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Inequality of Opportunities in the Educational Attainment of Chilean Students.

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Inequality of Opportunities in the Educational Attainment of Chilean Students.

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Abstract

This study measures the contribution of inequality of opportunities on the educational attainment of Chilean students, captured through the SIMCE test scores. For this, it employs a recently introduced methodology that quantifies the effect of exogenous and endogenous factors on socioeconomic outcomes, using parametric and non-parametric techniques. The study applies this methodology for the SIMCE tests in Mathematics and Language in the 1999 to 2007 period for fourth grade primary, eighth grade primary and for second grade of secondary school. The results show a reduction in the percentage of inequality of SIMCE results arising from exogenous circumstances, which can be interpreted as a decrease in inequality of opportunities. This conclusion is robust to the estimation technique and the schooling grade. In addition, the results reveal that inequality of opportunities is greater in secondary school than in primary school.

Keywords: education, inequality, opportunities

JEL Classification: I21, D39, D63

I. Introduction

Since the early 1990s, a wide range of policies have been introduced in Chile targeted at raising the quality and equality of education (Cox, 2005). These policies include programs for "raising the floor" of the most vulnerable schools, such as the P-900 and Mece Rural programs; the Education Quality Improvement Program (MECE) which provides infrastructure and educational inputs for municipal and private subsidized schools; programs for improving initial teacher training and internships abroad for teachers; providing computers and information technology skills to all schools in the country; reforms to the curricula updating the program content; restructuring of vocational education; and the extension of the school day. These policies have been backed up by large scale public spending to both finance the new educational initiatives and to significantly raise teacher pay; between 1990 and 2000 public spending in education rose 180% in real terms.

Nevertheless, the results obtained by Chilean students in national (SIMCE) and international (Pisa, Timss) performance tests, reveal major gaps in results by socioeconomic level, as well as lags compared to countries with a similar economic development level. Furthermore, there is no evidence indicating that educational results have improved significantly over time, although the evidence is limited since data is only available from 1999 onwards.

Most studies on educational results in Chile have focused on the differences in SIMCE scores between public and private schools, as well as on the impact of competition on student achievement (see Larrañaga (2004) for a review). There are no studies that have systematically explored inequality in the SIMCE test results partly because the distribution is standardized and it is not possible to ascertain the evolution of absolute inequality. What can be done is to evaluate the relative contribution on inequality of subgroups of determinants or students.

This study measures inequality of opportunities on school performance measured by the SIMCE tests, applying a recently methodology (Checci and Peragine techniques, 2005; Bourguignon, Ferreira and Melendez, 2007). The inequality of results can be decomposed statistically into two parts: that which is explained by circumstances beyond individual control, and a residual component linked to the endogenous variables and random factors. The measurement of the inequality of opportunities can be approximated through the percentage of the inequality of results explained by

circumstance variables. This methodology is based on the conceptualization of Roemer (1988) on inequality of opportunities.

This approach has been applied to evaluate educational attainment in a range of Latin American countries in a World Bank study (Ferreira and Gignoux 2008a). It consists of a comparative analysis of the results of the PISA 2000 tests in five Latin American countries - Chile, Argentina, Brazil, Mexico and Peru - and nine countries in North America and Europe. On average in the region, inequality of opportunities represents between 14% and 28% in reading, and between 15% and 29% in mathematics. Compared to OECD countries, Latin America has a higher level of inequality of opportunities: while in an average Latin American country, 20% of total inequality is attributable to inequality of opportunities, in an average OECD country the corresponding figure is 15%. In the case of Chile, inequality of opportunities represents between 22% and 24%[1] of the total inequality of results in reading and between 19% and 23% in mathematics.

In line with Ferreira and Gignoux (2008a) and (2008b), the objective of the present study is to measure inequality of opportunities in the educational attainment of Chilean students using the SIMCE test results in the 1999 to 2007 period for fourth and eighth grade primary, and second grade of secondary school. Three indices of inequality of opportunities are estimated with this data – one parametric and two non-parametric – using three different generalized entropy indices: E(0), which corresponds to the logarithmic mean deviation, E(1), known as the Theil index, and lastly, E(2), corresponding to half the square of the coefficient of variation.

The only earlier study that has used the SIMCE results to calculate the inequality of opportunity indices for the Chilean case was Gignoux and Crespo (2008), whi were interested in making a comparative analysis with results from the Pisa test. The authors report this index for the years 2001 and 2006 of second grade of secondary school. Their results suggest that inequality of opportunities accounts for between 16 and 19 per cent of the inequality of results, depending on the test considered. They find evidence using the SIMCE test but not the PISA test of a slight reduction in inequality of opportunities in Language between 2001 and 2006. However, the same authors highlight the importance of extending the analysis to other years in which the SIMCE test was implemented in order to have a more complete picture of the evolution of

[1] The interval arises from the use of two different kinds of estimate: one parametric and the other non-parametric.

inequality of opportunities. This is precisely one of the aspects included in the present paper.

This study is comprised of five sections, including this introduction. The second section presents the methodology used to measure inequality of opportunities; the third section presents the data and descriptive statistics of the variables used; the fourth section presents the results and the final section rounds off with the conclusions.

II. Methodology for Measuring Inequality of Opportunities[2]

The outcome variable (performance in the SIMCE test of student i), depends on the student circumstance variables, C_i, (family and environmental characteristics), effort variables, E_i, (study, commitment) and random or luck factors, u_i:

$$SIMCE_i = f(C_i, E_i, u_i)$$

Equality of opportunities requires that the educational results do not depend on the student circumstance variables, in other words, that the distribution of scores conditional on the characteristics of the students is equal to the non conditional distribution. The higher the contribution of circumstances to the outcome variable, the more unequal the distribution of opportunities will be.

To measure inequality of opportunities we need to estimate the difference between the conditional and non conditional distribution of scores, $F(SIMCE|C) \neq F(SIMCE)$. The distributions of results conditional on circumstances variables will be constructed based on the Checchi and Peragine (2005) study, which proposes three possible estimates.

For these effects we define subgroups of students who possess a vector of common characteristics. These "types" of students share exactly the same circumstance variables. The difference in results that exists between the subgroups is attributable to inequality of opportunities, while the differences within each subgroup are attributable to different levels of effort or luck factors. Let $Y^K = \{y_i^k\}$ be the

[2] This section closely follows Ferreira and Gignoux (2008b).

distribution of individual student scores comprising subgroup *"k* of students that share the same circumstance variables.

The first distribution of scores or the smoothed distribution, $Y_I^K = \{\mu^k\}$, corresponds to the average result of each subgroup of students who share the same characteristics. All students within subgroup k are assigned the average SIMCE score of the group. By applying an inequality measure on distribution Y_I^K, k= 1…K; we capture inequality among types, which reflects inequality of opportunities.

The second distribution is constructed by multiplying the individual scores of each student by the ratio between the average score of all students and the average score of their subgroup $Y_{II}^K = y_i^k \frac{\mu}{\mu^k}$. By applying an inequality measure to this distribution, we will capture inequality within each subgroup, which may be interpreted as inequality produced by individual responsibility.

