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Comparative analysis:

Public and Private school management systems

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Abstract

The Portuguese educational system has counted, for many years, with the co-existence of both public and private schools. In fact, the country's growth and development led, in the past, to an increasing demand for free of charge public education that could only be matched through the creation of "publicly-subsidized and privately owned and managed schools". Still, the demographic evolution of Portugal recently generated a decrease on the demand for public educational services. This situation has raised doubts about the true contribution of this type of school for the public education system. This paper aims at answering this question by isolating the impact of different property and management schemes on the performance of students, resorting to cross-section data on 9th grade students from 2010. The results corroborate the well known result on the relevance of the family socio-economic background for students' performance, but do also sustain the existence of a significant positive impact of private ownership and management schemes on the overall performance of students. These results suggest that there might be gains associated with the expansion of such schemes within the public education system.

Keywords: Publicly-subsidized privately owned and managed schools, ownership and management schemes, Portugal, Education

I-   Introduction

Until recently, education in most western countries has been almost fully administered and paid by central governments. The economic rationale[2] for this intervention was developed by Friedman (1962) on two main grounds. First of all, the recognition that the education of each individual in a society carries benefits for all its members that go beyond the individual gain. Secondly, the widespread idea that governments have a responsibly over its citizens, of guaranteeing their access to the recognized benefits of education. In spite of this crucial role of governments on the provision of education, in most countries the private sector also plays a role, of various dimensions.

The recognition of such a role of governments in education, and of the role of education as an engine for the development of societies, motivated an intense expansion of research, often fostered by governments themselves, on the factors that could determine an improvement of the learning experiences, both in public and private schools. The most acclaimed study in this area is the Coleman report, ordered by the American government, on the determinants of educational outcomes.

This line of research has struggled to identify new paths to further develop highly evolved educational systems and possible channels for improvement of current status. One of the most controversial channels is the impact of private school management and property schemes on educational performance. Several instruments have been used in recent years, in various countries, to analyze the relative performance of these two ownership schemes. Still many of these instruments have been accused of ignoring, or not fully controlling, the fact that the students in private and public schools tend to be very different, both in terms of family background and socio-economic condition. In this context, designing methods capable of identifying the true contribution of management and property schemes, with a tight control for differences in the background of students, has been growing in importance.

The goal of this paper is exactly this one: to solidly identify the contribution of public and private schools management and property schemes for the performance of students, in the case of the Portuguese

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[2] Of course there are also several political and ideological considerations behind this fact.

Educational System. The process to do it comprehends taking advantage of the peculiarities of the Portuguese educational system. In particular, the simultaneous existence in Portugal of strictly Private Schools, Public schools and publicly-subsidized privately owned and managed schools, provides a major window of comparison and measurement of the contribution of management schemes. As in the last two groups of schools, students are selected by the government on a geographical basis, by analyzing the comparative performance of public and publicly-subsidized private schools, we are only considering schools with student with the same background, that differ in the management and property schemes adopted. Through this comparison this study aims thus at identifying the true contribution of management schemes for the performance of students, in the Portuguese educational system.

In the following sections I intend to understand which management systems are more effective in producing good educational results and to identify the impact of student background in their schooling performance. Finally this research aims at analyzing the desirability of each management scheme for the Portuguese educational system and consequently the potential for expanding these experiences in Portugal.

The next sections of this project will try to give an answer to all these questions. The paper is subdivided in 6 major sections, being the present introduction the first one. Section two presents a summary of the existing literature on the main determinants of the educational process with special emphasis to the role given, in previous works, to the impact of management systems on the performance of students. In section three I present briefly the structure and functioning of the Portuguese educational system. The fourth section contains a description of the data and the methodology used in the empirical analysis. The description and discussion of the results obtained is stated in section five. Finally a summary of the main findings is presented in section six, together with an analysis of the main limitations of this work and the further steps of research

II-   Literature review

The determinants of educational Achievement

The critical determinants of education performance have been the target of a great variety of studies. Still, all research in this area is undoubtedly market by the seminal research commanded by J. S Coleman in 1966, on the determinants of educational achievement. From this literature we can identify mainly three types of factors that influence educational outcomes: student's attributes, family characteristics and thirdly school traits, including all the variables that describe the specific educational process and experience of a school, like school resources, teachers, ownership type and peers composition. One of the main conclusions of Coleman's investigation, also known as "Coleman report", is that family cultural and socio-economic characteristics are the most crucial determinants of the educational performance of students, instead of school resources, as was previously assumed.

Among student's characteristics, innate ability is certainly one of the variables that affects the most the educational achievement of students, but is also one of the most difficult to measure. Still Heckman et al (2001) and Bossiere et al (1985), using large databases, including past student information, managed to estimate a positive impact of ability on educational and labor market performance, as predictable. Also the Gender of students is known to influence significantly school outcomes. According to OECD (2007) girls tend to outperform boys in reading competencies but fall behind on the mathematical and scientific skills. According to Jimerson (2001) the number of times a student was retained can also explain part of the variation in outcomes, as he concludes that students who have already been retained in previous years tend to have a poorer performance than their peers, *ceteribus paribus*[3].

Regarding the impact of families on the educational performance of students, Becker (1964) states that parents and families influence largely the education performance and social integration of students. Namely, Dronkers (2010), Gamoran (2001) and Jerrim (2009) confirm that students whose parents have higher education levels and higher professional status tend to perform better at school. Neto-

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[3] In this study Jimerson performs a Meta-analysis on the effect of grade retention. All the studies considered include controls for ability of students, either through IQ or past academic achievement.

Mendes et al (2003) found evidence of this phenomenon for the case of Portugal. Graaf et al (2000) prove that cultural background of families is also an important feature in explaining educational achievement. Other characteristics of families such as family size or family structure are also known to affect the performance of children. Black (2005) finds that child born to large families tend to perform poorly, given the resource dilution within large families and the fewer time devoted to each child. Astone (1991) finds also evidence than single parented children tend to underperform children born to regular families possibly due to the higher financial vulnerability of these family aggregates.

