Households' Schooling Behavior and Political Economy Trade-offs after Decentralization

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February 20, 2006

Abstract

Combining information at the municipality level, this paper shows that in order to fully understand the effects of decentralization reforms households' reactions to them must also be taken into account. Specifically, only after changes in the schooling behavior of public high school students is controlled for, a positive result of the decentralization reforms implemented in the early nineties in Colombia on public schools' quality is obtained. Moreover, no evidence in favor of the existence of any of the common political economy trade-offs exposed in the theoretical literature that could reduce the positive effects of decentralization reforms are found for the country.

1 Introduction

Over the past two decades, decentralization has emerged as one of the most common policy recommendations for developing countries. It represents both a global and a regional phenomenon that, to different extents and in distinct settings, transfers political, fiscal and administrative powers to sub-national governments. The theoretical literature on the subject highlights that if decentralization reforms are successful, the decision making process is improved and the provision of public services would be done in a more efficient manner. It is argued that local governments are better suited to provide the services needed

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in their communities according to the idea that they have better information about local preferences and needs. Furthermore, it is thought that within a local democracy citizens can better monitor and punish, through the democratic process, local governments based on their performance than they could monitor higher-level governments reducing the levels of corruption present in a centralized regime.

However, decentralization reforms may not be the panacea policy makers were hoping for. Recently, other strands of the theoretical literature have drawn attention to the political economy trade-offs that could arise under this setting such as the low ability of local governments, unfunded mandates and local capture. The former trade-off is based on the idea that if the delegation of power has recently taken place, local governments may not have the same technical capacity and experience in the provision of public services as the bureaucrats nominated by the central government do. The second trade-off, unfunded mandates, could emerge if in order to reduce severe fiscal problems central governments delegate the responsibility of provision of public services to local governments without providing them with the sufficient resources to do so. Under the third trade-off, local governments may also be subject to capture by local elites in the sense that the final provision of services under a decentralized regime could be biased against the poor. Moreover, it has also been theoretically argued that even if no political economy trade-offs are present the final results of decentralization reforms may not be the expected ones since they will also depend on the way households respond to them and hence should also be incorporated into the analysis.

This paper evaluates the effect that the decentralization reforms implemented in the early nineties in Colombia had on the quality of its public schools. Although numerous studies have previously assessed the outcomes of decentralization reforms on the final provision of public education of different countries, this paper represents a first attempt to combine information on the quality of education with both households' schooling decisions and political economy variables at the municipality level. The available data as well as the particular characteristics of the decentralization process in Colombia allows us to evaluate and control for changes in households' schooling behavior induced by the reforms and test whether any of the political economy trade-offs discussed in the

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literature do in fact take place in the country.

It is shown that in order to fully understand the effects of decentralization reforms households' behavior must be taken into account; which supports the idea that such responses should be included in future empirical studies on the subject. A simple difference in difference approach that does not control for households' behavior shows that the quality gap between private and public schools in the country, measured by the results of a high school standardized exam, has increased after the decentralization reforms took place. This in principle could provide evidence against the benefits such reforms have brought to the public high school system in the country. However, once changes in households' schooling behavior are taken into account the previous result reverses. The examination of the number of students that present this exam shows that after the reforms took place there was a significant increase in the growth trend for public high school students that could have only be caused by a decrease in their dropout rate which induces a sample selection bias that needs to be taken into account. Assuming that otherwise drop-out students come from the lower tail in the ability distribution and controlling for their permanence in the public education system, the negative effect of the decentralization reforms disappears and a positive one is found. As a result this paper shows that not only is the public system serving a higher number of students, but also that there is evidence that its quality has improved.

Moreover, the empirical evidence also suggests that none of the political economy trade-offs commonly exposed in the theoretical literature, are taking place in the country. That is, the benefits of the decentralization reforms that reduced the quality gap between private and public schools are benefiting all municipalities in the country and no evidence of local capture, unfunded mandates or low ability of local governments is found. On the contrary, the results show that in those municipalities where the test score gap between private and public schools was bigger, and hence where the probability of presence of local capture could be stronger, the benefits of decentralization are higher. The results do provide evidence however of a learning by doing process in the sense that each year of decentralization reduces the gap by a higher amount than the previous one.

The paper is organized as follows. Section two and three respectively de-

scribe the decentralization processes in Colombia and some of the earlier empirical findings on the effect of such reforms on public education. In section four the empirical approach taken in the paper is explained; while section five provides a description of the data sets used. Section six evaluates and controls for changes in households' schooling decisions and section seven evaluates the presence of political economy trade-offs at the municipality level. Finally section eight concludes.

2 Decentralization in Colombia

From 1886 until 1991 Colombia was ruled by a Constitution that declared the country a centralized state where the central government (CG) managed all the public finances and was the ultimate responsible for the provision of public services.[1] Local governments (LG) were basically nominated by the President and only seen as the instruments through which his decisions were carried out. However, the world economic crisis of the late seventies -which severely affected government finances-, the increase in inequality, the high levels of corruption and an inefficient provision of public services started to weaken this highly centralized system. It became evident that the CG was not capable of assuming so many responsibilities and some fiscal and political reforms began slowly to take place.[2] In spite of them, most of the decisions and resources remained in the hands of the CG. It was not until the 1991 Constitution that it can be effectively said that the country was politically and administratively decentralized. The new constitution proclaimed Colombia a decentralized and democratic state where the territorial entities composed by states, districts and municipalities were now autonomous.[3]

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[1] This section is primarily based in Vargas and Sarmiento (1997) and Vergara and Simpson (2002). For a more comprehensive review of the decentralization process of the Education Sector in Colombia please refer to these two studies.

[2] Perhaps the most important political reform that took place during the eighties was the institutionalization of the popular election of mayors in 1988 which helped implant in the population the ideas of local autonomy and responsibility. Among the fiscal reforms that occurred during this same period, one should mention the creation of the Situado Fiscal and the "transfer of consumption tax" that in 1968 assigned to the states and municipalities respectively some resources to be invested in the health and education sectors.

[3] Colombia has a three level tier government where the President is the head of the country. Then in the second tier we find thirty two States and four Districts (Bogota, Barranquilla, Cartagena and Santa Marta) that are governed by governors and mayors respectively and which under the law they all have the same level of autonomy. Finally the third tier is composed by 1098 municipalities whose highest authority is the mayor.

The education sector followed the same national centralization - decentralization cycle above described. Between 1960 and 1985, almost all of the planning and financial decisions in the sector fell under the CG control through the Ministry of Education and most of the laws proclaimed during this period had a purely centralist ideology. Even though between 1986 and 1991 a few laws introducing some decentralization aspects into the education system were approved, they were never implemented due to several reasons. Hence, as in the national sphere, the education sector in Colombia was effectively decentralized only after the 1991 Constitution.[4]

Article 67 of the new Constitution declared education a right for all Colombian citizens and made it mandatory for children between five and fifteen years of age. It also declared the Nation and its territorial entities responsible for the direction, financing and administration of the public education services. To be able to carry out these new responsibilities, articles 357 and 358 of the new Constitution determined the type and amount of resources that the different levels of government were entitled to receive. The reforms described in these articles were institutionalized through Law 60/1993 and Law 115/1994. Table 1 summarizes the basic responsibilities and resources assigned to the different tiers of government and public schools under these two laws.

As briefly explained in Table 1, it can be said that the decentralization reform in the education sector in Colombia was done in two levels. In the first level, states were assigned the responsibility of hiring, financing and distributing all the teacher personnel among their respective municipalities. In the second level, municipalities were assigned the responsibility to build and maintain the infrastructure, buy all the education material needed and assign and finance scholarships among their population. Strangely, Law 60 and 115 did not assigned any level of autonomy regarding administrative and financial decisions to schools' directors who are the ultimate best informed agents of the system

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[4]One of the laws that increased the municpalities autonomy during this period was Law 12/1986. This law gave them the responsibility of building and maintaining the education infrastructure giving them a percentage of the nationally collected consumption tax in order to be able to finance it. Law 29/1989 increased their autonomy even further by giving municipalities the possibility to manage the human resources of the sector if they could reach to an agreement with their respective States. However, this Law was never adopted by either part. On one side municipalities believed this would increase their administrative workload without receiving the necessary resources to do so while on the other side States were not interested in giving away part of their control power.

about the necessities of the schools.

Starting from 1994, Law 60 assigned to all the municipalities of the country a proportion of the total national current income called *"Participaciones Municipales"*. The amount that each municipality received was not decided by political negotiations between the central and local governments, but rather by a pre-established formula where the principal objective was to assign the resources in a redistributive manner. The main determinants of the assignment according to this law were the number of inhabitants and the poverty level of the municipality. Graph 1 shows the evolution of the average total per capita government income of municipalities. They are grouped according to the number of inhabitants where Group 1 encompasses the smaller municipalities while Group 6 the biggest ones (mainly districts).[5] As can be observed the redistributive objectives of the law were achieved. In 1993, before Law 60/1993 was implemented most municipalities had approximately the same level of available resources. However as time elapsed, smaller municipalities, which are the poorest ones in the country, saw their per capita total municipal income increase by more than 400%. This increase was mostly due to the *Participaciones Municipales* transfers since as Graph 2 shows municipalities' own taxes did not experience a significant increase during the same period of time.

Contrary to what occurred with Municipalities, Law 60 obliged the States and Districts to comply with certain requirements in order to be certified and be able to start managing their own transfers called the Situado Fiscal.[6] They had four years to obtain the certification and until they did, the administration of the Situado Fiscal was done by the CG through the Ministry of Education. By 1995 nine States and three Districts were certified; in 1996 six States were certified and finally in 1997 the last seventeen States and one District were certified.[7]

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[5] Specifically each group has the following number of inhabitants: 0-5; 5-20; 20-50; 50-100; 100-500; >500 measured in thousands respectively.