The third distribution is parametric, $Y_{III}^K = F(\overline{C}, E(\overline{C}, \varepsilon_i), \upsilon_i)$ which arises from regression Simce results on circumstances and effort, $SIMCE = f(C, E(C))$ through a linear model. Where $\overline{C}$ corresponds to the average circumstance variables of all students, and variables ε_i and υ_i correspond to error terms.

The function is summarized in the following equation:

$$SIMCE = C\alpha + E\beta + u$$
$$E = \eta C + \upsilon$$

It is reduced to $SIMCE = (\alpha + \eta\beta)C + \upsilon\beta + u$, which can be estimated in a regression as $SIMCE = \lambda C + \omega$. Under this specification, the standardized parametric distribution is obtained as follows:

$$Y_{III} = \hat{\lambda}\overline{C} + \hat{\omega}$$

Distribution Y_{III} allows all circumstance differences to be eliminated, and therefore allows the inequality of results arising from the differences in individual efforts to be observed. This distribution was proposed by Bourguignon et al. (2003, 2007).

Using the above mentioned score distributions, three different inequality of opportunity estimators are constructed. The first, $O_I = I(Y_I^K)/I(Y^K)$, corresponds to the ratio between the inequality of the smoothed distribution and the inequality of the non conditional distribution, where I(.) represents an inequality indicator. The estimator can be interpreted as the percentage of the between groups inequality out of total inequality. The second alternative is $O_{II} = 1 - I(Y_{II}^K)/I(Y^K)$, in other words, one minus the ratio between inequality in the standardized distribution and the inequality of the original distribution. Given that ratio $I(Y_{II}^K)/I(Y^K)$ captures the aggregate inequality within the subgroup, one minus this ratio is an alternative measure to the inequality between subgroups as long as function I(.) can be expressed as a sum of intra and intergroup components. This method was proposed by Checci and Peragine (2005). The third alternative, $O_{III} = 1 - I(Y_{III})/I(Y^K)$, is the parametric alternative to O_{II}.

The chosen inequality function I(.) corresponds to the entropy index E(0), E(1) and E(2). The first, E(0), corresponds to the logarithmic mean deviation, the second, E(1), is known as the Theil index, and lastly E(2), corresponding to half of the square of the variation coefficient. In contrast to other inequality indicators, the entropy index is additively decomposable between subgroups of the population.

Ferreira and Gignoux (2008 a) only use the index E(2) in their study on the results of the 2001 PISA test, since this indicator is invariant to the linear transformations in the scale and the variance of the distribution being evaluated. This issue is relevant to the extent that the PISA test results reported are a standardization of the original distribution, such that an indicator like E(2) can evaluate the characteristics of the underlying distribution. In the case of the SIMCE tests, only a standardization of the variance of the distribution is carried out, so any indicator of the entropy family E(.) would be appropriate.

Notice that the standardization of the variance of the SIMCE test results does not allow the trends in the inequality of scores for the population as a whole to be known. However, aspects such as the contribution of subgroups of determinants of total

inequality can be known. This is precisely our case, since inequality of opportunities is measured as the contribution of circumstance variables on the non conditional of Simce results.

An advantage of the non-parametric estimators is that they do not have to assume a functional form for the relationship between the SIMCE results and the explanatory variables. However, this estimate presents problems when there are many subgroups, which may lead to cells with few or none observations. This may lead to estimators with very large variances, which makes them less precise and therefore less reliable. As such, there is an upper limit of subgroups and categories to consider, which also depends on the quantity of data available. On the other hand, the parametric estimate allows the data to be used more efficiently, since it is not necessary to restrict or limit them.

Another advantage of the parametric distribution is that it allows the partial effects of one of the circumstance variables to be estimated, or of a group of them, controlling for the others. This distribution is specified by the following function:

$$Y_{IV} = \hat{\lambda}^{J} \overline{C}^{J} + \hat{\lambda}^{j \neq J} C^{j \neq J} + \hat{\omega}$$

This allows the proportion of inequality specific to that circumstance variable to be obtained. The estimator is then defined by: $\mathrm{O}_{IV} = 1 - I(Y_{IV}) / I(Y^{K})$.

As shown in Ferreira and Gignoux (2008a), there is no certainty regarding the most efficient estimator, since while non-parametric methods are more flexible (since they do not require a specification of the functional form) parametric methods are more efficient in data use and are less demanding on the number of observations.

Considering all of the above, both types of estimators are used rendering an interval of inequality of opportunity measures. All the three methods described shall be applied to the Simce results of fourth and eighth grade primary, and second grade of year secondary school students, in order to identify what percentage of the inequality of educational results is explained by inequality of opportunities.

III. Data and Descriptive Statistics

The outcome variable corresponds to the educational results of 4th and 8th grade primary, and 2nd grade secondary school students in the SIMCE tests in Language and Mathematics. SIMCE is the national educational achievement test of the Chilean Ministry of Education. Its objective is to "contribute to improving education, report on student achievement in different areas of the national curriculum, and relate it to the school and social environment in which the learning takes place"[3].

Until 2005, the test implementation alternated between 4th grade primary, 8th grade primary and 2nd grade secondary school. Since 2006, 4th grade primary has been taken every year and 8th grade primary and 2nd grade secondary alternate. Table 1 shows the years as well as the corresponding grades in which the SIMCE has been implemented.

The comparability of the SIMCE results between one round and another has been made possible since 1998, when the methodology used for measuring student learning was changed, from the "Mean Percentage of Correct Answers (PMRC)" to the "Item Response Theory (IRT)" methodology. The PMRC methodology only allowed the cross-sectional comparison of SIMCE scores, between students or schools in the same year. However, "it was not possible to isolate the effect of differences in the difficulty levels of the tests implemented in different years from differences in the performance level of the cohorts being evaluated" (Mineduc, 2003). The use of the IRT methodology allows those limitations to be overcome thus allowing: "inter-annual comparisons, describing the characteristic performance of students in various points of the scale….. and including questions of various difficulty levels to more precisely measure students with different performance levels"[4]. In addition, "equating" procedures were included in order to undertake reliable comparisons between the results of the measurements from different years (Mineduc (2003).

The switch to the IRT methodology not only seeks to measure student performance in terms of the minimum obligatory content, but also students' cognitive skills. Apart from the IRT methodology, which is widely used in tests in other countries and in international level comparative studies, open questions were also introduced into the SIMCE tests. Another advantage of the IRT methodology compared to the PMRC methodology is that it discriminates between the difficulty level of questions when assigning scores to the tests. With this model, a higher score ensures a higher level of

[3] Ministerio de Educación, Chile. www.simce.cl
[4] "Evaluación de aprendizajes para una educación de calidad", Mineduc (2003). p. 27.

student learning, in contrast to the PMRC methodology, where all questions had the same score independent of their degree of complexity.

While the present methodology used by SIMCE allows for valid comparisons between the scores obtained by different cohorts measured in the same grade, it does not allow the evolution of student learning to be measured. To carry out the latter, "successive measurements of the same cohorts are needed and the instruments used need to be put on the same scale" (Mineduc 2003). In summary, the variations in scores between successive measurements of the same level cannot be interpreted directly as an improvement or deterioration in the student learning achievements in specific schools, since there may have been variations in the composition of the cohorts that took the tests in those measurements. However it is possible to interpret differences in scores between successive measurements of the same grade as variation in achievements between the respective cohorts.

