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Efficiency in the Italian Educational System: which role for accountability, autonomy and choice?

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Executive Summary

*A*CCOUNTABILITY, *autonomy and choice* are the watchwords *of contemporary education reformers around the globe*" (Woessmann *et al.*, 2009 – p. xi). Years of debate about the issue of quality of education and its determinants have led to reforms that contain these ingredients. It has been – and still it is nowadays, indeed – a fierce discussion. However, what is without the doubts is the importance of education. Two streams of theoretic and empirical literature do argue that education is the crucial leverage for any country to develop itself. The first "official" work on the field of economics of education entitled "Investment in human capital" (Schultz, 1961). This pioneer study showed how human capital is a relevant explanation of economic growth and how the imperfections of the capital market could cause an underinvestment on this "capital type" in case of people with insufficient resources to invest. The issue raised by Schultz and other scholars (Blaug, 1976; Vaizey, 1958; Wiseman, 1959) led to two main streams of literature: (i) analyses of the economic value of education, and (ii) analyses of the economic aspects of educational systems (Blaug, 1970). This thesis focuses on the second one, which deals with the internal *efficiency* of schools and with the relations between the *costs of education* and methods of financing these costs. In other words, it tries to answer to the question: how can education be "produced" in an effective and efficient way?

Although the aim – improving the educational level and doing it for all – was clear since the beginning, the path to follow is not straightforward. Historically, governments deeply intervened in the educational sector, by regulating, financing and producing schooling directly. Along with the birth of the economics of education, increasing proposals raised to address this issue. The most influential was the one promoted by Friedman (1962). He decisively disputed this tradition. In his opinion, government should only provide to families the cost of education (through a voucher), so that they can turn to their favourite school, whatever is the owner (public or private). This

way would allow for competition between schools, which in turn would put pressure on them and so increase education quality. The concrete implication of the Friedman's idea was that of attributing a relevant role to the private sector in education. More synthetically, Friedman and other scholars (Peacock and Wiseman, 1964; Wiseman, 1959) introduced the words *choice and competition* in the education sector.

About twenty years later, this idea pervaded the organisation of public sector and social services as a whole, by the birth of the so-called *New Public Management* (NPM) (Hood, 1987, 1995; Hood and Jackson, 1991; Pusey, 1991). The basic idea is the claim for a shift to private practices: disaggregation of public organisation into separately managed units (with performance-based salaries and incentives) and the systematic implementation of evaluation procedures, with clear and specific standards (Hood, 1995).

In the education sector, this meant the introduction of *school autonomy* or *school-based management* (Dimmock, 1993; Mohrman et al., 1994; Wohlstetter and Griffin, 1998). Many countries introduced school autonomy in order to improve student's performance. The original idea by Chubb and Moe (1990) is that the lower constraints schools have to respect, the more schools will be allowed to provide what is needed by families and students. In other words, autonomy should allow schools to create new tools and implement different practices according to the different contexts. Countries such as England, New Zealand, Australia, and Sweden embraced this idea (Hirsh, 1995; Whitty, 1997). An analogue case is the implementation of charter schools in the United States (Vergari, 2007).

This huge debate about how to effectively and efficiently produce education led to the so-called *market-oriented* reforms (Chubb and Moe, 1990; Bartlett and Le Grand, 1993; Le Grand, 2003). This new institutional setting decisively contributed to reverse the two cardinal doctrines of public administrations: "shifting the emphasis from *process* accountability towards a greater element of accountability in terms of *results*" (Hood, 1995 – p. 94). A new stream of literature conceptualised this reform process in a framework called *quasi-markets*, whose the most representative work is by Bartlett and Le Grand (1993). This theory merged choice, competition and autonomy in a unique

theoretical framework for the public sector. *Markets* means that competitive independent providers replace the monopolistic state ones; *quasi* because organisations are not necessarily out to maximise their profits, and purchasing power is expressed in voucher rather than money (Barltett and Le Grand, 1993). In other words, schools (whether public or private) are autonomous, and they compete for students, which "bring" money (throughout the voucher mechanism).

The injection of competition and autonomy caused an increasing claim for schools' *accountability*. The more a school has to face competition, and the more a school receives power from the central government, the more that school has to be accountable for their outcomes and results (Bush, 1994; Sockett, 1980). The most relevant issue in these market-oriented systems is the principal-agent problem whose basic characteristics is asymmetric information – between government and schools and/or between schools and families –, which can lead to opportunistic behaviours. Accountability plays its role at this level: by giving information and so, at least partially, by offsetting the asymmetry. The point is: information to whom? The essential characteristic of accountability is evaluation of performance and its public availability. This gives information to the government, who can verify whether schools are doing what it expects from them. It also gives information to families, who can verify whether their kids are learning as they concern. In case families are unsatisfied, they can choose another school who better meets their needs. This information then becomes the incentive for schools' actors and stakeholders to be more responsible for their actions.

Have the promises of market-oriented reforms been broken? There is still debate around this question. However, now there is the huge available empirical literature investigating the impact of these reforms. Countless studies have been published in these years. The quality of these works significantly increased when cross-country international inquiries on students' performance have been administered. Examples of this are PIRLS (*Progress in International Reading Literacy Study*, by I.E.A.), TIMMS (*Trends in International Mathematics and Science Study*, by I.E.A.), but the most used source of data is P.I.S.A. (*Programme for International Student Assessment*, by O.E.C.D.). The great value

of PISA data consists in collecting data at student level (either proficiency scores or student's background) but also in collecting relevant data at school, region and country level. A recent, robust and influential work by Woessmann *et al.* (2009) addressed this issue as a whole. Relying on PISA data, they estimate the impact of accountability, autonomy and choice and their interactions. What emerges from this study is striking: students in school systems with greater accountability, autonomy and choice perform substantially better – both on cognitive and non-cognitive skills – than students in school systems with less accountability, autonomy and choice. They highlight that these three factors are interrelated policies that can be mutually reinforcing. The most interesting finding is related to the impact on equity (which they measured as the dependence of the student's performance on his/her socio-economic background): "accountability, autonomy and choice are tides that lift all boats. […] There is not a single case where a policy designed to introduced accountability, autonomy or choice into schooling benefits advantaged students to the detriment of disadvantaged students" (pp. 111).

