Department of Economics- FEA/USP

The Effects of Decentralization on Schooling: Evidence From the Sao Paulo State's Education Reform

RICARDO A. MADEIRA

WORKING PAPER SERIES Nº 2012-26

DEPARTMENT OF ECONOMICS, FEA-USP
WORKING PAPER Nº 2012-26

The Effects of Decentralization on Schooling: Evidence from the Sao Paulo State's Education Reform

Ricardo A. Madeira (rmadeira@usp.br)

Abstract:

Decentralization of the delivery of public services provision is an important governance reform recently witnessed in many developing countries. Public education has been one of the key public services devolved to lower level governments. This paper uses an exclusive and rich longitudinal data on primary schools to evaluate the effects of the decentralization reform implemented on the State of Sao Paulo, Brazil, on several indicators of school performance and school resources. Specific aspects of the Sao Paulo's State education reform combined with the data available allow me to deal with some common identification issues encountered by previous empirical studies on the subject. I find conflicting results for different school quality measures; decentralization increased dropout rates and failure rates across all primary school grades but improved several school resources. Further empirical investigation suggests that the worsening of these school performance indicators for the two first grades was partially driven by the democratization of the school access promoted by the education reform. Evaluation of the distributive outcome of the reform suggests that its effects were more perverse for schools located on rural and poor areas. I also find evidence that decentralization widened the gap between the "good" and "bad" schools. Moreover, I find no evidence that the municipalities' administrative experience affected the program's outcome.

Keywords: Decentralization of Public Services, Education Economics, School Quality and Program Evaluation

JEL Codes: I2, I28, H43, H7, C21

The Effects of Decentralization on Schooling: Evidence From the Sao Paulo State's Education Reform

Ricardo Madeira*
University of São Paulo

September 2012

Abstract

Decentralization of the delivery of public services provision is an important governance reform recently witnessed in many developing countries. Public education has been one of the key public services devolved to lower level governments. This paper uses an exclusive and rich longitudinal data on primary schools to evaluate the effects of the decentralization reform implemented on the State of Sao Paulo, Brazil, on several indicators of school performance and school resources. Specific aspects of the Sao Paulo's State education reform combined with the data available allow me to deal with some common identification issues encountered by previous empirical studies on the subject. I find conflicting results for different school quality measures; decentralization increased dropout rates and failure rates across all primary school grades but improved several school resources. Further empirical investigation suggests that the worsening of these school performance indicators for the two first grades was partially driven by the democratization of the school access promoted by the education reform. Evaluation of the distributive outcome of the reform suggests that its effects were more perverse for schools located on rural and poor areas. I also find evidence that decentralization widened the gap between the "good" and "bad" schools. Moreover, I find no evidence that the municipalities' administrative experience affected the program's outcome.

Keywords: Decentralization of Public Services, Education Economics, School Quality and Program Evaluation.

JEL Classifications: I2, I28, H43, H7 and C21

*Department of Economics, Boston University. 270 Bay State Rd., Boston, MA 02215, USA; e-mail: *rmadeira@bu.edu*. I thank Dilip Mookherjee, Kevin Lang, Victor Aguirregabiria, Patricia Meirelles, Daulins Emilio, Gabriel Madeira, Marcos A. Rangel and participants of the BU empirical micro seminar for their helpful comments. I have benefited from discussions about the "Municipalizacao do Ensino" program with several scholars and government officials, I am especially thankful to Hubert Alqueres, Neide Cruz, Felicia Madeira and Rose Neubauer. Financial support from the Boston University's Institute of Economic Development (IED) and the Brazilian Ministry of Science and Technology (CNPq) were essential for the realization of this paper. I am also extremely thankful to Eliana Rodrigues who provided excellent assistance with the manipulation of the GIS data. All remaining errors are mine.

1 Introduction

The decentralization of public services has been one of the most common governance reforms implemented by developing countries. Decentralization reforms are commonly justified by the belief that local governments are more accountable and responsive to the needs of their local communities. It is believed that the proximity of elected local officials to their communities gives them an informational advantage over higher-level governments concerning the local communities' preferences, thus enhancing their ability to tailor public services delivery to the communities' demand. Moreover it is contended that as a result from political competition in local government, decentralization may promote innovation, experimentation and learning about service delivery policies.

On the other hand, the existing literature on decentralization also points to some possible impediments to the success of decentralization reform. One of the major obstacles involves the greater susceptibility of the local governments to being captured by local elites, in the sense that service provision may be designed to cater to the interests of local special interest groups. This threat is believed to be particularly relevant for unequal and poor communities, where the impoverished tend to be more alienated from the political process. It has also been argued that local governments do not have the necessary administrative competence to provide public services efficiently. In addition, the existence of local public goods externalities that go beyond the jurisdiction of local governments, combined with a low coordination effort among them, compromises the efficiency of service delivery under the decentralized regime. Finally, the devolution of administrative responsibilities unmatched with the devolution of fiscal autonomy may result on unfunded mandates. That is, if the necessary fiscal resources to manage the new administrative responsibilities are not granted to the local governments, the local services provision will suffer from scarcity of investments.

Under the existence of many favorable and unfavorable theoretical arguments, the consensus in the decentralization literature is that decentralization outcomes are context-dependent and must be settled by the conduct of empirical research. To that end, this paper employs exclusive and rich longitudinal data on primary schools to evaluate the effects of the decentralization reform implemented in the State of Sao Paulo, Brazil (known as "Municipalizacao do Ensino"), on several indicators of school performance and school resources. Specific aspects of the Sao Paulo's State education reform, combined with the available data, allow me to tackle some common identification issues encountered by previous empirical studies on the subject. Moreover, the availability of socio-economic data at the school neighborhood level combined with socio-economic characteristics and political and fiscal data at the municipality

level, allow me to investigate whether there is any empirical evidence that some of channels addressed in the literature through which decentralization affects service delivery, is at play in the Sao Paulo context.

Owing primarily to the lack of detailed, disaggregated and longitudinal data, and the constant discontinuity in the implementation of decentralization reforms in developing countries, most empirical studies have not been able to satisfactorily identify the effects of decentralization. Most of the existing evidence is contained in descriptive study cases based on small sample analyses that lack the rigor and generality of inferences based on deeper econometric analysis. The few rigorous empirical studies available on the decentralization effect on service delivery in general have found conflicting results.[1]Faguet (2004), has found that the broad 1994's decentralization reform implemented in Bolivia increased the responsiveness of public policies to the local needs. Some other studies, however, have found evidence of local elite capture. Bardhan and Mookherjee's (2006) findings suggest the presence of elite capture in inter-village allocation of pro-poor programs in West Bengal. Araujo et. al (2006), using data on Ecuadorian villages, also uncovered evidence of the influence of local elites on the village's choice among social programs offered by the central government.

There is a growing empirical literature on the decentralization of education provision, since public education has been one of the key public services devolved to lower level governments. The findings also point to distinct directions. King and Ozler (1998) use cross-sectional data on students' standardized test scores and their characteristics to evaluate the effect of the devolution of several management decisions to the schools as a result of Nicaragua school autonomy reform. To identify the decentralization effect, they take advantage of the time variation wherein schools were under the decentralized regime and the fact some schools were not decentralized. Using a two-stage procedure to control for school self-selection into the program, they find that the devolution of the responsibilities that effectively increases school autonomy has a positive impact on student performance. Jimenez and Sawada (1998) use the El Salvador decentralization program to evaluate the effect of the delegation of school administrative responsibilities to local communities on student attendance and test scores. Employing cross-sectional student level data and a control group formed by students in non-decentralized schools, they find that the program had no effect on test scores and diminished student absence caused by teacher absence. They control for the possible selection bias imposed by the students' school choice using the Heckman's two-stage procedure. The main concern with the empirical strategy adopted by both King and Ozler (1998) and Jimenez

[1]Bardhan and Mookherjee (2005a) present a survey with some of the most relevant empirical evidence.

and Sawada (1998) is that their identification of the decentralization effect relies on a correct specification of the selection equation, even though the causes of the possible selection bias in either context is different. In Nicaragua, the schools self-select themselves into the program, while in El Salvador, the students could choose the type of school (centralized or autonomous).

Rodriguez (2006) uses a panel on Colombian municipalities to asses the impact of decentralization on the difference between public and private school average grades on standardized tests. Her findings suggest that once one accounts for the increase in enrollment on public schools promoted by the reform, the decentralization improved student performance. Galliani et all (2005) use school-level data on standardized tests in Argentina to evaluate the effect of school decentralization on student performance. They find that decentralization improved test performance in the most affluent municipalities located in well administered provinces, while it decreased performance in the poorest municipalities located in weakly administered provinces. Their results are consistent with the theoretical prediction that the success of decentralization is related to low poverty rates and the local government's administrative ability. Since the identification of the decentralization effect in both papers, Rodriguez (2006) and Galiani et all (2005), stems from the variation on the timing of the decentralization across provinces, their identification strategy relies on the assumption that these variations are exogenously determined.

Paes de Barros and Mendonca (1998) use a state-level panel in Brazil to evaluate the impact of three innovations in school autonomy on several school quality measures and on state average student performance on standardized tests. The innovations are direct elections of school principals, the establishment of school councils with members from local communities, and school financial autonomy. They find very weak evidence that these innovations had positive effects on schooling. Their econometric strategy also relies on the assumption that the implementation of these innovations is exogenous.

The "Municipalizacao do Ensino" program was launched in 1996 by the newly elected government of the State of Sao Paulo. The reform was characterized by the transference of the full management control of the primary and secondary state-run schools to the municipalities. Different from most decentralization programs examined in the literature in the Sao Paulo reform the decision to decentralize was also decentralized. That is, the atate government devolved to each municipality the decision to take over the primary and secondary state schools located within its jurisdiction. The municipalities were allowed to make this decision at any time on a school-by-school basis. The data reveal that the municipalities' participation in the program was gradual. Other two distinctive features of the Sao Paulo educational

reform were its long continuity and size. The state government administration maintained the reform after winning two subsequent state elections (in 1998 and 2002). In the eight-year period covered by the data (from 1996 to 2003), more than 2,200 primary state schools were adopted by the municipalities, which is more than 50% of the state-run primary schools.

In the light of the existing literature, the contribution of this paper is threefold. First, the fact that the Sao Paulo reform school decentralization was gradual and not universal, combined with the availability of data on the pre-decentralization period, allows for the implementation of two compelling robustness checks on the identification assumptions of the econometric specifications used. The robustness exercises performed allow me to identify if the econometric specifications used are controlling for possible selection biases imposed by the municipalities' school choice. Second, the availability of data on measures of school resources and school performance at the school and grade level allow me to identify separately the decentralization effect on various measures of school quality across all school grades. The results confirm the relevance of this separation for deeper understanding of how decentralization affected school quality.

The third contribution stems from a distinctive feature of the data used, i.e., it provides information on socio-economic characteristics of the school neighborhoods, which I constructed aggregating the population census tract data through the application of GIS techniques. Information on socio-economic characteristics of the school neighborhood is of particular relevance for two reasons. First, they can be used as key time varying control variables to diminish possible selection bias, since several schools neighborhood characteristics are arguably related with the school adoption criteria used by municipalities. Second, the interaction between decentralization effects with school neighborhood characteristics allows me to identify whether some of these characteristics are relevant for successful of the reform, as predicted by some of the theoretical studies. That is, it allows for identifying how socio-economic characteristics of the school immediacy, where are located those who benefit most from the school, affects program outcome. In the light of the previous findings in the literature, it is of particular interest to examine the effects of the school immediacy's poverty rate and income distribution on the decentralization outcomes.

This paper finds conflicting results for the average reform impact for different dimension of school outcomes. The decentralization increased dropout rates and failure rates across all primary school grades, but improved several school resources. The robustness check performed provides compelling evidence that my findings are free of possible biases imposed by the mayor's selection, once the econometric specifications considered allows for school

specific-trends. Further empirical investigation using grade level enrollment and performance measures suggests that the worsening of the school performance indicators for the first and second grades were partially driven by the democratization of the school access promoted by the reform. However, the democratization hypothesis does not explain the performance worsening observed in the third and fourth grades. The results for the distributive outcomes of the reform indicate that decentralization was slightly more perverse for schools located in poor and rural neighborhoods. However, different from the findings of other papers on the literature I do not find a positive decentralization effect for schools located on more affluent areas. Interesting results are obtained when the state schools are grouped according to their dropout rate rank before the program was launched. The findings suggest that decentralization widened the gap between the "good" schools, the ones with low dropout rates, and the "bad" schools, the ones with high dropout rates. Finally, I find no evidence that the administrative experience with primary schooling management played any role on the effect of decentralization.

This paper is organized into six sections. Section 2 presents the institutional background of the Sao Paulo educational reform. Section 3 describes the various data sets used and explains how the final data set was constructed. Section 4 discusses the empirical strategy implemented along with the key underlining identification assumptions and presents the results of the robustness checks performed for the choice of the best econometric specifications. Section 5 describes the findings and section 6 presents the concluding remarks.[2]

2 Institutional Background and Decentralization Reform

The Brazilian pre-college educational system is organized into four levels: preschool (attended by 6 year-old), primary school (attended by 7 to 10 year-olds), secondary school (attended by 11 to 14 year-olds) and high school (attended by 15 to 17 year-olds). The primary school, which is our object of investigation here, comprises four school years, the first four grades. The basic displines offered at the primary educational level are language (Portuguese), mathematics, social studies and science.[3]

The Brazilian constitution dictates that states and municipal governments share the responsibility for the provision of primary and secondary public education. The proportion of primary and secondary schools provided by the municipalities and the states varies widely

[2] The tables with the results are displayed on Appendix I and the detailed description of the procedure used to construct the school neighborhood variables is presented on the Appendix II.

[3] All the basic subjects are taught by the same teacher, and some private schools enhence their curricular activities additional activities such as physical education and the arts, which are taught by specialized teachers.

across the Brazilian states (see Table 1). In 1997, Sao Paulo had the third highest proportion of students enrolled in state schools among all the 27 Brazilian states.

Sao Paulo State Decentralization Reform: In 1995, the Brazilian Social Democratic Party (PSDB) won the Sao Paulo's state government office, after winning the 1994 election. There was consensus among government officials about the inefficiency of the highly centralized state's educational system, because two key reasons. First, the existence of numerous bureaucratic tiers between state government policy makers and the schools' principal, which imposed impediments to the system's response to the schools specific needs. Second, the lack of community involvement in local school management. To tackle these problems, the state government launched one of the largest decentralization programs ever implemented in the Brazilian public education system, known as the "Municipalizacao do Ensino." The reform was expected to bring the educational policy decision-making closer to the local communities, since municipal governments are believed to be more accountable to the community demand than is state government. Moreover the decentralization could increase the involvement of the communities with the local schools, improving the response of school management to the communities needs. These arguments were appealing to the Sao Paulo state due to the huge social and economic differences across the various regions of the state.

Differently from most decentralization programs examined in the literature in the Sao Paulo reform the decision to decentralize was also decentralized. That is, the state government devolved to each municipality the decision to take over the primary and secondary state schools located within their jurisdiction. The municipalities were allowed to make this decision at any time on a school-by-school basis. The mayor of each municipality was responsible for the takeover decision, though the city council had the power to block the mayor's decision. The program was characterized not only for its size in terms of the number of pupils affected (over 5 millions), but also for its long continuity, since the PSDB continued the program after winning two succeeding state elections in 1998 and 2002.