In addition, SIMCE gathers additional information on the school, the teachers, parents and guardians. Through self report questionnaires, each of these actors provides contextual information on educational determinants. This data allows the "circumstance" variables of each student to be identified and thereby group students with the same characteristics into subgroups or types.

Circumstance variables were chosen within the set provided by the SIMCE data in the period under study. These include the father's education, the mother's education and household income. These circumstances have the highest explanatory power in the distribution of the result variables in the World Bank study on Latin American countries (World Bank, 2008). In addition, type of school: municipal, private subsidized and private fee-paying is considered as circumstances. This variable is correlated to household socioeconomic level, since municipal schools are free, private subsidized schools require a co-payment and private fee-paying schools are fully financed by families; however, the supply of the different types of schools varies according to geographic districts. The urban or rural location of the school is also considered as a circumstance variable.

The circumstance variables are expressed in terms of categories which allow "types" or subgroups of students with the same circumstances to be formed. The application of non-parametric techniques requires limiting the number of categories in order to obtain cells with a sufficient number of observations. Household income is

divided into five brackets with the same number of student subgroups; mother's schooling as well as father's schooling is represented in four categories: primary or earlier education, secondary education, third level technical or vocational education, third level university and postgraduate education; and type of school with the three categories already presented above.

Circumstance variables such as the number of people in the household, parents' occupation, ethnicity, zone of residence and gender, are available only for some years of the SIMCE test and cannot be used in the comparative analysis. Therefore, the results of the study should be interpreted as a lower bound of the contribution of inequality of opportunities on educational results. Nevertheless, the results are informative of the trends over time, under the reasonable assumption that omitted and included circumstances change in the same direction.

Tables 1 to 3 show the descriptive statistics of the results and circumstance variables for the fourth grade primary, eighth grade primary and second year secondary school SIMCE tests, respectively.

IV. Results: Inequality of Opportunities between 1999 and 2007

The results are presented for each year, each non-parametric and parametric indicators and for Mathematics and Language. In each case, the three generalized entropy indices are used, where the contribution of circumstances corresponds to inter-group inequality as a percentage of total inequality in the SIMCE test results. The standard error of the estimate is also shown in each case and is calculated from bootstrapping with 50 replications and substitution.

The fourth grade primary results for Mathematics and Language are presented in Tables 4 and 5 respectively. The fourth grade primary SIMCE test was implemented every three years between 1999 and 2005, and every year since 2005. However, in 2007 there was a problem with the processing of the socioeconomic data of families, which led to a non-random loss of data[5]. Estimated results for the year are biased and are not comparable to those obtained in other years, and they are therefore excluded from the analysis.

[5] The Ministry of Education (MINEDUC) recommends using the course variable (course code) for that year as the most reliable identification variable due to the loss of individual level data.

Indices O_I and O_{II}, obtained from non-parametric estimates, indicate that for the year 1999, inequality of opportunities represented between 17 and 19 percent of the inequality of results in Mathematics (Table 4). Meanwhile, the parametric indicator O_{III} estimates the contribution of circumstances on the inequality of results of the SIMCE Mathematics test in 1999 at 19%. This last estimate is based on OLS regressions whose results are presented in the statistical appendix.

Over the years, the three indices have declined, which indicates that the importance of circumstance variables for explaining inequality of results has decreased. Despite a slight increase of some indices on the previous year in 2006, there is a downward trend over time in inequality of opportunities, reaching between 15 and 17 percent of inequality in the learning results in Mathematics.

The decreased contribution of circumstances on educational results is more clearly marked in the fourth grade primary SIMCE Language test (Table 5). There, the drop in the inter-group percentage is from 19% to 22% in 1999 to 12% to 14% in 2006.

The decreasing trend of inequality of opportunities is a robust result, as it is reported by all estimation variants and entropy indices used. The trend holds over the four years of the SIMCE fourth grade primary measurements.

In the case of the eighth grade primary SIMCE test, the evidence is more limited, since although it has been implemented in three different years (2000, 2004 and 2007), the indices can only be calculated for the years 2000 and 2007. In the case of the 2004 eighth grade SIMCE, there is a non-random underreporting of the socioeconomic data of parents, as shown by the descriptive statistics in Table 2. Around 30% of the information on parents' schooling is not reported in the family questionnaires in that year, in contrast to other years in which the omission level is under 15%. The underreporting in 2004 alters the schooling distribution of parents, reducing the representation of groups with secondary and third level schooling.

The comparative analysis of eighth grade results shows a reduction of inequality of opportunities between 2000 and 2007. In the case of Mathematics test, the contribution

of circumstance variables for explaining the inequality of results dropped from 17% to 18% in the first year to 15% to 16% in the second year (Table 6).

There is a similar evolution in the Language test. The percentage of the inequality in Language tets attributed to inequality of opportunities dropped from 15 to 17 percent in 2000, to 13 to 14 percent in 2007 (Table 7).

Once again, the drop in inequality of opportunities is robust given that it is captured in all the indicators used in the analysis, even though there are only measurements available for the base and final years.

In the case of second year secondary school, there are measurements for 1998, 2001, 2004 and 2006. However, the 1998 information is not comparable with the other years since it uses a different classification for parents' education.

The indices obtained from parametric and non-parametric estimates for 2006 show a reduction of inequality of opportunities in the Mathematics results compared to earlier years (Table 8). Indices O_I and O_{II} indicate that the proportion of the inequality of results explained by inequality of opportunities dropped from between 27 to 28 percent in 2001 to between 19 to 22 percent in 2006. Based on the parametric estimates, a reduction is also observed in inequality of opportunities, even though there are problems in the 2001 estimate since there are indicators for which the parametric estimate is out of range.

In the case of Language learning, the O_I and O_{II} indices indicate that inequality of opportunities represented between 19 and 20 percent of the inequality of results in 2001 (Table 9). By 2006 that proportion had dropped to between 15 and 18 percent (considering all the indices).

The results for second year secondary school are similar to those of fourth and eighth grade primary, providing quite robust evidence on the decrease in the contribution of circumstances on the SIMCE test results between 1999 and 2007. This is a trend which is shared by all the indicators used in the analysis, for all grades under evaluation, and for the SIMCE Mathematics and Language tests.

The parametric estimates of the importance of the various circumstance variables in inequality of opportunities are presented in the Appendix. This exercise is undertaken for both Mathematics and Language tests, reporting only the entropy index E(0). The results show that mother's schooling is the circumstance with the highest impact on SIMCE test results in Language and Mathematics, for all grades, years and and indicators used.

Inequality across the educational cycle

Next we turn to the evolution of inequality of opportunities across the educational cycle, based on the results of the fourth grade primary, eighth grade primary and second year secondary school grades. We want to know if inequality of opportunities decreases over the educational cycle, as expected if school succeeded in terms of compensating inequalities of origin, or otherwise.