Despite of this empirical literature, several countries do not seem to will a change towards these reforms. The main reasons can be two: on the one hand any study, especially in the economics of education field, has some caveats, so they can be disputed. On the other hand, it is the policy-maker who has to decide to implement a certain policy or not, according to their values. This is the case of Italy: a typical example where students' achievements are poor and accountability, autonomy and choice are present but mitigated. Moreover, Italy is one of the countries that showed a decreasing performance in the last ten years and even under the OECD average (OECD PISA, 2009).

This thesis aims at investigating the determinants of the (in)efficiency of the Italian educational system. Further, a focus on the presence of the private sector and its outcomes compared to the public one has been conducted. Finally, through a qualitative inquiry, information about the actual school autonomy and accountability in Italy shall be given.

"Italy shows marked geographical variation in educational achievement: a key question is whether this is related to exogenous factor or to the characteristics of the education system" (Boarini, 2009 - p. 51). This is the

first issue addressed in the first chapter of this thesis: the efficiency of Italian educational system and its determinants. We analysed the system efficiency at two levels: regions and schools.

A well known problem in Italy is a wide difference in terms of socio-economics characteristics of its Regions, then the first analysis is focused on this question: in a comparative perspective, does the regional efficiency on education differ because of their structural differences (i.e. socio-economic factors)? Or is there a different productivity of public expenditure in this sector?

To estimate efficiency scores, a non-parametric technique called DEA (Data Envelopment Analysis) is used. The units of analysis are the 18 Italian Regions, and the focus is on the lower-secondary education. The teacher:students ratio and the PISA 2009 scores were chosen, respectively, as the input and the output. Then, a second-stage Tobit regression was used to detect the factors affecting efficiency. The results corroborate the difference between North and South of Italy (the Regions in the North outperform their counterparts in the South), even though there are some exceptions. What (should) alert the policy-maker is that the Regional socio-economic context appears as the key determinant of efficiency, rather than the school system.

Secondly, the school level has been considered. In this case only a Region has been chosen: Lombardy. Working at this level allowed to go more in depth of traditional efficiency measures. The aim of this analysis is twofold: (i) first, "baseline" efficiency scores are derived and related to a wider set of characteristics that can affect the performance of schools; (ii) second, a procedure is proposed to derive "adjusted" efficiency measures (i.e. "levelling" the out-of-control variables) to assess the managerial efficiency of the schools. Since the "intrusive" role of the context rose in the previous analysis, it is important to detect schools that, despite of the context, success in educating students. The quantitative approach is based again on two-stage DEA. In a first step, inputs are resources used by schools, while outputs are average scores obtained in a national standardised test. In the second stage, efficiency scores are regressed against a set of external variables (e.g. percentage of disabled and immigrant students, school size, rural/urban area, etc.). The residuals and predicted values of the second stage regression are then used to "adjust" initial efficiency scores for taking "environment harshness" into account, and derive information about "managerial" efficiency. The results show that managerial

efficiency is, on average, negatively related to baseline efficiency; that is, there is – again – a major role of external variables in affecting efficiency scores. The implication is that not only raw comparisons of schools' (average) achievement scores are misleading, but also input-output comparisons (efficiency approach) are not useful for policy purposes if external variables are not properly included in the analysis.

The debate about the comparison of public and private schools performance is of particular relevance in Italy – which is the issue discussed in the second chapter –, both from an academic and institutional perspective. With reference to the former, the empirical evidence from international datasets (especially OECD-PISA) and previous literature seems to suggest that public schools outperform private ones; it puts Italy among those few countries for which private schools provide less quality education than public ones (OECD, 2011). These results lead some scholars to argue that private schools in Italy have a "remedial" function, that is to assist lower quality, less motivated students instead of providing higher level education (Bertola *et al.*, 2004). However, such interpretation requires further testing, as it was based on studies that did not consider students' achievement as output, and refer to some specific grades (especially, high schools).

As for the institutional view, it is important to recall that some Italian Regions introduced voucher plans for stimulating attendance of private schools: it was especially the case of the biggest and richest region, named Lombardy; thus, the policy-making problem of evaluating the relative performances of the two types of school became relevant also for justifying or not this political orientation, which shall be described as to introduce the context of the analysis.

For the first time, a new dataset to analyse the relative performances of public and private schools in Italy has been used. Data come from the National Institute of the School System Evaluation (*Istituto nazionale per la valutazione del sistema educativo di istruzione e di formazione* – hereafter, INVALSI). INVALSI started in 2007 its activity of administering standardised tests for measuring students' achievement. The sample is limited to the schools located in a specific region, namely Lombardy, which is the most competitive area (between public and private sector) existing in Italy.

As for measuring the effect of attending a private school, we compared different techniques: IV regression and Propensity Score Matching. Both techniques allow us to overcome selection bias and endogeneity problems.

The main results, based on the preferred IV approach, are that private schooling attendance has a positive effect on Math scores for (relatively) richer students and those enrolled at school in a non-urban area, when considering grade 6 (also grade 5 is included in the analysis); instead, it exerts a negative effects on Math scores for students attending primary schools, especially for immigrant students, but a positive effect on Reading scores for disadvantaged students (those who are "relatively" poorer). These findings shed more light on the heterogeneity of the so called "private school effect", that is they claim for a more cautious interpretation of the role of private schools in the Italian context; in particular, they stress the importance of looking at this effect for different subpopulations of students and schools, as well as of taking into account heterogeneity across grades.

School autonomy is the last dimension analysed. Autonomy does not necessary mean ruling out central regulation (Bolam, 1993). In many circumstances, governments still have to define either boundaries or goals of autonomy (Eck and Goodwin, 2010). The different extent of public regulation explains why the implementation of school autonomy has been very differentiated across countries (Glenn, 2005). An interesting perspective is that "formal" autonomy could be not intended "true" autonomy by the school principal's perception. In other words, there can be highly formally autonomous schools with a perception of low real autonomy by principals. *Vice versa*, in apparently non-autonomous schools, principals could feel capable to achieve their goals with an adequate level of freedom. In this context, Gawlik (2007b) found that, even in case of clearly autonomous schools, principals are constrained by public sector's influence. Finningan (2007), relying on a national survey and twelve schools case study, showed the tendency of States and authorizers to treat charter schools as they do traditional public schools. On the other hand, Adamowski *et al.* (2007) found that even in most of American public schools (which have less autonomy than private and charter schools), "despite the constraints they face […] principals feel that they have the ability to exercise effective leadership within the terms of their job as they see it" (p. 5). This means

that detachment between formal and actual autonomy is possible also in strongly regulated systems.