Once a municipality adopts a school, its students are automatically transferred. State legislation mandates that public school students must attend the public school nearest their homes, irrespective of whether it is state or municipal. The transfer of schools was regulated by state *law 40,673*, which was further augmented by the state *laws 40,889* and *42,778*. Accordingly to the laws, the municipalities have total autonomy over the adopted schools; they are fully responsible for all school management activities, from setting the school curricular core to designing the career plans of school professionals. The few restrictions on

the school curricular content were some general educational guidelines established by the Brazilian National Council of Education, which were also applied to the state-run schools.

Upon school adoption, the property rights of all school physical resources, including the school building itself, are permanently transferred to the municipal government. Some of the school's human resources, including school teachers and staff, are temporally lent by the state to the municipal administration until the municipalities hire their school professionals to attend the demand of the newly adopted school. The number of school employees lent by the state varies according to the needs of the municipalities.

Before program implementation, the vast majority of Sao Paulo's municipalities had expertise with primary and secondary education provision. They were only responsible for kindergarten and preschool administration. Therefore, participation in the program represented a significant administrative challenge for the adopting municipalities as result of the higher level of administrative complexity involved in primary and secondary education vis-à-vis the lower levels of education. The municipalities with no past experience with primary education had one year, accordingly to the law, to hire new professionals and put in place a school professionals' career plan and a municipal education council (the municipal institution responsible for setting the municipal school's curricular content). The law further dictates that municipalities must meet certain minimum administrative and financial criteria in order to be able to adopt a school. However, the law does not explicitly specify those criteria. The task to determine the municipalities' eligibility for the program was delegated to a commission composed of education experts formed by a staff of the State-Department of Education. This commission, known as the Decentralization Team, was also responsible for providing technical and administrative support to the municipalities engaged in the program during the transition period.

Primary Education Funding: Before describing the decentralization process and its extents on the Sao Paulo state, it would be helpful to review the laws that regulate educational funding in Brazil during the decentralization process. In particular, an education funding reform (known as FUNDEF) implemented in January of 1998 played a major role in shaping the public resources earmarked to education.

The Brazilian constitution mandates that municipalities and states must spend at least 25% of their tax revenues and transfers on their educational system to accomplish their constitutional duty. However, until the FUNDEF[4] implementation, there was no regulation

[4]FUNDEF stands for Fundo para a Manutencao e Desenvolvimento do Ensino Fundamental e Valorizacao do Magisterio.

in the constitution about how these resources earmarked to education should be spent. Due to the heterogeneity between states and municipalities with respect to the number of pupils enrolled in their education system, richer states and municipalities were spending more per pupil than their poorer counterparts. That is, the allocation of resources earmarked to education was not driven by the investment necessity. In addition, because the lack of regulation in the constitutional law about how the earmarked resources should be allocated, richer states and municipalities could exploit the broad definition of education to spend their resources earmarked for education in other activities marginally related to education. The lack of effective monitoring also contributed to this type of moral hazard behavior. This problem was particularly acute in the municipalities on the Sao Paulo state, since most of them were only responsible for maintaining a pre-school system, which requires fewer resources per pupil than higher levels of education.

An additional issue of the pre-FUNDEF education funding law was the lack of specification of how the earmarked resources should be distributed across various levels of education. For some researchers (Castro, 1998), this problem was particularly severe, since they contended that the lack of investments in primary and secondary education was one of the bottlenecks of the Brazilian public education system.

As an attempt to deal with these distortions, the federal government implemented a national education bill (FUNDEF), which was approved by the national congress in 1996, but not implemented until January 1998. The essential features of the FUNDEF are:

i) Create a fund with resources collected from states and municipalities. Each state and municipality must contribute 15% of its tax revenues and transfer revenues.

ii) Redistribute the resources collected within states to municipalities and state government according to the number of students enrolled in their primary and secondary education system.[5]

iii) Create a commission to annually set a minimum monetary value per pupil to be distributed. This minimum value is based on an estimate of school management costs. Due to the characteristics of various types of schools, this minimum can be different for primary and secondary schools. If for some states, the resources per pupil collected by the fund are smaller than the minimum set value, the federal government must provide the difference.[6]

iv) States and municipalities must spend at least 60% of the fund on teacher wages.

This new educational funding regulation represented a significant change on the fiscal incentives for school adoption. During the pre-FUNDEF's period (1996 and 1997), there was no

[5] The redistribution of resources is based on the School Census data.
[6] In 1997, the federal government complemented the fund for 6 states

pre-established financial compensation in exchange for school adoption. Financial compensations were negotiated in a case-by-case basis, depending on the financial situation of each municipality and on the number of schools they were willing to adopt. However, FUNDEF granted to the adopting municipalities the financial resources to manage the schools, since the fund's resources were allocated in order to maintain the spending per pupil constant.[7] After its implementation, FUNDEF was the only fiscal incentives for the adopting municipalities, i.e., the state government dropped all other forms of fiscal compensation.

Decentralization Diffusion Tables 2 and 3 in the appendix describe the diffusion of the decentralization process. Table 1 compares the yearly evolution of the average municipal enrollment share on total public enrollment for primary and secondary schools across all the 645 municipalities of the Sao Paulo state. It shows that the program engagement was much stronger for primary schools. From 1996 to 2003, the average municipal enrollment share of primary schools climbed from 5.98% to 70.46%, while for secondary school schools the figures increased from 1.90% to 21.26%. The municipalities could also increase their share on the total public school enrollment by building their own schools instead of adopting state-managed schools. However, table 3 shows that decentralization was responsible for more than half of the observed increase on municipal enrollment in primary schools across the state. The third column reports the total number of decentralized schools and enrolment in decentralized schools by year, while the second column presents the same figures for own municipal schools. By 2003, 2,326 schools had been decentralized, accounting for 60% of the existing municipal schools across the sate.

The number of state schools adopted by year is presented on the fourth column of Table 3. It reveals that the program participation was gradual on time. The engagement in the program peaked in 1998 and has decreased at a slow rate since then. This pattern suggests the important role played by the FUNDEF reform.

The spatial dispersion of the adoption decisions across municipalities over time is depicted in Figure 1. The municipalities marked in blue are the adopters. The blue scale indicates the fraction of state schools that were adopted (the darker it is, the higher the fraction of adopted schools). The figure shows that decentralization diffusion across municipalities was also gradual. In addition, the figure reveals that many municipalities adopted schools over time, starting with a few schools and increasing the share of adopted schools in subsequent years. Lastly, the figure suggests that the adoption decisions by the municipalities are spa-

[7] The FUNDEF was an attempt to discipline 60% of the resources earmarked to education by the constitution. Castro (1998) shows that the FUNDEF was effectively a fiscal reform within states, given the magnitude of its impact in municipalities and states budget.

tially correlated. The sequel of maps, from 1996 to 2003, shows that there were a few pioneers in 1996; in the following years, cluster of adopters were being built around the 1996 adopters.

3 Data

The final data set used in this paper was assembled by combining four different sources of Brazilian data: the School Census, Decennial Population Census data, electoral data and municipalities Fiscal Data.[8]

School Census: The School Census is an annual survey that collects information on every school in Brazil, both public and private. The survey is conducted by the Ministry of Education in collaboration with state-level education departments. Questionnaires are sent to each school principal and a response is mandatory.[9]

The data provide detailed information on school resources, such as number of classrooms, libraries, computer labs, sports facilities, source of water supply, and access to sewerage. The data also provides the number of teachers per school level and the highest degree of education obtained by each teacher. At the student level, the School Census provides information on the number of students per school grade, organized by gender and age. Data on student performance is also available in the form of failure and dropouts per school grade.

I use data from 1996 to 2003 for all primary (first to fourth grades) schools (public and private) in the State of Sao Paulo. In 1996, there were 6,615 primary schools in the Sao Paulo State with 2,327,177 students. In 2003 there were 7,615 primary schools with 2,097,120 students. For the 8-years period covered by this paper, the data provides information on 11,709 primary schools, which comprise the set of all primary schools in the State of Sao Paulo that were operational at some point during these years.

Decennial Population Census: The Decennial Population Census is the most detailed

Brazilian household survey. It has been collected decennially since 1950 by the Brazilian Institute of Geography and Statistics (IBGE), an agency of the federal government.[10] The

[8] Each of these data sets are publicly available (some upon request) from their administrators. The Decennial Population Census data can be found at the Sao Paulo state government agency Data Analysis Foundation (SEADE) at <http://www.seade.gov.br/>. The School Census data can be found at the Brazilian Ministry of Education's website at <http://www.mec.gov.br/>. The fiscal data of the Municipality-level Data is available at the website of the Sao Paulo State Account Office (TCE-SP) at <http://www.tce.sp.gov.br/>, and the electoral data is available from the Brazilian Supreme Electoral Court (TSE) at <http://www.tse.gov.br/>.

[9] In order to check the accuracy of the information provided a random sample of schools is inspected every year by the state-level Education Department.

[10] The only exception was in 90's, where the census was collected in 1991.

census data are organized into two different samples, the sample census and the universal census, both provide household data. The former provides information on the universe of the Brazilian households, while the later provides more detailed household information for a sample of 20% of the Brazilian households (every fifth home is surveyed). Most the information provided by the universal census is for the head-of-household, while the sample census contains information on all household members.

This paper uses data from the census tract, which is constructed based on the universal census, for the years of 1991 and 2003. The census tract is a geographic division of the census that roughly contains data on 1000 households each; with its borders being defined by the IBGE according to administrative criteria. I use data on all the 49,713 census tracts that cover the entire territory of the Sao Paulo State. In 2000, the Sao Paulo State population was 37,032,403 distributed among 645 municipalities.

For each census tract, there are 527 variables on the characteristics of the households (mostly head-of-household) who live inside its boundaries. Due to the IBGE confidentiality policy, census tract micro data are not available; IBGE only provides the marginal distribution of each variable. The variables available are organized into three different groups according to the type of information. The first group provides information on several home characteristics, such as type of property (e.g., rented, owned), access to treated water and sewerage, and number of bathrooms. The second and larger group is composed of variables on the characteristics of the head-of-household, such as age, gender, income and years of education. The last group of variables provides information on the other members of the households, such as number of members, gender, age, and relation to the head-of-household. This last set of variables does not provide information on the income of the other members of the household nor detailed information on their education attainment; the only education information available is on literacy.

Electoral Data: >From 1996 to 2003, four elections were held in Brazil, one every two years starting from 1996. In the years 1996 and 2000, local elections were held for mayors and city council and in 1998 and 2002, general elections were held for president, state governor, the senate, the state congress, and the national congress. The electoral data provide information on all election outcomes per pooling station, including the number of votes received by all candidates, political parties, and turnout rate. This paper makes use of data from the four elections aggregated at the municipal level for all municipalities in the state. I also use data on the political party of the mayors and on the city councils' political party composition.

Fiscal Data: The fiscal data contain yearly information on municipal revenues, expenditures, and deficits. The revenue data are broken down by various sources of taxes and transfers (e.g., property tax and federal government transfers). The expenditure data are broken down into 12 areas of public policies, including health, education, housing, transportation, and social security.

Final Data Set: For all the urban municipalities with more than 25,000 habitants in 2000 (which accounts for 170 municipalities out of 645), the IBGE provides digital maps of the census tract, and the SEADE (Data Analysis Foundation of the State of Sao Paulo) provides digital street maps. By combining these maps, it becomes possible to identify in which census tract each school is located through the full school addresses provided by the school census. Making use of GIS techniques and interpolating the 1991 and the 2000 Decennial Population Census, I have aggregated the census tract for each public school neighborhood by year, where the school neighborhood was defined to match the area where are located the potential public school users accordingly to the Brazilian legislation. The data appendix explains in more detail how the school neighborhoods were constructed.

The final outcome is an eight-year school level panel, from 1996 to 2003, that includes all primary schools (private and public) located in the State of Sao Paulo. Besides the school level information available on the school census data, the panel also contains yearly information on the census tract household's variables for the public school neighborhoods and the yearly information provided by the Electoral and Fiscal data aggregated at the municipal level.

4 Econometric Strategy

In order to obtain a comprehensive understanding of the decentralization effect on the quality of school provision, we examine its impact on indicators of school performance and school resource. In doing so, I use three measures of school performance aggregated across the four primary school grades[11]: dropout rates, failure rates and age-grade distortion. The dropout rate is given by the total number of students who have dropped out the school by the end of the school year divided by total enrollment at the beginning of the school year. The failure rate is given by the total number of students who failed by the end of the school year divided by the initial enrollment. The age-grade distortion is given by the average difference between the students' age and the ideal age of the grade in which they are enrolled. As for school

[11] All the three mesures are first computed at the grade level and than aggregated across the four grades taking a weighted average, where the weight are given the share of the student enrollment in each grade over total school enrollment across grades.

resources, we use seven different indicators; class size, pupil-teacher ratio, hours of schooling, percentage of teachers with college degree, number of computers per hundred pupils, number of television per hundred pupils and number of VCRs per hundred pupils.

A major econometric concern for estimating the impact of the decentralization on these school quality indicators stems from the fact that the municipalities selected themselves into the program, i.e., the decentralization was not randomly assigned. Therefore, observed differences in quality between the decentralized and non-decentralized schools could potentially be driven by the adoption criteria used by the mayors, rather than the decentralization reform. The hypothetical counterfactual exercise that one would like to perform to accurately access the decentralization effect on the school quality indicators involves comparing at the same time the quality indicators of the same school under the two type of administration, state and municipal. Since this is not feasible, my identification strategy relies on the difference-in-differences approach proposed by the treatment effect literature for non-random treatments. The rationale for this approach is to compare the school quality indicators of the decentralized schools (treated) to the same indicators of a control group of schools, which are not affect by the decentralization. A valid control group must include non-decentralized schools where the average school quality indicators would not differ from the decentralized ones on the absence of decentralization. In other words, the control group should provide a good proxy for the decentralized schools in the absence of the decentralization.

Based on that, my identification strategy relies on three factors: (i) the fact the school adoption was gradual in time, (ii) the availability of panel data with information before and after the decentralization, and (iii) the availability of several time varying control variables that are possibly correlated with the adoption decision and the decentralization effect on school quality. The combination of the first and second factors allows me to use as a control group all state managed schools that were never decentralized and all the decentralized state schools before the decentralization.[12] In addition, the availability of panel data allows me to control for all time invariant school's unobserved heterogeneities that might be correlated to the adoption decision and the decentralization effect. Lastly, the availability of several time varying variables at the school, school neighborhood and municipality level allows me to control for key time varying elements that might be related with the mayors' choice. Therefore, unless the mayors based their school adoption decisions on some unobservable time varying characteristic that affects the decentralization outcome on the school quality measures, one of the econometric specifications considered should provide unbiased estimates

[12] For all schools decentralized after 1996, which comprises 96% of them, there are data available on the quality indicators before an after the decentralization.

of decentralization effect. Given the large set of time varying controls available, it is difficult to thing of any possible unobservable time varying school and municipality characteristics that could possibly affect the impact of the reform on school quality.