To examine this point, the annual averages of inequality of opportunities in the various schooling grades are presented in Table 10. The following main facts arise from there: (i) between fourth and eighth grade primary school, there is a reduction of inequality of opportunities in the Language test results, a trend which is captured by all the indicators used; (ii) there is no defined trend in the evolution of opportunities between fourth and eighth grade primary school on the Mathematics test results; (ii) all the indicators show a significant increase in the contribution of opportunities on second year secondary school results in relation to primary education, with a higher increase in Mathematics than in Language.

The results are not easy to interpret, particularly after considering that dropouts from secondary school come from the most economically and culturally vulnerable families. It might be the case that students that come from most disadvantaged families mostly attend vocational schools, where language and mathematics formation is weaker than in general education schools.

V. Conclusions

This study measures the importance of inequality of opportunities on the inequality of educational attainment of Chilean students, as measured by the SIMCE results in the 1999-2007 period. It uses recent measurement techniques based on John Roemer's work. This author proposed that the contribution of characteristics exogenous to the individual on outcome variables represents a measure of inequality of opportunities.

Our results show a reduction in the contribution of circumstances on SIMCE results between 1999 and 2007. This trend is reflected in all the indicators used in the analysis and applies to all grades being evaluated, as well as to the Mathematics and Language tests.

In fourth grade primary school, inequality of opportunities dropped from between 17 and 19 percent of the inequality of results in Mathematics to between 14 and 17 percent in 2006. In the case of Language, the downward trend is sharper and clearer: from between 19 and 22 percent in 1999 to between 12 and 14 percent in 2006.

In the case of Mathematics results in eighth grade primary school, inequality of opportunities represented 17-18 percent of total inequality in 2000, dropping to 15-16 percent in 2007. For Language, the percentage of the inequality of results attributed to inequality of opportunities dropped from between 15 and 17 percent in 2000, to between 13 and 14 percent in 2007.

In second year secondary school the proportion of the inequality of results in Mathematics explained by inequality of opportunities decreased from between 27 and 28 percent in 2001 to 19 to 22 percent in 2006. For Language learning, inequality of opportunities represented between 19 and 20 percent of the inequality of results in 2001. On the other hand, in 2006 this proportion dropped to between 15 and 18 percent.

Even though inequality of educational opportunities shows a downward trend for all grades studied, it is higher in second year secondary school than in primary school

grades, which casts doubts in how effective schools are to compensate inequalities at home.

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TABLES

Table: SIMCE tests between 1998 and 2007

School Grades	Years of test implementation				
4th grade primary	1999	2002	2005	2006	2007
8th grade primary	2000	2004	2007		
2nd grade second	1998	2001	2003	2006	

Table 1: Descriptive Statistics SIMCE fourth grade primary school

	Years of test implementation			
	1999	2002	2005	2006
Variable				
Father's primary education	33.0	33.7	27.0	24.7
Father's secondary educat.	41.3	45.2	48.2	47.8
Father's vocat/tech educat.	15.3	9.4	11.3	12.4
Father's university educat.	9.1	10.6	11.5	12.3
Father's post grad. educat.	1.2	1.1	1.4	1.9
Mother's primary education	35.9	34.1	27.2	25.2
Mother's secondary educat.	40.3	45.8	48.7	47.8
Mother's vocat/tech educat.	16.4	11.7	14.0	15.2
Mother's university educat.	6.7	8.0	9.0	9.7
Mother's post grad. educat.	0.4	0.4	0.6	0.8
Rurality of school	11.1	11.3	11.7	11.8
Private subsidized school	36.3	40.2	44.5	45.9
Public municipal school	56.4	52.7	49.2	47.7
Private fee-paying school	7.4	7.1	6.3	6.4
Income bracket 1	37.2	30.3	23.0	18.9
Income bracket 2	31.4	35.1	34.7	33.5
Income bracket 3	11.6	12.8	14.8	16.2
Income bracket 4	5.6	6.0	7.6	8.5
Income bracket 5	14.2	15.8	19.9	22.9
Per capita income bracket 1	25.3	26.4	20.1	19.7
Per capita income bracket 2	16.1	15.1	22.5	30.4
Per capita income bracket 3	26.7	21.9	23.4	11.4
Per capita income bracket 4	12.7	16.7	14.4	18.3
Per capita income bracket 5	19.2	19.9	19.6	20.1
Northern zone	25.4	23.0	23.0	23.3
Metropolitan zone	8.5	39.2	39.0	38.5
Southern zone	66.1	37.8	38.1	38.2
Number of observations	237,891	216,127	219,513	223,017

Table 2: Descriptive Statistics SIMCE eighth grade primary school

	Years of test implementation		
	2000	2004	2007
Variable			
Father's primary education	36.0	41.3	29.0
Father's secondary educat.	45.7	40.7	49.0
Father's vocat/tech educat.	5.9	6.9	10.3
Father's university educat.	11.3	9.1	9.8
Father's post grad. educat.	1.0	2.0	1.0
Mother's primary education	39.5	44.4	29.7
Mother's secondary educat.	45.1	39.2	49.0
Mother's vocat/tech educat.	6.5	7.8	12.2
Mother's university educat.	8.4	7.2	7.3
Mother's post grad. educat.	0.4	1.2	0.5
Rurality of school	9.8	13.4	11.0
Private subsidized school	35.4	43.1	43.6
Public municipal school	57.0	50.5	52.9
Private fee-paying school	7.6	6.4	3.5
Income bracket 1	30.2	26.2	16.7
Income bracket 2	34.1	34.4	34.1
Income bracket 3	13.0	13.7	17.9
Income bracket 4	6.6	6.9	9.7
Income bracket 5	16.1	18.8	21.6
Per capita income bracket 1	26.5	-	13.1
Per capita income bracket 2	15.7	-	5.8
Per capita income bracket 3	20.6	-	0.0
Per capita income bracket 4	18.2	-	10.7
Per capita income bracket 5	19.1	-	19.1
Northern zone	24.2	19.8	21.7
Metropolitan zone	41.0	34.1	37.2
Southern zone	34.8	46.1	37.5
Number of observations	173,190	161,615	214,610

Table 3: Descriptive Statistics SIMCE second year secondary school

	Years of test implementation		
	2001	2003	2006
Variable			
Father's primary education	38.5	36.0	27.3
Father's secondary educat.	40.3	45.0	46.5
Father's vocat/tech educat.	7.1	6.7	10.6
Father's university educat.	11.7	10.3	12.8
Father's post grad. educat.	2.3	2.1	1.9
Mother's primary education	40.0	38.4	27.9
Mother's secondary educat.	41.0	44.6	37.2
Mother's vocat/tech educat.	7.3	7.7	22.9
Mother's university educat.	9.4	7.9	9.8
Mother's post grad. educat.	2.3	1.4	0.8
Rurality of school	5.7	3.4	3.6
Private subsidized school	43.3	46.2	50.0
Public municipal school	47.3	46.6	42.6
Private fee-paying school	9.4	7.2	7.4
Income bracket 1	27.2	23.3	15.2
Income bracket 2	35.3	35.7	33.5
Income bracket 3	12.9	14.3	16.9
Income bracket 4	6.6	7.1	9.2
Income bracket 5	18.0	18.4	25.2
Per capita income bracket 1	32.6	-	24.4
Per capita income bracket 2	10.2	-	21.1
Per capita income bracket 3	25.5	-	19.4
Per capita income bracket 4	11.9	-	16.2
Per capita income bracket 5	19.9	-	18.9
Northern zone	23.9	23.3	23.9
Metropolitan zone	39.5	38.5	35.5
Southern zone	36.7	38.3	40.6
Number of observations	151,664	196,106	190,087