The aim of this analysis is to show that, despite of weak formal autonomy, school principal's perception and willingness can determine different degrees of school's autonomy and proactivity even in very centralised systems (like the Italian educational system). The Italian setting is interesting because of its particular institutional characteristics: that is an "incomplete" school autonomy.

The methodology employed is a qualitative survey. Thirty-five Italian principals have filled in a non-standardised questionnaire. It has been constructed according to a theoretical framework, which embodies three critical dimensions emerging from the literature. The first group of questions were related to the governing body, the second to the school climate (intended as the relationship between principal and teachers) and the last group to accountability issues (i.e. evaluation policies and relationships with stakeholders and competition).

Three archetypes have been found:

- *Enterpreneurial* - the strategies to be followed and the tools to be used are defined well beyond what the law strictly prescribes. This character has a strong vision that allows creating and introducing new practices;
- *Chaotic* – many actors (principals, parents, teachers) argue their opinion but, at the end, there is not a shared decision at school level. Someone just gives it up;
- *Bureaucratic* – this character only observes the law. It does not feel to have to do anything without or beyond the law prescriptions.

A policy implication can be drawn from these results. More than ten years ago, Derouet (2000) pointed at recruitment and training of principals as one of the conditions required to give substance to school autonomy. More recently, Bush (2008) concludes an article in this way: "The best way to ensure the efficacy of leadership is to ensure that it is focused on classroom learning rather than being obsessed by budgets and HR practice" (p. 85). Our results challenge this idea and suggest that there is still a room to improve managerial attitude of schools' principals in the long way towards real autonomy for Italian schools.

Conclusively, the analysis showed a system – the Italian one – profoundly affected by the context. Thus, the contribution of this thesis consists in arguing that diversification process is not avoidable even in centralised systems. A set of

indicators, which take into account all the diversity (such as in the analysis of adjusted efficiency), should be used in order to define school funding criteria and incentives/disincentives of the system. Otherwise the risk of wasting resources will become unsustainable in short-time. A concrete hypothesis concerns with standard cost. Every agency, in this case schools or regions in accordance to the policy-maker, should receive resources based on a formula. This was the choice of many countries, such as United Kingdom and Sweden. Through the formula policy-makers can pursue their objectives. For example, the English government established that at least 80% of the formula – constructed by each Local Education Authority – must depend on the number of pupils. In this case, the idea is to promote choice and competition. Whatever the objective, identifying a standard cost through a formula, is the best way to pursue it. Instead, in the Italian case, even if some formulae are formally adopted, the result is just following the historical distribution (CTFP, 2008). This formula should also be extended to private schools, which in this analysis appeared performing, at least, as good as the public ones on average.

Finally and more importantly, what is a priority is to intervene on actors' motivation. The most used strategy around the world is decentralisation (Mitch, 2004). More specifically, many countries introduced school autonomy, in order to establish a more competitive system. Woessmann *et al.* (2009) show that the presence of school autonomy and national (and independent) evaluation system positively affects students' achievements. Then, the second suggestion rising from this thesis is to "liberalise" Italian school sector so that a stimulus to actors can be given. This is even more useful since the evaluation process has already started by INVALSI (national agency devote to evaluation of school system); so the remaining piece is just *real* school autonomy. Liberalising the school sector would mean: (i) attributing wide autonomy to schools, especially on staff matters and (ii) funding any type of schools according to a formula, which should takes into account enrolment but also contextual variables.

xxx

Part of this work has been conducted within research projects with my supervisor and colleagues, and has been published in academic journals and presented during academic conferences:

Agasisti, T., Bonomi, F., Sibiano, P. (2012), "Do the managerial school's characteristics affect its performance?", *International Journal of Educational Management*, vol. 26, n. 6, pp.593 - 609.

Agasisti, T. Bonomi, F., Sibiano, P., *Adjusted efficiency measures for schools: a two-stage empirical analysis with Bootstrap DEA and Tobit regression*, 37th AEFP Annual Conference, 15th-17th March, Boston, MA.

Agasisti, T., Sibiano, P. (2012), "Heterogeneity and efficiency on public spending in education among Italian regions", *Journal of Public Affairs*, forthcoming, http://dx.doi.org/10.1002/pa.1404.

Agasisti, T., Catalano, G., Sibiano, P. (2012), "Riformare il sistema di finanziamento degli studenti: la Dote Scuola della Regione Lombardia", *Scuola Democratica*, vol. 2, n. 5, pp. 92-116.

Agasisti, T., Catalano, G., Sibiano, P. (2012), "Can schools be autonomous in a centralised educational system?", *International Journal of Educational Management,* vol, 27, n. 3 (on-line published).

Agasisti, T., Murtinu, S., Sibiano, P., The heterogeneity of "Private school effect" in Italy, Conference "Improving Education through Accountability and Evaluation" organized by INVALSI, 3-5 October 2012, Rome.

1. Introduction

1.1   Policy challenges for educational systems: an overview

Accountability, autonomy and choice are the watchwords of contemporary education reformers around the globe" (Woessmann *et al.*, 2009 – p. xi). Years of debate about the issue of quality of education and its determinants have led to reforms that contain these ingredients. It has been – and still it is nowadays, indeed – a fierce discussion. However, what is without the doubts is the importance of education. Two streams of theoretic and empirical literature do argue that education is the crucial leverage for any country to develop itself. The first "official" work on the field of economics of education entitled "Investment in human capital" (Schultz, 1961). This pioneer study showed how human capital is a relevant explanation of economic growth and how the imperfections of the capital market could cause an underinvestment on this "capital type" in case of people with insufficient resources to invest. A couple of years afterwards, the study of Becker (1964) linked explicitly the human capital to education: schooling is a process that cultivates and increases individual ability and skills and so also productivity. Then, the human capital started to be conceived as one of the most determinants of differences in labour-market outcomes (Mincer, 1970). The issue raised by Schultz and other scholars (Blaug, 1976; Vaizey, 1958; Wiseman, 1959) led to two main streams of literature: (i) analyses of the economic value of education, and (ii) analyses of the economic aspects of educational systems (Blaug, 1970). This thesis focuses on the second one, which deals with the internal efficiency of schools and with the relations between the costs of education and methods of financing these costs. In other words, it tries to answer to the question: how can education be "produced" in an effective and efficient way?