[6] According to Law 60, the requirements that states and districts needed to comply with: i) the Organization and building of a basic system of information and the adoption of the necessary procedures to plan, execute, evaluate and control the physical and financial evolution of the health and education programs; ii) adoption of the necessary methodology to elaborate a development project annually; iii) the consent by the State Assembly of the rules and procedure of the distribution of the Situado Fiscal among municipalities, and; iv) adoption of a plan to assume the responsibilities of coverage, quality and efficiency of health and education services.

[7] In 1995 the States Vichada, Risaralda, Antioquia, Quindío, Valle del Cauca, Atlántico, Boyacá, Bolívar, Caquetá and the districts of Cartagena, Barranquilla and Bogota got cer-

The system implemented by Law 60/1993 and Law 115/1994 was in place until the year 2001. In that year, the Acto Legislativo 01 and Law 715 introduced a new set of rules for the decentralization process which abolished the existing system of transfers and created in place the *"Sistema General de Participaciones"* (SGP). Under this new system districts and municipalities with more than a hundred thousand inhabitants, as well some other municipalities with either a state's or CG's certification, have complete autonomy in the administration of the education sector resources without requiring any intervention from higher tiers. All other municipalities however, lost a significant level of their autonomy since the decision powers were given back to their respective states. Since most Colombian municipalities fall in the second category, it can be said that the Laws implemented in 2001 in a sense re-centralized the education sector leaving most of the decisions in the states' hands. The new law allowed two years of transition for all the reforms to be implemented and hence their effects are probably just starting to take place.

3   Previous Empirical Evidence

The complexity of the decentralization processes, the short period of time that has elapsed since the reforms have taken place and the lack of the adequate and usable data in developing countries may help explain the scarcity of empirical studies that try to evaluate the impact that the decentralization reforms have brought to the quality of public education systems around the world. Furthermore, given the differences in the design and setting of the reforms, it is not surprising that the small empirical evidence that do exist has found both positive and negative results.

Some examples of positive impact of decentralization include those reported by Jimenez and Sawada (2003) where they found that student attendance in Salvador improved in schools subject to reforms and by King and Ozler (2000) in Nicaragua where the authors show that de facto autonomy is positively related with tests scores of children in primary school. By contrast, negative effects were found by Gunnarsson et. al. (2004) who using a survey conducted in 1997

tified. In 1996 the States Sucre, Tolima, Caldas, Norte de Santander, Putumayo y Meta got certified. Finally in 1997 Nariño, Santander, Guaviare, Vaupés, Guainía, Casanare, San Andrés, Cauca, Cundinamarca, Huila, Choco and Santa Marta received the certification.

for third and fourth graders in ten different Latin American countries obtain a negative effect of school autonomy on student performance.

Mixed evidence is found in studies such as Galiani et. al. (2005), Di Gropello (1998) and Kremer et. al (2002). Using a panel of public high school test scores in Argentina, the former study finds that on average decentralization had a positive and significant effect. However, when the wealth of the state and the technical capability of its government are taken into account, they find that the average test scores in poorer and less efficiently managed states are deteriorating since the decentralization reforms took place. For Chile, Di Gropello (1998) finds that while financial and labor decisions autonomy at the municipality level had a negative effect on educational achievement; curricular autonomy and school involvement in local financing issues had a positive impact on the same variable. Finally, Kremer et. al (2002) find that the decentralization aspects present in Kenya's education system since the late sixties created perverse incentives which, among other things, induced the creation of too many small schools in the country and the overspending on teacher resources relative to other education inputs. However, under this same system the literacy rate of the country increased from 20% in 1960 to 77% in 1995.

For Colombia, there are only three studies that evaluate the effect of the decentralization reforms in the education sector. Using information from a national household survey for the years 1993 and 1997, Simpson and Vergara (2002) analyze the evolution of the level of education of the population comparing access and permanence in the system for nine different regions of the country. Even though they find that the results differ slightly across regions, they cannot conclude that 1993 reforms brought significant benefits to the system. Similarly, using a survey for ten different Colombian cities for the years 1991, 1994 and 1998, Acosta and Borjas (2002) conclude that the decentralization reforms did not have a significant impact in the public education sector of the country. Focusing on the trends of variables such as student enrollment rates, the internal migration of teachers and teacher's salaries; they find that only the latter one experienced a significant increase after 1994.

In the third study, Barrera (2003) finds mixed evidence on the effect that decentralization reforms had on the quality of public high schools in Colombia using test score outcomes for the years 1991 and 1999 and three different econo-

metric specifications Introducing state fixed effects and controlling for school and individual characteristics, his first model uses a difference in difference approach where the treatment and control groups are public and private schools respectively. He obtains a positive and significant coefficient for the difference in difference estimator suggesting a positive effect of decentralization on the quality of public schools. In a second model, he defines his control group as those students who attend public schools in three of the biggest cities in Colombia and their respective states while his treatment group is composed by all the other public students in the country who according to the author reside in states with an initially lower degree of decentralization. Under this second model he finds that the test scores of public high schools in states with initially less autonomy increased in a higher rate than in the other ones suggesting that decentralization reforms were beneficial. Finally in a third model he estimates a triple difference equation that combines the two models previously described. In this final estimation he obtains a negative and significant difference-in-difference-in-difference coefficient which led him to conclude that decentralization did not increase the quality of public education in the country.

The main contribution of the present paper to the existing literature is its combination of information on schools and political economy variables at the municipality level which allows an evaluation of the effect of 1993 reforms on the public school system in Colombia. The available data makes it possible to test how changes in households' schooling decisions induced by the reforms may influence the quality of schools and whether any of the political trade-offs addressed in the decentralization literature are present.

4   Empirical Strategy

In order to test the effect of decentralization reforms on the quality of public schools in Colombia, the traditional literature on economics of education is followed. According to it, average test scores proxy the quality of education students attain. Specifically, letting $ATS_{h,j,t}$ be the average test scores attained by the students in school h, municipality j and time t it is assumed that $ATS_{h,j,t} = f\left(\overline{X}_{h,j,t}, S_{h,j,t}, Z_{j,t}\right)$ where $\overline{X}_{h,j,t}$ represents the average student characteristics of school h, municipality j and time t; $S_{h,j,t}$ represents characteristics of school h in municipality j and time t and finally $Z_{j,t}$ capture general

characteristics of municipality j in time t.

Given the fact that the decentralization reforms implemented in Colombia in 1993 were an exogenous shock that affected all municipalities, the comparison of test score outcomes for public and private high school students before and after 1993 across the country can identify the effect this reforms had in the quality of its public schools. Using information at the municipality level, a difference in difference approach can estimate the impact of decentralization reforms on the quality of education attained by public school students where its simplest specification will be given by:

$$DATS_{j,t} = \left(\overline{ATS_{j,t}^{\mathrm{Private}}} - \overline{ATS_{j,t}^{\mathrm{Public}}} \right) = \alpha_1 + \alpha_2 Dec_t + \mu_j + \xi_{j,t} \qquad (1)$$

where $DATS_{j,t}$ is the difference in average test scores for private and public schools in municipality j in time t; Dec_t is a variable that represents the number of years in year t that have passed since the decentralization reforms took place; μ_j captures time constant characteristics of municipality j that affects both private and public schools and; $\xi_{j,t}$ is an unobserved error that is homoskedastic and uncorrelated across time with the other explanatory variables across all periods.

The theoretical literature has pointed out that besides changing public schools characteristics, decentralization reforms could also induce changes in households' schooling decisions as well as political economy trade-offs at the municipality level. In order to address both possibilities, the present paper uses a two step estimation procedure. In the first stage, changes in households' schooling behavior are evaluated and taken into account. In the second stage, using a restricted sample based on the first stage, the presence of political economy trade-offs is tested through different specifications of regression (1).

4.1 Changes in households' schooling decisions

Based on a Becker-Rosen type framework where either individuals themselves or their altruistic parents maximize the net benefits of acquiring education, it can be shown that by varying the marginal benefits and costs of an additional year of education decentralization reforms could alter both the type of schools attended

by individuals as well as the optimal level of education attained by them.[8] Such possibility implies that an empirical analysis of the effect of decentralization reforms in the education sector should include households' responses to them.

The first issue to be addressed regarding households' schooling decisions is related to changes in the type of schools attended. If the perception of parents regarding the difference in the quality between both private and public schools is altered, it is expected that they will optimally change their decisions regarding the type of school of where to send their children and a significant migration of students from one type of school to another would be taking place. Moreover, the decisions of the level of schooling attained could also change and the drop-out rates in these schools could also vary after the reforms are implemented. Under these scenarios such changes in households' schooling decisions should be reflected in a significant change in the number of high school students that take a standardized national exam at the end of the senior high school year. To test this hypothesis the following regressions at the national and municipal level respectively can be carried out:

$$NS_t^{\text{Private/Public}} = \beta_1 + \beta_2 tr + \beta_3 \max(0, year - 1993)$$

where $NS_t^{\text{Private/Public}}$ represents the number of high school students in private or public schools that take the national standardized exam at the national level in year t; the variable tr represents a time trend while lastly the expression $\max(0, year - 1993)$ test whether a break in the growth trend of the number of students occurred in the year 1993.

If decentralization reforms, as expected, only altered the number of students from public schools that take this exam, the second issue that needs to be taken into account concerns the characteristics of students in these schools. If there was a change in NS_t^{Public} it is expected that the average characteristics of public schools' students $(\overline{X_{h,j,t}})$ will also change and will therefore influence the average test scores attained by this sector and the coefficient α_2 from specification (1) would be biased if such change is not taken into account.[9] The basic assumption

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[8] Examples of such models can be found in Kremer et. al (2002) and Glomm (1997) among others. A simple example of it is also presented in the Appendix.