Table 4: Inequality of opportunities SIMCE Mathematics fourth grade primary school

Indicators of Inequality		Years of test implementation 1999	2002	2005	2006
Non-Parametric Estimators					
O_I	E(0)	17.4	16.8	15.3	15.4
		0.05	0.06	0.05	0.05
	E(1)	18.3	18.0	16.4	16.5
		0.06	0.04	0.05	0.06
	E(2)	19.0	18.8	17.2	17.4
		0.05	0.08	0.06	0.06
O_{II}	E(0)	17.4	16.8	15.3	15.4
		0.10	0.14	0.10	0.13
	E(1)	16.9	16.1	14.7	14.5
		0.11	0.11	0.13	0.12
	E(2)	16.6	15.6	14.1	13.7
		0.10	0.14	0.13	0.14
Parametric Estimator					
O_{III}	E(0)	19.0	18.8	16.9	17.4
		0.15	0.17	0.14	0.19
	E(1)	18.6	18.3	16.6	16.7
		0.16	0.15	0.15	0.15
	E(2)	18.5	18.0	16.3	16.2
		0.13	0.17	0.15	0.15

Estimates using the income variable and without the zone variable

Values are in percentages

Table 5: Inequality of opportunities SIMCE Language fourth grade primary

Indicators of Inequality		Years of test implementation 1999	2002	2005	2006
Non-Parametric Estimators					
O_I	E(0)	19.5	16.8	14.7	12.6
		0.05	0.05	0.05	0.06
	E(1)	20.7	18.2	15.7	13.4
		0.06	0.06	0.06	0.04
	E(2)	21.7	19.2	16.5	14.1
		0.06	0.06	0.06	0.05
O_{II}	E(0)	19.5	16.8	14.7	12.6
		0.11	0.11	0.11	0.12
	E(1)	19.0	16.3	14.2	12.1
		0.11	0.12	0.12	0.11
	E(2)	18.7	15.9	13.9	11.8
		0.12	0.11	0.13	0.14
Parametric Estimator					
O_{III}	E(0)	21.5	18.9	15.9	13.3
		0.16	0.18	0.15	0.15
	E(1)	21.2	18.6	15.8	13.2
		0.18	0.17	0.17	0.13
	E(2)	21.1	18.4	15.7	13.1
		0.15	0.15	0.13	0.14

Estimates using the income variable and without the zone variable

Values are in percentages

Table 6: Inequality of opportunities SIMCE Eighth grade primary Mathematics

Indicators of Inequality		Years of test implementation 2000	2007
Non-Parametric Estimators			
O_I	E(0)	17.0 0.05	15.3 0.07
	E(1)	18.0 0.05	15.9 0.06
	E(2)	18.7 0.07	16.3 0.06
O_{II}	E(0)	17.0 0.11	15.3 0.13
	E(1)	17.2 0.13	15.2 0.13
	E(2)	17.5 0.13	15.3 0.14
Parametric Estimator			
O_{III}	E(0)	16.9 0.18	16.1 0.17
	E(1)	17.5 0.21	16.4 0.18
	E(2)	18.1 0.22	16.7 0.16

Estimates using the income variable and without the zone variable

Values are in percentages

Table 7: Inequality of opportunities SIMCE Eighth grade primary Language

Indicators of Inequality		Years of test implementation 2000	2007
Non-Parametric Estimators			
O_I	E(0)	15.8 0.05	13.1 0.06
	E(1)	16.7 0.05	13.7 0.07
	E(2)	17.2 0.06	14.2 0.07
O_{II}	E(0)	15.8 0.10	13.1 0.14
	E(1)	16.1 0.12	13.2 0.11
	E(2)	16.4 0.15	13.3 0.16
Parametric Estimator			
O_{III}	E(0)	15.3 0.25	13.8 0.18
	E(1)	16.0 0.16	14.1 0.14
	E(2)	16.7 0.20	14.5 0.16

Estimates using the income variable and without the zone variable

Values are in percentages

Table 8: Inequality of opportunities SIMCE Second year secondary school Mathematics

Indicators of Inequality		Years of test implementation 2001	2003	2006
Non-Parametric Estimators				
O_I	E(0)	27.1 0.10	22.8 0.10	19.1 0.05
	E(1)	27.7 0.09	24.1 0.08	20.6 0.06
	E(2)	27.9 0.10	24.9 0.09	21.8 0.07
O_{II}	E(0)	26.6 0.18	22.8 0.13	19.1 0.11
	E(1)	27.3 0.20	23.1 0.17	18.9 0.15
	E(2)	28.2 0.22	23.6 0.17	18.9 0.15
Parametric Estimator				
O_{III}	E(0)	-6.8 1.21	22.1 0.16	16.8 0.15
	E(1)	14.4 0.61	23.2 0.19	17.6 0.16
	E(2)	20.5 0.36	24.3 0.18	18.2 0.16

Estimates using the income variable and without the zone variable

Values are in percentages

Table 9: Inequality of opportunities SIMCE Second year secondary school Language

Indicators of Inequality		Years of test implementation 2001	2003	2006
Non-Parametric Estimators				
O_I	E(0)	19.1 0.06	19.3 0.06	17.2 0.05
	E(1)	19.9 0.08	20.1 0.08	18.0 0.05
	E(2)	20.4 0.10	20.7 0.05	18.6 0.06
O_{II}	E(0)	18.9 0.16	19.3 0.13	17.2 0.14
	E(1)	18.9 0.13	19.1 0.11	17.1 0.14
	E(2)	19.0 0.15	19.1 0.11	17.1 0.16
Parametric Estimator				
O_{III}	E(0)	-3.4 1.07	19.7 0.15	15.0 0.17
	E(1)	10.5 0.50	19.9 0.14	15.3 0.16
	E(2)	14.5 0.30	20.1 0.12	15.6 0.17

Estimates using the income variable and without the zone variable

Values are in percentages

Table 10: Inequality of opportunities, anual sum

		Learning					
		Mathematics			Language		
Non-Parametric Estimators		E(0)	E(1)	E(2)	E(0)	E(1)	E(2)
O_I	fourth grade primary school	16.2	17.3	18.1	15.9	17.0	17.9
	eighth grade primary school	16.1	16.9	17.5	14.5	15.2	15.7
	second grade of secondary school	23.0	24.1	24.9	18.6	19.4	19.9
O_{II}	fourth grade primary school	16.2	15.5	15.0	15.9	15.4	15.0
	eighth grade primary school	16.1	16.2	16.4	14.5	14.6	14.9
	second grade of secondary school	22.8	23.1	23.6	18.5	18.4	18.4
Parametric Estimator							
O_{III}	fourth grade primary school	18.0	17.5	17.2	17.4	17.2	17.1
	eighth grade primary school	16.5	17.0	17.4	14.5	15.0	15.6
	second grade of secondary school	19.5	20.4	21.2	17.4	17.6	17.9