Although the aim – improving the educational level and doing it for all – was clear since the beginning, the path to follow is not straightforward. Historically, governments deeply intervened in the educational sector, by regulating, financing and producing schooling directly. Along with the birth of the

economics of education, increasing proposals raised to address this issue. The most influential was the one promoted by Friedman (1962). He decisively disputed this tradition. In his opinion, government should only provide to families the cost of education (through a voucher), so that they can turn to their favourite school, whatever is the owner (public or private). This way would allow for competition between schools, which in turn would put pressure on them and so increase education quality. The concrete implication of the Friedman's idea was that of attributing a relevant role to the private sector in education. More synthetically, Friedman and other scholars (Peacock and Wiseman, 1964; Wiseman, 1959) introduced the words *choice and competition* in the education sector.

This radical idea introduced a fierce debate both in academic and in institutional fields. The typical discussed issue about school choice is the role of public money: should public resources go to private institutions? The question embodies both legal and moral aspects. A typical point from who does not agree with school choice is: "it is not affordable to divert scarce resources from already hurting public schools to fund private school education". On the other hand, advocates of school choice retain that school voucher programs helps low-income students and that those students succeed, and so that this should be the role of public resources. Moreover, advocates of school choice also point at a much more relevant role for parents in private schools, that would not be possible in private schools. Another typical discussion point is that of the society or system point of view. During the debate about the voucher program in California, the Association of School Administrators argued: "Educating […] is to create a viable social order to which individuals contribute and by which they are sustained. «Family choice», is, therefore, basically selfish and anti-social in that it focuses on the «wants» of a single family rather than the «needs» of a society" (Billingsley, 1994 – p. vii). On the other side, the accuse is on the fact the who works in public schools actually is not interested in pupils but just to themselves: "School choice effectuates a revolution that transfers the basic power over education from bureaucrats to parents. […] That is why the education establishment is fighting choice as if its livelihood depends upon it – because it does" (Bolick, 1994 – pp. 41-42). School choice and competition could also cause social segregation, it is argued, especially if schools can select students. Even this is likely to happen, interesting opinions are not missing among the school choice advocates: "Minorities can be empowered by choice because they can start their own school systems. We have the skills, and if we are in control of our own school system we cannot use the excuse that we have been discriminated against" (Chavis, 1994 p. 18).

1.2 Choice, autonomy, and competition: the academic debate

Opinions about school choice and competition could be listed here in thousands pages, however, this idea of choice for families and competition among schools did not stop. The reason for the increasing interest and debate on school choice can be explained by this fact: since the '70s the declining process (especially in US) of student's performance was still evident (NGA, 1986; Walberg, 1988) and no remedy was found. As Chubb and Moe (1990 – p. 1) stated: "For America's public schools, the last decade has been the worst of times and the best of times." On the one hand, "children are not learning enough", but on the other hand, "never before have governments been so aggressively dedicated to studying the schools' problems."

The pioneer study by Coleman *et al.*, (1966), which combined schools' inputs (school, family, and student characteristics) and educational outputs (relying on standardized tests), showed that students' achievements were determined more by family background than by school facilities and resources. In other words, schools did not work. These findings had a clear effect on the way through which conceiving *equity*: from equity of *resources* to equity of *outcomes*. This was the new focus of the academic research and also institutional debate (Bryk *et al.*, 1993). This put the basis for the birth of a stream of literature focusing on the "school's effectiveness" (Purkey and Smith, 1983; Kyle, 1985). Several studies tried to isolate some characteristics of effective schools, especially for disadvantaged students: clear school goals, academic standards, orderly school climate, homework, strong leadership, teachers' participation in decision-making, parental involvement, high expectations by teachers for student performance, emphasis on the acquisition on basic skills, frequent evaluation of student progress (Brookover *et al.*, 1979; Edmonds, 1979; Rosenholtz, 1985; Rutter *et al.*, 1979).

Subsequent works on school's effectiveness said something more, such as associating a specific school type to the ideal effective school. Coleman *et al.* (1982) argued that Catholic schools, in comparison with public schools, produced higher cognitive achievement with a lower rate of racial segregation and that the variation across students' achievements was much less dependent on family background. Relying on the same data, Greeley (1982) concluded that this positive difference between Catholic and private schools, in terms of achievements, was greatest for the mods disadvantaged students (poor families and/or parents undereducated).

All these statements intensified the debate, especially when tuition tax credits and educational vouchers started to be proposed. Firstly, the methodological limitations associated with the data used in those studies were highlighted; specifically, the fact that just a single cohort of sophomores and seniors was included in the data. Therefore, without longitudinal data – which would allow

for tracking progress of students over time – it is hardly possible to draw reliable inferences on achievements[1] (Heyns, 1981). However, these higher achievements for students attending this type of school did not result completely nullified by these methodological caveats (Jenck, 1985).

Yet, the main point did not deal with private versus private school; rather, the point was that some kind of schools, due to their different organization, could do better (Chester and Finn, 1981).

Thus, if there are effective schools and ineffective schools (whatever the owner or the religious orientation), who would not like to have a *choice* between them? This claim for more choice in education led to a dichotomy scenario: if choice is not introduced, then families have no choice, which would mean children would be assigned to a school only based upon their upon address. Indeed, Henig and Sugarman (1999) described the choice possibilities within the public sector. Firstly, they remind that the choice of residence, which is obviously free (at least, from a legal point of view), is the first step towards the choice of school. Secondly, as far as the intradistrict choice is considered, they show evidence that families can choose, and indeed they do, *nonneighborhood schools*, which are alternative schools, such as experimental or thematic or selective, even though students would be formally assigned to another school. Thirdly, in case of some families wish to enrol their children in public schools located in other districts – interdisctrict choice – public schools have traditionally opposed these requests. Although something changed on this respect[2], families already living in the desired district still have priority rights, so that who lives somewhere else is disadvantaged. Hence, this present but mitigated school choice was not considered as sufficient.