[9] If no significant difference in the number of students that attend private and public schools is obtained, specification (1) could identify how decentralization reforms changed the quality of public schools in the country with no additional control needed. If a significant change in the number of students in both sectors is observed what α_2 identifies would be the differential

made in this paper in order to control for this possibility is that any change observed in the number of students from public schools that present the national standardized exam in each municipality is caused by a change in the drop out rate of public high school students. Hence, the growth rate of the number of students in private and public schools that present the exam are equated and a *corrected* sample is used in the second stage when the presence of political trade-offs is evaluated.

4.2 Presence of Political Economy Trade-offs

Through the specification of the different incentives and characteristics present under a centralized and a decentralized regime, a simple model can show that decentralization reforms will change public schools' characteristics ($S_{h,j,t}$) and that this change, as specified in the Appendix, will in turn be given by:

$$\Delta S_{h,j} = f\left(A_{LGj}, E_j, A_{CGj}, T_j, \gamma_j, \phi_{c,j}, \beta_{c,j}\right) \tag{2}$$

where A_{CGj} and E_j represents the technology available to CG in community j and the CG's transfers to bureaucrats under a centralized regime; A_{LGj} and T_j represents the technology available to LG in community j and the transfers received under a decentralized regime; while γ_j, $\phi_{c,j}$ and $\beta_{c,j}$ capture political economy characteristics of municipality j such as the proportion of poor households and the preferences of its population. That is, changes in schools' characteristics will depend on the common political trade-offs exposed in the theoretical literature. Low technical ability of local governments is captured through A_{LGj} ; unfunded mandates are captured through T_j; while local capture is represented by the political economy characteristics of each municipality.

By introducing interactions of Dec_t with the political economy variables from equation (2) into specification (1) and by changing its definition in order to capture time effects, the presence of local capture, unfunded mandates and low ability of LGs is tested. It should also be noted that, by introducing a variable that captures the number of years in year t that have passed since state k obtained its certification, this framework also allows us to test whether there exists any difference in the results achieved under decentralization depending on the level of government in which the responsibilities are assigned to.

impact that decentralization reforms had in both type of schools.

5 Data

The information used in this paper comes from four different data sources: tests outcomes for high-school students, fiscal data at the municipality level, political data regarding the elections of mayors in each municipality and basic school characteristics such as number of students and teachers in the municipality.

The test outcomes used come from the ICFES exam. This is a government administered exam that twice per year evaluates approximately 90% of Colombian high school students in math, language and science areas at the end of their senior year.[10] Information for the period 1980-2004 is available, however the years 1986, 1988, 1991 and 2000-2004 are excluded from the evaluation. The former three years are excluded because results for only one of the two rounds of the exam are available.[11] The latter five years are not used because the structure of the exam changed in the year 2000 and experts from the ICFES department affirm that these new results are non comparable with the previous ones.

The second source of information comes from the municipal budgets for the years 1993 until 1999. They contain data on all the different sources of income for each municipality such as the transfers received from the CG, the level of their own raised taxes as well as the different sectors in which these resources are being invested. As it was described in section two, these variables have significantly changed after the decentralization reforms were implemented and the theoretical models stress their importance in the determination on the final provision of public schooling.

Using the transfers received by municipalities regulated by Law 60/1993 and their total income a dependence index, which is the ratio of these two variables, is constructed and displayed in Graph 3. Given the specific characteristics of the transfers' distribution, municipalities with higher dependence ratio are normally smaller and poorer ones and hence this variable could be used as a proxy for the

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[10] The reason for there to be two dates per year in which the exam is administered is due to the fact that there are two different high school academic calendars in Colombia. The exam in March is taken by those students that will graduate in June and the exam in October is taken by those who graduate in December.

[11] There are some differences in the pool of schools that present the exam in each academic calendar. For instance students from the best bilingual schools in the country present the exam in May while most public students present the exam in October. Hence, using years where only one of the two rounds is available could bias the results obtained.

poverty level. To proxy the level of industrialization of a given municipality and hence, how much does the wealthy value public schooling, the total per capita industry and commerce taxes collected in each of them are used. Graph 4 shows that over the period 1993-2001 this tax has almost doubled for every group of municipalities but the increase is especially significant for those with less than five thousand inhabitants. Finally, an index of fiscal saving of the municipality, that could in principle reflect the technical ability and sense of responsibility of the municipal governments in charge, is also constructed.

The political data used in this paper contains information on the results for the popular elections of mayors for the years 1992, 1994 and 1997 in each municipality. Table 2 summarizes the election results by displaying the percentage of municipalities won by the most traditional parties of the country (*Liberal* and *Conservador*). Although both the Liberal and the Conservative Parties are the clear major political parties in Colombia the percentage of municipalities they have under their control varies in almost 10% across the different elections. At the same time, smaller parties such as Movimiento Nacional Conservador and the Coalitions seem to be gaining more votes and becoming stronger through time. With this political data the turnout rate and the percentage by which each mayor won the election are also constructed.

The fourth and final source of information used in the paper comes from a school national census which takes place in Colombia every year. It is a rich data set gathered by the Colombian national bureau of statistics (DANE) that contains information on all private and public schools in the country since the mid eighties. The total number of students and teachers in each municipality for the years 1993-1999 are constructed and used in the empirical exercises that follow.

6 Influence of households' schooling decisions on public schools' quality

As previously explained, this paper uses the ICFES test scores as a proxy of the quality of high schools in the country. Graph 5 depicts the evolution of the mean and median total score gap between private and public schools for the period 1980-1999. As can be observed, private schools students perform on

average better in this exam than their public school peers do.[12]. Moreover, both trends show that after the decentralization reforms were undertaken in 1993, the decreasing trend in the quality gap between private and public schools reverted. Such intuition is confirmed by regressing both the average and median test score gap on a trend and a trend break in the year 1993. As can be observed in Table 3 both coefficients of interest are significant implying that after the decentralization reforms were implemented the quality gap between private and public schools started to increase.

Without further analysis the conclusion that would emerge after such exercise is carried out would be that decentralization reforms had a negative impact on the quality of public schools in Colombia. However, possible changes in households' schooling decisions and hence on the average characteristics of the students in each type of school that present the ICFES exam are not taken into account and this could significantly bias the results obtained.

In order to test whether the number of students in private and public schools that present the ICFES exam was affected by the decentralization reforms, these variables were regressed on a time trend and a break in the trend for the year 1993. The first column in Table 4 provides evidence which supports the idea that, as expected, the number of students from private schools that present the ICFES exam was not influenced by the reforms and hence that the average characteristics of these students did not drastically change either.[13] A different story however applies to the number of students that attend public schools. Column two of Table 4 shows the results having as dependent variable the number of students from public schools that present the exam. In this case, the break in the trend coefficient is positive and significant implying that the number of high school students from the public sector that took the ICFES exam has significantly increased with the decentralization reforms.[14]

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[12] This is probably related to the fact that on average, private schools have more resources, hire more and better qualified teachers and the average education and income of the families that send their kids to these schools is higher. Evidence of this is found in Barrientos et. al. (2001) and Cadena et.al. (2002).

[13] Consequently this would imply that α_2 effectively measures the effect that decentralization reforms had in the quality of public high schools in Colombia.

[14] It should be mentioned that according to figures from the National Bureau of Statistics (DANE), the number of children between ages 5 and 19 who should be in school have not drastically changed. In 1993 there were 10,958,738 children between these ages while in 1998 there were 11,412,172. This implies an increase of approximately 4% of the population this age.

A channel through which the increase in the number of students served by the public system could bring the public schools' ICFES Total average score down is if these extra number of students come from the lower tail in the ability distribution. Since this exam is taken by high school students at the end of their senior year, it must be the case that part of this extra number of public students that now present the exam must be otherwise drop-out students who after the reforms took place were induced to remain in the system. These drop-out students are normally thought to belong to the lower tail in the ability distribution since they generally quit school for monetary reasons or because they can not comply with all the academic requirements and hence may bring the average public schools' test scores down.[15]

Let us take the extreme assumption that all of these "extra" public high school students that now present the ICFES exam come from the lower tail in the ability distribution. It is expected that if the municipal averages are recalculated without taking these "low ability" students into account and if the quality of the public system has improved after the reforms took place, then the test score gap between schools should be shrinking. To test this hypothesis, we assume that the growth rate of the number of public students in municipality j in year t that present the ICFES exam is the same as the growth rate of private students in that municipality and year. Hence, after ordering all the students that attend public schools in municipality j by their Total ICFES score, only those with the highest scores are kept so that the growth rate of public and private students in that municipality is the same. That is, those students from public schools with the lowest Total ICFES score are dropped and a new test score gap for each municipality is calculated.

Table 5 shows the effect of such an exercise. Using data from 229 municipalities where both private and public schools exist previous to decentralization reforms, a panel for the period 1993-1999 was constructed and specification (1) is carried out.[16] Having a total of 8189 schools where approximately 54% of

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[15] In the former case several reasons could explain the lower academic achievement of these children. If the family doesn't have enough resources to sustain itself, these children are sometimes forced to work and hence have less available time to study. Health and nutritional reasons could also influence their academic achievement since they might not be well fed or have a poor health.