I use two different econometric specifications to evaluate the decentralization impact. The first is a standard fixed effect model (FE hereafter) given by:

$$y_{imt} = \alpha_i + \theta_t + \sum_{j=1}^{5} \delta_j D_{itj} + \beta X_{it} + \gamma X_{mt} + \mu_{imt} \tag{1}$$

where y_{imt} represents a given school quality indicator for a school i located on the municipality m on period t, α_i denotes school i fixed effect, θ_t denotes year fixed effects, X_{it} denotes a vector with school and school neighborhood time variant characteristics, X_{mt} denotes a vector with municipality m time varying characteristics, and D_{itj} is an indicator varying that assumes value 1 if the school i in the year t has been decentralized for j years and zero otherwise. I allow j to vary from 1 to 5, therefore the group index by $j = 5$ includes all the schools that have been decentralized for 5 or more years. This specification allows for nonlinear decentralization effects over time (up to four years since the decentralization), which may be expected under the presence of any type of transition effect upond the transference of school management from the state to the municipalities. The justification for allocating the schools decentralized for 5 or more years in the same group resides on the fact that the primary schools have four grades, so after five years since decentralization the cohort of first grader's pupils at the year of decentralization will be out of the school. The coefficients of interest are the δ_j for $j = \{1, 2..., 5\}$ for each of the school quality indicators.

The second econometric specification I use is the random trend model (RT hereafter), as discussed by Heckman & Hotz (1989), given by:

$$y_{imt} = \alpha_i + g_i t + \theta_t + \sum_{j=1}^{5} \delta_j D_{itj} + \beta X_{it} + \gamma X_{mt} + \mu_{imt} \tag{2}$$

In addition to the school fixed effects, this model allows for school-specific time trends, given by the term $g_i t$. To estimate (2), I take the first difference to obtain:

$$\Delta y_{imt} = g_i + \xi_t + \sum_{j=1}^{5} \delta_j \Delta D_{itj} + \beta \Delta X_{it} + \gamma \Delta X_{mt} + \varepsilon_{imt} \tag{3}$$

where Δz_t denotes the first difference of the variablez_t ($\Delta z_t = z_{t+1} - z_t$). The equation (3) is a standard fixed effect specification applied to the variables' first difference, where the school

i fixed effect is given by the growth rate of school i specific trend (g_i).[13] The advantage of the RT model over the FE model is that it allows me to control for the possibility of selection bias on the schools' specific trends. That is, if the adoption criteria used by the mayors are related to school specific trends the FE model would provide biased estimates of the decentralization effect. For instance, if the mayors can observe school-specific time trends on some school quality indicators and adopt the schools that have more favorable trends, the decentralization effect δ_j under the FE specification would attribute to the decentralization reform a positive effect, which actually stems from the difference in trends between decentralize and non-decentralized schools.

Table 4 presents the descriptive statistics for all the school quality indicators. The comparison of the statistics of the state schools that were never decentralized (column 2) with the decentralized schools before the decentralization (column 3) indicates that the adopted and non-adopted schools presented systematic differences in several characteristics. The adopted schools displayed on average lower levels on the main school quality indicators. On average, before the decentralization, the adopted schools presented higher dropout rates, failure rates and distortion age-grade. Also, the decentralized schools had less school resources on average than the other state schools. The difference in the percentage of teachers with college degree was particularly sharp; the share of teachers with college education on the adopted school was 7% less on average.

The descriptive statistics for school and school neighborhood characteristics (Table 5) presents a pattern consistent with the one of school quality indicators. The adopted schools are on average smaller and located in poorer, more unequal and less populated neighborhoods. Moreover, the adopted schools were less sophisticated in terms of school facilities; on average they had fewer libraries, sport courts, and computer and science labs.

The descriptive statistics for the municipalities' socio-economic characteristics presented in Table 6 also reveals some systematic differences between the cities of the decentralized schools and the cities of the non-decentralized schools. The adopted schools' municipalities are on average smaller, poorer, and have a higher population share living in rural areas.

These observed differences on key characteristics between the adopted and non-adopted schools and school neighborhoods reinforce the concern of potential bias on the decentralization effect estimates due to the criteria used by the mayors to adopt state-run schools. To account for the potential bias that these observed characteristics may impose on the decentralization effect estimates, I run both specifications (RT and FE), adding many of them as

[13] Due to the differencing, the Random Trend Model can only be used for panels where each observation appears for at least three periods. Therefore, the schools that only appear for two or less years were dropped from the data.

controls. More specifically, I include controls for school characteristics (enrollment, number of employees, number of classrooms, school levels offered, library, science lab, computer lab and sports court), school neighborhood and cities' socio-economic characteristics (population, percentage of population on the primary schooling age range, average income, and income's coefficient of variation). For the school performance regressions all the measures of school resources were also added to the controls.

Although the descriptive statistics for the municipalities (Table 6) do not suggest any sharp differences between the political characteristics of the adopting and non-adopting municipalities, key political characteriscs relevant for the decentralization process were included nonetheless among the set of controls. Since the reform was proposed by the Brazilian Social Democrat Party (PSDB), it is reasonable to conjecture that the mayor's party affiliation played a role on their decision to engage in the program. That is, it is possible that the mayors whose political party is closer to PSDB were more prone to engage in the program. To account for possible biases imposed by school adoptions induced by the mayor's party affiliation, a dummy variable that indicates if the PSDB belongs to the mayor's coalition on the municipal election was included among the controls. Also, since the city council has the power to block the mayor's adoption decision, I also added among the set of controls the share of the city council members who belong to the coalition of the mayor's party. Finally, I also include among the city level controls revenue per-capita and a dummy variable that indicates if the city is running a fiscal deficit or surplus (budget status).

4.1 Specification Choice

Table 7 displays the results for the FE model, while table 9 presents the results for the RT model. The "*sample year*" row on tables indicates the years that were included in the sample for each regression. Since some of the controls are only available for more recent years, due to changes on the School Census questionnaire through the years, I present the regressions for different years to allow for the inclusion of additional controls.[14][15] The dependent variable student age-grade distortion and percentage teachers with college education are only available after 1997.

Apart from the magnitude of effects, both specifications present similar results for school

[14] A potential relevant control that was only included on the School Census survey after 1997 is the existence automatic promotion policy. Schools that have adopted this policy only fail students who have extremely bad performances related to clear lack of effort and high school absence. Therefore is natural to expect that this policy affect students' performance.

[15] I also run all the regressions without the inclusion of school characteristics and school resources among the controls, since the decentralization could be affecting the school quality indicators through changes in these resources. The results obtained with the omission of these variables are quite similar and are available under request. These results will show on a future version of this paper.

performance. The estimates show that decentralization has a negative and statistically significant impact on all performance indicators, i.e., it has increased failure rates, age-grade distortion, and dropouts. Moreover, these negative effects are increasing in time. As for school resources, the two specifications yield similar results for class size and students-per-pupil ratio; they both indicate that theses resources have improved with the decentralization. However, the FE estimates reveal a negative and significant effect of decentralization on the percentage of college-educated teachers while the RT estimates show no significant effect. For the number of VCRs and computers the FE estimates show that decentralization has a negative effect in the first two years, but revert to a positive effect after the fifth year, while the RT estimates indicates only the positive effect after the fifth year.

Due to the differences in the decentralization effect estimates of both specifications, I perform two robustness check exercises. First, I run both specifications for a reduced sample containing only the decentralized schools and I then compare this with the results obtained for the full sample (with all public schools). If the econometric specification is indeed controlling for the potential bias on decentralization effect coefficients, we would expect similar results across the two samples, since the only difference between the samples is the composition of the control group. The reduced sample control group comprises only the decentralized schools before the decentralization, while the control group in the full sample contains also the non-decentralized schools. So, if the econometric specification is controlling for all the relevant differences between the decentralized and the non-decentralized schools imposed by the mayor's selection, the average decentralization effects estimates should be invariant to the addition of the never decentralized state schools to the control group.

Table 8 reports the FE results for the reduced sample, while table 10 presents the reduced sample estimates for the RT specification. The comparison of theses results with those obtained for the full sample (previously discussed) reveals that the RT specification provides very similar estimates for both samples, in particular for the school performance regressions. On the other hand, the FE model provides quite different estimates. The differences in the decentralization effect estimates are particularly sharp for the school performance regressions, i.e., some estimates on the reduced sample are two times greater than the estimates for the full sample. These results suggest that the RT specification is more effective in controlling for school selection biases. That is, accounting for schools idiosyncratic trends seems to be important for effective control of the selection bias. Moreover, the difference between FE estimates across samples suggests that the selected schools had indeed a "worse" idiosyncratic trend on school quality measures than the never adopted state schools. This finding

is consistent with the descriptive statistics presented before, since on average the adopted schools were located in rural, poorer and more unequal neighborhoods.

For the second robustness check exercise, I take advantage of data availability for the pre decentralization period to perform the pre-program specification test for non-experimental estimators.[16] This test is executed in two steps. First, I selected all the schools that were decentralized between 2000 and 2003 and I then run all regressions for both specifications for a further reduced sample containing only the 2000-2003 period. In the second step, I lagged the "*years since decentralization*"[17] variable in four years for all the after-2000 decentralized schools and I then run both specifications (all regressions) for the 1996-1999 sample and compare them with the results obtained for the 2000-2003 sample. If the specifications are indeed capturing the average decentralization effect, the estimates for the 1996-1999 sample should not be significant, since these school were only decentralized after 1999. The results for this test for the school performance regressions are reported in Table 11, and the results for the school resource regressions are reported in Table 12. Both specifications for all regressions pass the test, that is, they provide non-significant effects (at the 5% level or lower) for the 1996-1999 sample even when significant effects are obtained on the 2000-2003 sample.

5 Results

5.1 Average Effects

The two robustness checks performed here suggest that the RT model provides unbiased estimates of the average decentralization effect.[18] According to the findings of the RT model, decentralization has on average decreased school performance and improved most school resources. The results for school performance reveal that the negative effects are increasing over time, suggesting that they are not transitory effects related to possible temporary adjustments to the new decentralized regime. The comparison of decentralization effects to the dependent variables' standard deviations shows that the effect is quite relevant for dropout

[16] An example of the application of this test can be found in Heckman and Hotz (1989).

[17] Since the 1996-1999 and 2000-2003 samples are comprised of four years, to perform the pre-program specification the decentralization variables $\sum_{j=1}^{5}\delta_j D_{itj}$ in the specifications (1) and (2) were replaced by δDY_{it}, where DY_{it} indicates years elapsed since the decentralization occurred. Therefore this specification does not allow for nonlinear decentralization effects.

[18] Under the presence of serial correlation in the error term, the standard errors of the decentralization effect estimates could be understated. In a future version of this paper I intend to correct the standard errors using the *block-bootstrapping* suggested by Bertrand, Duflo and Mullainathan (2004). However, it should be noted that since the data has a short time series, only 8 periods, the existence of serial correlation in the error term is not expected to have a major impact in understating the standard errors. In addition, the fact that the standard errors are clustered at municipal level mitigates the effects of serial correlation on the standard error.

and failure rates. On average, one year of decentralization increases dropouts by almost 0.6 standard deviations and failure rates by almost 1 standard deviation.[19] The results for the students age-grade distortion are more modest; the increase on the distortion is statically significant only after two years of decentralization.[20] On average, one year of decentralization increased the distortion by 0.13 standard deviations.

As for school resources, the reform had an increasing, albeit modest, positive effect on electronic equipments per student, starting from the third year of decentralization. On average, one year under the decentralized management increased VCRs and TVs per hundred students by 0.1 standard deviations. More significantly, the reform has substantially decreased class size and the pupils-teacher ratio; on average one year of reform lead to decrease both measures by 0.4 standard deviation. The U-shape pattern of the estimated decentralization coefficients suggests that the reform effects on class size and pupils-teacher ratio were highly non linear. The fact that the "*3 years of decentralization"* coefficient displays the lowest number, combined with the fact that "*5 years of decentralization*" coefficients are not significant, indicates that on average the adopted school adjusted the class size and pupils-teacher ratio in three years.[21] As for primary school enrollment, the reform had a positive and increasing effect starting from the third year, i.e., on average one year of decentralization increased primary school enrollment by 0.2 standard deviation. Lastly, the reform had no significant effect on the number of teachers with a college education.

5.2 Democratization Hypothesis

The conflicting findings for school performance and school resources, combined with the positive effect on enrollment, suggest that the worsening of school performance measures might be related to the democratization of schooling access promoted by the decentralization. That is, decentralization might have made schooling more attractive due to improvements on schooling resources, thus increasing the opportunity cost of staying out of the school. The decrease in performance would follow if the students who decide to enroll in the school due to the improvements promoted by the decentralization were on average less able than the

[19] This numbers were computed taking the average of the coefficients for the first five years of decentralization ($\sum_{j=1}^{5} \frac{\widehat{\delta}_j}{5}$) and dividing them by the sample standard deviation.

[20] The estimates obtained for the 1999-2003 period reveal that the first year of decentralization actually decreased the age-grade distortion.

[21] To verify if there is indeed an non-monotonic decentralization effect on students per class and pupil-teacher ratio, I re-run the regressions for these variables replacing $\sum_{j=1}^{5} \delta_j D_{itj}$ by $\delta_1 DY_{it} + \delta_2 (DY_{it})^2$. The results show that δ_1 is significant and positive, and δ_2 is significant and negative , confirming the U-shape pattern.

students who would enroll in the school in the absence of the improvements. In this case, decentralization would decrease average student ability, which in turn would result in lower average student performance. Rodriguez (2006) has identified this democratization effect in Colombia.

To identify whether the democratization hypothesis can indeed explain the findings for school performance, I look to the decentralization effect at the grade level. The grade level regression for dropouts and failure rates show that decentralization has worsened these measures for all four grades (Tables 13 and 14). The grade enrollment regressions reveal that decentralization has increased enrollment in the first and second grades, but decrease it on the third and fourth grades (Table 16). It is thus possible that the democratization hypothesis is valid for the two first grades, but the effects on enrollment argue against the hypothesis for the last two grades. The second grade enrollment regression provides further evidence of the democratization hypothesis for the earlier grades since it shows that one year of decentralization has significantly increased enrollment in the second grade. This finding provides additional evidence that students who were out of the school were contributing to the increase in second grade enrollment.

It is reasonable to conjecture that the pupils who decide to obtain primary education as a result of the decentralization-induced increase in the opportunity cost of staying out of school are on average older than the students who would attend school in the absence of the decentralization. Accordingly, the positive effect of the decentralization on age-grade distortion for the second grade (Table 15) provides further support that past primary school dropouts were contributing to the increase in enrollment, since an increase in the age-grade distortion means that older students are getting enrolled. In addition, the positive impact of the decentralization variable on the age-grade distortion for the first grade indicates that older students were also enrolling in the first grade. Moreover, the fact that the results show no indication that decentralization has increased the students' age-grade distortion for the third and fourth grades, where it has decreased enrollment, suggests that older students indeed contributed to an increase in the overall primary school enrollment.