By the '70s several social scientists were proposing school choice policies, other than Friedman (1962) (Jencks, 1970; Levin, 1968, Coons and Sugarman, 1971), so that there was a growth of alternative public schools. The first step was the introduction of *magnet schools*, academies that offered specialized themes or programs, which were intended to draw students away from their neighbourhood schools and so to promote integration. However, the expected attraction of students was unsatisfactory as well as the Alum Rock voucher experiment, especially for choice's advocates (Bulman and Kirp, 1999).

The publication of *A Nation at Risk* Report in 1983 strongly highlighted again the problematic situation: "The educational foundation of our society are presently being eroded by a rising tide of mediocrity" (NCEE, 1984 – p. 5). Moreover, the study by Chubb and Moe (1990) refocused the attention on educational choice, but motivating through empirical analysis their proposal,

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[1] The special issues devoted to this debate have been widely mentioned in Bryk *et al.* (1993).
[2] Several states adopted choice plans that give children rights to enrolling public schools outside their district of residence (Henig and Sugarman, 1999).

which is indeed, autonomy and competition, and in turn, choice. They firstly detected the peculiar characteristics of effective schools, as in the school effectiveness literature: school goals, leadership, personnel and practice. By combining these variables[3] they obtained a synthetic indicator, which they called school organization. Then they constructed two indicators for "bureaucracy", called index of administrative constraint and index of personnel constraint. Both of them rely on principals' and teachers' answer to questions asking the influence of superintendents, central office administrators, unions and of themselves over the following functions: establishing curriculum, determining instructional methods, allocating school funds, hiring new full-time teachers, dismissing or transferring teachers, and setting disciplinary policy. The first main result of this study is that these two indicators came out as negatively (and significantly different from zero) associated to schools effectively organized. In other words, schools that suffer from too much influence of external authorities cannot organize itself in effective way. Secondly, the low degree of school autonomy (or "bureaucracy") was found to be associated to the institutions control. The different impact of institutions control was captured by two variables: school sector (private or public), which is quite intuitive and school's location (urban or non-urban). The motivation for the second is that in urban area the heterogeneity can easily generate conflicts, which normally are faced with bureaucracy. Therefore, the school location should capture more or less push for bureaucracy. The results, indeed, confirm the expectations of the two scholars, with large and positive effect for private sector and negative and large effect for urban location (both coefficients significantly different from zero). Thus, the idea of Chubb and Moe (1990) which is not just choice, but *school autonomy*, started being attractive.

This concept opened the doors to a new stream of literature called *school-based management* (Dimmock, 1993; Mohrman et al., 1994; Wohlstetter and Griffin, 1998). School autonomy was defined as the independence and self-determination of a community in its external and internal relations (Lakoff, 1990). Thus, autonomy can be seen as freedom "reduced" by constraints imposed by an authority. An example in education, is the difference between independent/private schools and public (government-dependent) schools. The first ones are able to determine its own course of action as it operates outside state authority. Whereas, the second ones, even the most autonomous schools, are self-determining but they are nested in state authority.

Wohlstetter *et al.* (1995) distinguished school autonomy between three categories: (i) autonomy from higher levels of government; (ii) local or organizational autonomy, and (iii) consumer sovereignty.

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[3] The explanation of how they measured these characteristics is in the Chapter 4 of the book, p. 122.

The first category deals with devolution of powers from the government to the schools, such as giving the authority to make operational decisions regarding staffing, the budget and curriculum. It is possible to distinguish between self-management and self-government of schools. According to Caldwell and Spinks (1992), self-government implies the lack of a centrally determined framework for the management of schools, while self-management implies that decisions are taken in accordance to local, state or national policies and guidelines. Moreover, this distinctions relate with the recipients of these power: while power is typically devolved to school level governing bodies, comprising the representatives of relevant stakeholders, operational management is devolved to the principal (Bush and Gamage, 2001). The more organizational powers are devolved, the more organizations are autonomous.

The local autonomy, instead, relates to the internal policy preferences of the organization, given the boundaries established by higher levels of government. In other words, this category of autonomy consists in self-determination over certain domains by individuals or the community over its internal operations. Many studies[4] focused on certain domains: governance, personnel, curriculum, instructional methods, disciplinary policies, budgeting, facilities and equipment, students' admission policies and accountability to parents.

Given a certain degree of power devolution, different kinds of exercised autonomy can exist. Bush and Gamage (2001) highlight the potential different kind of governing body, for example. On the one hand, there could be an inactive governing body, where governors fulfil only their minimum statutory role and delegate most of their responsibilities to their professional staff. On the other hand, in a proactive governing body, governors want to be directly involved in all policy matters and may seek to influence operational management. This is what can differ between accountability and responsibility. Indeed, for being accountable, following the orders can be enough, while responsibility deals more with being answerable to others (Allen and Mintrom, 2009).

West (1992) linked consumer sovereignty to autonomy. The idea is that, so as parents should be free to choose a (better) school and reject another (worse) one, schools should be able to meet the parents' preferences. This is the link between autonomy and consumer sovereignty. However, that is not just changing or developing itself but it is a requirement to provide an account or reckoning of the actions for which one is held responsible (Gray et al., 1987). Indeed, the information is crucial for consumer sovereignty. Thus, schools have to make certain that performance information, for example, is well known and well publicized. Thus, school autonomy is linked with competition too.

The original idea by Chubb and Moe (1990) can easily sum up: the lower constraints schools have to respect, the more schools will be allowed to provide

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[4] A collection of these studies can be found in Agasisti *et al.* (2011).

what is needed by families and students. In other words, autonomy should allow schools to create new tools and implement different practices according to the different contexts. Many countries, such as England, New Zealand, Australia, and Sweden embraced this idea (Hirsh, 1995; Whitty, 1997). An analogue case is the implementation of charter schools in the United States (Vergari, 2007).