[16] Given that all the control variables are at the municipality level and date from 1993; for the remaining of the paper only information on the difference in ICFES scores between private and public schools at the municipality level from that year onwards is used. However results

them belonged to the public sector, the first two columns in Table 5 present the results using information from all the students that took the exam having as dependent variables the differences in the average mean and median scores between private and public schools in municipality j and time t.[17] Controlling by municipal fixed effects the results obtained imply that each year of decentralization increases the gap in Total ICFES scores between private and public schools by 0.4 points. The last two columns of the same Table show the results of estimating specification (1) with the *corrected* sample of students. Assuming that the growth rate of public students that present the ICFES exam is the same as that of private ones, it appears that the test score gap between public and private schools is shrinking since the municipal decentralization variable is negative and significant for both regressions.

In principle the results found could provide evidence on the general benefits that decentralization at the municipality level has brought to the education sector. Under this scenario not only has the number of Colombian children that remain in the education system increased, but also the quality of public schools seem to have improved compared to that of private ones. Of course, given the assumptions under which the estimation was based, such conclusion should be taken with caution.

7   Political Economy Trade-offs

The complexity of the decentralization process in Colombia as well as the theoretical models present in the literature suggests that other variables should be taken into account when evaluating the effect of decentralization reforms in the quality of public schools. Having as dependent variable the difference in the median ICFES scores this section presents the results of adding into specification (1) additional controls at the municipality level and the evaluation of the presence of possible political economy trade-offs such as local capture, unfunded mandates or low technical ability of the local governments.[18]

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without control variables and using information since 1980 are similar and are available by request.

[17]Given that Districts, as explained in section two, have a different autonomy level as municipalities and are not dependent in any way from their respective states they were excluded from every regression presented in this paper. However, including these four major Colombian cities do not alter the main results obtained in the paper and are available by request.

[18]All the empirical exercises in this section uses the difference in the median since it is a less stringent assumption to assume that otherwise drop-out students attain a test score below

As explained in section two, one could say there were two types of decentralization in Colombia: i) the "municipal decentralization" which occurred at the same time in all the municipalities in the country and; ii) a "state decentralization" that occurred in different periods of time for each state. The general view of state administrators interviewed by the National Planning Agency (DNP) in regards to the timing of the certifications is that it was not related with the state's administrative ability or their real capacity for managing the education sector (DNP 1995) and therefore it is a valid control that should be included into the estimation. Using the corrected sample, Model II in Table 6 test the hypothesis of whether decentralization at the second level of government, the state, had any effect in the test score gap between private and public schools in the country. A state decentralization variable that captures the number of years in year t that a given state has been assigned the responsibility of managing the Situado Fiscal (decentralized) was constructed and included into the regression. This last result is worrisome given the fact that the new reforms implemented in the education sector in the year 2001 "recentralized" the system by giving to the States all the investment decisions and only allowing municipalities with more than one hundred thousand inhabitants to receive and manage directly the transfers from the CG. Future research on the effects of this last reform is therefore imperative.

The result obtained in this Model is a very interesting one since it evaluates how the delegation of responsibilities in different tiers of government affects the provision of public services. Some of the biggest problems of decentralization reforms that assign responsibilities at several levels is that, unless they are clearly determined, the accountability advantages that decentralization reforms can bring could be undermined. Furthermore, it has been previously established that the behavior of each level of government could be significantly different to one another and hence should be taken into account. For instance, previous studies such as Bardhan and Mookherjee (2003), Galasso and Ravallion (2004) have found accountability problems at higher levels of government but not at lower ones.[19]

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the median than below the mean of the distribution of public ICFES test scores.

[19]Both papers respectively evaluate pro-poor targeting programs in India and Bangladesh and find a different behavior at each level of government. They both find evidence of anti-poor bias at the inter-village level while intra-village allocations seemed to follow the objectives of the program.

Model III incorporates into the estimation some of the political economy variables that the theoretical models of the literature suggest. Proxies for the fiscal behavior of LGs, the level of political competition, as well as the poverty, industrialization and literacy rates of the municipalities were introduced. Although the obtained signs for each of these proxies are the expected ones, none of their coefficients were significant. Finally Model IV introduces dummy variables that capture the political party that the mayor in municipality j belonged to at time t and their interactions with the municipal decentralization variable. As standard in probabilistic voting models, the results suggests that the political ideology of the majors doesn't seem to affect the test score gap between private and public schools.

7.1 Local Capture

It could be the case that Colombian municipalities are experiencing local capture problems in the sense that certain LGs neglect the delivery of public education in order to concentrate their efforts in other services preferred by the elite groups in their municipality. Papers such as Bardhan and Mookherjee (1998, 2001, 2002) suggest that the level of capture will depend on community characteristics such as the proportion of unaware voters, the level of campaign costs or the presence of special interest groups that could influence the decision process through lobbying. Hence, if this was the case and political capture was affecting the education sector in some municipalities, the theoretical models leads us to expect that the degree of the positive effect of decentralization would differ across municipalities depending on the factors that are normally thought to affect the levels of capture.

Table 7 tests the presence of local capture in Colombia by including in specification (1) interaction terms of the decentralization variable with factors such as the level of poverty, industrialization and political competition in each municipality proxied by a basic necessity index of households in each municipality for the year 1993, the per capita industry and commerce tax and by the percentage by which each mayor won the municipal elections respectively. As can be observed, none of the interacted terms are significant and the positive effect of years since municipal decentralization took place is still significant. The evidence does suggest then that decentralization is affecting public schools in all

municipalities in the same way irrespective of their political economy characteristics and no evidence of local capture is found.

To further test if there are differences in the results across municipalities, quantile regressions were also carried out. Such an exercise could provide evidence of whether capture problems are taking place since it will allow to distinguish the effect of decentralization across municipalities depending on the quality of their public schools relative to their private ones. For instance, municipalities with high quality of public schools could have a higher literacy rates which would in turn increase the political awareness of their constituents and reduce the possible levels of capture.[20] The regressions are done at the 25th, 50th and 75th percentile; where municipalities at the 25th percentile are those that have a higher quality of public schools relative to private ones (the lowest test score gap) while those at the upper 75th percentile are municipalities with the higher positive gap between their private and public schools. Table 8 displays the results having as dependent variable the Total test scores gap.[21] As can be observed there is a clear difference between each of the three coefficients of interest and F tests allows the rejection of the hypothesis that they are statistically the same.[22] Moreover, the results show that municipalities where the test score gap between private and public schools is higher are catching up with those municipalities where the difference in quality between both sectors is not that big. This is a positive result in the sense that if there was any presence of capture occurring at the municipality level, it should be expected that precisely the opposite result should have been obtained. Henceforward, decentralization reforms are reducing the quality gap between municipalities allowing an homogenization of the system.

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[20] In a sense, this exercise also examines if the gap between private and public schools in the country is converging or diverging across municipalities. It is also interesting since it tests whether municipalities' characteristics affect in a different manner the total test scores gap depending on where in the public quality education distribution the municipality is.

[21] The three regressions are simultaneously estimated and the errors are corrected by bootstrap methods.

[22] More specifically, the F test for the null hypothesis that the three municipal coeficients are the same is: $F(2, 894) = 5.09$ where $Prob > F = 0.0063$.

7.2 Unfunded Mandates

The second political economy trade-off that decentralization reforms could bring is that of unfunded mandates. This occurs when, in order to reduce fiscal deficits, the CG delegates to LGs the responsibility of public service delivery without providing them with the necessary resources to do so. It could be the case that during the nineties some LGs in Colombia did not receive enough resources to manage all the new responsibilities they were in charge of and one of the areas negatively affected was the public education sector. If this was the case, the decrease in the quality gap between private and public schools in Colombia would differ across municipalities depending on the amount of resources received or invested in the sector.

In principle, aggregate data of the country don't seem to support this hypothesis. Not only did the total transfers from the CG to municipalities increased by more than two percent of the GDP since the enactment of Law 60/1993; but the total spending in public education increased from 3.1% of GDP in 1991 to 4.5% of GDP in 1997 (Acosta et.al 2000). Moreover, the empirical education literature has not found evidence that could favor the unfunded mandate trade-off hypothesis either since it has not been able to prove there is a casual relationship between quality of education and levels of expenditure. Specifically, after analyzing 147 separate studies that estimate education production functions in the USA, Hanushek (1986) concludes that even though significant differences in schools quality exist, "there appears to be no systematic relationship between school expenditures and student performance."

Suppose however that the decrease in the test score gap between private and public schools in Colombia differs across municipalities due to unfunded mandates problems. Then, it must be the case that the decrease in the gap should depend in a significant manner on the total transfers of each municipality and/or the total investment in the education sector. Table 9 tests this hypothesis by including in specification (1) the interaction between municipal decentralization variables and the per capita values of total municipal investment in education and the total transfers received from the CG using information only after 1994.[23]

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[23] The reason for this restriction is that no information about the total investment made by the CG at the municipality level previous to the decentralization reforms is available. Without it, including investment and transfers information prior to 1994 could significantly bias the municipal decentralization coefficient upwards. Of course, this restriction on the data

The inclusion of the former variable is standard in the literature while that of the latter one is a valid one since, as previously described in Table 1, transfers made by the CG to the municipalities during the nineties did not depend on the quality of their public schools but rather on population and poverty measures captured in a pre-established formula. Although both coefficients have the expected signs, neither of them appear to cause a difference in the magnitude of the reduction in the gap and hence no evidence of unfunded mandates is found either.[24]

7.3 LG's Ability

The third and final theoretical trade–off that could emerge under a decentralized regime is that the technology available to the LG may be lower than that available to the centrally nominated bureaucrats. This difference could be caused by lack of experience or by lower ability of the local policy makers when compared to the centrally nominated bureaucrats.