Still, Averett et al (2004), argue that the conclusions of the "Coleman report" should not be read as a lack of responsiveness of student performance to variations in school inputs. In fact, Leithwood et al (2009), on their review of the empirical work of the effect of school size on student outcomes, conclude that smaller schools are preferable, especially for socially disadvantaged and disruptive students. Regarding the effect of class size on student achievement, Averett et al (2004) analyze all the empirical evidence available, and conclude that class size reductions might be desirable only for some students, on some classes, with certain dimensions, and only for some specific dimension reductions. Regarding the effect of variations in teacher's quality on the performance of students, many studies find that most characteristics normally found in a teacher's curriculum have few or even no impact on the performance of students[4]. Still, Rivikin et al (2005) identify persistent differences in the quality of instruction, within classes of the same school, after controlling for student and family characteristics[5]. These differences are, according to these authors, only explainable by asymmetries in the quality of teachers. Still these asymmetries are not justifyed by differences in the academic qualifications of teachers and are only mildly explained by the years of experience of teachers. Coleman et al (1966) and Hoxby (2000) also state that student outcomes are significantly affected by the performance and background of their peers. According to Hoxby, being in a class with peers that score 1 point higher raises a student's own score by 0,1 to 0,55 points. In particular he observes that the prevalence of females in a class tends to benefit both

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[4] See for example Mancebón et al (2010).
[5] This study uses information on average achievement gains and teacher turnover to create a lower bound estimate of teacher quality within a school.

male and female scores in math and reading competencies, although females score worse in Mathematics.

On the literature there is also an intense and unfinished debate concerning the impact of education expenditures in explaining educational outcomes. On this topic OECD (2007) and Glewwe et al (2010) suggest that, for both developed and underdeveloped countries, most variables regarding educational spending are not statistically significant.

Public/Private schools

The importance of ownership and property mechanisms to the performance of students is one of the most controversial topics on the education literature. At the center of the debate is the fact that attending a Private school is not a random event, but rather the consequence of a decision taken by students and families, conditioned by their financial wealth. According to Hoxby (2004), students apply to private schools either because they are performing badly in their current public school, or because of the poor quality of public schools, or due to the exceptional quality of students who need specific resources to develop or even due to having highly motivated parents that want to search for the best options available. Still, the requirement to pay tuitions in most private schools puts strong constraints on the access to those schools. For all these reasons, students who apply to private schools are self-selected into them and thus the student body of public and private schools tends to be very different. Coleman et al (1982) observe that Private school students come from wealthier families, with more educated parents, who invest more on their education. In this context identifying which schools are performing better is not a consensual task as the first results certainly suffer from self-selection bias.

In their comparative studies of several countries Coleman el al (1982), Neal (1997), Mizala et al (2002), Jiménez et al (1991) concluded that Private schools outperform public schools, even after controlling for differences in the background of students, not only in terms of grades, but also in terms of higher high school and college graduation rates and even in terms of higher future wages. Nevertheless, Mancebón et al (2010),

Fertig (2003) and Kirjavainen et al (1998) argue that the apparent superiority of private schools fades way after considering controls for differences in the background of students and in their peer composition.

Some authors even argue that the direction of the selection bias, introduced by differences in the background of students, is not necessary favoring the results of private schools. Neal (1997), Neal (2002) and Coleman et al (1987) assert from their analyses of data that it is erroneous to assume that students are positively selected into private schools. These authors present evidence that with respect to personality and ability traits, students are negatively selected into some private schools, namely catholic schools and try to identify reasonable causes for this phenomena. They state that often middle and upper class families, when choosing a place to live, take into account the quality of public schools in the area. Consequently students from upper and middle class families tend to go into top public schools, and not to private ones. According to these authors only the least able children from upper class families, those with more stringent educational needs, go to private schools.

There are mainly two types of arguments often presented in favor of the larger efficiency of private schools when compared to their public counterparts, even after controlling for differences in the background of their students: the labor market flexibility in the private sector and the financial competition among private schools. Hanushek et al (2002) and Rivkin et al (2005) argue that one of the core characteristics of a school is the capacity to locate, attract, retain and motivate talented teachers. As Hanushek et al (2002) point out, there are significant differences among teachers in their ability to foster learning and achievement among students. Still, according to Hanushek et al (2002), this capacity is not easily identified as it is poorly explained by characteristics of teachers directly observable in a resume or in a school database. These kinds of skills are only accessed by direct contact with the teachers and principals are, in general capable of detecting the presence of such skills.

As private school's principals are free to choose which teacher they hire and what salary they wish to pay, they are, according to Rivkin et al (2001), capable of attracting the professionals who gather the most desirable skills. According to Hoxby (2002) private schools do deviate from public schools wage

settings to create incentive mechanisms. Ballou et al (1995) present evidence that private schools present a much more flexible wage schedule than their public peers and that even when salaries in the private sector have wage schedule resembling the public one, deviations from settings are very frequent even when salaries in private schools are lower, on average[6]. On the other hand, Ballou et al (1995) and Neal (2002) point that wage mechanisms that settle pay and promotion in the public sector are very rigid and burocratic and persistently fail to compensate for individual differences in the performance of teachers, even when those differences are observable by principals.

This labor market rigidity, according to Ballou, results in public schools giving relatively lower weight to the quality of applicants when making hiring decisions. Consequently, as Hoxby et al (2002) indicate, private sector salaries vary more with teacher scores and quality, and are more prone to create incentives to attract and maintain better teachers.

One other argument often invoked to justify a larger efficiency of private schools is the one popularized by Milton Friedman (1962) that, as private schools must be financially viable, they must attract a considerable amount of students to sustain their functioning, in this sense private schools are integrated in a competitive market for students. This competition is reinforced by the fact that, as Mancebón et al (2010) point out, students enrolled in a private school may leave in search for better options at almost any moment, both for public or other private institution, without increasing, or even decreasing, the financial burden of their education.

 According to Chubb et al (1990) and Friedman (1962) this competition between private providers of education makes them more receptive to customer's demands. According to these authors the competition between privates also obliges these schools to use resources in the most efficient way possible, to achieve a high level of quality and satisfaction on the educational process, at the lowest possible cost. As Pincus (1974) and Levin (1976) point out, this mechanism is not active in the public sector. According to these authors public schools are local monopolies, not obliged to magnetize

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[6] This seems to be the case for Portugal as salaries in private schools are similar to the public ones, but inferior on average. Still privates report deviations from this schedule more often.

students, as these are secured by regional assigning. According to Chubb et al (1990), even if private schools do operate better than the public ones in one area, they are still not capable of exerting competitive pressure over public institutions given the financial barrier to mobility between these schools, imposed by tuitions in private schools. Consequently, parents will only change their child from a public to a private school if the perceived value of attending a private school is much higher than the public one and only if their financial situation permits such a decision. This barrier weakens the competition in the educational market and reduces the need for efficiency by public providers.