1.3 Market-oriented reforms and international experiences

About twenty years after the Friedman's proposal, the idea of choice, autonomy and competition pervaded the organisation of public sector and social services as a whole, by the birth of the so-called *New Public Management* (NPM) (Hood, 1987, 1995; Hood and Jackson, 1991; Pusey, 1991). The basic idea is the claim for a shift to private practices: disaggregation of public organisation into separately managed units (with performance-based salaries and incentives) and the systematic implementation of evaluation procedures, with clear and specific standards (Hood, 1995). Thus, deep changes affected the social services by implementing the so-called *market-oriented* reforms (Chubb and Moe, 1990; Bartlett and Le Grand, 1993; Le Grand, 2003). This new institutional setting decisively contributed to reverse the two cardinal doctrines of public administrations: "shifting the emphasis from *process* accountability towards a greater element of accountability in terms of *results*" (Hood, 1995 – p. 94). A specific stream of literature conceptualised this reform process in a framework called *quasi-markets*, whose the most representative work is by Bartlett and Le Grand (1993). This theory merged choice, competition and autonomy in a unique theoretical framework for the public sector. *Markets* means that competitive independent providers replace the monopolistic state ones; *quasi* because organisations are not necessarily out to maximise their profits, and purchasing power is expressed in voucher rather than money (Barltett and Le Grand, 1993). In other words, schools (whether public or private) are autonomous, and they compete for students, which "bring" money (throughout the voucher mechanism). This new theory, according to Le Grand (2003), represented a change not just in policies but in the assumptions about the actors of the welfare system. This is what Le Grand called the theory of knights and knaves, and pawns and queens, where: *knights* are people predominantly public-spirited or altruistic; *knaves* are mainly selfish individuals; *pawns* are people that receive benefits as passive victims; *queens* are active agents. According to this theory, what changed in the organization of the welfare state was not just the organizational setting but the assumptions at the basis of the behaviour of the three actors of the system: the State (and its providers), taxpayers and recipients of the services. The setting in force before quasi-market has been described as a policy that assumed the public providers and taxpayers as knights and the

recipients as pawns. Yet, these assumptions were challenged by people (middle class especially) that wanted different kinds and different levels of services, but it was hard to get that diversification, because of uniformity of social services, so that they started turning to private sector. Hence, both taxpayers and public providers started behaving as knaves rather than knights. In Le Grand's opinion, the change of quasi-market was inspired by these new assumptions, and by giving power to individuals, making them queen rather than pawns. This mainly meant introducing mechanisms that allow individuals to determine quantity and quality of public services through the foot vote (Tiebout, 1956).

For these reasons the approach of the quasi-markets was chosen in the '80s, not only in the United Kingdom. The debate on these new ideas led to two types of intervention with regard to the policies: on the one hand the implementation of targeted voucher policies, on the other hand an overall reform of the financing and organization of education system. The first case deals with experiences - such as Milwaukee and Cleveland - where the distinction between public and private sector still operates: the state manages public schools, while private ones are managed by either secular or religious subject. The policy consists in defining a threshold income for families that would whish to attend their children to a private school[5].

The second case, as experienced in England and Sweden, consists in a move from a system in which the public sector is at the same time regulator, financier and producer of education to a quasi-market system.

The Milwaukee voucher scheme was activated during the 1990 on a trial basis to 300 students by the award of a voucher to move to one of six private schools. Five years later, it came to 832 students, which could choose between 11 private schools. To date, the Milwaukee voucher includes more than one hundred schools, reaching about 20,000 students (Barrow and Rouse, 2008).

In order to receive the vouchers, families must have an income below 175% of the poverty line, which means having an income no greater than about $ 26,000, in case of family with two children. Beltrametti (2004) has analysed the income of families in receipt of vouchers: this is approximately $ 12,300. In the same study he reveals that the recipients of the vouchers come from families with income levels significantly lower than the average public school ($ 24,000) and private schools ($ 43,000) students.

The voucher amount has gone from about $ 2,000 in the first year of implementation to the nearly $ 6,000 in 2003 (Chakrabarti, 2008), a value which has been sustained to date. The program is aimed particularly at students enrolled for the first time in public schools or students with the highest marks expressing the desire to move to a different school from the one attributed according to their residence. Two signs have emerged from the assessment on

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[5] The Lombardy policy, which shall be described in the second chapter, falls into this kind of intervention.

the results of this project after its first application (West, 1997): (i) it was not a regressive instrument, where the only beneficiaries are likely to be more affluent families, (ii) cream skimming behaviours were not found (Witte *et al.*, 1995). One common aspect to most of the evaluations is the difficulty in identifying significant differences between the educational students achievements. In Milwaukee, after the first year clear difference between students enrolled in public schools and those who received the voucher was not found. However, some significant changes to the program (such as the removal of the exclusion of religious schools from the program and the increase in the contribution of the voucher) were implemented over time. Several studies show that competition triggered by the voucher has led to an improvement in public sector performance (Hoxby, 2003; Carnoy et al., 2007 and Chakrabarti, 2008) .

Since 1997, the city of Cleveland has instituted a program of school vouchers, called Cleveland Scholarship and Tutoring Program, justified by the will of the administration to increase the freedom of choice of low-income families. The program is funded with state contributions. In 2000 it was aimed at 3,400 students, while in 2008, the voucher has been delivered to more than 6,000 students (Beltrametti, 2004, Barrow and Rouse, 2008). The schools covered by the program must fall into the school district of the city and adhere to state standards for non-public schools in terms of educational objectives, faculty qualifications, facilities and services offered, the rules on health, safety and equal treatment.

Voucher is provided primarily to students from low-income families (those that do not exceed the threshold of 200% of federal poverty level). The amount of the voucher is 90% (for families whose income lies below 200% of poverty level) or 75% (for families whose income lies above 200% of that threshold) of the registration fee at the private school chosen up to a maximum of $ 3,450. The allocation of vouchers is defined throughout a lottery among those who have applied. Overall, among the beneficiaries, one out of three was previously enrolled at a private school, while only 40% of claimants belong to families that are below the poverty line (Beltrametti, 2004). Finally, also in this case, a substantial equality of results between students who attend public or private schools has been found (Metcalf et al., 2003).