It is possible that the increase in the student age-distortion promoted by the decentralization was a result of student retention in the school rather than being a consequence of the enrollment of older students who were out of school. To verify whether student enrollment was indeed driving the results obtained for age-grade distortion, I run the grade level regression for age-grade distortion while controlling for grade enrollment. If the increase in enrollment is completely responsible for the increase in the age-grade distortion, we should

expect positive and significant coefficients for the enrollment variable and a decrease in the decentralization effect coefficients (the higher this decrease, the more enrollment explains the age-grade distortion). The results are reported in Table 15. The coefficients for enrollment are indeed positive and significant for all grades, except the first grade. Although the inclusion of grade enrollment reduces the decentralization coefficients, the reduction is quite modest suggesting that the increase in the age distortion for the first two grades was only partially driven by the increase in enrollment.

To determine if older pupils are partially responsible for the observed decrease in student performance, I run a grade level dropout and failure rate regression, adding the grade level age-grade distortion to the controls. The results for dropout rates reported in Table 13 are consistent with the democratization hypothesis. They show that the age-grade distortion variable is positively related to dropouts. Moreover, the inclusion of the age-grade distortion in the controls reduces the decentralization effect, though the reduction is quite modest. The results for failure rates (Table 14) corroborate the democratization hypothesis only for the first grade, since the inclusion of the age-grade distortion reduces the decentralization effect on the first grade failure rates. But again, the reduction is quite weak. Therefore, the worsening in performance in the two first grades can be only partially attributed to the democratization of schooling access promoted by the reform.

5.3 Distributive Effects

I now turn to investigating the distributive outcomes of the reform. As previously discussed, the theoretical literature on decentralization suggests that decentralization is more likely to fail in poor and unequal communities, a result that was confirmed by empirical studies. Therefore, I am particularly interested in determining whether decentralization has affected rich and poor communities differently. To do so, I classified school neighborhoods into three income groups. The poor group is formed by schools located in school neighborhoods ranking in the lowest 25% percentile of average household income, the rich group is composed of schools located in neighborhoods ranking in the top 25% percentile and the middle group is composed of the remaining schools. I then interacted the decentralization variable with the school neighborhood income group. The results, displayed in Table 17, show that the impact of the decentralization was uniform across neighborhoods with different income levels for almost all measures of school quality. I only find differences for failure rates, student age-grade distortion, and class size. For the age-grade distortion, and the failure rate the results suggest that decentralization had a slightly more negative effect for the schools located in the

poorest areas. As to class size, the results indicate that decentralization has only significantly improved the school located in more affluent areas. It thus seems that the decentralization was more perverse in the poorest communities, but different from the findings of Galiani et all (2006) in Argentina, there is no evidence that the Sao Paulo reform improved performance on the richer communities. I further investigate the decentralization distributive effects searching for differences across rural and urban schools. Table 18 depicts the regression results for the decentralization effect interacted with an indicator of the region (urban or rural) where the school is located. The effects on school performance are quite similar across rural and urban areas. However, the improvements in school resources are only statistically significant for schools located on urban regions. These results are consistent with those obtained for the income interaction, since rural areas are poorer than the urban areas on average.

Finally, to identify whether there were any discrepancies on the decentralization effect between the "good" and "bad" adopted schools, I ranked all the state-run schools that were not adopted in 1996 according to their dropout rates in 1996, and classified them in three groups; the 25% highest 1996 dropout (high 1996 dropout), the 25% lowest 1996 (low 1996 dropout) and all the remaining (mid 1996 dropout). Table 19 displays the results for regressions that include the interaction between the decentralization effect and the 1996 dropout rank classification.[22] The estimates reveal a dissimilar effect on good and bad schools (evaluated according to 1996 dropout rates). Decentralization has increased the dropout rate and student age-distortion of the schools that ranked lower in 1996, while it has reduced these measurers, thought not significantly, for higher ranked schools. As for school resources, the most striking result stems from the fact that decentralization has decreased the teachers with a college education in lower ranked schools, while it did not affect the teachers' average education in the higher ranked schools. The combination of these results suggests that decentralization has enlarged the gap between the good and bad schools.

5.4 Administrative Experience Effect

The theoretical literature on decentralization argues that in the absence of the necessary administrative competence in local government, the quality of public service provision may decrease under the decentralized regime. One may argue that this argument may represent a real threat to Sao Paulo reform, since before its implementation only few municipalities had previous experience with primary education management. To test for this effect, I run the regressions interacting the decentralization effect with a dummy variable that indicates if the

[22] To run these regression I dropped from the data all the schools that were not operational in 1996.

municipality managed primary schools before the implementation of the program, in 1996. The results displayed on Table 20 indicate that the administrative experience with education did not play any significant role in determining the effect of the reform, since the findings for the schools located in the experienced and non-experienced municipalities are very similar.

6 Summary, Discussion and Conclusion

Governance reforms in the decentralization of public services delivery has been widely implemented in developing countries, with public education being one of primary targets of these reforms. This has been a worldwide trend in the developing world, in spite of the fact that the theoretical literature on the subject shows that the success of this type of reform is context-dependent. The paucity of quality data and the institutional volatility of developing countries has been a major obstacle for accessing the effect of decentralization reforms. Most of the existing empirical literature on the evaluation of decentralization reforms has been based on descriptive study cases, which lack the scrutiny of rigorous econometric analyses.

This paper employed an exclusive and rich longitudinal data on primary schools to evaluate the effects of a major decentralization reform implemented in the public educational system of the State of Sao Paulo, Brazil, based on measures of school performance and school resources. The reform was characterized by the transference of full management control of the primary and secondary state-managed schools to the municipal governments. The availability of school level data both before and after the program implementation, coupled with the fact that program participation was not universal, enabled some identification problems to be confronted. More specifically, such features allowed me to identify which of the two different econometric specifications is more effective in controlling for possible selection biases imposed by the fact that the mayors were allowed to select the school into the program.

I found conflicting results for the program effects, i.e., the decentralization increased dropout rates and failure rate across all primary school grades but improved school resources. Robustness checks on alternative econometric specifications suggest that these findings are not affected by possible selection biases when school idiosyncratic trends are allowed. Using grade level regressions, I encountered some evidence that the democratization of schooling access promoted by the decentralization was partially responsible for decreased in performance in the first and second grade. The evaluation of the distributive effects of the program indicates that its impact was more perverse for schools located in poor and rural communities. More importantly, I found that the program widened the gap between the "good" and the “bad” schools, where the “good” and “bad” classification is attributed to the school with

high and low dropout rates before program implementation, respectively. Lastly, I did not uncover any evidence that municipalities' administrative experience with public schooling management before the program implementation played any role on its effects.

These findings suggest that local government invested in school resources that make schooling more attractive, but is ineffective in keeping pupils in the school. The evidence that decentralization increased enrollment and the average pupils age in the earlier grades, and at the same time, increased dropout rates, indicates that the decentralized schools were not prepared to receive pupils with higher educational deficits. It is possible that the implementation of the necessary pedagogical changes to deal with this new pool of students requires school-specific experience and time, which cannot be captured here by the eight year span of the data. If such is the case, the widening of the gap between the "good' and "bad" schools can be explained by the difference of experience in dealing with less able students. This possibility can also be reconciled with the fact the decentralization was more perverse in poor and rural areas, since these regions have higher educational deficit.

Another hypothesis that seems to be consistent with this paper's findings is that decentralization might have adversely affected the pool of students in the school. That is, the more able students might have left the public school in response to the increase in enrollment of the less able students promoted by the reform. This would be consistent with the worsening of school performance and the decrease in enrollment that occurred in third and fourth grades. Assuming that this effect is increasing in the share of less able students, this hypothesis is also coherent with the findings for the distributive effects. In a future research, I intend to investigate this hypothesis by examining the effect of the decentralization on the average enrollment of private schools located in public school neighborhoods. If this effect turns out to be present, there should be an increase in private schools' enrollment.

7 Appendix I: Table and Figues

Table 1

Student enrollment share in prymary public schools by level of government across all Brazilian states: rank of centralization (year of 1997)

Brazilian States	Enrollment Share		Rank of Centralization
	State Schools	Municipal Schools	
Distrito Federal	100	0	1st
Roraima	96.3	3.7	2nd
Sao Paulo	**87.5**	**12.5**	**3rd**
Amapa	84.8	15.2	4th
Espirito Santo	74.8	25.2	5th
Santa Catarina	70.7	29.3	6th
Tocantins	68.3	31.7	7th
Goias	67.9	32.1	8th
Acre	67.7	32.3	9th
Rondonia	66.1	33.9	10th
Mato Grosso	65.8	34.2	11th
Amazonas	65.2	34.8	12th
Para	60.9	39.1	13th
Rio Grande do Sul	60.9	39.1	14th
Mato Grosso do Sul	60.4	39.6	15th
Sergipe	55.1	44.9	16th
Rio Grande do Norte	53.6	46.4	17th
Parana	53.5	46.5	18th
Paraiba	50.4	49.6	19th
Bahia	49.8	50.2	20th
Pernambuco	49	51	21st
Piaui	45.1	54.9	22nd
Ceara	39.5	60.5	23rd
Rio de Janeiro	35.7	64.3	24th
Alagoas	35.1	64.9	25th
Maranhao	35	65	26th
Minas Gerais	11.5	88.5	27th

Table 2

Average Enrollment Share in Municipal Schools Across Sao Paulo's cities: 1st to 4th grade and 5th to 8th grade

year	1st to 4th grade Municipal	5th to 8th grade Municipal
1996	5.98	1.90
	(17.63)	(7.65)
1997	24.20	3.43
	(30.40)	(13.46)
1998	38.12	4.35
	(38.51)	(15.22)
1999	50.07	12.11
	(41.00)	(27.39)
2000	56.14	12.95
	(40.81)	(28.08)
2001	61.28	15.00
	(40.50)	(30.16)
2002	68.19	18.86
	(39.01)	(33.54)
2003	70.46	21.26
	(38.31)	(35.66)
# Municipalities	645	645

Obs: Standard error in parentheses

Table 3

Decentralization Evolution Across Years

Year		State	Own Municipal	Decentralized	Adopted	Public	Private
1996	No Schools	6,592	374	85	85	7,051	1,242
	Student Enrollment	2,097,824	108,216	31,637	31,637	2,237,677	238,610
1997	No Schools	5,287	917	355	270	6,559	1,428
	Student Enrollment	1,877,663	191,103	104,395	72,212	2,173,161	245,457
1998	No Schools	4,242	1,118	1,081	727	6,441	1,575
	Student Enrollment	1,518,817	227,533	340,915	238,076	2,087,265	241,476
1999	No Schools	3,661	1,323	1,438	363	6,422	1,699
	Student Enrollment	1,231,243	296,415	467,537	135,835	1,995,195	237,568
2000	No Schools	3,239	1,427	1,752	319	6,418	1,807
	Student Enrollment	1,063,445	353,918	538,324	78,372	1,955,687	236,513
2001	No Schools	2,864	1,555	1,996	239	6,415	1,908
	Student Enrollment	964,655	426,416	594,722	46,608	1,985,793	237,669
2002	No Schools	2,462	1,606	2,283	299	6,351	2,006
	Student Enrollment	855,218	471,901	676,299	82,604	2,003,418	238,260
2003	No Schools	2,313	1,642	2,326	80	6,281	2,107
	Student Enrollment	791,110	513,569	687,423	22,285	1,992,102	241,316

Figure 1: Decentralization Diffusion in Time and Space Across Municipalities

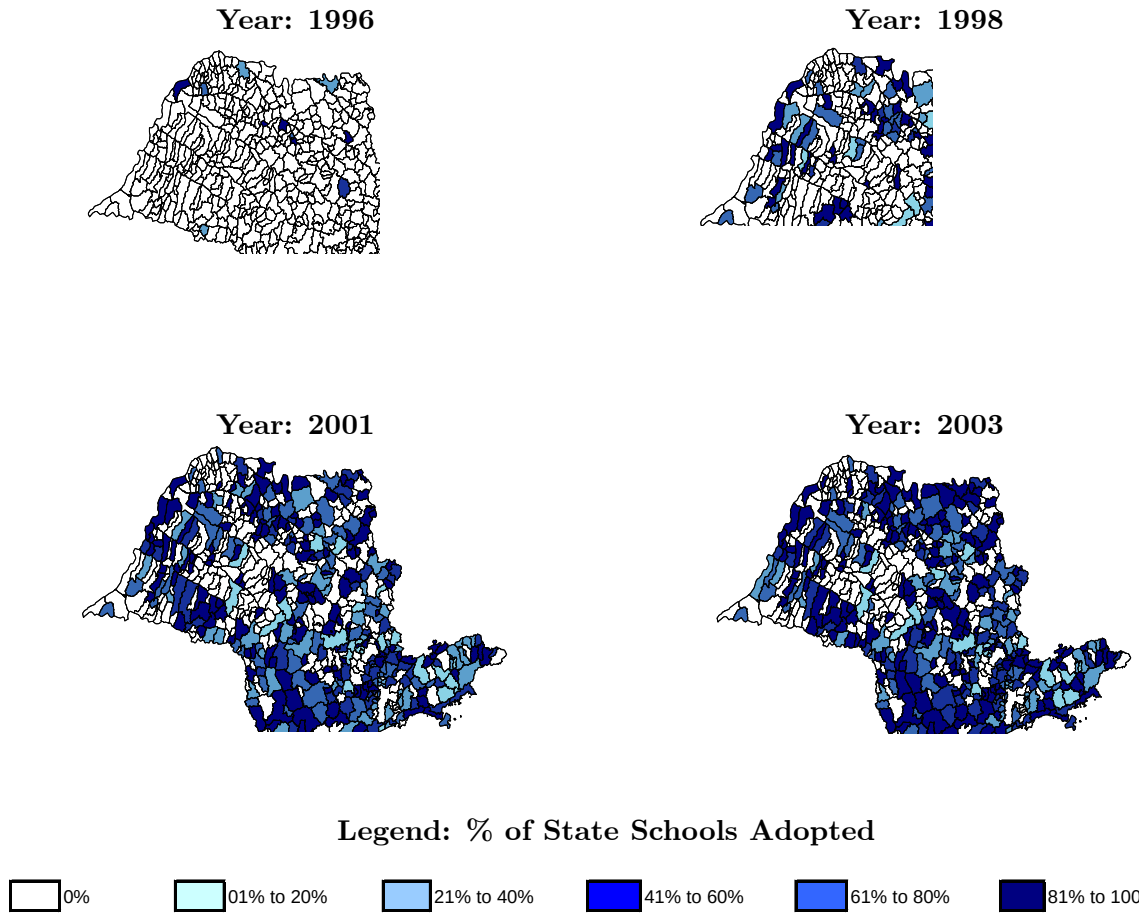

Table 4

Descriptive Statistics for School Performance and School Resources Indicators

	Variable	State	Never Decentralized	Pre-Decentralization	Adopted	Decentralized	Own Municipal Schools	Private	Total
School Performance	Dropout rate	2.606	2.428	3.187	2.553	2.137	1.931	0.357	1.936
		(5.152)	(5.044)	(5.451)	(4.419)	(4.650)	(4.929)	(2.211)	(4.626)
	Failure rate	4.991	4.907	5.263	8.863	8.754	7.762	1.712	5.292
		(8.439)	(8.300)	(8.870)	(11.762)	(10.190)	(10.180)	(4.010)	(8.653)
	Age-Grade Distortion	0.844	0.812	0.961	0.750	0.671	0.656	0.327	0.670
		(0.497)	(0.507)	(0.440)	(0.396)	(0.395)	(0.513)	(0.272)	(0.484)
School Resources	Log Enrollment 1st to 4th	5.200	5.236	5.086	5.046	5.082	4.911	4.473	4.982
		(1.345)	(1.363)	(1.281)	(1.287)	(1.295)	(1.317)	(1.027)	(1.302)
	Enrollment 1st to 4th	343.582	354.621	308.250	297.240	304.948	260.025	139.226	280.892
		(317.636)	(319.823)	(307.906)	(299.071)	(298.539)	(263.378)	(143.367)	(288.579)
	Class Size	32.282	32.316	32.135	31.319	29.725	29.104	18.551	27.665
		(5.158)	(4.934)	(6.029)	(5.540)	(5.960)	(6.257)	(8.869)	(8.700)
	Pupil-Teacher Ratio	28.483	28.418	28.692	27.907	26.023	25.872	16.141	25.049
		(7.619)	(7.835)	(6.875)	(7.441)	(7.245)	(8.175)	(9.771)	(9.433)
	% Teacher College	38.674	40.033	33.591	36.046	41.768	46.680	54.617	43.971
		(33.152)	(33.180)	(32.549)	(32.754)	(33.155)	(35.496)	(35.624)	(34.645)
	Schooling Hours	3.837	3.958	3.385	3.396	3.527	3.827	4.533	3.930
		(2.062)	(1.983)	(2.278)	(2.248)	(2.185)	(1.913)	(0.567)	(1.871)
	TV per 00's pupils	0.459	0.470	0.418	0.482	0.653	0.491	1.248	0.681
		(1.191)	(1.307)	(0.593)	(0.649)	(1.025)	(1.129)	(2.497)	(1.594)
	PC per 00's pupils	0.325	0.371	0.154	0.249	0.554	0.557	4.994	1.437
		(2.559)	(2.875)	(0.272)	(0.581)	(1.205)	(1.516)	(6.855)	(4.167)
	VCR per 00's pupils	0.405	0.412	0.379	0.432	0.588	0.436	1.080	0.599
		(1.133)	(1.245)	(0.551)	(0.602)	(1.004)	(0.995)	(1.937)	(1.353)