Estimates using the income variable and without the zone variable

Values are in percentages

Anexo

OLS Regression. Mathematics Fourth Grade 2006

	1	2	3	4
Private subsidized school	8,86	8,56	8,07	7,76
	(36,25)**	(35,37)**	(32,28)**	(31,31)**
Private fee-paying school	26,07	25,53	22,7	22,13
	(51,15)**	(50,57)**	(43,83)**	(43,12)**
Income bracket 2	9,77	9,37		
	(31,06)**	(29,78)**		
Income bracket 3	15,7	14,98		
	(40,54)**	(38,71)**		
Income bracket 4	18,44	17,69		
	(39,31)**	(37,69)**		
Income bracket 5	20,09	19,28		
	(47,58)**	(45,73)**		
Mother's secondary educat.	13,19	12,81	13,07	12,64
	(44,21)**	(42,87)**	(42,75)**	(41,30)**
Mother's vocat/tech educat.	21,6	21,27	20,87	20,46
	(51,67)**	(50,79)**	(48,88)**	(47,84)**
Mother's university educat.	28,6	28,63	27,75	27,69
	(57,43)**	(57,40)**	(54,73)**	(54,51)**
Mother's post grad. educat.	25,59	25,64	26,2	26,13
	(21,62)**	(21,68)**	(22,37)**	(22,29)**
Father's secondary educat.	6,57	6,15	6,82	6,34
	(22,24)**	(20,80)**	(22.60)**	(21,00)**
Father's vocat/tech educat.	12,81	12,28	12,47	11,83
	(29,45)**	(28,17)**	(28,20)**	(26,72)**
Father's university educat.	19,42	19,07	19,03	18,56
	(41,07)**	(40,25)**	(39,59)**	(38,55)**
Father's post grad. educat.	19,55	19	19,65	18,99
	(23,81)**	(23,15)**	(23,74)**	(22,95)**
Rurality of school	-1,1	0.30	-0,16	1.22
	(3,06)**	-0,83	-0,42	(3,31)**
Northern zone	-2,94		-3,01	
	(10,61)**		(10,67)**	
Southern zone	5,49		5,56	
	(21,87)**		(21,74)**	
Per capita income bracket 2			10,8	10,42
			(32,48)**	-31,3
Per capita income bracket 3			14,96	14,41
			(34,83)**	(33,52)**
Per capita income bracket 4			19,7	19,15
			(49,58)**	(48,16)**
Per capita income bracket 5			24,22	23,63
			(52,74)**	(51,43)**
Constant	210,25	212,7	209,49	211,97
	(601,98)**	(698,75)**	(574,24)**	(659,97)**
Number of observations	234.023	234.023	223.017	223.017
R-squared	0,17	0,17	0,17	0,17

Robust t-statistics in parentheses
* significant at 5%; ** significant at 1%
(1): with income variable and the zone variable; (2): with income variable and without the zone variable
(3): with per capita income variable and the zone variable;
(4):with per capita income variable and without the zone variable

OLS Regression. Leanguage Fourth Grade 2006

	1	2	3	4
Private subsidized school	9,15	8,34	8,49	7,64
	(38,31)**	(35,17)**	(34,66)**	(31,43)**
Private fee-paying school	22,7	21,1	19,65	18,02
	(43,50)**	(40,86)**	(36,77)**	(34,04)**
Income bracket 2	6,92	6,25		
	(22,79)**	(20,53)**		
Income bracket 3	12,27	11,14		
	(32,48)**	(29,44)**		
Income bracket 4	15,2	14,07		
	(32,93)**	(30,42)**		
Income bracket 5	16,71	15,51		
	(40,28)**	(37,40)**		
Mother's secondary educat.	10,97	10,56	10,77	10,3
	(38,08)**	(36,49)**	(36,44)**	(34,69)**
Mother's vocat/tech educat.	19,12	18,83	18,32	17,92
	(46,32)**	(45,42)**	(43,41)**	(42,31)**
Mother's university educat.	25,81	26,06	24,84	24,96
	(51,76)**	(52,12)**	(48,85)**	(48,96)**
Mother's post grad. educat.	24,81	24,99	25,11	25,11
	(20,78)**	(20,96)**	(21,15)**	(21,17)**
Father's secondary educat.	5,11	4,58	5,33	4,71
	(17,89)**	(15,95)**	(18,23)**	(16,05)**
Father's vocat/tech educat.	11,29	10,6	10,91	10,09
	(26,21)**	(24,54)**	(24,92)**	(22,97)**
Father's university educat.	18,22	17,87	17,81	17,31
	(38,70)**	(37,86)**	(37,18)**	(36,03)**
Father's post grad. educat.	19,16	18,4	19,31	18,41
	(22,72)**	(21,85)**	(22,63)**	(21,59)**
Rurality of school	4,44	6,47	5,24	7,24
	(12,89)**	(18,93)**	(14,75)**	(20,47)**
Northern zone	0,1		0,05	
	-0,37		-0,19	
Southern zone	9,3		9,34	
	(37,61)**		(37,05)**	
Per capita income bracket 2			8,03	7,43
			(25,07)**	(23,08)**
Per capita income bracket 3			12,08	11,23
			(28,70)**	(26,60)**
Per capita income bracket 4			16,53	15,71
			(42,51)**	(40,27)**
Per capita income bracket 5			20,84	19,96
			(45,98)**	(43,96)**
Constant	218,34	223,52	217,45	222,64
	(645,86)**	(763,25)**	(615,57)**	(719,27)**
Number of observations	232.998	232.998	222.050	222.050
R-squared	0,14	0,14	0,14	0,14

Robust t-statistics in parentheses
* significant at 5%; ** significant at 1%
(1): with income variable and the zone variable; (2): with income variable and without the zone variable
(3): with per capita income variable and the zone variable;
(4):with per capita income variable and without the zone variable