England implemented a quasi-market institutional setting, starting in the 1980s (1980, 1988 and 1993 Education Reform Acts) and now it is almost completely embedded in the country, although different governments have come to power, the pillars of this feature are still operating. Although theory and reality are often quite far, the English educational system did lead a change regarding choice, school autonomy, school funding and evaluation. With reference to choice, parents have the right to choose their preferred school, though a problem arises when one school is chosen by many families; in other words, when a school is oversubscribed it has to select someone and to reject someone

else. The criteria used to select students are subject to regulation by central government, which are, mainly, the presence of siblings in the school, whether the child is "looked after" by the state (i.e. in social care) and whether the child has special educational needs. However, after these categories, schools use catchment areas in order to decide who will be accepted and who will not (Allen, 2007 and Parsons et al., 2000). Thus, some complication about implicit or explicit selection by ability or by income might occur. However, evidence shows that in primary schools almost every family get their first choice (Burgess et al, 2009).

As for school autonomy, the managers of the school are the governing body, which embodies parents and – eventually, depending on school type – stakeholders. Every school (Levačić 2008 and Simkins 2004):

- determines all matter relating to its staff, recruiting, pay-roll, training, disciplining and dismissing;
- has discretion on how to teach and organize the national curriculum;
- is the owner of lands and buildings.

However, in relation to the staff, school autonomy is somewhat limited in its ability to hire and fire teachers as it has to negotiate/engage with the unions.

Public funded Local Authority (LAs) maintained schools in England receive their funding in two stages: firstly, a central government grant for education is given to the LAs, secondly, the LAs are required to determine a budget for each school using a formula. The largest grant distributed to LAs is allocated by the Department for Children, Schools and Families (DCSF). That is the primary source of funds for schools` "recurrent expenditure" (i.e. spending on teacher salaries, support staff salaries and other items such as books and equipment).

The amount of that fund takes into account factors that allow disadvantage LAs (such as ones in areas with high poverty rates, like percentage of Free School Meals beneficiaries) to get higher levels of funding per pupil. Before 2006, these allocations were calculated on the basis of a basic amount per pupil with top-ups for area costs and for deprivation.

At the second stage, LAs allocate what they have received, eventually integrated through other resources like council tax revenue. Moreover, once LAs determine their own budget for their central educational services they are required to draw up a funding scheme for their schools (School Standard and Framework Act 1998). At least 75% of what every school receives by LA must be allocated for primary and secondary schools according to the number and ages of pupils at each school (voucher mechanism). The remaining 25% may be delegated in relation to:

- a fixed amount regardless of size of school;
- indicators of additional educational needs, of which free school meals is the most popular (Marsh, 2002);
- indicators relating to the costs of operating the school building and grounds (size, condition, split-sites, special facilities, etc...).

The English school system has both external and internal evaluation. The external one consists of the league tables and OFSTED`s inquiries. Every year, the results of GCSE (at 16 years old) and A-level (at 18 years old) exams in England are published on websites and in newspapers. The information published for every school contains: the number of pupils at the end of KS4 , the contextual value added, that is measure progress made by pupils between KS2 tests at 11 years old, at GCSE and percentage of A*-C passes.

However, it has been recognized that only GCSE and A*-C scores give a very misleading picture of school effectiveness, as some schools have much different intake than other ones. Thus, Value Added measures were given to parents, which measured pupil progress and took account of intake kind. Then, Contextualised Value Added measures which not only took account of prior pupil attainment but also other factors that might influence attainment, such as FSM, ethnicity, and gender. Moreover, an agency called OFSTED (Organization for Standard in Education), assesses in depth the situation of certain schools. The outcome is a Report that describes the problems detected and the targets to solve them. Every school also has an internal evaluation. In England, schools observe their teachers over time, giving them marks and sending them on training courses in the case of teachers who are under performing.

Regarding the outcome of the *quasi-markets,* the evidence is not straightforward, though it is hard to dispute the fact that student's performance increased after this new institutional setting (Le Grand, 2003). West e Pennell (2000) shows that the average point score of pupils went up between 1992 and 1997 by 8%, and more interestingly, the score for the top tenth of pupils increased by 7%, but that for the bottom tenth fell by 13%. The increasing trend of student's performance is confirmed also by Glennerster (2001), though just for primary school and mathematics. Interesting findings come from a study by Bradley and Taylor (2007), which argues that the competition injected by quasi-makert led to positive results especially in disadvantaged schools. By the contrary, other studies points at social segregation as a "price" for these results (Allen, 2007; Hansen and Vignoles, 2005; Noden, 2000).

Likewise, since the '90s, Sweden has implemented a comprehensive reform of school organization, characterized by three main elements:
  (i) a move from a decentralized to a centralized system, leaving the responsibility to Municipalities the management of schools (including teachers' salaries);
  (ii) the abolition of the automatic assignment of students at the school of reference (i.e., according to the catchment area), leaving free to enrol in any school;
  (iii) the accreditation of private schools (for-profit and nonprofit) that is given the right to receive equal funding of public schools.

Public funding of schools varies according to the Municipalities, but the national rule expects to award resources on the basis of a capitation amount (pupil grant). The Municipalities set the criteria, which are the same for public and private schools. In turn, schools cannot set additional fees.

The reform has triggered a fierce competition by increasing the number of private schools and increasing subscribers from 0.5% to 5% of the school population. Unlike the U.S. cases, in the Swedish case it seems to emerge positive results for both private schools and - through competition - for public schools (Ahlin, 2003; Bjorklund *et al.*, 2005; Bohlmark and Lindahl, 2008; Sandström and Bergström, 2002).

The injection of competition and autonomy caused an increasing claim for schools' *accountability*. The more a school has to face competition, and the more a school receives power from the central government, the more that school has to be accountable for their outcomes and results (Bush, 1994; Sockett, 1980). The most relevant issue in these market-oriented systems is the principal-agent problem whose basic characteristics is asymmetric information – between government and schools and/or between schools and families –, which can lead to opportunistic behaviours (Laffont and Martimort, 2002). Accountability plays its role at this level: by giving information and so, at least partially, by offsetting the asymmetry. The point is: information to whom? The essential characteristic of accountability is evaluation of performance and its public availability. This gives information to the government, who can verify whether schools are doing what it expects from them. It also gives information to families, who can verify whether their kids are learning as they concern. In case families are unsatisfied, they can choose another school who better meets their needs. This information then becomes the incentive for schools' actors and stakeholders to be more responsible for their actions.