Obs 1 : Standard errors in parentheses

Obs 2: All statistics were computed pooling the data across years. "State" contains all the state schools; "Never Decentralized" contains data on all state schools that were never decentralized; "Pre-Decentralization" contains data on all decentralized state schools before the decentralization and "Adopted" contains data on all decentralized school at the year the decentralization took place.

Table 5

Descriptive Statistics for School and School Neigborhood Characteristics

	Variable	State	Never Decentralized	Pre-Decentralization	Adopted	Decentralized	Own Municipal Schools	Private	Total
School Characteristics	Autoimatic Promotion Policy	0.013	0.015	0.004	0.199	0.301	0.371	0.842	0.338
		(0.114)	(0.120)	(0.061)	(0.399)	(0.459)	(0.483)	(0.364)	(0.473)
	# Employees	28.554	30.753	21.515	17.471	21.328	27.449	43.412	30.321
		(25.180)	(25.811)	(21.585)	(15.564)	(18.371)	(25.467)	(36.800)	(28.139)
	# Permanent Classrooms	7.833	8.279	6.407	6.291	6.800	7.524	14.022	8.925
		(5.506)	(5.583)	(4.990)	(4.802)	(5.004)	(6.135)	(10.445)	(7.375)
	# Temporary Classrooms	0.245	0.251	0.227	0.293	0.281	0.529	0.153	0.275
		(0.975)	(0.994)	(0.914)	(1.228)	(1.125)	(1.819)	(0.875)	(1.158)
	Classes	7.661	8.122	6.187	5.936	6.416	7.024	13.086	8.505
		(5.516)	(5.619)	(4.890)	(4.640)	(4.798)	(5.557)	(9.440)	(6.896)
	Science Lab	0.136	0.147	0.095	0.060	0.049	0.083	0.638	0.221
		(0.343)	(0.354)	(0.293)	(0.238)	(0.215)	(0.276)	(0.481)	(0.415)
	Computer Lab	0.060	0.070	0.022	0.027	0.125	0.153	0.685	0.226
		(0.237)	(0.255)	(0.147)	(0.161)	(0.331)	(0.360)	(0.465)	(0.418)
	Library	0.457	0.481	0.364	0.368	0.419	0.386	0.868	0.528
		(0.498)	(0.500)	(0.481)	(0.482)	(0.493)	(0.487)	(0.339)	(0.499)
	Sport Court	0.603	0.640	0.465	0.446	0.490	0.381	0.741	0.574
		(0.489)	(0.480)	(0.499)	(0.497)	(0.500)	(0.486)	(0.438)	(0.494)
	Secondary Level	0.368	0.409	0.234	0.069	0.094	0.179	0.796	0.383
		(0.482)	(0.492)	(0.424)	(0.254)	(0.292)	(0.383)	(0.403)	(0.486)
	Hischool	0.137	0.159	0.065	0.000	0.001	0.016	0.417	0.155
		(0.344)	(0.366)	(0.247)	(0.000)	(0.032)	(0.124)	(0.493)	(0.362)
School Neigborhood Characteristics	25% poorest	0.271	0.253	0.330	0.335	0.307	0.222	-	0.269
		(0.445)	(0.435)	(0.470)	(0.472)	(0.461)	(0.415)	-	(0.444)
	Midle	0.281	0.308	0.196	0.220	0.231	0.302	-	0.275
		(0.450)	(0.462)	(0.397)	(0.414)	(0.421)	(0.459)	-	(0.446)
	25% richest	0.447	0.439	0.474	0.446	0.462	0.476	-	0.456
		(0.497)	(0.496)	(0.499)	(0.497)	(0.499)	(0.499)	-	(0.498)
	Population	4119.970	4440.416	3094.345	3291.361	3541.883	3866.148	-	3946.996
		(4038.864)	(4147.470)	(3476.785)	(3576.427)	(3702.716)	(3448.590)	-	(3866.385)
	% 7 to 10 years old	8.427	8.277	8.908	8.322	7.889	7.946	-	8.219
		(1.669)	(1.700)	(1.465)	(1.561)	(1.596)	(1.543)	-	(1.649)
	% 0 Minimum Wage	8.274	8.499	7.553	7.923	8.445	8.265	-	8.309
		(5.631)	(5.875)	(4.694)	(5.164)	(5.749)	(5.849)	-	(5.700)
	% 1/2 Minimum Wage	1.569	1.407	2.088	1.185	0.616	0.814	-	1.219
		(2.373)	(2.386)	(2.256)	(1.419)	(1.039)	(1.628)	-	(2.065)
	% 1 Minimum Wage	15.471	14.830	17.523	16.954	16.585	13.881	-	15.397
		(10.021)	(10.034)	(9.698)	(9.965)	(9.696)	(8.801)	-	(9.763)
	% 1-2 Minimum Wage	21.496	20.519	24.629	23.095	21.803	19.825	-	21.235
		(9.234)	(9.210)	(8.592)	(9.012)	(9.015)	(9.350)	-	(9.238)
	Average Years of Education	5.321	5.497	4.755	4.951	5.187	5.760	-	5.378
		(1.757)	(1.807)	(1.447)	(1.512)	(1.529)	(1.713)	-	(1.713)
	Average Income (# MW)	3.542	3.690	3.067	3.207	3.377	3.858	-	3.569
		(1.972)	(2.051)	(1.603)	(1.697)	(1.756)	(2.007)	-	(1.941)
	Coefficient of Variation	1.257	1.228	1.351	1.297	1.266	1.174	-	1.243
		(0.383)	(0.385)	(0.361)	(0.367)	(0.356)	(0.340)	-	(0.371)
	% Homes w/ Garbage Collection	74.448	76.827	66.829	70.882	74.990	82.467	-	76.128
		(38.506)	(38.741)	(36.723)	(34.845)	(32.896)	(30.855)	-	(36.108)

Obs 1 : Standard errors in parentheses

Obs 2: All statistics were computed pooling the data across years. "State" contains all the state schools; "Never Decentralized" contains data on all state schools that were never decentralized; "Pre-Decentralization" contains data on all decentralized state schools before the decentralization and "Adopted" contains data on all decentralized school at the year the decentralization took place.

Table 6

Descriptive Statistics for the Municipalities Characteristics

		State	Never Decentralized	Pre-Decentralization	Adopted	Decentralized	Own Municipal Schools	Private	Total
Political Characteristics	Center Party mayor	0.197	0.230	0.093	0.105	0.141	0.219	0.286	0.210
		(0.398)	(0.421)	(0.291)	(0.307)	(0.348)	(0.414)	(0.452)	(0.407)
	Left Party mayor	0.367	0.351	0.421	0.446	0.397	0.330	0.324	0.357
		(0.482)	(0.477)	(0.494)	(0.497)	(0.489)	(0.470)	(0.468)	(0.479)
	Right Party mayor	0.436	0.420	0.486	0.448	0.462	0.451	0.390	0.433
		(0.496)	(0.494)	(0.500)	(0.497)	(0.499)	(0.498)	(0.488)	(0.495)
	% City Council Gov.	21.026	20.617	22.336	21.203	21.908	20.303	18.661	20.562
		(15.484)	(14.925)	(17.087)	(13.521)	(13.536)	(12.810)	(11.616)	(14.056)
	% City Council Oposotion to Gov.	78.974	79.383	77.664	78.797	78.092	79.697	81.339	79.438
		(15.484)	(14.925)	(17.087)	(13.521)	(13.536)	(12.810)	(11.616)	(14.056)
	% City Council Mayor	28.505	27.635	31.289	27.153	27.817	26.548	25.140	27.375
		(16.280)	(15.412)	(18.516)	(13.851)	(12.816)	(12.720)	(11.799)	(14.398)
	% City Council Oposition to Mayor	71.495	72.365	68.711	72.847	72.183	73.452	74.860	72.625
		(16.280)	(15.412)	(18.516)	(13.851)	(12.816)	(12.720)	(11.799)	(14.398)
	# Mayoral Candidates	4.458	4.616	3.952	4.013	3.813	4.409	4.851	4.425
		(1.900)	(1.937)	(1.680)	(1.657)	(1.554)	(1.914)	(1.881)	(1.872)
	# Party Coalitions	1.888	2.164	1.005	1.054	2.450	2.515	2.704	2.252
		(2.561)	(2.714)	(1.719)	(2.124)	(2.761)	(2.984)	(3.040)	(2.791)
	Mayors' Voting Share	38.429	37.888	40.451	38.851	38.471	38.152	37.392	38.162
		(19.958)	(19.658)	(20.920)	(21.959)	(21.615)	(20.796)	(19.936)	(20.425)
	Turnout	82.101	82.032	82.357	82.826	82.189	82.416	83.089	82.389
		(6.489)	(6.458)	(6.597)	(5.799)	(6.196)	(5.324)	(4.166)	(5.811)
	Mayor allied to the Gov	0.333	0.333	0.336	0.382	0.463	0.410	0.349	0.370
		(0.471)	(0.471)	(0.472)	(0.486)	(0.499)	(0.492)	(0.477)	(0.483)
Socal & Economic Characteristics	Population	185316.000	218059.800	80515.630	90372.260	98998.960	195258.100	-	168807.500
		(258602.300)	(279068.000)	(131322.500)	(137201.000)	(142737.400)	(265001.200)	-	(242750.600)
	% 7 to 10 years old	8.225	8.087	8.668	8.209	7.822	7.739	-	8.044
		(1.095)	(1.092)	(0.981)	(0.955)	(0.978)	(0.931)	-	(1.063)
	% 11 to 14 years old	8.615	8.515	8.933	8.649	8.431	8.309	-	8.516
		(0.884)	(0.871)	(0.846)	(0.822)	(0.798)	(0.784)	-	(0.856)
	% Literacy	87.822	88.343	86.152	87.398	88.395	89.277	-	88.228
		(3.742)	(3.681)	(3.432)	(3.166)	(2.983)	(3.077)	-	(3.514)
	Average Years of Education	5.750	5.914	5.222	5.476	5.692	6.155	-	5.816
		(1.181)	(1.183)	(1.007)	(0.994)	(1.007)	(1.136)	-	(1.149)
	Average Income	3.924	4.061	3.486	3.671	3.837	4.267	-	3.972
		(1.317)	(1.333)	(1.157)	(1.193)	(1.245)	(1.298)	-	(1.307)
	Coefficient of Variation	1.187	1.164	1.260	1.226	1.197	1.130	-	1.178
		(0.243)	(0.239)	(0.241)	(0.227)	(0.218)	(0.196)	-	(0.230)
	Rural Population	6614.595	6618.369	6602.518	6610.424	6534.614	5715.069	-	6422.283
		(7194.749)	(6954.447)	(7915.480)	(8301.605)	(8572.034)	(6935.624)	-	(7470.692)
	% Rural Pop.	15.203	13.121	21.865	19.147	16.850	10.722	-	14.682
		(19.117)	(17.797)	(21.523)	(19.799)	(18.283)	(14.146)	-	(18.188)
	Own School	0.655	0.695	0.528	0.806	0.815	1.000	-	0.756
		(0.475)	(0.461)	(0.499)	(0.396)	(0.388)	(0.000)	-	(0.429)
	Own School 1996	0.300	0.333	0.193	0.227	0.252	0.228	-	0.276
		(0.458)	(0.471)	(0.394)	(0.419)	(0.434)	(0.419)	-	(0.447)

Obs 1 : Standard errors in parentheses

Obs 2: All statistics were computed pooling the data across years. "State" contains all the state schools; "Never Decentralized" contains data on all state schools that were never decentralized; "Pre-Decentralization" contains data on all decentralized state schools before the decentralization and "Adopted" contains data on all decentralized school at the year the decentralization took place.