Despite these arguments, several authors stand that the apparent superiority of private schools can be severely questioned. The main stream of arguments is developed around the idea that the competitive pressure, introduced by the necessity of private schools to capture funds, does not produce the expected effects. According to Shepard (1991) the existing measures of school performance, namely school rankings, introduce incentives for private schools to demonstrate good results that do not reflect their effective quality. Shepard (1991) argues that the competitive pressure leads private schools to practice "cream skimming" that is to retain, encourage transfer or even drop-out of low performance students. Consequently, traditional schools evaluation mechanisms are biased, in the case of private schools, towards their high performing students, even after accounting for background differences. Mancebón et al (2010) question the capacity of parents to evaluate the effective quality of schools, arguing that parents decide mainly based on superficial evidence that does not reflect the quality of schools. Hence, if families and users are not capable of measuring school quality, there is little room for competition to improve the quality of schools.

In order to correct some of the enumerated deficiencies of public schools, some governments have tried to find solutions that combine the advantages of private education agents, both their flexibility in labor markets and their vulnerability to financial markets, without abnegating the fundamental duty of the state of ensuring universal access to education. From this effort several experiences have been born, like

charter schools[7], school vouchers[8], publicly-subsidized private schools[9] and many other hybrid systems. The debate around the advantages of these choice mechanisms has been very intense since the proliferation of Milton Friedman's argument, in 1962, that competition, under school choice, would improve the quality of schools and its cost efficiency, especially by introducing financially unrestricted competition within the public education system. Still the empirical evidence on this issue has been far from conclusive. Mancebón et al (2010) concluded that Spanish publicly subsidized private schools were ultimately worse than regular public schools after controlling for student characteristics. Hanushek (2007) concluded that charter schools were not significantly better than regular public schools but were better at satisfying family preferences, regarding several aspects of the educational environment[10], and that charter school parents are more responsive to variations in the quality of schools, advocating thus the idea that the existence of school choice develops an education market that is more responsive to quality. Neal (2002) also finds that large scale school choice mechanisms that result in an active competition for teachers among independent schools, can improve the quality of the teaching profession.

III-   The Portuguese educational System

The co-existence of Public and Private schools has been frequent in the Portuguese educational system over the last century. Still, in the late seventies and eighties the expansion of mandatory education up to the 9th grade generated a shortage of supply in the public education system. As the state was not financially capable of providing the funds required for the construction of new schools in areas of shortage, a new solution had to be designed. The establishment of contracts between the central government and private schools seems to have solved the problem by creating the so called *"Escolas*

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[7] Charter Schools are public schools funded on per-person basis for each student they attract. These schools are exempted from some of the public schools regulations, but are also constrained by public admission rules.
[8] School vouchers are transfers from central governments to parents that can only be applied to pay for the educational expenditures of their children.
[9] Publicly-subsidized private schools are privately owned and managed but their student's tuitions are supported by central governments. These schools are constrained to accept students under the same rules as public schools.
[10] According to Hanushek et al (2006) charter schools are better in satisfying family preferences in terms of educational approaches and social and religious focus.

com contrato de associação" which are state-funded private schools, that is, schools that are privately owned and managed, whose student's tuitions are mostly supported by the central government[11].

In order to enroll a child in a private school parents are required to pay fees in order to compensate the financial cost incurred by the school. On the contrary, in Public and state-funded private schools these costs are supported by the state, without any significant additional payment from the families. Disadvantaged students in these schools are also eligible to receive financing to cover their expenditure in materials, food and accommodation. According to the Portuguese law[12] publicly funded private schools are, alike regular public schools, obliged to accept all interested students conditional on the geographical and family criteria.

The ministry of education controls teaching contents and learning methods, in all types of schools up to the 12th grade. The ministry is also responsible for regulating the allocation of expenditures among public schools and state funded private schools. Private schools, both regular and state-funded, are responsible for selecting their teachers, where as in Public schools teachers are allocated to each school by ministry matching.

The educational track of students starts with optional pre-primary education for children between 3 and 5 years old. Afterwards there are three cycles of mandatory education with durations of 4, 2, and 3 years, respectively. After mandatory education, students can participate in secondary education, either general or technological, with duration of 3 years[13]. Since 2005, students are subject to national exams at the end of the 9th grade. In order to evaluate the relative performance of the two types of management systems, we looked at the performance of students at the end of the third cycle (9th grade).

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[11] In some of these schools there is a small number of students whose tuitions are not supported by the government but by the families.

[12] Art 16: DL 553/80.

[13] According to the Portuguese law 85/2009 mandatory schooling is extended either until the conclusion secondary education or up to the moment where the student completes 18 years of age. Still this reform applies only to students that were at the 7th grade, or lower, in the school year 2009/2010. Consequently the students that are currently (in the school year 2011/2012) studying at the 9th grade of mandatory schooling are the first ones to be covered by this law.

IV- Data and Methodology

Data

Since 2005, the Portuguese Ministry of education discloses yearly information regarding 9th grade national exams. The data provided regards the exam and school scores of students along with a set of variables on student characteristics and a bundle of school descriptive variables.

In this research data from 2010 was used, regarding 171 611 Portuguese and Mathematics exams, administered to 9th grade students[14] in all schools, located only in Portuguese mainland. According to DGIC[15], in 2010, there were 1348 schools teaching third cycle students in mainland Portugal, from which 1130 (84%) were public schools, 139 (10%) were private schools and 79 (6%) were publicly subsidized private schools. The exclusion of the archipelagos is appropriate, given the scarcity of data on these regions and the fact that their political autonomy is reflected in different rules for mandatory schooling. This sample includes only the students that took the exams and have been subject along that academic year to a continuous evaluation process at a school. This analysis excludes thus those that registered themselves at a specific school only to undergo national exams[16].