To test whether the effect of the decentralization reforms depends on the level of experience of LG it should be appropriate that a difference between the tenure of the mayors in each municipality differed across the country. For the Colombian case however, the popular elections of mayors occur at the same moment in time in the country and hence no difference between municipalities can be obtained on this respect. Nonetheless, a measure of tenure for all municipalities as a group can be obtained. Specifically five indicator variables (Id_t) that specify the number of years that municipalities have been decentralized in year t are introduced into specification (1). For instance, Id_{1995} would assign a value of two to all observations from year 1995 and zero otherwise since in that date two years had passed since the responsibility of the delivery of public education was delegated to the LGs.

The main results of this estimation are presented in Table 10. As can be observed the average effect is significantly different across cohorts of students and hence across LG's experience. More importantly, the positive effect that

implies that what the coefficient on municipal and state decentralization reports in Table 10 is how the quality of public high schools have changed during the decentralized regime and no comparison with the previous regime can be done.

[24] The basic results on the effect of transfers and investment on the test score gap are maintained when all information is used. As expected, the coefficients on municipal decentralization increase. Results are available by request.

decentralization reforms are bringing to the quality of public schools in Colombia is increasing in time. This result provides evidence in favor of the hypothesis that there is in fact a learning by doing process for newly elected LG implying that with time the quality of the services provided by them, in this case education, improved.

Following Galiani et. al. (2005) Model II in the same Table explores the possibility that the LGs fiscal behavior, which could be related with its general ability and sense of responsibility, influences the test score gap. An interaction term between the fiscal deficit and fiscal saving index with the municipal decentralization variable is introduced into specification (1). Contrary to what is found in Argentina, for the Colombian case there is no evidence of any difference in the decrease in the test score gap among municipalities depending on their fiscal behavior.

8   Conclusions

The significant effects that education has on personal, community and national outcomes make the evaluation of decentralization reforms implemented in the public education systems imperative. Through panel data techniques and using four different data sets containing information on the quality of schools, households' schooling decisions and political economy variables at the municipality level, this paper empirically studies the effects of decentralization reforms implemented in Colombia in the early nineties. Specifically, changes in the schooling attainment of high school students after the reforms took place are evaluated and control for; as well as the possible presence of local capture, unfunded mandates and lack of local governments' experience problems.

It is found that on average, the total test score gap of a standardized high school test between private and public schools increased after the decentralization reforms took place. This increase however appears to be caused by changes in households' schooling investment decisions. Panel regressions show that while the number of students enrolled in private schools that present the national standardized ICFES exam was not affected by the decentralization reforms, the number of students from the public sector significantly increased after them. Assuming that all these "extra" students served by the public system come from the lower tail in the ability distribution and adjusting for the resulting sample

selection bias, the previous negative effect of the reforms is reversed. Not only is the public education system serving a higher number of students but it is also providing them with a higher quality of education. Therefore, the increase in the test score gap appears to be caused by the fact that, even though the quality of public schools improved, the presence of "lower ability" students increased and are bringing public test scores down.

Moreover, the benefits of the reforms are constant through out the country and none of the common political trade-offs discussed in the theoretical literature is taking place. No local capture is occurring at the municipality level as all municipalities are experiencing the same decrease in the test score gap irrespective of their level of poverty, industrialization, political competition or political parties in mandate. There are no problems of lack of funds transferred from the central government or insufficient resources invested in the sector either because these variables do not affect in a significant manner the measure of quality of education, as it is commonly found in the education literature. Finally, it does not appear to be a problem of lack of experience or ability of the local governments given the fact that the test score gap is decreasing in time and that the interactions of the municipal decentralization and fiscal behavior variables are not significant.

I.   TABLES

Table 1.
*Summary of the obligations and resources assigned by Laws 60/1993 and Law 115/1994
to the different Levels of government.*

Level	Obligations	Resources Assignation	Uses of Resources
Central Government	Elaboration and formulation of the development policies and objectives. Establish technical, curricular and pedagogical rules to serve as an orientation guide to the local governments and schools.		
States and Districts	Administration of the resources given by the Nation (CG). Oversight and administration in conjunction with municipalities of the provision of education services in pre-school, elementary and secondary education. Finance the teaching personnel needed in their own municipalities and promote and evaluate their training according to the curricular needs. Hence, under these laws the teachers are a state employee.	Certified States will receive the "Situado Fiscal" which amounts to 23-24.5% of the total Current income of the Nation. It is assigned according to the following rules: *i)* 15% of it is divided in equal parts among the states and districts; ii) the 85% left is divided according to: "Situado Fiscal Minimo" that should cover the level of spending in education and health of each state in 1993. If any resources are left they will be assigned according to the level of population that should be attended and the fiscal effort of each state. In order to be able to receive and manage these resources, every State and District needed to comply with certain requirements. If they did not, the administration of such resources was left in the CG.	Of these resources at least 60% of them should be invested in the education sector and 20% in health services. The other 20% should be assigned between the two sectors according to the necessities of each state.

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Municipalities	Administration of the education services at the pre-school, elementary and secondary level. They must finance the necessary investments for construction and maintenance of the existent infrastructure and should provide the education materials needed in their schools. They should inspect, supervise and evaluate the public education services.	Staring from 1994 all municipalities immediately received the "Participaciones Municipales" which are resources that in 1993 amounted to 15% of the total current national income and were supposed to increase until 22% of it by 2001. These resources are distributed between them according to criteria such as the number of inhabitants and the level of poverty in each municipality. Small percentages of the total resources are also distributed according to fiscal and administrative efficiency of the LG government.	Of these resources, 30% should be invested in education, 25% in health, 20% in water management, 5% in sports and culture and the last 20% is up to the municipalities' judgment.
Schools	They are now in charge of the school academic curriculum. However, the school directors have no authority over personnel and infrastructure decisions.		School directors have no direct control over financial resources.

Table 2
Results by Political Party of Municipal elections of Mayors in Colombia

	Mayor Popular Election Year		
	1992	**1994**	**1997**
Political Party			
Liberal Colombiano	36.03%	45.00%	39.82%
Conservador Colombiano	24.20%	32.09%	24.82%
Movimiento Nacional Conservador	0.55%	2.00%	3.91%
Coalicion	2.37%	2.45%	5.45%
Union Patriotica	1.09%	1.00%	0.45%
Other Parties	35.76%	17.45%	25.55%

Source: Registraduria Nacional

Table 3

Dependent variables: Difference in the mean and median Total ICFES scores between private and public schoolsat country level.

	Difference in the Mean ICFES Score	Difference in the Median ICFES Score
Year	-0.151***	-0.123*
	(0.049)	(0.061)
Break in Trend	0.717***	0.721**
	(0.152)	(0.189)
Constant	3.12E+02	2.55E+02
	(9.71E+01)	(1.21E+02)
No. Observations	16	16
Adjusted R2	0.5888	0.5089

(*), (**) and (***) Denotes significance level at 10%, 5% and 1% respectively.

Sources: ICFES results.

Table 4

Dependent Variables: Number of students that present the ICFES exam from each sector

	Number of Students from Private Schools	Number of Students from Public Schools
Year	5693.558***	8461.143***
	(769.932)	(879.120)
Break in Trend	89.95733	6756.998**
	(2393.060)	(2732.434)
Constant	-1.12E+07	-1.67E+07
	(1.53E+06)	(1.75E+06)
No. Observations	16	16
Adjusted R2	0.909	0.9615

(*), (**) and (***) Denotes significance level at 10%, 5% and 1% respectively.

Sources: ICFES results.

Table 5

Dependent variable: Difference in the mean and median Total ICFES scores between private and public schools at the municpality level.

	Complete Sample of Students		Corrected Sample of Students	
	Difference in the Mean ICFES Score	Difference in the Median ICFES Score	Difference in the Mean ICFES Score	Difference in the Median ICFES Score
Years since Municipal Decentralization	0.364	0.376	-1.040***	-3.22***
	(0.161)	(0.183)	(0.056)	(0.227)
Constant	7.350	7.851	7.845	6.33***
	(0.626)	(0.708)	(0.580)	(0.900)
				.
No. Observations	1212	1212	1189	1189
Adjusted R2	0.791	0.767	0.8436	0.7439

All specifications include municipal fixed effects.

† Denotes dummy variables.

Robust Standard errors corrected by cluster at the municipality/year level are in parenthesis

(*), (**) and (***) Denotes significance level at 10%, 5% and 1% respectively.

Sources: ICFES results.

Table 6
Dependent variable: Difference in the median Total ICFES scores between private and public schools in each municipality

	Municipal Fixed Effects Panel Regressions using corrected sample			
	Model I	Model II	Model III	Model IV
Years since Municipal Decentralization	-3.224***	-4.291***	-4.31***	-3.942***
	(0.227)	(0.432)	(0.720)	(0.728)
Years since State Decentralization		2.082***	3.507***	3.588***
		(0.635)	(0.902)	(0.907)
Transfers Dependence			-1.195	-0.924
			(3.700)	(3.675)
Industrial per capita tax			0.569	0.598
			(1.107)	(1.107)
Proportion of urban population			13.496	11.602
			(28.503)	(28.804)
Turnout Rate			6.588	7.021
			(14.336)	(14.291)
Percentage by which Mayor won			0.044	0.049
			(0.028)	(0.028)
% of education investment in Infrastructure			4.477*	3.899
			(2.691)	(2.721)
% of education investment in Teachers			-0.017	-0.360
			(3.092)	(3.108)
% of education investment in Education Mat.			-2.815	-2.966
			(4.948)	(4.993)
† Fiscal Deficit			2.887	2.898
			(2.272)	(2.270)
Fiscal Deficit Index			-0.436	-0.407
			(1.405)	(1.399)
† Liberal Mayor				1.444
				(2.459)
† Conservative Mayor				-0.166
				(3.224)
† Liberal Mayor*Mun. Decentralization				-0.496
				(0.583)
† Conservative Mayor*Mun. Decentralization				-0.940
				(0.786)
Constant	6.333***	7.728***	-6.832	-6.165
	(0.900)	1.09	(18.809)	(19.239)
Number of Observations	1189	1189	1127	1127
Adjusted R2	0.744	0.747	0.748	0.748

All specifications include municipal fixed effects.