Table 7

Decentralization Average Effect (1st to 4th Grades) - All Public Schools - Fixed Effect Model

	School Performance						School Resources							
	Dropout Rate	Dropout Rate	Failure Rate	Failure Rate	Age-Grade	Age-Grade	Enrollment 1st to 4th	Pupil-Teacher Ratio	Class Size	Schooling Hours	PC per 00's pupils	VCR per 00's pupils	TV per 00's pupils	% Teacher College
1 year decentralized	0.312	0.693	4.743	6.459	-0.030	-0.031	0.030	0.154	-0.401	-0.013	0.033	-0.063	-0.075	-3.656
	(0.083)***	(0.160)***	(0.431)***	(0.575)***	(0.010)***	(0.012)**	(0.010)***	(0.178)	(0.184)**	(0.018)	(0.022)	(0.024)**	(0.025)***	(1.129)***
2 year decentralized	0.149	0.778	5.114	6.615	0.009	0.001	0.065	-0.596	-1.042	0.021	0.025	-0.048	-0.063	-4.196
	(0.129)	(0.225)***	(0.426)***	(0.566)***	(0.012)	(0.014)	(0.012)***	(0.211)***	(0.243)***	(0.025)	(0.036)	(0.030)	(0.032)**	(1.431)***
3 year decentralized	0.173	0.793	4.940	6.842	0.036	0.028	0.106	-0.887	-1.296	0.049	0.110	-0.007	-0.018	-3.811
	(0.126)	(0.220)***	(0.440)***	(0.632)***	(0.014)***	(0.016)*	(0.014)***	(0.243)***	(0.292)***	(0.035)	(0.051)**	(0.031)	(0.032)	(1.417)***
4 year decentralized	0.318	0.998	4.635	6.680	0.053	0.049	0.142	-0.665	-1.344	0.054	0.232	0.060	0.044	-5.142
	(0.129)**	(0.236)***	(0.459)***	(0.704)***	(0.017)***	(0.019)***	(0.017)***	(0.284)**	(0.262)***	(0.032)*	(0.072)***	(0.046)	(0.048)	(1.669)***
5 year decentralized	0.321	1.068	5.474	7.628	0.066	0.061	0.190	-0.104	-1.302	0.065	0.407	0.167	0.154	-5.532
	(0.150)**	(0.254)***	(0.529)***	(0.787)***	(0.021)***	(0.022)***	(0.021)***	(0.325)	(0.304)***	(0.033)**	(0.104)***	(0.059)***	(0.061)**	(1.879)***
% Teacher College 1st to 4th		-0.000		0.008	-0.000	-0.000								
		(0.001)		(0.003)***	(0.000)	(0.000)								
No Automatic Promotion		-0.064		0.639		0.028								
		(0.130)		(0.455)		(0.010)***								
Revenue per capta		-0.000		-0.000		0.000								
		(0.000)		(0.001)		(0.000)								
Budget status		0.026		-0.172		0.003								
		(0.046)		(0.156)		(0.005)								
school controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
city controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Sample Yaers	97-02	99-02	97-02	99-02	98-03	99-03	97-03	97-03	97-03	97-03	97-03	97-03	97-03	98-03
Obs	21187	12526	21187	12526	21853	15904	33836	38902	26183	33836	33836	31670	31833	28726
# Schools	4132	3661	4132	3661	4153	3815	5295	5296	4200	5295	5295	5293	5293	5295
R-squared	0.08	0.05	0.10	0.09	0.50	0.35	0.25	0.20	0.11	0.02	0.05	0.04	0.05	0.10

Robust standard errors in parentheses clustered at municipality level

* significant at 10%; ** significant at 5%; *** significant at 1%

Obs1: **School controls for school performance regressions**: # classrooms, enrollment, # employees, levels of education, school facilities (library and sport court), school resources and school neighborhood characteristics.

Obs 2: **School controls for school resources regressions**: # classrooms, # employees, levels of education, and socio-economic characteristics of the school neighborhood characteristics.

Obs 3: **School controls for school enrolment regression**: # classrooms, # employees, levels of education, school facilities (library and sport court), and socio-economic characteristics of the school neighborhood characteristics.

Obs4: **City controls**: population, average income, average years of education, coefficient of variation, share of rural population, revenue percapita, budget status, mayor's political party and city council composition.

Table 8

Decentralization Average Effect (1st to 4th Grades) - Decentralized Schools Only - Fixed Effect Model

	School Performance								**School Resources**					
	Dropout Rate	Dropout Rate	Failure Rate	Failure Rate	Age-Grade	Age-Grade	Enrollment 1st to 4th	Pupil-Teacher Ratio	Class Size	Schooling Hours	PC per 00's pupils	VCR per 00's pupils	TV per 00's pupils	% Teacher College
1 year decentralized	0.591	1.105	4.999	7.195	-0.016	-0.018	0.007	-0.075	-0.383	-0.012	-0.011	-0.102	-0.107	-3.040
	(0.124)***	(0.238)***	(0.485)***	(0.618)***	(0.010)	(0.012)	(0.009)	(0.200)	(0.221)*	(0.021)	(0.029)	(0.034)***	(0.033)***	(1.239)**
2 year decentralized	0.536	1.425	5.507	7.775	0.018	0.007	0.022	-1.003	-0.954	0.021	-0.029	-0.107	-0.112	-3.269
	(0.175)***	(0.333)***	(0.492)***	(0.678)***	(0.013)	(0.015)	(0.013)*	(0.275)***	(0.303)***	(0.029)	(0.048)	(0.045)**	(0.046)**	(1.610)**
3 year decentralized	0.680	1.676	5.577	8.573	0.048	0.035	0.043	-1.308	-1.144	0.047	0.040	-0.082	-0.081	-2.991
	(0.208)***	(0.400)***	(0.555)***	(0.838)***	(0.019)***	(0.020)*	(0.018)**	(0.339)***	(0.368)***	(0.040)	(0.059)	(0.044)*	(0.044)*	(1.856)
4 year decentralized	0.879	2.084	5.606	9.104	0.068	0.056	0.063	-1.377	-1.269	0.051	0.147	-0.045	-0.043	-4.092
	(0.247)***	(0.486)***	(0.634)***	(0.992)***	(0.022)***	(0.023)**	(0.022)***	(0.409)***	(0.368)***	(0.042)	(0.079)*	(0.059)	(0.060)	(2.261)*
5 year decentralized	0.983	2.448	6.114	10.250	0.086	0.069	0.087	-1.713	-1.248	0.043	0.288	0.026	0.043	-3.189
	(0.290)***	(0.573)***	(0.745)***	(1.146)***	(0.027)***	(0.026)***	(0.027)***	(0.494)***	(0.431)***	(0.054)	(0.100)***	(0.063)	(0.064)	(2.678)
% Teacher College 1st to 4th		0.001		0.009	-0.000	0.000								
		(0.002)		(0.004)**	(0.000)	(0.000)								
No Automatic Promotion		-0.074		1.000		0.034								
		(0.153)		(0.521)*		(0.011)***								
Revenue per capta		-0.000		-0.001		0.000								
		(0.000)		(0.001)		(0.000)**								
Budget status		-0.001		-0.175		0.005								
		(0.070)		(0.259)		(0.006)								
school controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
city controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Sample Yaers	97-02	99-02	97-02	99-02	98-03	99-03	97-03	97-03	97-03	97-03	97-03	97-03	97-03	98-03
Obs	8941	5418	8941	5418	9560	6870	15696	15696	11408	15696	15696	14422	14505	13468
# Schools	1705	1556	1705	1556	1733	1602	2277	2277	1754	2277	2277	2277	2277	2277
R-squared	0.08	0.05	0.16	0.19	0.50	0.35	0.20	0.20	0.13	0.04	0.16	0.07	0.08	0.08

Robust standard errors in parentheses clustered at municipality level

* significant at 10%; ** significant at 5%; *** significant at 1%

Obs1: **School controls for school performance regressions**: # classrooms, enrollment, # employees, levels of education, school facilities (library and sport court), school resources and school neighborhood characteristics.

Obs 2: **School controls for school resources regressions**: # classrooms, # employees, levels of education, and socio-economic characteristics of the school neighborhood characteristics.
Obs 3: **School controls for school enrolment regression**: # classrooms, # employees, levels of education, school facilities (library and sport court), and socio-economic characteristics of the school neighborhood characteristics.
Obs4: **City controls**: population, average income, average years of education, coefficient of variation, share of rural population, revenue percapita, budget status, mayor's political party and city council composition.

Table 9

Decentralization Average Effect (1st to 4th Grades) - All Public Schools - Random Trend Model

	School Performance						School Resources							
	Dropout Rate	Dropout Rate	Failure Rate	Failure Rate	Age-Grade	Age-Grade	Enrollment 1st to 4th	Pupil-Teacher Ratio	Class Size	Schooling Hours	PC per 00's pupils	VCR per 00's pupils	TV per 00's pupils	% Teacher College
1 year decentralized	0.828	1.539	6.120	7.904	-0.011	-0.025	-0.004	-0.240	-0.281	-0.017	-0.003	0.001	0.002	-0.996
	(0.169)***	(0.411)***	(0.624)***	(0.887)***	(0.009)	(0.013)*	(0.008)	(0.200)	(0.169)*	(0.018)	(0.027)	(0.017)	(0.018)	(1.456)
2 year decentralized	1.197	2.513	7.376	10.100	0.035	0.020	0.016	-1.173	-0.732	0.002	-0.032	0.032	0.035	0.518
	(0.270)***	(0.609)***	(0.814)***	(1.164)***	(0.013)***	(0.020)	(0.013)	(0.305)***	(0.263)***	(0.029)	(0.055)	(0.030)	(0.031)	(2.108)
3 year decentralized	1.839	3.307	8.049	10.992	0.060	0.054	0.042	-1.381	-0.937	0.024	0.019	0.091	0.105	1.316
	(0.376)***	(0.783)***	(1.135)***	(1.658)***	(0.019)***	(0.027)**	(0.017)**	(0.415)***	(0.346)***	(0.040)	(0.086)	(0.055)*	(0.056)*	(2.858)
4 year decentralized	2.574	4.193	8.383	11.132	0.076	0.075	0.068	-1.063	-0.845	0.030	0.070	0.132	0.145	0.135
	(0.494)***	(0.955)***	(1.482)***	(2.106)***	(0.024)***	(0.034)**	(0.021)***	(0.542)*	(0.423)**	(0.053)	(0.117)	(0.070)*	(0.073)**	(3.693)
5 year decentralized	3.112	4.713	9.519	11.931	0.078	0.083	0.098	-0.756	-0.505	0.044	0.149	0.181	0.194	-0.225
	(0.602)***	(1.098)***	(1.844)***	(2.528)***	(0.028)***	(0.041)**	(0.026)***	(0.675)	(0.578)	(0.072)	(0.164)	(0.079)**	(0.084)**	(4.479)
% Teacher College 1st to 4th		-0.001		0.003	-0.000	-0.000								
		(0.002)		(0.004)	(0.000)	(0.000)**								
No Automatic Promotion		-0.062		0.177		0.004								
		(0.162)		(0.648)		(0.008)								
Revenue per capta		0.000		0.002		0.000								
		(0.000)		(0.001)**		(0.000)								
Budget status		-0.070		-0.350		-0.002								
		(0.054)		(0.198)*		(0.004)								
school controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
city controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Sample Yaers	97-02	99-02	97-02	99-02	98-03	99-03	97-03	97-03	97-03	97-03	97-03	97-03	97-03	98-03
Obs	16494	8557	16494	8557	17353	11347	28466	33452	21875	28466	28466	25198	25467	23377
# Schools	3867	3405	3867	3405	3876	3555	5284	5290	4074	5284	5284	5247	5248	5047
R-squared	0.01	0.03	0.06	0.05	0.07	0.03	0.04	0.03	0.01	0.01	0.01	0.01	0.01	0.02

Robust standard errors in parentheses clustered at municipality level

* significant at 10%; ** significant at 5%; *** significant at 1%

Obs1: **School controls for school performance regressions**: # classrooms, enrollment, # employees, levels of education, school facilities (library and sport court), school resources and school neighborhood characteristics.

Obs 2: **School controls for school resources regressions**: # classrooms, # employees, levels of education, and socio-economic characteristics of the school neighborhood characteristics.
Obs 3: **School controls for school enrolment regression**: # classrooms, # employees, levels of education, school facilities (library and sport court), and socio-economic characteristics of the school neighborhood characteristics.

Obs4: **City controls**: population, average income, average years of education, coefficient of variation, share of rural population, revenue percapita, budget status, mayor's political party and city council composition.

Table 10

Decentralization Average Effect (1st to 4th Grades) - Decentralized Schools Only - Random Trend Model

	School Performance						School Resources							
	Dropout Rate	Dropout Rate	Failure Rate	Failure Rate	Age-Grade	Age-Grade	Enrollment 1st to 4th	Pupil-Teacher Ratio	Class Size	Schooling Hours	PC per 00's pupils	VCR per 00's pupils	TV per 00's pupils	% Teacher College
1 year decentralized	0.863	1.575	5.917	7.944	-0.003	-0.016	-0.001	-0.087	-0.272	-0.008	0.004	-0.000	-0.001	-1.973
	(0.174)***	(0.406)***	(0.630)***	(0.840)***	(0.009)	(0.012)	(0.009)	(0.200)	(0.171)	(0.018)	(0.025)	(0.017)	(0.018)	(1.464)
2 year decentralized	1.219	2.600	7.404	10.773	0.041	0.029	0.016	-0.987	-0.745	0.019	-0.021	0.022	0.021	-1.388
	(0.272)***	(0.629)***	(0.823)***	(1.144)***	(0.013)***	(0.019)	(0.014)	(0.300)***	(0.263)***	(0.029)	(0.054)	(0.030)	(0.033)	(2.053)
3 year decentralized	1.829	3.409	8.369	12.390	0.071	0.068	0.034	-1.187	-1.016	0.048	0.021	0.074	0.084	-1.810
	(0.377)***	(0.823)***	(1.139)***	(1.623)***	(0.019)***	(0.026)***	(0.018)*	(0.403)***	(0.341)***	(0.040)	(0.084)	(0.055)	(0.057)	(2.796)
4 year decentralized	2.462	4.235	8.939	12.991	0.091	0.090	0.048	-1.141	-1.126	0.064	0.061	0.103	0.113	-3.963
	(0.486)***	(0.994)***	(1.480)***	(2.033)***	(0.025)***	(0.033)***	(0.023)**	(0.510)**	(0.428)***	(0.055)	(0.115)	(0.074)	(0.078)	(3.692)
5 year decentralized	2.873	4.681	9.270	13.266	0.101	0.099	0.062	-1.278	-0.941	0.083	0.108	0.148	0.163	-5.088
	(0.593)***	(1.127)***	(1.813)***	(2.347)***	(0.030)***	(0.039)**	(0.028)**	(0.617)**	(0.579)	(0.074)	(0.164)	(0.085)*	(0.092)*	(4.439)
% Teacher College 1st to 4th		0.004		0.000	-0.000	-0.000								
		(0.003)		(0.005)	(0.000)	(0.000)**								
Automatic promotion		0.027		0.871		0.001								
		(0.178)		(0.613)		(0.009)								
Revenue per capta		0.000		0.002		-0.000								
		(0.000)		(0.001)*		(0.000)***								
Budget status		-0.147		-0.248		0.004								
		(0.098)		(0.240)		(0.005)								
school controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
city controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Sample Yaers	97-02	99-02	97-02	99-02	98-03	99-03	97-03	97-03	97-03	97-03	97-03	97-03	97-03	98-03
Obs	6757	3778	6757	3778	7617	4939	13385	15559	9584	13385	13385	11432	11570	11165
# Schools	1637	1480	1637	1480	1645	1500	2277	2277	1680	2277	2277	2262	2263	2275
R-squared	0.02	0.04	0.10	0.16	0.08	0.05	0.06	0.02	0.01	0.02	0.02	0.01	0.01	0.01

Robust standard errors in parentheses clustered at municipality level

* significant at 10%; ** significant at 5%; *** significant at 1%

Obs1: **School controls for school performance regressions**: # classrooms, enrollment, # employees, levels of education, school facilities (library and sport court), school resources and school neighborhood characteristics.

Obs 2: **School controls for school resources regressions**: # classrooms, # employees, levels of education, and socio-economic characteristics of the school neighborhood characteristics.
Obs 3: **School controls for school enrolment regression**: # classrooms, # employees, levels of education, school facilities (library and sport court), and socio-economic characteristics of the school neighborhood characteristics.
Obs4: **City controls**: population, average income, average years of education, coefficient of variation, share of rural population, revenue percapita, budget status, mayor's political party and city council composition.

