524	498	904	1042
6	(11)	772	1084	412	734	1202	688	982	384	716	1188
6	(12)	2408	3368	1288	2316	3738	2366	3322	1242	2346	3724
6	(14)	712	998	366	712	1178	742	1050	390	734	1192
6	(15)	2468	3454	1334	2338	3762	2312	3254	1236	2328	3720
9	(2)	1304	2222	626	1512	2532	1232	2138	590	1514	2516
9	(3)	1876	2230	1074	1424	2408	1822	2166	1036	1434	2396
9	(5)	1442	2222	626	1360	2384	1348	2138	590	1368	2382
9	(6)	1738	2230	1074	1576	2556	1706	2166	1036	1580	2530
9	(8)	1360	2206	828	1550	2474	1272	2088	812	1544	2460
9	(9)	1820	2246	872	1386	2466	1782	2216	814	1404	2452
9	(11)	1564	2222	822	1530	2660	1478	2138	760	1542	2652
9	(12)	1616	2230	878	1406	2280	1576	2166	866	1406	2260
10	Dropout	70760	11381	9691	14130	14756	20802				
10	Retention	60997	10251	8902	11758	12058	18028				

Table A3 - Average and Standard Deviation - Control Students - Pre-treatment

	Language		Mathematics	
	Mean	**Std. Dev.**	**Difference**	**Std. Dev.**
	(1)	**(2)**	**(3)**	**(4)**
S. Paulo	223.4	46.00	226.8	42.65
V. Paraíba	234.6	46.70	239.7	45.31
R. Janeiro	216.7	52.63	224.6	47.05
P. Alegre	208.4	49.62	234.4	43.27
B. Horizonte	229.2	49.94	223.1	48.68

Notes: This table shows the averages and standard deviations used to create the standardized scores. The averages and standard deviation are from the control students in the pre-treatment period and they are in a Brazilian scale known as SAEB.

Table A4 – ENEM – Students Characteristics

	S. Paulo		V. Paraíba		R. Janeiro		P. Alegre		B. Horizonte	
	Treated	Diff and p-value	Treated	Diff and p-value	Treated	Diff and p-value	Treated	Diff and p-value	Treated	Diff and p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Female	61.7	-1.179	59.9	-1.117	57.7	-6.270	60.1	-2.090	63.7	2.961
		0.538		0.511		0.000		0.182		0.008
Non-white	57.9	-0.560	35.6	-1.673	59.8	-6.230	23.8	0.543	69.4	-1.252
		0.775		0.321		0.000		0.693		0.239
Correct age to the grade	97.4	0.222	97.9	0.142	89.1	-1.577	83.0	-3.105	89.8	-0.149
		0.729		0.782		0.085		0.009		0.831
Father Education - At least Elementary level	36.1	-0.497	58.2	7.869	55.6	-0.554	47.7	2.102	40.7	3.388
		0.806		0.000		0.731		0.206		0.004
Mother Education - At least Elementary level	45.2	0.853	61.3	8.992	59.6	-1.067	48.4	-1.299	45.1	2.800
		0.671		0.000		0.482		0.424		0.016
Income - More than 3 Minimum Wages	14.8	1.305	27.0	5.752	15.3	2.587	24.5	-0.013	25.5	2.020
		0.343		0.000		0.013		0.992		0.041
Live with more than 3 people	73.9	0.328	75.1	0.452	65.9	-0.262	45.3	-1.381	56.5	-2.203
		0.850		0.764		0.855		0.388		0.052
Number of Students		2572		3335		4418		3951		7633

Notes: This table report and compare characteristics of students in treatment and control schools based on the survey applied by National High School Exam (ENEM). The year of reference to Sao Paulo, Vale do Paraiba and Rio de Janeiro is 2012 and in Porto Alegre and Belo Horizonte is 2010. Columns (1), (3), (5), (7) and (9) report means for Treatment schools. First row of the columns (2), (4), (6), (8) and (10) report differences between Treatment and control schools and the second row report a p-value from a test of equal means.