† Denotes dummy variables.

Robust Standard errors corrected by cluster at the municipality/year level are in parenthesis

(*), (**) and (***) Denotes significance level at 10%, 5% and 1% respectively.

Sources: ICFES results, DNP Municipal Budget Figures, Registraduria Nacional political results.

Table 7
Dependent variable: Difference in the median of ICFES scores between private and public schools in each municipality

	Difference in the Median ICFES Score using corrected sample
Years since Municipal Decentralization	**-2.830**
	(1.592)
Years since Municipal Decentralization Interacted with	
Transfers Dependence	-0.010
	(0.019)
Industrial per capita tax	-0.020
	(0.210)
Political Competition	-0.024
	(0.018)
Years since State Decentralization	-9.945
	(19.572)
Number of Observations	1127
Adjusted R2	0.747

All specifications include the controls from Model III of Table 6 and municipal fixed effects.

Robust Standard errors corrected by cluster at the municipality/year level are in parenthesis

(*), (**) and (***) Denotes significance level at 10%, 5% and 1% respectively.

Sources: ICFES results, DNP Municipal Budget Figures, Registraduria Nacional political results.

Table 8
Dependent variable: Difference in the mean Total ICFES scores between private and public schools in each municipality

	Municipal Fixed Effects Panel Regressions using corrected sample			
	OLS	25th Quantile	50th Quantile	75th Quantile
Years since Municipal Decentralization	-4.31***	-2.847***	-3.461***	-5.481***
	(0.720)	(0.856)	(0.730)	(0.843)
Years since State Decentralization	3.507***	1.811	2.653***	4.731***
	(0.902)	(1.171)	(0.990)	(1.073)
Transfers Dependence	-1.195	0.060	-1.874	-2.929
	(3.700)	(4.664)	(4.091)	(4.784)
Industrial per capita tax	0.569	-0.567	-0.334	0.616
	(1.107)	(1.363)	(1.195)	(1.066)
Proportion of Urban Population	13.496	18.298	16.540	51.619**
	(28.503)	(37.489)	(34.167)	(25.802)
Turnout Rate	6.588	-17.253	-21.332	0.177
	(14.336)	(17.951)	(20.706)	(19.956)
Percentage by which Mayor won	0.044	0.047	0.031	0.027
	(0.028)	(0.035)	(0.031)	(0.033)
% of education investment in Infrastructure	4.477*	3.287	3.232	3.258
	(2.691)	(3.783)	(2.895)	(2.822)
% of education investment in Teachers	-0.017	-0.443	-2.801	-0.979
	(3.092)	(3.723)	(3.618)	(3.744)
% of education investment in Education Mat.	-2.815	0.349	-6.214	-0.644
	(4.948)	(5.983)	(5.883)	(6.699)
† Fiscal Deficit	2.887	-0.298	2.789	2.439
	(2.272)	(3.570)	(2.787)	(2.875)
Fiscal Deficit Index	-0.436	-0.570	-0.142	-0.859
	(1.405)	(2.366)	(2.444)	(2.956)
Constant	-6.832	4.540	9.732	-26.286
	(18.809)	(35.641)	(32.050)	(24.474)
Number of Observations	1127	1127	1127	1127
Adjusted R2	0.748	0.625	0.605	0.628

All specifications include the controls from Model III of Table 6 and municipal fixed effects.

† Denotes dummy variables.

Robust Standard and Bootstrap corrected erros are in parenthesis for the OLS and quantile regressions respectively.

(*), (**) and (***) Denotes significance level at 10%, 5% and 1% respectively.

Sources: ICFES results, DNP Municipal Budget Figures, Registraduria Nacional political results, DANE C-600 Forms.

Table 9
Dependent variable: Difference in the median of ICFES scores between private and public schools in each municipality

	Difference in the Median Total ICFES Score using corrected sample	
	Model I	**Model II**
Years since Municipal Decentralization	-3.865***	-2.912***
	(1.023)	(1.020)
Years since Municipal Decentralization interacted with		
Per Capita Municipal Transfers	-0.002	
	(0.014)	
Per Capita Municipal Investment in Education		-0.021
		(0.021)
Years since State Decentralization	2.267**	2.192**
	(1.114)	(1.090)
Number of Observations	948	948
Adjusted R2	0.790	0.792

All specifications include the controls from Model III of Table 6 and municipal fixed effects using information after 1994.
Robust Standard errors corrected by cluster at the municipality/year level are in parenthesis
 (*), (**) and (***) Denotes significance level at 10%, 5% and 1% respectively.
Sources: ICFES results, DNP Municipal Budget Figures, Registraduria Nacional political results.

Table 10
Dependent variable: Difference in the median ICFES scores between private and public schools in each municipality

	Difference in the Median Total ICFES Score using corrected sample	
	Model I	**Model II**
Year of Municipal Decentralization		
Second	-12.556***	
	(2.774)	
Third	-15.248***	
	(2.842)	
Fourth	-19.19***	
	(3.136)	
Fifth	-18.751***	
	(5.226)	
Sixth	-22.517***	
	(6.034)	
Years since Municipal Decentralization		-4.126***
		(0.795)
Years since Municipal Decentralization Interacted with		
Fiscal deficit		-2.343
		(1.627)
Fiscal Deficit Index		-0.082
		(0.730)
Years since State Decentralization	2.707**	3.472***
	(1.069)	(0.906)
Number of Observations	1127	1127
Adjusted R2	0.748	0.748

All specifications include the controls from Model III of Table 6 and municipal fixed effects.
Robust Standard errors corrected by cluster at the municipality/year level are in parenthesis
 (*), (**) and (***) Denotes significance level at 10%, 5% and 1% respectively.
Sources: ICFES results, DNP Municipal Budget Figures, Registraduria Nacional political results, DANE C-600 Forms.
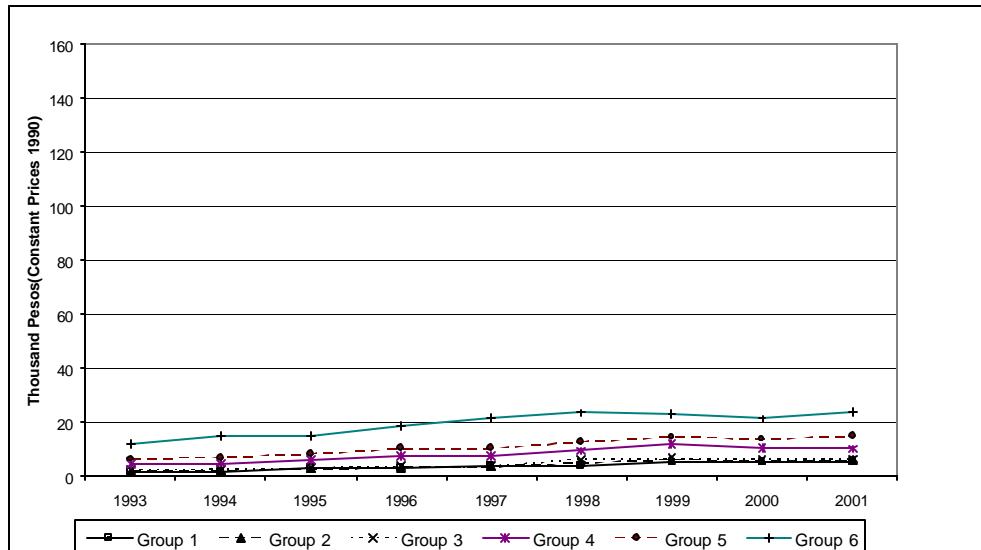
II.   GRAPHS

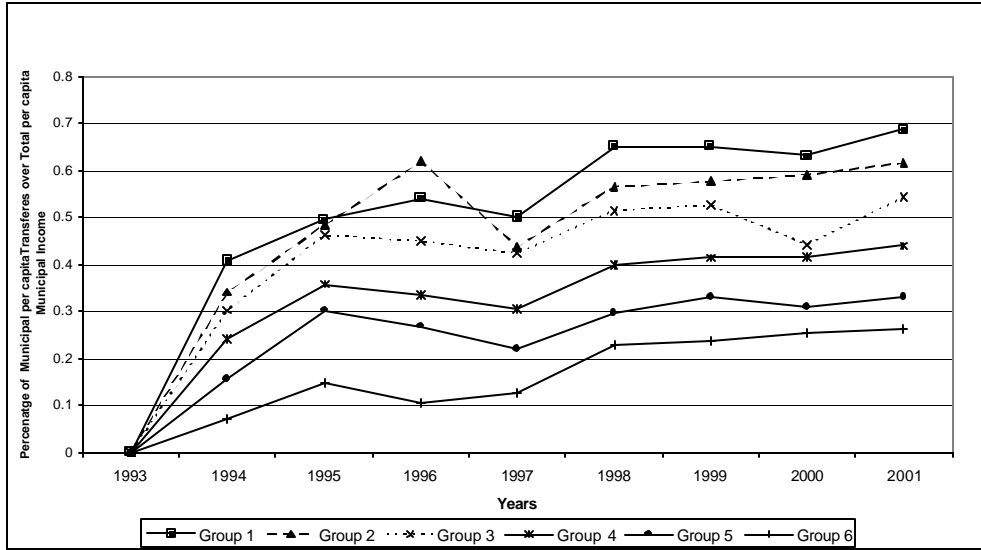**Graph 1: Total per capita municipal Income by groups of Municipalities**
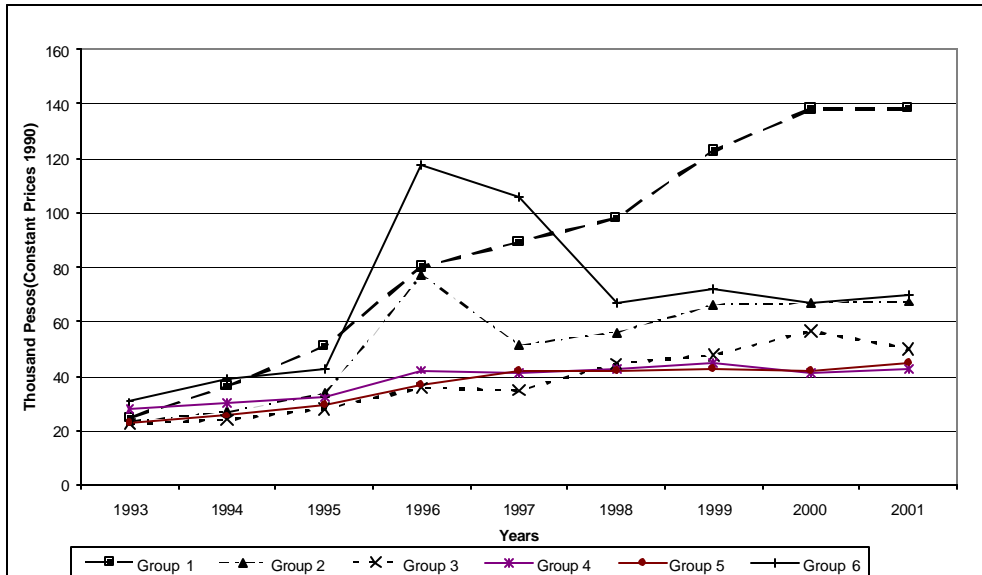
*Source: DNP.