Table 11

Pre Treatment Test - School Performance - 1st to 4th Grade

	Fixed Effect Model				Random Trend Model			
	2000-2003 sample		1996-1999 sample		2000-2003 sample		1996-1999 sample	
	Dropout	Failure	Dropout	Failure	Dropout	Failure	Dropout	Failure
Years Decentralized	1.544	2.733	-0.436	-0.368	3.395	13.840	-1.160	-0.048
	(0.380)***	(0.812)***	(0.422)	(0.753)	(0.886)***	(1.978)***	(0.672)*	(1.246)
school controls	yes	yes	yes	yes	yes	yes	yes	yes
city controls	yes	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes
Obs	2635	2635	3092	3092	1743	1743	2035	2035
# Schools	892	892	876	876	884	884	855	855
R-squared	0.04	0.12	0.09	0.29	0.07	0.17	0.03	0.15

Robust standard errors in parentheses, clustered at municipality level

* significant at 10%; ** significant at 5%; *** significant at 1%

Obs: **School controls**:# classrooms, enrollment, # employees, levels of education, school facilities (library and sport court), school resources and school neighborhood characteristics. **City controls**: population, average income, average years of education, coefficient of variation, share of rural population, mayor's political party and city council composition.

Table 12

Pre Treatment Test -School Resources

Fixed Effect Model

	2000-2003 sample							1996-1999 sample						
	Enrollment 1st to 4th	Pupil-Teacher Ratio	Class Size	Schooling Hours	PC per 00's pupils	VCR per 00's pupils	TV per 00's pupils	Enrollment 1st to 4th	Pupil-Teacher Ratio	Class Size	Schooling Hours	PC per 00's pupils	VCR per 00's pupils	TV per 00's pupils
Years Decentralized	-0.001	-0.486	0.224	0.085	0.041	0.105	0.094	-0.024	0.081	-0.197	-0.080	0.021	-0.022	0.010
	(0.016)	(0.295)	(0.283)	(0.039)**	(0.062)	(0.047)**	(0.046)**	(0.014)*	(0.269)	(0.698)	(0.059)	(0.020)	(0.024)	(0.026)
school controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
city controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Obs	3530	3530	2299	3530	3530	2844	2873	3415	3415	1680	2560	2560	2560	2560
# Schools	893	893	612	893	893	893	893	888	888	591	877	877	877	877
R-squared	0.11	0.14	0.09	0.05	0.08	0.08	0.07	0.12	0.04	0.01	0.01	0.18	0.03	0.03

Random Trend Model

	2000-2003 sample							1996-1999 sample						
	Enrollment 1st to 4th	Pupil-Teacher Ratio	Class Size	Schooling Hours	PC per 00's pupils	VCR per 00's pupils	TV per 00's pupils	Enrollment 1st to 4th	Pupil-Teacher Ratio	Class Size	Schooling Hours	PC per 00's pupils	VCR per 00's pupils	TV per 00's pupils
Years Decentralized	-0.028	-1.223	-0.050	-0.055	0.027	0.129	0.108	-0.015	0.209	0.563	-0.090	-0.013	-0.050	-0.030
	(0.019)	(0.502)**	(0.430)	(0.050)	(0.083)	(0.054)**	(0.056)*	(0.022)	(0.568)	(1.210)	(0.083)	(0.056)	(0.055)	(0.056)
school controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
city controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Obs	2634	2634	1679	2634	2634	1587	1636	2516	2516	1085	1679	1679	1679	1679
# Schools	892	892	582	892	892	584	593	871	871	555	860	860	860	860
R-squared	0.07	0.05	0.02	0.03	0.02	0.14	0.14	0.05	0.01	0.01	0.01	0.29	0.02	0.01

Robust standard errors in parentheses, clustered at municipality level

* significant at 10%; ** significant at 5%; *** significant at 1%

Obs: **School controls**: # classrooms, # employees, levels of education, and socio-economic characteristics of the school neighborhood characteristics. **City controls**: population, average income, average years of education, coefficient of variation, share of rural population, mayor's political party and city council composition.

Table 13

Dropout Rate by Grade - All Public Schools - Random Trend

	Dropout Rate 1st Grade	Dropout Rate 1st Grade	Dropout Rate 2nd Grade	Dropout Rate 2nd Grade	Dropout Rate 3rd Grade	Dropout Rate 3rd Grade	Dropout Rate 4th Grade	Dropout Rate 4th Grade
1 year decentralized	0.519	0.523	0.572	0.606	0.348	0.387	0.586	0.655
	(0.223)**	(0.223)**	(0.179)***	(0.177)***	(0.122)***	(0.122)***	(0.165)***	(0.167)***
2 year decentralized	0.416	0.415	0.610	0.604	0.209	0.212	0.624	0.654
	(0.269)	(0.269)	(0.239)**	(0.239)**	(0.169)	(0.169)	(0.217)***	(0.220)***
3 year decentralized	0.331	0.328	0.717	0.672	0.321	0.309	0.491	0.490
	(0.280)	(0.280)	(0.219)***	(0.219)***	(0.176)*	(0.176)*	(0.198)**	(0.200)**
4 year decentralized	0.512	0.507	0.816	0.735	0.506	0.475	0.647	0.652
	(0.293)*	(0.292)*	(0.229)***	(0.230)***	(0.186)***	(0.186)**	(0.214)***	(0.216)***
5 year decentralized	0.680	0.670	1.056	0.957	0.424	0.382	0.683	0.678
	(0.304)**	(0.303)**	(0.238)***	(0.241)***	(0.215)**	(0.215)*	(0.223)***	(0.223)***
Age-grade distortion 1st grade		0.139						
		(0.215)						
Age-grade distortion 2nd grade				1.120				
				(0.140)***				
Age-grade distortion 3rd grade						1.119		
						(0.164)***		
Age-grade distortion 4th grade								1.043
								(0.150)***
school controls	yes	yes	yes	yes	yes	yes	yes	yes
city controls	yes	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes
Sample Year	97-02	97-02	97-02	97-02	97-02	97-02	97-02	97-02
Obs	16272	16272	16607	16607	16921	16921	16957	16957
# Schools	3771	3771	3826	3826	3888	3888	3891	3891
R-squared	0.02	0.02	0.07	0.08	0.03	0.05	0.03	0.04

Robust standard errors in parentheses clustered at municipality level

* significant at 10%; ** significant at 5%; *** significant at 1%

Obs: **School controls**: # classroom, grade enrollment, # employees, levels of education, school facilities (library and sport court), school resources and school neighborhood characteristics. **City controls:** population, average income, average years of education, coefficient of variation, share of rural population, mayor's political party and city council composition.

Table 14

Failure Rate by Grade - All Public Schools - Random Trend

	Failure Rate 1st Grade	Failure Rate 1st Grade	Failure Rate 2nd Grade	Failure Rate 2nd Grade	Failure Rate 3rd Grade	Failure Rate 3rd Grade	Failure Rate 4th Grade	Failure Rate 4th Grade
1 year decentralized	4.483	4.510	7.262	7.258	4.103	4.098	4.568	4.505
	(0.635)***	(0.633)***	(0.738)***	(0.737)***	(0.581)***	(0.581)***	(0.457)***	(0.457)***
2 year decentralized	4.806	4.803	7.222	7.222	3.802	3.801	4.614	4.588
	(0.667)***	(0.663)***	(0.708)***	(0.709)***	(0.602)***	(0.602)***	(0.493)***	(0.491)***
3 year decentralized	5.079	5.058	7.184	7.188	3.368	3.370	4.087	4.087
	(0.708)***	(0.703)***	(0.782)***	(0.783)***	(0.635)***	(0.635)***	(0.563)***	(0.563)***
4 year decentralized	4.788	4.755	7.639	7.647	2.809	2.813	3.381	3.378
	(0.777)***	(0.772)***	(0.880)***	(0.881)***	(0.662)***	(0.662)***	(0.639)***	(0.640)***
5 year decentralized	5.409	5.342	8.354	8.364	2.856	2.861	4.843	4.847
	(0.885)***	(0.877)***	(0.991)***	(0.993)***	(0.684)***	(0.685)***	(0.826)***	(0.829)***
Age-grade distortion 1st grade		0.967						
		(0.336)***						
Age-grade distortion 2nd grade				-0.110				
				(0.298)				
Age-grade distortion 3rd grade						-0.136		
						(0.186)		
Age-grade distortion 4th grade								-0.950
								(0.279)***
school controls	yes	yes	yes	yes	yes	yes	yes	yes
city controls	yes	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes
Sample Year	97-02	97-02	97-02	97-02	97-02	97-02	97-02	97-02
Obs	16272	16272	16607	16607	16921	16921	16957	16957
# Schools	3771	3771	3826	3826	3888	3888	3891	3891
R-squared	0.04	0.04	0.06	0.06	0.03	0.03	0.15	0.15

Robust standard errors in parentheses clustered at municipality level

* significant at 10%; ** significant at 5%; *** significant at 1%

Obs: **School controls**: # classroom, grade enrollment, # employees, levels of education, school facilities (library and sport court), school resources and school neighborhood characteristics. **City controls:** population, average income, average years of education, coefficient of variation, share of rural population, mayor's political party and city council composition.

Table 15

Age-Grade Distortion by Grade - All Public Schools - Random Trend

	Age-Grade Distortion 1st Grade	Age-Grade Distortion 1st Grade	Age-Grade Distortion 2nd Grade	Age-Grade Distortion 2nd Grade	Age-Grade Distortion 3rd Grade	Age-Grade Distortion 3rd Grade	Age-Grade Distortion 4th Grade	Age-Grade Distortion 4th Grade
1 year decentralized	-0.017	-0.017	0.018	0.018	-0.017	-0.017	-0.021	-0.023
	(0.013)	(0.013)	(0.016)	(0.016)	(0.017)	(0.017)	(0.017)	(0.017)
2 year decentralized	0.039	0.038	0.081	0.079	-0.009	-0.009	0.020	0.015
	(0.022)*	(0.022)*	(0.028)***	(0.027)***	(0.028)	(0.028)	(0.026)	(0.026)
3 year decentralized	0.063	0.062	0.120	0.118	-0.035	-0.039	0.027	0.019
	(0.031)**	(0.031)**	(0.039)***	(0.038)***	(0.040)	(0.039)	(0.039)	(0.039)
4 year decentralized	0.084	0.083	0.150	0.149	-0.055	-0.059	0.014	0.001
	(0.041)**	(0.041)**	(0.052)***	(0.051)***	(0.053)	(0.053)	(0.053)	(0.054)
5 year decentralized	0.117	0.116	0.145	0.145	-0.090	-0.096	0.001	-0.015
	(0.052)**	(0.053)**	(0.064)**	(0.063)**	(0.066)	(0.066)	(0.068)	(0.069)
Log Enrollment 1st grade		0.004						
		(0.009)						
Log Enrollment 2nd grade				0.067				
				(0.011)***				
Log Enrollment 3rd grade						0.085		
						(0.013)***		
Log Enrollment 4th grade								0.056
								(0.017)***
school controls	yes	yes	yes	yes	yes	yes	yes	yes
city controls	yes	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes
Sample Year	98-03	98-03	98-03	98-03	98-03	98-03	98-03	98-03
Obs	12983	12983	13302	13302	13588	13588	13867	13867
# Schools	3602	3602	3675	3675	3743	3743	3817	3817
R-squared	0.02	0.02	0.05	0.05	0.01	0.02	0.06	0.06

Robust standard errors in parentheses clustered at municipality level

* significant at 10%; ** significant at 5%; *** significant at 1%

Obs: **School controls**: # classroom, grade enrollment, # employees, levels of education, school facilities (library and sport court), school resources and school neighborhood characteristics. **City controls:** population, average income, average years of education, coefficient of variation, share of rural population, mayor's political party and city council composition.

Table 16

School Enrollment by Grade - All Public Schools - Random Trend Model

	Enrollment 1st Grade	Enrollment 2nd Grade	Enrollment 3rd Grade	Enrollment 4th Grade
1 year decentralized	4.222	2.448	-1.641	-1.843
	(1.351)***	(1.156)**	(0.995)*	(1.100)*
2 year decentralized	7.361	7.871	-2.106	-4.318
	(2.045)***	(2.284)***	(1.278)*	(1.535)***
3 year decentralized	6.602	9.712	0.751	-4.511
	(2.449)***	(2.965)***	(1.924)	(2.120)**
4 year decentralized	6.442	10.188	1.258	-2.005
	(3.226)**	(3.755)***	(2.408)	(2.658)
5 year decentralized	7.241	10.059	2.338	-1.652
	(4.026)*	(4.629)**	(3.516)	(3.266)
school controls	yes	yes	yes	yes
city controls	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
Sample Year	98-03	98-03	98-03	98-03
Obs	26677	27284	27614	27821
# Schools	5054	5142	5196	5238
R-squared	0.04	0.11	0.07	0.06

Robust standard errors in parentheses clustered at municipality level

* significant at 10%; ** significant at 5%; *** significant at 1%

Obs 1: Enrollment is given by # students enrolled

Obs 2: **School controls**: # classroom, # employees, levels of education, school facilities (library, science and computer lab, and sport court), grade level schooling hours, % college educated teachers, and school neighborhood characteristics.

Obs3: **City controls**: population, average income, average years of education, coefficient of variation, share of rural population, mayor's political party and city council composition.

Table 17

Distributive Effects - School Performance & Resources - All Public Schools - Random Trend

	Dropout Rate	Failure Rate	Age-Grade	Enrollment 1st to 4th	Pupil-Teacher Ratio	Class Size	Schooling Hours	PC per 00's pupils	VCR per 00's pupils	TV per 00's pupils	% Teacher College
Years Decentralized*poor	1.212	5.253	0.034	0.030	0.225	-0.191	0.016	0.008	0.034	0.032	-3.269
	(0.269)***	(0.536)***	(0.011)***	(0.011)***	(0.203)	(0.190)	(0.020)	(0.028)	(0.023)	(0.027)	(1.490)**
Years Decentralized*midle	1.027	5.818	0.020	0.039	0.142	-0.220	0.012	0.019	-0.004	-0.007	-2.646
	(0.183)***	(0.580)***	(0.008)**	(0.010)***	(0.179)	(0.149)	(0.019)	(0.027)	(0.017)	(0.020)	(1.398)*
Years Decentralized*rich	0.992	6.016	0.020	0.051	0.152	-0.346	0.009	0.035	0.008	0.009	-1.526
	(0.185)***	(0.621)***	(0.010)**	(0.010)***	(0.218)	(0.163)**	(0.018)	(0.039)	(0.017)	(0.020)	(1.617)
school controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
city controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Sample Yaers	97-02	97-02	98-03	97-03	97-03	97-03	97-03	97-03	97-03	97-03	98-03
Obs	16494	16494	17353	28466	28466	21875	28466	28466	25198	25467	23377
# Schools	3867	3867	3876	5284	5284	4074	5284	5284	5247	5248	5047
R-squared	0.01	0.04	0.06	0.04	0.03	0.01	0.01	0.01	0.01	0.01	0.02

Robust standard errors in parentheses clustered at municipality level

* significant at 10%; ** significant at 5%; *** significant at 1%

Obs1: **School controls for school performance regressions**: # classrooms, enrollment, # employees, levels of education, school facilities (library and sport court), school resources and school neighborhood characteristics.