Student individual characteristics accommodated in this dataset, besides student's scores, were age and gender. At a school level, the information available concerned the size and the ownership/ management scheme of the institutions. As no information was made available regarding the socio-economic background of students and their families, these variables were proxied by the average municipality levels of the area where the school is located, taken from CENSOS 2001[17]. This methodology is supported by the fact that school choice, taken by families, is severely limited by the

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[14] According to law 85/2009 these students were at their final year of mandatory schooling. The students that completed the 8th grade in June 2010 are the first ones to have to comply with a larger period of mandatory schooling.
[15] DGIC is the Innovation and curriculum development department ("*Direcção Geral de Inovação e Desenvolvimento curricular*).
[16] The Portuguese educational system allows students to sign up at a school only for an exam, independently of their academic progress along the year, by discarding their yearlong evaluation. These students are named self-applying students (in Portuguese "*auto-propostos*") in opposition to school internal students ("*internos*" in Portuguese).
[17] CENSUS is a nationwide official count of the Portuguese population. This headcount is performed every 10 years. The last one was concluded in July 2011, still most data at municipality level was not yet available at the date of conclusion of this paper.

residence-based allocation rule to admission in public schools[18]. Consequently using municipality socio-economic indicators to control for variations in background of students is an appropriate proxy.

Methodology

Despite all the theoretical arguments advocating relative superiority to public or private schools, the difficulty in controlling for self-selection of students into private schools and isolating the true impact of schools from differences in the motivations and background of students has not yet found a consensual solution among researchers[19].

Still, the Portuguese educational system offers a privileged opportunity to disentangle the impact of student selection and background from the impact of Public and Private school management systems, on the performance of students. Public and private schools diverge both on the background of their students and on their property and management schemes adoptes. Consequently any direct comparison of these two types of institutions faces severe problems in measuring the separate impact of these two effects. In this context the existence of state-funded private schools can be of crucial importance. These schools, as mentioned previously, accept students under the same criteria as public schools, hence it is reasonable to assume that public school students are very similar to their counterparts in publicly funded private schools, given the lack of barriers to the mobility of students across these schools. Consequently any direct comparison between the performances of students in these two sorts of institutions gives us a measure of the impact of different management and property schemes on the educational outcomes of pupils. The dimension of this impact will be mentioned, from now on, as "management and property" effect.

Similarly regular private schools diverge from state-funded private ones on the composition of their student body even though they share the same management and property scheme[20]. Consequently any direct parallel between the performances of students in these two types of organizations is particularly

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[18] According to this criterion, students are assigned to the public school that is closer to their residence area, which is in most cases the school in their municipality.

[19] One possible solution would be to use value-added measures. This methodology, described in Hanushek et al (2006), uses student's past academic information to control for selection and identify the true contribution of schools. Given the scarcity of data on the Portuguese System, this methodology cannot be replicated here.

[20] According to article 16 of DL 553/80, state-funded private schools operate exactly under the restrictions as regular private schools, except on access student admission rules and on the tighter financial and administrative control they are subject, from the ministry of education.

suitable to measure the impact of differences in student background on education outcomes. This impact will be, from now on, referred to as "background" effect.

Summarily, the particular features of the Portuguese educational system accommodate the detachment of "background" effects from "management and property" effects, by comparing separately private with state funded private schools and comparing state funded private schools with regular public schools. Of course this detachment is only feasible if there is no distortion imposed by self-selection of students into charter schools, which seems to be the case, as stated above: students are assigned between public and publicly subsidized private schools according to geographical and family criteria that leave few room for selection distortions.

To analyze the impact of "management and property" mechanisms, including an astringent control for "background effects" three main models were estimated:

$$(1) StudentOutcome = \alpha_1 Female + \alpha_2 Age + \alpha_3 Priv_{vs} Pub + \alpha_4 SchoolSize + \alpha_5 Socioeconomic + \alpha_6 District$$
$$(2) StudentOutcome = \alpha_1 Female + \alpha_2 Age + \alpha_3 Priv_{vs} Charter + \alpha_4 SchoolSize + \alpha_5 Socioeconomic + \alpha_6 District$$
$$(3) StudentOutcome = \alpha_1 Female + \alpha_2 Age + \alpha_3 Charter_{vs} Pub + \alpha_4 SchoolSize + \alpha_5 Socioeconomic + \alpha_6 District$$

The variable *StudentOutcome* refers to several possible student outcomes of an educational process that will be used in separate regressions. In this analysis seven main outcomes were the focus of attention: student scores in Portuguese and Mathematics national exams[21], whether a student passed or failed the exam, for both subjects, the number of times a student was retained before 9th grade and finally two joint measures of performance, that combine student scores on national exams with the time required to complete mandatory schooling. The first one measures whether a student had never been retained and passed the exam (called *passontime*) and on the opposite top of the distribution, whether a student had already been retained and failed the 9th grade exam (named *failrepeater*). These outputs will be represented by dummy variables[22]. The first one takes the value 1 if the student has never failed before 9th grade and passes the national exam, if any of these conditions fails the variable takes the value 0. Similarly

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[21] The separation between the results on the two subjects is understandable, given the different determinants of achievement of these two subjects, as reported in OECD (2006) for the impact of gender on different skills.
[22] One should be attentive to the possible practices of "cream-skiming" described in Shepard (1991).

failrepeater has the value 1 if the student has already failed at least one school grade and fails the national exam; if any of these two conditions is not verified the variable takes the value 0.

The models estimated using the first two outputs considered, exam scores and passing or failing the exam, provide a detailed view of the determinants of success on the national exam, and in particular the contribution of "background" and "management and property schemes" to the performance of students on nationwide tests. By using the number of times a student was retained before 9th grade as a dependent variable, I manage to analyze the determinants of the performance of students during the first eight years of mandatory schooling. By using the efficiency measures as outputs, I analyze separately the impact of school management systems on the exam performance of students that have had high and low performances in previous years.

The variable *SchoolSize* indicates the dimension of a school, measured by the number of 9th grade exams taken in that school in 2010. The item *SocioEconomic* represents the bundle of municipal indicators that proxy socio-economic and cultural status of families, such as the municipality level of unemployment (*%Unemp*), the rate of female participation in the labor force (*% female activity)* and the average educational performance within a municipality, as measured by the share of the population that completed at least mandatory education (*% Mandatory School),* the school dropout rate (*% Dropout)*, the share of illiterates (*% Illiteracy)* and the share of the population that completed tertiary education (*%Higher Education).* The item *DistrictDummy* represents a set of eighteen dummies, one for each district in Portuguese mainland, that account for persistent regional disparities.