Graph 2: Total per capita Muncipal taxes according to number of inhabitants
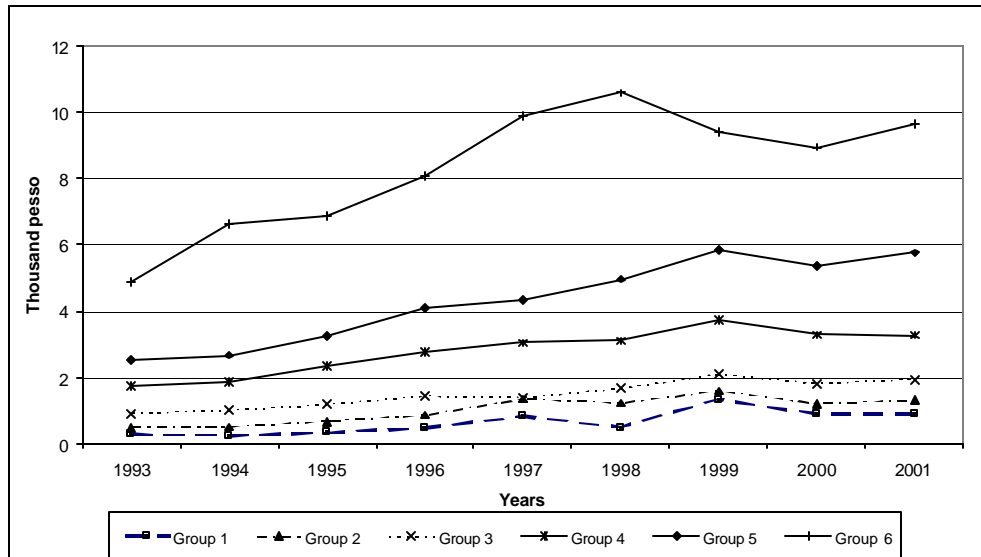

*Source: DNP.

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Graph 3: Evolution of the "dependence ratio" by groups of Municipalities
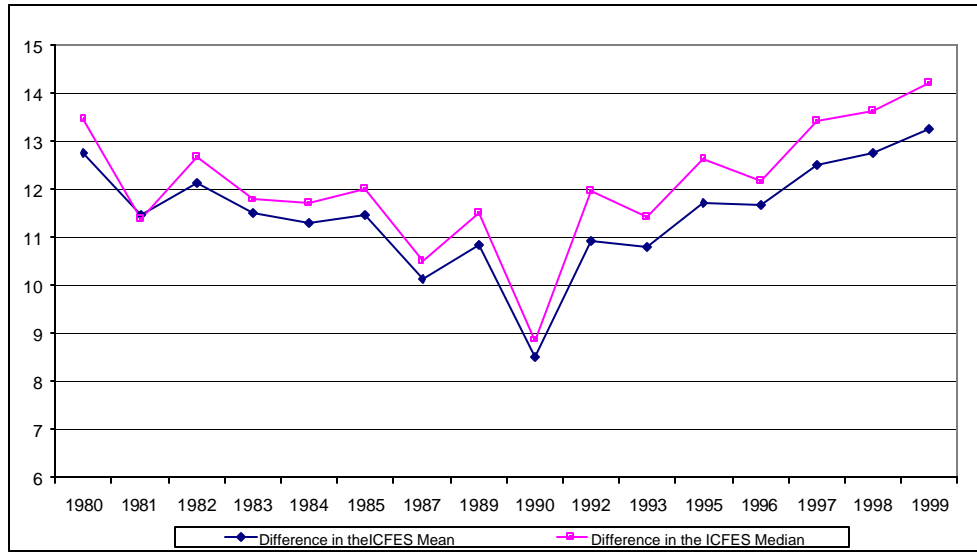

*Source: DNP.

Graph 4: Total Industry and Commerce per capita Taxes by groups of Municpality.

*Source: DNP.

Graph 5: ICFES test score gap between private and public schools.

*Source: ICFES.

9   Appendix

9.1   Provision of Public Education Services

It is assumed that regardless of the governance system there are N communities indexed by j where $j = 1, 2, \ldots N$. In each community there are two types of households: wealthy (w) and poor (p) where γ_j is the proportion of poor households in community j. The utility that households in community j obtain from public goods will differ across wealth levels c and depend on the provision of public schooling (S_{jt}) and on that of other public goods (O_{jt}) such as health or infrastructure. Specifically it is assumed that the utility of a household of type c from community j is given by

$$U_{c,j} = \beta_{c,j} \ln S_j + (1 - \beta_{c,j}) \ln O_j$$

We assume that even though all communities have private and public schools, they are two segmented markets of education that serve different type of households. It is assumed that only children from rich households can afford to attend private schools while those from poorer households attend public institutions. Since the only possibility for poor children to obtain education is if the government provides it for them, the value that these households assign to the quality of public schooling is very high. Wealthy households will still obtain a positive utility from this public service based on factors such as spillover effects or from the obvious gains in productivity that industry owners would get with more educated laborers. Hence, under both regimes it is assumed that $\beta_{p,j} > \beta_{w,j} > 0$. It is further assumed that decentralization reforms in the education sector will not change the incentives governing private schools but only that of public ones.

9.1.1   Centralized Regime

The model of public education provision under a centralized regime follows the idea in Bardhan and Mookherjee (1998) where the CG delivers to bureaucrats the responsibility of the provision of local services. These bureaucrats are assumed to be agents whose only objective is to maximize their personal income and are not accountable to the local population they serve since they are not popularly elected but rather nominated by the center. They are in charge of reporting to the CG information about the costs of capital (such as infrastruc-

ture and teaching material - pK_j) and labor (such as teachers and directors - pL_j) needed in order to provide the poor in community j a level of public schooling S_j. The production function of schooling is given by a Cobb-Douglas production function of the form:

$$S_{CGj} = A_{CGj} K_j^\alpha L_j^{1-\alpha}$$

where A_{CGj} represents the technology available to CG bureaucrats in community j.

The CG transfers a certain level of resources (E_j) to the bureaucrat and gives him the responsibility of the provision of the service. As in Bardhan & Mookherjee (1998), the transfers are not based on the reports the bureaucrats give to the CG since it knows bureaucrats are tempted to inflate costs. Instead, E_j will be determined by a pre-established formula that could depend on factors such as the poverty and population level in each region. It is also assumed the CG is not able to verify the information given by the bureaucrat and only knows that the costs of capital and labor are in a given range $\left(\underline{p_{Fj}}, \overline{p_{Fj}}\right)$ where $F = K, L$. However, the CG does know the production function and the available technology and hence it could verify whether or not the bureaucrat is providing all the possible level of service given the reported costs.

Under these assumptions it can be shown that the only way for bureaucrats to obtain profits is to report the highest possible level of cost, choose to buy the optimal level of capital and labor under these prices and deliver to the community the following level of public schooling:

$$S_{CGj} = A_{CGj} \left(\frac{\alpha E_j}{\overline{p_{Kj}}}\right)^\alpha \left(\frac{(1-\alpha)E_j}{\overline{p_{Lj}}}\right)^{1-\alpha} \tag{A.1.}$$

This level of public schooling is a second best level since it is not cost effective and is lower than that attained if bureaucrats where not corrupt and reported the true costs to the CG. Furthermore, it is not related to the preferences of schooling of any group in the community since the nominated bureaucrat's only objective is to maximize his profit given the available technology and the resources the CG transfers to him.