OLS Regression. Mathematics Eighth Grade 2006

	1	2	3	4
Private subsidized school	9,84	9,56	10,1	9,82
	(44,37)**	(43,50)**	(44,59)**	(43,79)**
Private fee-paying school	33,34	32,94	26,89	26,59
	(66,36)**	(65,85)**	(43,31)**	(42,79)**
Income bracket 2	-8,22	-7,35		
	(10,66)**	(9,59)**		
Income bracket 3	0,25	0,6		
	-0,34	-0,8		
Income bracket 4	5,43	5,49		
	(7,00)**	(7,10)**		
Income bracket 5	10,12	10,06		
	(13,23)**	(13,19)**		
Mother's secondary educat.	9,91	9,57	11,36	10,93
	(38,47)**	(37,07)**	(43,65)**	(42,00)**
Mother's vocat/tech educat.	17,74	17,38	19,17	18,68
	(43,74)**	(42,78)**	(46,12)**	(44,87)**
Mother's university educat.	26,02	26,05	26,61	26,52
	(53,30)**	(53,26)**	(51,29)**	(51,02)**
Mother's post grad. educat.	26,96	26,91	27,32	27,19
	(23,85)**	(23,80)**	(18,08)**	(17,99)**
Father's secondary educat.	5,28	4,89	7,06	6,58
	(20,32)**	(18,77)**	(26,87)**	(25,05)**
Father's vocat/tech educat.	11,47	11,02	13,67	13,08
	(26,63)**	(25,55)**	(31,28)**	(29,90)**
Father's university educat.	21,4	21,08	22,35	21,91
	(46,44)**	(45,67)**	(46,55)**	(45,56)**
Father's post grad. educat.	23,02	22,48	21,8	21,24
	(27,41)**	(26,75)**	(19,53)**	(19,02)**
Rurality of school	-0,86	0,07	-1,66	-0,74
	(2,65)**	-0,21	(4,99)**	(2,22)**
Northern zone	-2,94		-2,92	
	(11,40)**		(10,90)**	
Southern zone	4,94		4,54	
	(21,86)**		(19,39)**	
Per capita income bracket 2			-2,51	-2,67
			(5,89)**	(6,27)**
Per capita income bracket 3			0.00	0.00
			(.)	(.)
Per capita income bracket 4			6,6	6,39
			(19,38)**	(18,71)**
Per capita income bracket 5			11,5	11,27
			(34,34)**	(33,59)**
Constant	229,94	231,42	228,2	230
	(302,37)**	(310,41)**	(842,68)**	(1015,86)**
Number of observations	230.008	230.008	214.610	214.610
R-squared	0,2	0,2	0,16	0,15

Robust t-statistics in parentheses
* significant at 5%; ** significant at 1%
(1): with income variable and the zone variable; (2): with income variable and without the zone variable
(3): with per capita income variable and the zone variable;
(4):with per capita income variable and without the zone variable

OLS Regression. Language Eighth Grade 2006

	1	2	3	4
Private subsidized school	9,63	9,21	9,8	9,37
	(43,13)**	(41,57)**	(43,04)**	(41,52)**
Private fee-paying school	24,58	23,9	19,68	19,2
	(48,14)**	(47,04)**	(31,15)**	(30,39)**
Income bracket 2	-7,76	-6,34		
	(9,22)**	(8,09)**		
Income bracket 3	-0,18	0,19		
	-0,23	-0,24		
Income bracket 4	4,44	4,48		
	(5,61)**	(5,67)**		
Income bracket 5	8,35	8,28		
	(10,68)**	(10,64)**		
Mother's secondary educat.	9,78	9,48	10,98	10,58
	(37,44)**	(36,21)**	(41,66)**	(40,12)**
Mother's vocat/tech educat.	17,54	17,24	18,89	18,43
	(42,57)**	(41,80)**	(44,82)**	(43,71)**
Mother's university educat.	25,85	25,93	26,58	26,54
	(52,46)**	(52,56)**	(50,93)**	(50,78)**
Mother's post grad. educat.	28,25	28,2	27,91	27,78
	(24,12)**	(24,10)**	(17,72)**	(17,68)**
Father's secondary educat.	6,04	5,65	7,59	7,11
	(22,83)**	(21,35)**	(28,48)**	(26,68)**
Father's vocat/tech educat.	12,61	12,19	14,41	13,81
	(28,85)**	(27,84)**	(32,55)**	(31,19)**
Father's university educat.	20,68	20,42	21,72	21,31
	(44,74)**	(44,10)**	(45,20)**	(44,31)**
Father's post grad. educat.	22,01	21,45	20,62	20,05
	(25,21)**	(24,58)**	(17,78)**	(17,29)**
Rurality of school	0,07	1,02	-0,53	0,44
	-0,21	(3,16)**	-1,58	-1,34
Northern zone	-1,2		-1,29	
	(4,60)**		(4,78)**	
Southern zone	5,68		5,3	
	(24,84)**		(22,48)**	
Per capita income bracket 2			-2,62	-2,8
			(6,13)**	(6,53)**
Per capita income bracket 3			0,00	0,00
			(.)	(.)
Per capita income bracket 4			6,00	5,75
			(17,37)**	(16,62)**
Per capita income bracket 5			9,84	9,61
			(29,22)**	(28,48)**
Constant	227,74	229,89	226,02	228,52
	(292,72)**	(301,53)**	(821,71)**	(1001,01)**
Number of observations	228.869	228.869	213.531	213.531
R-squared	0,17	0,16	0,14	0,13

Robust t-statistics in parentheses
* significant at 5%; ** significant at 1%
(1): with income variable and the zone variable; (2): with income variable and without the zone variable
(3): with per capita income variable and the zone variable;
(4):with per capita income variable and without the zone variable

OLS Regression. Mathematics Second Grade 2006

	1	2	3	4
Private subsidized school	11,82	11,03	10,2	9,39
	(42,78)**	(41,13)**	(33,63)**	(31,9)**
Private fee-paying school	49,32	48,22	38,92	37,92
	(83,15)**	(82,55)**	(59,53)**	(58,79)**
Income bracket 2	-13,89	-12,5		
	(28,76)**	(26,05)**		
Income bracket 3	-3,24	-2,52		
	(7,30)**	(5,68)**		
Income bracket 4	3,86	4,2		
	(7,28)**	(7,91)**		
Income bracket 5	9,87	10,13		
	(18,74)**	(19,25)**		
Mother's secondary educat.	9,42	9,01	9,76	9,24
	(27,02)**	(25,85)**	(27,39)**	(25,92)**
Mother's vocat/tech educat.	21,9	21,32	21,91	21,18
	(50,08)**	(48,73)**	(48,94)**	(47,32)**
Mother's university educat.	31,11	31,03	31,02	30,77
	(50,81)**	(50,63)**	(49,35)**	(48,91)**
Mother's post grad. educat.	30,27	30,11	30,97	30,64
	(20,38)**	(20,24)**	(20,43)**	(20,18)**
Father's secondary educat.	2,28	1,9	3,12	2,61
	(6,51)**	(5,44)**	(8,76)**	(7,34)**
Father's vocat/tech educat.	12,86	12,43	13,37	12,77
	(29,19)**	(28,18)**	(29,95)**	(28,58)**
Father's university educat.	23,26	23,01	23,68	23,24
	(40,68)**	(40,21)**	(40,28)**	(39,49)**
Father's post grad. educat.	25,1	24,63	26,53	25,81
	(24,39)**	(23,88)**	(25,20)**	(24,48)**
Rurality of school	-14,95	-14,29	-15,2	-14,93
	(26,51)**	(25,38)**	(22,64)**	(22,23)**
Northern zone	-0,7		-1,09	
	(2,11)**		(3,03)**	
Southern zone	6,03		6,22	
	(20,37)**		(19,22)**	
Per capita income bracket 2			10,25	10,07
			(26,12)**	(25,60)**
Per capita income bracket 3			15,21	14,68
			(35,98)**	(34,70)**
Per capita income bracket 4			20,45	19,84
			(43,29)**	(41,96)**
Per capita income bracket 5			27,91	27,32
			(50,13)**	(49,05)**
Constant	224,74	227,42	213,05	216,89
	(544,41)**	(626,68)**	(510,27)**	(671,23)**
Number of observations	225.442	225.442	190.087	190.087
R-squared	0,21	0,21	0,22	0,22