The variable $Pri_{vs}Pub$, in model (1) is a dummy that takes the value 1 if the school is private and the value 0 if the school is Public. This first model aims at providing a crude comparison between public and private schools performance by analyzing the impact of this item on the relative performance o public and private school students. I am aware that, given the scarcity of student specific indicators and background indicators, this regression will not be capable of disentangling the impact of "background effects" from the impact of attending schools with different management and property schemes, on the performance of

students. Nevertheless this regression consents the identification of the crude impact of attending a private school, instead of a public one, on the student achievement and thus giving an idea of the total impact of private schooling. With the models (2) and (3) I will be capable of separating this impact of private school attendance on its two components: "background" and "management and property" effects. Consequently the impact of private schooling, as estimated in (1), will give an idea of the bias normally incurred in analysis that identify the impact private management systems with the impact of private schooling.

The second model aims at estimating the "background" effect by comparing students attending regular private schools with their state-funded private schools counterparts, that is, students from schools with the same management and ownership schemes, only with different backgrounds. This impact is measured through the inclusion in (2) of the variable $Charter_{vs}Priv$[23], a dummy variable that takes the value 1 if the student is enrolled in a publicly-subsidized private school and 0 if he attends a private institution.

The purpose of the third model is to estimate the real impact of attending privately managed and owned schools on the achievement of students. To estimate the determinants of differences in the performance of public and publicly subsidized school students, I resort to model (3), where the variable $Charter_{vs}Pub$ takes the value 1 if the student attends a publicly subsidized private school and 0 if he attends a public one. The impact of this variable on student performance provides thus a measure of the "management and property" effect.

In order to take into account the discrete nature of the dependent variables exam scores and years retained in mandatory schooling before 9th grade, I used an ordered probit model. Using a standard normal distribution this model predicts the impact of each explanatory variable on the probability of achieving each of the ranked outcomes[24].

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[23] I am completely aware of the differences between a publicly subsidized private school and a charter school. The variable included in models (2) and (3) refers to charters instead only for a matter of simplicity.

[24] The estimated coefficients cannot be read as the impact of variations in each explanatory variable on the probability of achieving a certain outcome, only the signs of the regression coefficients can be interpreted as indicating the direction of the impact of each specific factor, on the performance of students. The z-statistics are also indicative of the statistical significance of a variable. In order to access the impact of variations in each explanatory variable on the dependent one, we have thus to use the marginal effects of each variable on the probability of achieving each specific outcome.

Given that passing of failing the exam, passing without having ever been retained and failing having already been retained, are three events of binary nature, the models estimated for these outputs require the use of probit specifications. This model measures the impact of each explanatory variable on the probability of dependent variable taking the value one[25].

V- Discussion of Results

1. Passing or failing

The results of the estimation, for the dependent variable passing or failing the exam[26], of models (1), (2) and (3) are reported in table 1. In this table only the marginal effects of each variable on the dependent variable *pass* are reported and not the regression coefficients[27]. In all these specifications the variables *Female*, *Age*, *%Dropout* and *%Higher Education* present the expected signs. Girls outperform boys in Portuguese but fall behind on Mathematical grounds. Older students, and thus students that have already repeated a school grade have a higher probability of failing again than their peers that have never failed before. The level of unemployment influences negatively student performance in Mathematics. In this subject students that live in municipalities with higher unemployment, and consequently were parents have lower economical stability, perform significantly worse.

The educational background of adults, which is the average level of attainment of families within a municipality, is significant to explain the educational performance of students. Students born in areas were school abandonment is lower tend to perform better[28]. The percentage of the population with at least mandatory schooling pronounces a very interesting behavior in explaining student performance, in models (1) and (3). The share of the population with at least mandatory schooling seems to affect negatively the performance of students. On the contrary, the share of the population with higher education has a positive impact on the attainment of students. These results suggest that given the increasingly high education levels

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[25] It is necessary to compute marginal effects to analyze the impact of each variable on the probability of success.
[26] The estimation of the three models for the dependent variables exam levels and being approved or retained at the exam yielded very similar results. Consequently I decided to report and discuss only the results for the exam approval rates given that this specification reports a higher explanatory power.
[27] In probit models the marginal effects are much more informative than the regression coefficients.
[28] As the data for school dropout is from 2001, there no should be no concern for endogenous relations between this variable and the performance of students in 2010.

of adults, only living in an area with a large number of people with college education is capable of impacting positively the results of children.

When explaining the differences among private school students and publicly subsidized private school students, in model (2), results are much more linear, as they show that living in a municipality with a large number of adults with at least mandatory education and even with higher education levels increases the likelihood of achieving better results. This difference to the previous two models is probably due to the higher differences in the education levels of adults, between students from private and publicly subsidized private schools, that is, between students with very different backgrounds.

Pass	(1)Math PRIV vs PUB	(1)Port PRIV vs PUB	(2)Math PRIV vs CA	(2)Port PRIV vs CA	(3)Math CA vs PUB	(3)Port CA vs PUB
Female	-6,87%*** (-17,85)	11,10%*** (33,45)	-4,43%*** (-4,96)	8,72%*** (12,54)	-6,99%*** (-18,43)	10,79%*** (33,89)
Age	-26,86%*** (-85,03)	-17,45%*** (-76,21)	-21,55%*** (-27,40)	-13,97%*** (-26,77)	-26,50%*** (-86,39)	-17,87%*** (-81,30)
Number of Exams	0,03%*** (12,45)	0,02%*** (10,44)	-0,004% (-1,00)	-0,003% (-1,01)	0,02%*** (8,51)	0,01%*** (5,82)
Private vs Public	31,79%*** (33,51)	17,01%*** (19,59)	-	-	-	-
Private vs Charter	-	-	15,20%*** (8,28)	4,55%*** (3,22)	-	-
Charter vs Public	-	-	-	-	2,06%*** (2,67)	2,16%*** (3,17)
% Unemp.	-0,82%*** (-4,99)	0,01% (0,10)	-2,38%*** (-3,76)	-0,52% (-1,08)	-1,01%*** (-6,32)	-0,09% (-0,68)
% Mandatory School	-0,48%*** (-5,43)	-0,29%*** (-3,88)	0,77%*** (3,26)	0,35%* (1,91)	-0,37%*** (-4,28)	-0,24%*** (-3,28)
% Dropout	-2,83%*** (-11,41)	-2,02%*** (-9,61)	-2,75%*** (-3,45)	-2,54%*** (-4,20)	-2,84%*** (-11,92)	-1,98%*** (-9,90)
% Female activity	-0,002% (-0,25)	0,10% (1,60)	0,11% (0,44)	0,47%** (2,45)	-0,01% (-0,19)	0,10%* (1,64)
% Illiteracy	0,003% (0,22)	-0,21%* (-1,63)	1,51%*** (3,01)	1,53%*** (4,01)	0,16% (1,13)	-0,08% (-0,66)
% Higher Education	1,38%*** (12,42)	0,82%*** (8,50)	0,16% (0,55)	0,2% (1,00)	1,24%*** (10,87)	0,94%*** (10,02)
N	75 709	75 041	10 947	10 943	76 800	80 816
R^2	12,07%	10,85%	13,68%	14,90%	10,21%	10,38%