9.1.2 Decentralized regime

We assume decentralization devolves LGs the provision of different public services such as schooling, health and roads to their communities . However, no authority over tax decisions are devolved to them. As in the centralized model, LG will obtain from the CG a certain grant (T_j) given by a previously determined formula that will depend on the poverty and population level of each municipality.[25] The difference now is that the local authority has to decide how to distribute the resources available across all the sectors he is now in charge of and within each sector how much to invest in labor and capital. The budget constraint of the LGs will therefore be given by:

$$T_j = p_{Kj}K_j + p_{Lj}L_j + p_{Oj}O_j$$

where K_j and L_j are the amount of capital and labor used in the education sector and O_j represents the level spent on other public services such as health and infrastructure provided by this same government. As in the centralized regime the production of schooling of the LG is given by a Cobb-Douglas production function, but in this case the level of technology available to the LG will be different than the one available at the central level. That is:

$$S_{LGj} = A_{LGj}K_j^\alpha L_j^{1-\alpha}$$

where S_{LGj} represents the public schooling provided by the local government and where $A_{LGj} \neq A_{CGj}$.

Following the probabilistic voting literature, it is assumed local politicians have to win a popular election in order to be in power. There will be two parties $(P = A, B)$ competing in the elections and choosing a policy vector $g_P = (QS_P, QO_P)$ of provision of level of quality of public schooling QS_P and other public services QO_P. A voter i in group c will vote for party A instead of B if $U_c(g_A) \succ U_c(g_B) + \sigma_{ic,j} + \delta$ where $\sigma_{ic,j}$ is an individual specific parameter bias towards party B distributed uniformly on $\left[\frac{-1}{2\phi_{ic,j}}, \frac{1}{2\phi_{ic,j}}\right]$ and δ represents the popularity of party B also uniformly distributed on $\left[\frac{-1}{2\varphi}, \frac{1}{2\varphi}\right]$. Under these

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[25]This assumption is also consistent with the Colombian system of transfers which as explined before until 2001 was done by a pre-established formula that had these characteristics as one of their main variables.

assumptions it can be shown that the level of schooling provided by LGs under the decentralized regime is given by:

$$S_{LGj} = A_{LGj} \left(\frac{\alpha T_j}{p_{Kj}} \right)^{\alpha} \left(\frac{(1-\alpha)T_j}{p_{Lj}} \right)^{1-\alpha} \left(\frac{\gamma_j \phi_{p,j} \beta_{p,j} + (1-\gamma)\phi_{w,j}\beta_{w,j}}{\gamma_j \phi_{p,j} + (1-\gamma)\phi_{w,j}} \right)$$
(A.2.)

The final provision of schooling under this system will therefore depend on the total transfers assigned by the government, the technical capacity of their elected government, as well as on the demographic characteristics of the population and their preferences. As in the probabilistic voting models, the final result is independent on the political party that is finally elected since a convergence in policy is obtained.

Comparing (A.1.) and (A.2.) one can see the general results previously found in the decentralization literature: it is not clear whether decentralization will deliver a higher or more equitable level of quality of public schooling than the one delivered under a centralized model. Even though S_{LGj} is cost effective the final provision of public schooling under a decentralized regime may be lower since the LG could be subject to problems of technical capacity, unfunded mandates or local capture.

9.2   Households' Schooling Decisions

The considerable amount of time and monetary resources devoted by households to the education sector and the substantial effects that their decisions could bring to the education sector imply that households' behavior should also be incorporated into the analysis. To understand the effect that changes in public schools' quality induced by decentralization reforms can have in the schooling investment decisions of individuals, in this section we consider a simple investment in education model similar in spirit to that in Kremer et. al (2002).

Specifically, assume that wages (ω_i) are a function of factors such as the quantity and quality of education that each individual receives as well as on their innate ability. That is wages will be given by $\omega_i = e^{K(QS_i^h, a_i)f(s)}$ where s is the level of schooling that individuals chose to have; QS_i^h is the quality of education received which will depend on the type of school h they attend ($h =$

public or private) and a_i represents the innate ability of each individual. It is assumed that K and f are concave in their arguments and that both satisfy the Inada conditions. Individuals will face education costs c^h that will include monetary expenses such as tuition, transport costs and expenditures in books and which will vary according to the type of schools h attended. It is assumed that there are imperfect credit markets and only wealthy households can afford the monetary costs of attending private schools. Each individual will choose a level of education s that maximizes:

$$\max_s V(s) = \int_s^\infty e^{K(QS_i^h, a_i)f(s)} e^{-rt} dt - \int_0^s c^h e^{-rt} dt$$

where the optimal level of education will satisfy:

$$\left(\frac{K(QS_i^h, a_i)f'(s) - r}{r} \right) e^{K(QS_i^h, a_i)f(s)} = c^h$$

Under such assumptions, the level of education s chosen by individuals will depend on the quality of education provided by the type of school each student attend QS_i^h, on their innate ability a_i and on the costs c^h incurred when attending school. Specifically, it can be shown that if the quality of education increases, the returns to education and hence the households' optimal level of education s will also change.

10   References

Acosta, Olga Lucia and George J. Borjas (2000). Education Reform in Colombia. Fedesarrollo Working Papers 19.

Acosta, Olga Lucia, Adriana Gonzalez and Juan Gonzalo Zapata. 2002. "Se consolido la sostenibilidad fiscal de los municipios colombianos durante los años noventa?" In Evaluación de la descentralización municipal en Colombia: balance de una década. Departamento Nacional de Planeación.

Bardhan, Pranab. 2001. "Decentralization and Governance." Working Paper. University of Califronia at Berkeley.

Bardhan, Pranab and Dilip Mookherjee. 1999. "Relative Capture of Local and Central Governments: An Essay in the Political Economy of Decentralization." Working Paper.

Bardhan, Pranab and Dilip Mookherjee. 2000. "Capture and Governance at Local and National Levels." American Economic Review (pg 135-139).

Bardhan, Pranab and Dilip Mookherjee. 2002. "Corruption and Decentralization of Infrastructure Delivery in Developing Countries." Working Paper.

Bardhan, Pranab and Dilip Mookherjee. 2003. "Pro-poor Targeting and accountability of Local Governments in West Bengal" Working Paper.

Barrera, Felipe. 2003. "Decentralization and Education: An empirical Investigation" Ph.D. Dissertation. University of Maryland.

Barrientos, Jorge Hugo and Alejandro Gaviria. 2001. "Determinantes de la calidad de la educación en Colombia." Planeación Nacional, Archivos de Economia No. 159

Behrman, Jere and Elizabeth M. King. 2000. "Household Schooling Behaviors and Decentralization." Working Paper Series on Impact Evaluation of Education Reforms. Paper No. 20. The World Bank. Development Research Group.

Cadena, Ximena, Jairo Núñez, Renata Pardo and Roberto Steiner. 2002 "Cuales colegios ofrecen mejor educación en Colombia?" Planeación Nacional, Archivos de Economía No. 193.

Carnoy, Martin, Susanna Loeb, and Tiffany L.Smith. 2001. "Do higher state test scores in Texas make for better high school outcomes?" Research Report Series, RR-047, consortium for Policy Research in Education (November).

Cropper Maureen, Ahmed Mushfiq Mobarak and Andrew Sunil Rajkumar.

2004. "The Political Economy of Health Services Provision and Access in Brazil." Working Paper.

Di Gropello, E. "An assesment of the impact of decentralization on the quality of education in Chile."

DNP

Faguet Jean-Paul. 2001. "Does Decentralization Increase Responsiveness to Local Needs? Evidence from Bolivia", Policy Resarch Working Paper No. 2516.

Galiani, Sebastian, Paul Gertler and Ernesto Schargrodsky. 2005. "School Decentralization: Helping the good get better, but leaving the poor behind." Working Paper.

Gunnarsson, Louis Victoria, Peter Orazem, Mario Sanchez and Aimee Verdisco. 2004. "Does decentralization raise student outcomes?: Theory and Evidence on the roles of school autonomy and community participation." Working Paper # 04005. Iowa State University.

Hallock, Kevin and Roger Koenker. 2001. "Quantile Regression" Journal of Economic Perspectives, Vol. 15 (4).

Haney, Walter.2000. "The myth of the Texas miracle in education." Education Policy Analysis Archives 8, no..41 (August).

Hanushek, Erik A. 1986. "The economics of schooling: Production and Efficiency in Public Schools." Journal of Economic Literature Vol 24, No. 3 (September): 1141-1177.

Hanushek, Erik A. 1992. "The trade-off between child quantity and quality." Journal of Political Economy 100, no.1 (February): 84-117.

Hanushek, Erik A. 2004. "Some simple Analytics of School Quality" National Bureau of Economic Research, Working Paper 10229, (January).

Hanushek, Erik A. and M. Raymond, 2004. "Does School Accountability Lead to improved student perfomance?" Working Paper.

Jacob, Brian. 2002. "Accountability incentives and behavior: Evidence from school reform in Chicago." National Buerau of Economic Research, Working Paper No. 8968.

Kremer, M., S. Moulin and R Namunyu (2002). "Unbalanced Decentralization" Work in Progress.

Lazear Edward. 2003 "Teacher Incentives" Swedish Economic Policy Review.

Mary Simpson and Carmen Helena Vergara 2002. "Estudio general sobre los antecedentes, diseño avances y resultados generales del proceso de descentralización territorial en el sector educativo." In Evaluación de la descentralización municipal en Colombia: balance de una década. Departamento Nacional de Planeación.

Sarmiento, A. and J.E. Vargas (1997), "Descentralizacion de los Servicios de Educacion y Salud en Colombia", Colombia.

Soares, Rodrigo. "Development, crime and punishment: accounting for the international differences in crime rates." Journal of Development Economics No. 73 (pg 115-184).

Strauss, John and Duncan Thomas. 1995 "Human Resources: Empirical Modeling of Household and Family Decisions". Handbook of Development Economics, V3.

Toenjes, Laurence A. and A. Gary Dworkin. 2002. "Are increasing test scores in Texas really a myth, or is Haney's myth a myth?" Education Policy Analysis Archives 10, no.17 (March).