Robust t-statistics in parentheses

* significant at 5%; ** significant at 1%

(1): with income variable and the zone variable; (2): with income variable and without the zone variable

(3): with per capita income variable and the zone variable;

(4):with per capita income variable and without the zone variable

OLS Regression. Language Second Grade 2006

	1	2	3	4
Private subsidized school	8,33	7,86	6,91	6,31
	(37,43)**	(36,26)**	(28,43)**	(26,62)**
Private fee-paying school	31,83	31,22	24,12	23,43
	(64,67)**	(64,10)**	(44,36)**	(43,46)**
Income bracket 2	-12,57	-11,54		
	(31,79)**	(29,40)**		
Income bracket 3	-4,45	-3,94		
	(12,24)**	(10,87)**		
Income bracket 4	0,42	0,64		
	-0,96	-1,48		
Income bracket 5	4,6	4,74		
	(10,73)**	(11,06)**		
Mother's secondary educat.	8,01	7,62	8,34	7,85
	(28,33)**	(26,96)**	(28,89)**	(27,16)**
Mother's vocat/tech educat.	17,74	17,24	17,82	17,16
	(50,04)**	(48,60)**	(49,14)**	(47,33)**
Mother's university educat.	26,08	25,96	26,19	25,94
	(52,23)**	(51,93)**	(51,11)**	(50,56)**
Mother's post grad. educat.	26,07	25,95	26,67	26,38
	(20,92)**	(20,82)**	(21,07)**	(20,85)**
Father's secondary educat.	2,67	2,35	3,33	2,87
	(9,43)**	(8,29)**	(11,55)**	(9,96)**
Father's vocat/tech educat.	10,27	9,91	10,67	10,13
	(28,73)**	(27,66)**	(29,47)**	(27,94)**
Father's university educat.	17,71	17,47	18,11	17,69
	(38,13)**	(37,54)**	(37,92)**	(36,98)**
Father's post grad. educat.	18,97	18,57	20,37	19,71
	(21,75)**	(21,25)**	(22,84)**	(22,07)**
Rurality of school	-12,66	-12,09	-11,49	-11,2
	(27,58)**	(26,37)**	(21,09)**	(20,55)**
Northern zone	-2,13		-2,02	
	(7,85)**		(6,93)**	
Southern zone	4,4		5,16	
	(18,39)**		(19,79*)*	
Per capita income bracket 2			7,56	7,41
			(23,74)**	(23,21)**
Per capita income bracket 3			11,79	11,35
			(34,39)**	(33,04)**
Per capita income bracket 4			15,52	14,99
			(40,61)**	(39,16)**
Per capita income bracket 5			20,24	19,73
			(44,91)**	(43,74)**
Constant	235,66	237,28	224,17	227,12
	(701,33)**	(797,16)**	(662,47)**	(859,92)**
Number of observations	225.483	225.483	190.130	190.130
R-squared	0,18	0,17	0,19	0,18

Robust t-statistics in parentheses
* significant at 5%; ** significant at 1%
(1): with income variable and the zone variable; (2): with income variable and without the zone variable
(3): with per capita income variable and the zone variable;
(4):with per capita income variable and without the zone variable

Fourth Grade
Mathematics

Indicators of Inequality		Years of test implementation 1999	2002	2005	2006
Parametric Estimator					
O_{IV}	All circumstance variables	19.0	18.8	16.9	17.4
		0.15	0.17	0.14	0.19
	Only mother's education	9.4	9.2	8.2	8.6
		0.16	0.15	0.14	0.19
	Only father's education	7.4	7.4	6.7	6.7
		0.15	0.15	0.13	0.17
	Only parents's education	14.2	14.1	12.7	13.0
		0.14	0.16	0.17	0.16
	Only household income	6.6	7.4	7.3	6.7
		0.15	0.14	0.15	0.12
	Only type of school	6.4	5.4	4.8	5.5
		0.16	0.10	0.12	0.11

Estimates using the income variable and without the zone variable

Estimates using E(0)

Values are in percentages

Fourth Grade
Language

Indicators of Inequality		Years of test implementation 1999	2002	2005	2006
Parametric Estimator					
O_{IV}	All circumstance variables	21,5	18,9	15,9	13,3
		0,16	0,18	0,15	0,15
	Only mother's education	11,1	9,4	8,2	6,8
		0,15	0,18	0,17	0,16
	Only father's education	8,5	7,6	6,5	5,7
		0,14	0,17	0,15	0,18
	Only parents's education	16,5	14,3	12,3	10,4
		0,16	0,19	0,14	0,15
	Only household income	7,3	7,6	6,7	4,9
		0,12	0,12	0,12	0,11
	Only type of school	6,7	5,3	4,4	4,3
		0,15	0,14	0,15	0,17

Estimates using the income variable and without the zone variable

Estimates using E(0)

Values are in percentages

Eighth grade
Mathematics

Indicators of Inequality		Years of test implementation 2000	2007
Parametric Estimator			
O_{IV}	All circumstance variables	16.9 0.18	16.1 0.17
	Only mother's education	7.1 0.20	7.5 0.17
	Only father's education	6.6 0.19	6.2 0.19
	Only parents's education	11.8 0.17	11.6 0.20
	Only household income	6.9 0.11	6.1 0.14
	Only type of school	6.8 0.13	5.7 0.13

Estimates using the income variable and without the zone variable

Estimates using E(0)

Values are in percentages

Eighth grade
Language

Indicators of Inequality		Years of test implementation 2000	2007
Parametric Estimator			
O_{IV}	All circumstance variables	15,3 0,25	13,8 0,18
	Only mother's education	7,3 0,20	7,0 0,18
	Only father's education	6,3 0,19	5,8 0,20
	Only parents's education	11,4 0,20	10,7 0,18
	Only household income	5,9 0,15	4,8 0,16
	Only type of school	5,6 0,13	4,4 0,12

Estimates using the income variable and without the zone variable

Estimates using E(0)

Values are in percentages

Second grade
Mathematics

Indicators of Inequality		Years of test implementation 2003	2006
Parametric Estimator			
O_{IV}	All circumstance variables	22.1	16.8
		0.16	0.15
	Only mother's education	9.18	7.97
		0.19	0.19
	Only father's education	8.32	6.58
		0.20	0.18
	Only parents's education	14.97	12.30
		0.20	0.19
	Only household income	10.15	6.11
		0.15	0.16
	Only type of school	8.95	8.06
		0.14	0.17

Estimates using the income variable and without the zone variable

Estimates using E(0)

Values are in percentages

Second grade
Language

Indicators of Inequality		Years of test implementation 2003	2006
Parametric Estimator			
O_{IV}	All circumstance variables	19,7	15,0
		0,15	0,17
	Only mother's education	9,24	7,96
		0,19	0,17
	Only father's education	8,01	6,31
		0,18	0,18
	Only parents's education	14,56	11,87
		0,16	0,18
	Only household income	8,81	5,11
		0,14	0,15
	Only type of school	5,44	5,85
		0,17	0,16

Estimates using the income variable and without the zone variable

Estimates using E(0)

Values are in percentages