Z-statistics are in brackets
* Statistically significant at 10% ** Statistically significant at 5% ***Statistically significant at 1%
Table1: Marginal effects of the determinants of passing or failing

Regarding the discussion on the literature on the consequences of school size on student performance, the results show that when comparing students from private and publicly subsidized private schools with their public school counterparts, larger schools perform significantly better.

1.1 Total effect

The crude comparison between regular private school and public school students (model (1)) is presented in columns 1 and 2 of table 1, for Mathematics and Portuguese respectively. In these two regressions the coefficients associated to the dummy *Private vs Public* are positive, indicating that attending a private school improves the performance of students. In the case of Mathematics, students attending regular private schools have 31,79% higher probability of passing than their public school counterparts. On the Portuguese exam, private school students are 17,01% more likely to be approved on the national exam. Summing up, private schooling seems to impact positively student performance, when compared with public schooling.

The results on these two specifications evidence some disparities across disciplines: the advantage of private schooling on exam approval is much higher for Mathematics than for Portuguese. This disparity has two main possible explanations, either the educational inputs used in private schools, such as teacher quality, student tutorials and homework frequency, provide students with much better basis to face mathematical problems or private school students are supported by more educated parents in their "at home" study. To test the validity of these explanations we have to check in models (2) and (3) if these differences are still present.

This regression provided me with an estimation of the differential impact of attending private schools versus attending public ones, which was subsequently divided in asymmetries resulting from background disparities and from management and property disparities. This division was performed throughout models (2) and (3), respectively.

1.2 "Background" Effect

The estimation of model (2) is presented in columns 3 and 4 of table 1, for Mathematics and Portuguese respectively. We can see in this table that attending regular private schools instead of publicly subsidized ones has a positive impact on the probability of passing both exams. In particular,

attending an independent private school increases by 15,19% the probability of being approved in Mathematics and by 4,55% in Portuguese.

By looking at these results it becomes clear that there are significant differences in the performance of student that attend schools with similar property and management mechanisms but have very different socioeconomic background. Nevertheless, the impact of background on exam grades is much larger for Mathematics than for Portuguese. This result is in line with the one obtained in the comparison between private and public schools in model (1). The only difference is that the dimension of this differential is much larger in model (1) than in (2). This result most likely indicates that part of the differential in the advantage of private schooling, in Portuguese and Mathematics results, is explained by differences in the background of students, that is children born in more educated environments have better mathematical preparation than those born in less educated ones.

1.3 "Management and Property" effects

The differences between private and public school management systems were estimated using model (3) and the results are summarized in columns 5 and 6 of table 1, for Portuguese and Mathematics respectively. By looking at the coefficients for the dummy variable *Charter vs Public*, we can see that changing from a public to a publicly-subsidized private school increases by 2,06% the probability of passing the Mathematics exam and increases by 2,34% the probability of passing the Portuguese one.

In this model there is not a large difference between the Portuguese and Mathematics results. In reality the gap observed in the two previous models has not only vanished but also slightly inverted its direction, meaning that attending publicly subsidized private schools instead of public ones increases more the probability of success in the Portuguese exam than it does in Mathematics. Consequently we can conclude that the large disparity in magnitude of the impact of private schooling on the probability of passing in Portuguese and Mathematics, observed in the comparison between public and private schools is not due to differences in the management systems that would make private schools prepare their students better.

2. Retentions before 9th grade

The determinants of the number of school years repeated before 9th grade were estimated using models (1), (2) and (3), and their marginal effects are reported in table 2. The variable *Repetition* takes the value 1 if the student enters 9th grade without having ever been retained, 2 if the student has been retained once or twice and 3 if he failed more than twice[29].

The estimates of all the three models indicate that girls are less likely to be retained before 9th grade. The impact of *Number of Exams* on the probability of being retained before 9th grade points that attending larger schools decreases the probability of ever being retained. Regarding the socioeconomic indicators that proxy socio-economic background of families, we can see that having high levels of unemployment and low levels of female activity, in a municipality, increase the probability of ever being retained, possibly due to the fact that unemployed parents have fewer income sources and are less capable of investing in their children education.