Obs 2: **School controls for school resources regressions**: # classrooms, # employees, levels of education, and socio-economic characteristics of the school neighborhood characteristics.

Obs 3: **School controls for school enrolment regression**: # classrooms, # employees, levels of education, school facilities (library and sport court), and socio-economic characteristics of the school neighborhood characteristics.

Obs4: **City controls**: population, average income, average years of education, coefficient of variation, share of rural population, revenue percapita, budget status, mayor's political party and city council composition.

Table 18

Urban vs Rural Effects - School Performance & Resources - All Public Schools - Random Trend

	Dropout Rate	Failure Rate	Age-Grade Distortion	Enrollment 1st to 4th	Pupil-Teacher Ratio	Class Size	Schooling Hours	PC per 00's pupils	VCR per 00's pupils	TV per 00's pupils	% Teacher College
1 year decentralized*urban	1.264	5.806	-0.010	0.001	-0.320	-0.320	-0.054	-0.023	0.021	0.027	-0.781
	(0.233)***	(0.604)***	(0.010)	(0.013)	(0.208)	(0.149)**	(0.018)***	(0.034)	(0.020)	(0.021)	(1.550)
2 year decentralized*urban	1.790	7.105	0.036	0.022	-1.541	-0.801	-0.061	-0.036	0.062	0.076	1.869
	(0.323)***	(0.807)***	(0.013)***	(0.018)	(0.288)***	(0.235)***	(0.028)**	(0.070)	(0.035)*	(0.037)**	(2.275)
3 year decentralized*urban	2.504	7.908	0.061	0.034	-1.879	-0.990	-0.032	0.026	0.108	0.139	1.745
	(0.430)***	(1.128)***	(0.019)***	(0.021)	(0.400)***	(0.331)***	(0.038)	(0.108)	(0.050)**	(0.053)***	(2.967)
4 year decentralized*urban	3.273	8.437	0.075	0.047	-1.659	-0.988	-0.018	0.132	0.166	0.193	2.142
	(0.547)***	(1.486)***	(0.024)***	(0.026)*	(0.525)***	(0.400)**	(0.050)	(0.145)	(0.065)**	(0.069)***	(3.663)
5 year decentralized*urban	3.856	9.805	0.075	0.063	-1.232	-0.772	0.004	0.231	0.217	0.248	2.082
	(0.666)***	(1.870)***	(0.029)***	(0.030)**	(0.651)*	(0.498)	(0.062)	(0.197)	(0.083)***	(0.088)***	(4.375)
1 year decentralized*rural	1.337	7.723	-0.018	-0.019	-0.123	-0.069	0.040	0.029	-0.045	-0.061	-1.223
	(0.562)**	(1.291)***	(0.025)	(0.013)	(0.336)	(0.590)	(0.038)	(0.027)	(0.053)	(0.055)	(2.172)
2 year decentralized*rural	2.432	8.655	0.023	-0.021	-0.585	-0.369	0.101	-0.023	-0.040	-0.072	-1.500
	(0.613)***	(1.450)***	(0.025)	(0.020)	(0.496)	(0.800)	(0.057)*	(0.045)	(0.104)	(0.100)	(2.979)
3 year decentralized*rural	3.235	8.320	0.053	0.004	-0.589	-0.670	0.106	0.010	0.049	0.012	0.965
	(0.819)***	(1.700)***	(0.030)*	(0.025)	(0.613)	(0.788)	(0.075)	(0.066)	(0.188)	(0.182)	(4.034)
4 year decentralized*rural	3.885	7.179	0.081	0.026	-0.105	0.017	0.097	-0.041	0.030	0.003	-3.125
	(1.074)***	(2.040)***	(0.036)**	(0.031)	(0.776)	(0.915)	(0.099)	(0.088)	(0.265)	(0.261)	(5.170)
5 year decentralized*rural	4.024	6.739	0.095	0.062	-0.082	1.138	0.087	-0.000	0.077	0.036	-3.922
	(1.492)***	(2.449)***	(0.043)**	(0.037)*	(0.986)	(1.509)	(0.142)	(0.135)	(0.320)	(0.310)	(6.479)
school controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
city controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Sample Yaers	97-02	97-02	98-03	97-03	97-03	97-03	97-03	97-03	97-03	97-03	98-03
Obs	13252	16494	17353	23377	33452	21875	28466	28466	25198	25467	23377
# Schools	3745	3867	3876	5047	5290	4074	5284	5284	5247	5248	5047
R-squared	0.02	0.06	0.07	0.04	0.03	0.01	0.01	0.01	0.01	0.01	0.02

Robust standard errors in parentheses clustered at municipality level

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 19

Interaction with Dropout Rank for 1996 - School Performance & Resources - All Public Schools - Random Trend

	Dropout Rate	Failure Rate	Age-Grade	Enrollment 1st to 4th	Pupil-Teacher Ratio	Class Size	Schooling Hours	PC per 00's pupils	VCR per 00's pupils	TV per 00's pupils	% Teacher College
years decentralized*high dropout 1996	1.317	7.608	0.036	0.039	0.390	-0.272	0.017	0.017	-0.001	0.009	-5.313
	(0.179)***	(0.658)***	(0.011)***	(0.011)***	(0.176)**	(0.153)*	(0.021)	(0.031)	(0.019)	(0.023)	(1.560)***
years decentralized*mid dropout 1996	0.592	6.746	-0.002	0.048	0.034	-0.457	-0.001	0.072	0.023	0.029	3.001
	(0.169)***	(0.859)***	(0.013)	(0.012)***	(0.211)	(0.215)**	(0.028)	(0.033)**	(0.020)	(0.023)	(2.240)
years decentralized*low dropout 1996	-0.090	11.005	-0.032	0.021	0.207	0.646	0.044	-0.052	0.131	0.051	0.259
	(1.381)	(2.778)***	(0.031)	(0.017)	(0.328)	(1.219)	(0.040)	(0.035)	(0.065)**	(0.073)	(2.544)
school controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
city controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Sample Yaers	97-02	97-02	98-03	97-03	97-03	97-03	97-03	97-03	97-03	97-03	98-03
Obs	16217	13011	17026	27659	32644	21483	27659	27659	24551	24793	22654
# Schools	3780	3663	3784	5098	5104	3974	5098	5098	5075	5075	4861
R-squared	0.01	0.03	0.06	0.04	0.03	0.01	0.01	0.04	0.01	0.01	0.02

Robust standard errors in parentheses clustered at municipality level

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 20

Administrative Experience Effects - School Performance & Resources - All Public Schools - Random Trend

	Dropout Rate	Failure Rate	Age-Grade	Enrollment 1st to 4th	Pupil-Teacher Ratio	Class Size	Schooling Hours	PC per 00's pupils	VCR per 00's pupils	TV per 00's pupils	% Teacher College
years decentralized*own school 1996	1.130	7.164	0.022	0.062	0.850	0.062	0.013	0.089	0.038	0.035	-3.110
	(0.285)***	(1.343)***	(0.017)	(0.016)***	(0.318)***	(0.242)	(0.037)	(0.074)	(0.043)	(0.045)	(2.233)
years decentralized*no own school 1996	1.034	5.477	0.023	0.032	0.196	-0.318	0.014	0.000	0.003	0.000	-2.658
	(0.203)***	(0.603)***	(0.010)**	(0.011)***	(0.162)	(0.170)*	(0.018)	(0.027)	(0.017)	(0.020)	(1.610)*
school controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
city controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Sample Yaers	97-02	97-02	98-03	97-03	97-03	97-03	97-03	97-03	97-03	97-03	98-03
Obs	16494	16494	17353	28466	33451	21875	28466	28466	25198	25467	23377
# Schools	3867	3867	3876	5284	5290	4074	5284	5284	5247	5248	5047
R-squared	0.01	0.04	0.06	0.04	0.03	0.01	0.01	0.01	0.01	0.01	0.02

Robust standard errors in parentheses clustered at municipality level

* significant at 10%; ** significant at 5%; *** significant at 1%

8 Appendix II: School Neighborhood Data

For all the urban municipalities with more than 25,000 habitants in 2000 (which accounts for 170 municipalities out of 645), the IBGE provides digital maps of the census tract, and the SEADE (Data Analysis Foundation of the State of Sao Paulo) provides digital street maps for all municipalities. By combining these maps, it is possible to identify in which census tract the schools are located through the full school addresses provided by the school census. Figure 2 shows the census tracts for the municipality of Adamantina matched with the street map. The gray lines are the streets and red lines are the borders of the census tract.

In order to use GIS techniques to construct the public school neighborhood variables, the 645 municipalities of the Sao Paulo state were first divided into two groups according to the size of their population. The first group, the "large cities group," contains all the 170 urban municipalities with populations larger than 25,000 habitants for which the SEADE provides the digital street maps compatible with the IBGE's digital census tract maps. The second group, the small cities group, includes all rural municipalities with populations larger than 25,000 and all municipalities with population smaller than 25,000 habitants for which the digital maps of census tracts are unavailable.

Due to the availability of the digital street maps and the digital census tract maps, the definition of the public schools neighborhoods used varies depending on which municipality group the school is located. I first present the steps necessary to create the public school neighborhoods variables for each group of municipality:

Large Cities Group For the schools located in large cities, the data are constructed using the following steps:

Step (1): This consisted of finding the cartographic coordinates (latitude and longitude, or the so-called "geo codes") of each school (public and private). For 60% of the schools, this could be accomplished using schools addresses and zip codes provided by the school census data and the digital street maps provided by the SEADE, since for 60% of the schools there, is a perfect match between their addresses and the digital street maps. For the remaining 40% of the schools there are no matches between their address and the digital maps. For the "no match" cases different strategies were used to find the schools geo codes. For the public schools with no match, the geo codes were obtained from hard copy maps kept by the public schools administrators (either the municipals or the state secretaries of education),

that indicates schools location. For the "no match" private schools, the geo codes were obtained through phone calls and manual searches on hard copy maps.

Step (2): This consisted of defining the public school neighborhoods and then aggregating the census tract data for the defined neighborhoods. The neighborhood for each public school was defined as the area where the potential public school pupils are located. Since the law dictates that public school students must attend the closest school to their homes, the public schools' neighborhood was defined as the area closest to a public school than to any other public school (these areas are given by the Voronoi Diagram). Due to public schools attrition in the 1996-2003 period and the fact the neighborhood boundaries are sensitive to the number of schools within the municipality, the public school neighborhoods were redesigned for every year in the sample. Once the boundaries of the schools' neighborhood were defined, all the 527 variables of the census tracts within the schools' neighborhood were aggregated to the neighborhood level.

Step (3): This consisted of interpolating the household variables in the 2000 census with the 1991 census. The major problem in performing this interpolation relies on the fact that the 1991 Population Census is not organized in census tracts. However, since both censuses (2000 and 1991) variables are available at the municipality level, the interpolation at the municipal level is possible. Under the assumption that the time variation of the variables aggregated at the municipal level are a good proxy for the time variation of the variables aggregated at the school neighborhood level, it is thus possible to interpolate the variables at the school neighborhood level. In short, I use the same line obtained for the interpolation of variable A (let us say) aggregated at municipal level to interpolate the very same variable A aggregated at the school neighborhood level. Based on this interpolation procedure I inputted the household variables aggregated at the school neighborhood level for every public school for the 8 years of the sample (1996 to 2003).

Small Cities Group As consequence of the unavailability of the census tract digital maps for the cities in the small cities group, it is not possible to identify the census tract where the schools are located. It is thus impossible to define the schools' neighborhoods as defined for the schools located at the large cities group. To overcome this problem, I first classified the schools located in each municipality into two groups according to the region (urban or rural) where they are located i.e., rural schools and the urban schools. I then took advantage of the fact that it is also possible to identify the region (urban or rural) where the census

tracts are located to aggregate the household variables (provided by the census tract) for the rural and urban areas in each municipality. Lastly, the household variables aggregated for the rural areas were distributed uniformly among the schools located in rural areas, while the household variables aggregated for the urban areas were distributed uniformly among the schools located in urban areas. Using the population census data interpolated (between 1991 and 2003) for the rural and urban areas of each municipality, it was then possible to replicate this procedure for all years the available (1996 to 2003).

References

[1] **Araujo, M. C. , Ferreira F.H.G., Lanjouw, P. and Ozler, B. (2006)** "Local inequality and project choice : theory and evidence from Ecuador", *World Bank Policy Research Working Paper No. 3997*

[2] **Barros, R. P. and Mendonca R. (1998)** "The Impact of Three Institutional Innovation in Brazilian Education" in *Organization Matters: Agency Problems in Health and Education in Latin America*, Savedoff, W. D, (ed), Inter-American Development Bank, Washington, DC

[3] **Bardhan, P. and Mookherjee, D. (eds) (2005a)**, *Decentralization and Local Governments in Developing Countries: A Comparative Perspective*, Cambridge, US: MIT Press

[4] **Bardhan, P. and Mookherjee, D. (2005b)**, "Decentralization, Corruption and Government Accountability: An Overview" in *Handbook of Economic Corruption, Elgar, E. and Rose-Ackerman, S. (eds).*

[5] **Bertrand, M., Duflo, E. and Mullainathan, S. (2004)** "How Much Should We Trust Differences-in-Differences Estimates?" *Quarterly Journal of Economics*,119 (1), 249-275

[6] **Cameron, A. C. and Tivedi, P. K. (2005)**, *Microeconometrics Methods and Applications*, Cambridge University Press

[7] **Galiani, S., Gertler, P. and Schargrodsky, E. (2005)**, "School Decentralization: Helping the Good Get Better but Leaving the Poor Behind", *Working Paper* , Buenos Aires, Universidade de San Andres

[8] **Heckman and Robb (1995) " "** "Alternative Methods for Evaluating the Impact of Interventions", in *Logitudinal Analysis of Labor Market Data,* Heckman and Singer (eds), New York: Cambridge University Press, pp. 243-287.

[9] **Heckman and Hotz (1989)** 'Choosing Among Alternatives Nonexperimental Methods for Estimating the Impact of Social Programs: The Case of Manpower Training', *Journal of American Statistical Association*, **84**, 862-874.

[10] **Jimenez, E. and Sawada Y. (1999)**, "Do Community-Managed Schools Work? An Evolution of El Salvador's EDUCO Program", The World Bank Economic Review, **13**, **(3),** 415-441

[11] **King, E. and Ozler B. (1998)**, "What's Decentralization Got To Do With Learning? The Case of Nicaragua's School Autonomy Reform", *The World Bank Working Paper Series on Impact Evaluation of Education Reforms*

[12] **Rodriguez, C. (2006)** "Households´ schooling behavior and Political Economy Trade-offs After Decentralization", *Working Paper*, Universidad de los Andes, Colombia

[13] **Tulchin, J. S. and Selee, A. (eds) (2004)** *Decentralization and Democratic Governance in Latin America*, Woodrow Wilson International Center for Scholars, Washington, D.C.

[14] **Winkler, D. R. and Gershberg A. I. (2000)** , "Education Decentralization in Latin America: The Effects on the Quality of Schooling" *LCSHD Paper Series* **No 59**, The World Bank, Washington, D.C.

[15] **Wooldridge, J. M. (2002)** *Econometric Analysis of Cross Section and Panel Data*, MIT press