	Arrive on time			Repeat once twice			Repeat more than twice		
Repetition	**PRIV vs PUB**	**PRIV vs CA**	**CA vs PUB**	**PRIV vs PUB**	**PRIV vs CA**	**CA vs PUB**	**PRIV vs PUB**	**PRIV vs CA**	**CA vs PUB**
Female	5,07%*** (22,97)	4,63%*** (9,65)	4,87%*** (22,90)	-4,39%*** (-22,94)	-4,23%*** (-9,61)	-4,19%*** (-22,87)	-0,67%*** (-21,57)	-0,41%*** (-8,34)	-0,67%*** (-21,65)
Number of Exams	0,05%*** (29,36)	0,02%*** (9,01)	0,03%*** (23,13)	-0,04%*** (-29,19)	-0,02%*** (-8,98)	-0,03%*** (-23,04)	-0,01%*** (-27,11)	-0,002*** (-7,99)	-0,004%*** (-22,09)
Private vs Public	20,07%*** (71,11)	-	-	-18,30%*** (-67,70)	-	-	-1,78%*** (-51,81)	-	-
Private vs Charter	-	16,62%*** (17,74)	-	-	-15,08%*** (-17,79)	-	-	-1,55%*** (-11,70)	-
Charter vs Public	-	-	-0,79%* (-1,73)	-	-	0,68%* (1,73)	-	-	0,11%* (1,70)
% Unemp.	-0,55%*** (-5,95)	-0,68%** (-2,02)	-0,53%*** (-5,92)	0,48%*** (5,94)	0,62%** (2,02)	0,46%*** (5,92)	0,07%*** (5,93)	0,06%** (2,01)	0,07%*** (5,92)
% Mandatory School	-0,21%*** (-4,21)	0,24%* (1,91)	-0,24%*** (-4,95)	0,18%*** (4,21)	-0,22%* (-1,91)	0,21%*** (4,95)	0,03%*** (4,21)	-0,02%* (-1,90)	0,03%*** (4,95)
% Dropout	-1,00%*** (-7,08)	-1,41%*** (-3,42)	-0,81%*** (-6,37)	0,87%*** (7,07)	1,29%*** (3,42)	0,74%*** (6,37)	0,13%*** (7,04)	0,12%*** (3,36)	0,11%*** (6,35)
% Female activity	0,11%** (2,50)	-0,22%* (-1,65)	0,07%* (1,74)	-0,09%** (-2,50)	0,20%* (1,65)	-0,06%* (-1,74)	-0,01%** (-2,50)	0,02%* (1,65)	-0,01%* (-1,74)
% Illiteracy	-0,04% (-0,51)	-0,46%* (-1,79)	-0,07% (-0,94)	0,04% (0,51)	0,42%* (1,79)	0,06% (0,94)	0,01% (0,51)	0,04%* (1,78)	0,01% (0,94)
% Higher Education	0,45%*** (7,21)	-0,16% (-1,02)	0,81%*** (13,34)	-0,39%*** (-7,20)	0,15% (1,02)	-0,70%*** (-13,32)	-0,06%*** (-7,17)	0,01% (1,02)	-0,11%*** (-13,12)
N	150 750	21 890	162 302	150 750	21 890	162 302	150 750	21 890	162 302
R²	2,76%	5,13%	1,56%%	2,76%	5,13%	1,56%%	2,76%	5,13%	1,56%%

Z-statistics are in brackets
* Statistically significant at 10% ** Statistically significant at 5% ***Statistically significant at 1%
Table2: Marginal effects of the determinants of number off repetitions prior to 9th

[29] The ages of students are reported, in the dataset, at the beginning of the civil year. Consequently students that have never repeated a school grade before should be 13 or 14 years old, those who repeated once or twice should be 15 or 16 years old and those who repeated more than twice should be older than 16.

The variables representing the educational background of families exhibit the same impact on the number of repetitions before 9th grade, as they did on the likelihood of passing. For example, living in a municipality with a large share of individuals with at least mandatory education is not sufficient to increase the probability of arriving on 9th grade "on time". Only having a population with tertiary education can decrease the probability of ever being retained during mandatory school. Similarly high levels of school *dropout*, at a municipality level, decrease the probability of never being retained before 9th grade[30].

2.1 Total effect

The estimation of the marginal effects of the total impact of attending private schools instead of public ones, on the age of completion of mandatory school, is presented in columns 1, 4 and 7 of table 2 for each of the possible events of the variable repetition. Here we can see that private school students are more likely, than their public school counterparts, to never be retained before 9th grade. The marginal effects of changing from a public to a private school on the variable *Repetition* indicate that attending a private school increases the likelihood of never repeating a school grade before 9th grade by 20,08%, decreases the probability of being retained once or twice by 18,30% and decreases the probability of repeating more than twice by 1,78%.

2.2 "Background" Effect

The comparison of the determinants of the number of repetitions before 9th grade, for students that attend private and publicly-subsidized private schools, is presented in columns 2, 5 and 8 of table 2, for each of the values taken by the variable repetition. The coefficient on the variable *Private vs Charter* indicates that students that attend regular private schools have a higher probability of completing mandatory schooling "on time". In particular, students from regular private schools, when compared to their publicly subsidized private schools counterparts, are 16,62% more likely to arrive at 9th grade "on time", are 15,08% less likely to be retained once or twice and are 1,55% less likely to be retained more than twice during mandatory

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[30] As the data for school dropout is from 2001, there no should be no concern for endogenous relations between this variable and the performance of students in 2010.

schooling. Summing up, students that were born to families with higher socioeconomic and cultural wealth are less likely to ever being retained before the end of mandatory schooling.

2.3 "Management and Property" effects

The impact of management and property mechanisms on the number of retentions before 9th grade is reported in columns 3, 6 and 9 of table 2. The coefficient on the variable *Charter vs Public* indicates that attending publicly subsidized private schools instead of public schools, decreases the probability of arriving at 9th grade "on time". In particular, public school students are 0,79% more likely, than publicly subsidized private school ones, to arrive at 9th grade without ever being retained. In fact public school students are 0,68% less likely to have already repeated once or twice before 9th grade and 0,11% more likely to have repeated more than twice. Summing up there is evidence that private school management and ownership systems slightly increase the probability of being retained at least once before 9th grade.

3. "Efficiency"

The results obtained so far regarding the impact of private management and ownership schemes of schools on educational achievement, pointed on two different directions. On the one hand, attending schools with private management systems improves the performance of students on 9th grade national exams, on the other hand increases the probability that students fail, at least once, before 9th grade.

In order to bring some light on this issue I decided to analyze the impact of such systems on an "efficiency" measure, that is on a joint measure of impact that captures the interaction between the performances of a student on the 9th grade national exams and whether or not he has already been retained in a school grade before. In the interaction between these two variables it is particularly interesting to analyze two situations: what is the performance on national exams of students that have never been retained and, on the other top, what is the performance of students that have already been retained in previous years of mandatory education.

To measure the capacity of a school to generate good results on national exams, without submitting their students to a period of mandatory schooling longer than necessary, models (1), (2) and (3) were re-

estimated using the variables *passontime* and *failrepeater* as a depend variables. The marginal effects are summarized in table 3 below[31]. The results, for all three models, indicate that large schools increase the performance of students, as they increase the probability of completing mandatory schooling without having ever failed, and reduce the probably relapsing retention situations. The variables representing the educational capital of families exhibit a behavior very similar to the previous specifications. Being in an environment with highly educated adults and low levels of school dropout, increases the probability of passing the 9th grade exams without having ever been retained and reduces the probability for previously retained students to be retained again. The results for the impact of unemployment on these outcomes are very similar to the previous ones: high levels of unemployment worsen education outcomes.

	PRIvsPUB		PRIvsCA		CAvsPUB	
	passontime	failrepeater	passontime	Failrepeater	passontime	failrepeater
Port	13,36%*** (51,03)	-6,57%*** (-34,68)	8,93%*** (14,16)	-2,95%*** (-8,25)	13,55%*** (52,41)	-6,81%*** (-35,41)
Female	5,30%*** (20,20)	-3,88%*** (-20,53)	6,13%*** (9,69)	-2,47%*** (-6,86)	5,20%*** (20,10)	-4,06%*** (-21,18)
Number of Exams	0,05%*** (30,06)	-0,03%*** (-23,96)	0,02%*** (5,09)	-0,01%*** (-4,69)	0,04%*** (25,25)	-0,03%*** (-21,13)
Private vs Public	36,85%*** (57,69)	-21,37%*** (-38,14)	-	-	-	-
Private vs Charter	-	-	21,52%*** (16,64)	-9,74%*** (-13,08)	-	-
Charter vs Public	-	-	-	-	0,76% (1,45)	-0,76%* (-1,83)
% Unemp.	-0,61%*** (-5,39)	0,42%*** (5,34)	-1,52%*** (-3,35)	0,77%*** (3,13)	-0,83%*** (-7,59)	0,57%*** (7,18)
% Mandatory School	-0,41%*** (-6,91)	0,22%*** (5,08)	0,58%*** (3,47)	-0,31%*** (-3,29)	-0,30%*** (-5,13)	0,18%*** (4,17)
% Dropout	-2,44%*** (-14,36)	1,22%*** (10,22)	-2,58%*** (-4,57)	1,58%*** (5,32)	-2,33%*** (-14,31)	1,22%*** (10,27)
% Female activity	0,08%* (1,72)	-0,08%** (-2,35)	-0,07% (-0,38)	-0,09% (-0,98)	0,10%*** (2,02)	-0,10%*** (-2,79)
% Illiteracy	-0,17%* (-1,67)	0,04% (0,58)	-0,27% (0,76)	-0,51%*** (-2,71)	-0,10% (-0,47)	-0,04% (-0,69)
% Higher Education	1,08%*** (14,27)	-0,52%*** (-9,51)	0,06% (0,32)	0,14% (1,14)	0,97%*** (12,56)	-0,51% (-9,05)
N	150 750	150 750	21 890	21 890	152 932	152 932
R²	4,64%	3,76%	7,50%	6,44%	2,97%	2,70%

Z-statistics are in brackets
* Statistically significant at 10% ** Statistically significant at 5% ***Statistically significant at 1%

Table 3: Marginal effects of the determinants of *passontime* and *failrepeater*

3.1 Total effect

The direct comparison between public and private schools is reported in columns 1 and 2 of table 3. By looking at the coefficients on the variable *Private vs Public*, we can see that changing from a public

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[31] As the different determinants of educational outcomes for Portuguese and mathematics were already analyzed and yielded very similar results, except for gender, I did not perform the regressions separately for Portuguese and mathematics. Still a dummy variable for Portuguese (value 1) and mathematics (value 0) was included in all three models, to take into account differences between these two disciplines.

into a private school increases the probability of completing mandatory schooling on time by 36,85% and decreases the probability, *ceteribus paribus*, of failing the exams for students that have already been retained in previous grade courses by 21,37%.

3.2 "Background" Effect

The impact of background on the probability of academic success, for students that have never been retained before and for those who have been retained at least once, are reported in columns 3 and 4 of table 3. The results indicate that private school students are 21,51% more likely, than their publicly subsidized school colleagues, to pass national exams when they have never been retained before and are 9,74% less likely to relapse in failure situations when they have already been retained.

3.3 "management and property" effects

The coefficients on the variable *Charter vs Public* in columns 5 and 6 of table 3, indicates that attending a publicly subsidized private school instead of a regular public one reduces by 0,76% the probability of failing the exams for students that have already been retained in previous grades. It is also noticeable that being enrolled in a publicly subsidized private school instead of a public does not have a significant impact on the probability of successfully completing mandatory schooling without having ever been retained.

VI – Conclusions

Any social planner would wish to have a public education system performing at the top of its capabilities, both in terms of the learning experience and in terms of economic efficiency. The results obtained indicate that this is not totally the case for the Portuguese educational system. This study evidences that private management and property schemes, within the public system, have room to improve the performance of students on national exams.

Still, results also suggest that students in privately managed and owned schools are more prone to being retained before 9th grade. This result could possibly indicate that expanding the private presence

in the public education system could represent an increase in the duration of studies, for some students. However the results in terms of efficiency indicate that this is not the case. Both students that have already been retained and students that have never been retained are less likely to fail on 9th grade exams under private management schemes. These results reflect that the duration mandatory education under private management schemes tends to be shorter.

It would be interesting to access, if information was made available, the financial impact of publicly subsidized private schools on public education systems. Still the results obtained indicate that expanding the private offer inside the public education system, could represent a considerable saving for the central government. As students under private school management schemes are likely to finish mandatory schooling in a shorter period of time, the expansion of such systems could represent a significant decrease in the average number of years necessary to successfully complete mandatory school, and thus in the average cost of educating each student.

It would also be appealing, in further research, to test the hypothesis that school choice strengthens competition in public education markets in the area, creating incentives for improving the quality of public schools. I believe that if more information was released regarding school and student characteristics, this hypothesis could successfully be analyzed and provide non negligible conclusions.

One important missing variable in this analysis is past student performance. According to Heckman et al (2001) this information is very relevant to proxy student ability, one of the core determinants of education achievement. If such data was made available one could, following some authors[32] use value added measures to better control for the impact of ability on student performance. This information, together with more specific data on families (like composition, education and economic status) and schools (like teachers, resources and years of functioning) could open several further lines of useful investigation in this area.

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[32] This methodology is suggested by Hanushek et al (2006)

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