For these reasons, the school-based accountability movement emerged out of a desire, particularly in the United States and the United Kingdom beginning in the '80s, to measure in the public and non-profit sectors (Figlio and Kenny, 2009). The objective can be not just assessing performances, but to identify a set of clear, measurable and ambitious performance standards, and to expect students to meet these standards (Figlio and Loeb, 2011).

Accountability can consider different units of analysis: teachers, schools or districts. Some studies found evidence indicating that performance incentives for teachers can be beneficial for student's outcomes (Lavy, 2007; Figlio and Kenny, 2007). However, school level assessments could be preferable because it can promote collaboration among teachers and because schools have more opportunities than do individual teachers to enact the types of changes in resource allocation and practices that may be needed to raise student's achievements (Ladd, 2001). Thirdly, choosing the school district as unit of

analysis could mask the substantial heterogeneity in school performance, especially in case of large school districts with thousands of schools; at the same time assessments at district level can be useful in determining resources allocation (Figlio and Loeb, 2011).

The most used instrument of accountability is running external exit exams. According to Woessmann *et al.* (2009), the impact of this tool can run through three channels. Firstly, external exams gives increased external rewards for learning; schools have to place greater weight on educational achievement when making admissions and hiring decisions. Secondly, these exams have an impact on peer behaviour; the idea is that while assigning grades relative to the class average gives an incentive to lower average class achievement so that students will receive the same grades at less effort, with exit exams the peer incentives to denigrate studiousness dissipate because inferior class work leads only to lower marks. Thirdly, thanks to external exams it becomes evident whether the bad performance of an individual student is an exception within a class or whether the whole class taught by a teacher is doing badly relative to the country mean. With this information, parents have the information they need to initiate action.

A lack of accountability procedures is that it cannot assess everything. In other words, some concerns for stakeholders can hardly be evaluated, such as citizenship, work ethic, and critical thinking (Rothstein *et al.*, 2008). Yet, the traditional evaluation of reading and mathematic performance can have an impact on the behaviour of stakeholders anyway, meaning that they put attention to these indicators too. For example, Black and Machin (2011) demonstrates that aggregate test score results are capitalized into real estate prices. Another example is that school accountability measures affect voluntary contributions to public schools (Figlio and Kenny, 2009).

1.4   Evidence about the effect of market-oriented reforms

Have the promises of market-oriented reforms been broken? There is still debate around this question. However, now there is the huge available empirical literature investigating the impact of these reforms. Countless studies have been published in these years. The quality of these works significantly increased when cross-country international inquiries on students' performance have been administered. Examples of this are PIRLS (*Progress in International Reading Literacy Study*, by I.E.A.), TIMMS (*Trends in International Mathematics and Science Study*, by I.E.A.), and the most used source of data, which is P.I.S.A. (*Programme for International Student Assessment*, by O.E.C.D.). The great value of PISA data consists in collecting data at student level (either proficiency scores or student's background) but also in collecting relevant data at school, region

and country level. At the individual level, the factors include student characteristics such as age, gender, immigration, and pre-primary educational attendance and family background measures (socio-economic status, parental occupation, family status, number of books at home). At the school level, data are available for resources measures such as class size and shortage of materials, instructional time, teacher education, community location and institutional factors such as a set of measures of teacher and student evaluation, and different dimension of school autonomy. Moreover, since these inquiries embody more than one hundred countries, also relevant variable at country level can be used: GDP per capita, educational expenditure per student, the presence of external exit exams, and share of private schools.

Having all these data for different countries, and running estimates across countries, allows for significant advantages (Hanushek and Woessmann, 2011): it makes exploitable institutional variation; it draws on much larger variation than usually available within any country; it reveals whether any result is country specific or more general; it tests whether effects are systematically heterogeneous in different settings; it circumvents selection issues – which makes so hard to get robust estimates in within country inquiries – by using system-level aggregated measures; it uncovers general equilibrium effects that often elude studies in a single country[6]. In other words, the studies across countries relying on these data (such as PISA) are particularly robust.

The findings deriving from this stream of literature shed light on these new market oriented reforms. Firstly, while a strong association of family background with student's achievements is corroborated (Fuchs and Woessmann, 2007; Jurges and Schneider, 2004; Woessmann, 2003), this association is not equal across countries; this suggests that differences in education policies might be an important element in differences in equality of opportunity (Hanushek and Woessmann, 2011).

Interestingly, the amount of resources employed by single countries does not have any impact on the student's performance, both when considering the expenditure per student (Hanushek and Kimko 2000; Woessmann, 2002) and the class-size (Fuchs and Woessmann, 2007). On the contrary, several studies tend to find positive associations of student's achievement with the quality of instructional material and the quality of the teaching force (Dolton and Marcenaro-Gutierrez, 2010; Lee and Barro, 2001; Woessmann, 2003).

However, the most relevant finding deriving from the across countries studies is the impact of different institutional settings. In other words, the different extent of accountability, school autonomy and school competition. Regarding accountability, the most used proxy for comparing different countries is

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[6] Indeed, Hanushek and Woessman (2011) mention the disadvantages as well, especially the cross-sectional character of most available achievement data, and possible bias from unobserved country factors like culture.

whether external exit exams are introduced in the system. According to the existing cross-country literature, the effect of external exit exams on student's achievements may be larger than a whole grade-level equivalent (Hanushek and Woessmann, 2011; Woessmann, 2005). Since this effect could be indeed determined by an omitted variable, such as the different culture across countries, Woessmann (2003) showed the robustness of these results by relying on a model with regional fixed effects specification. However, the positive impact of external exams is confirmed also by within country literature (Bishop, 1999, 2006; Figlio and Loeb, 2011). Other policies accountability-oriented, such as teachers' monitoring, internal and external assessment of teacher lessons, evaluations used to compare schools to district or national achievement, were found to have a positive impact, too, on student's performance (Fucs and Woessmann, 2007; Woessmann *et al.*, 2009).

School autonomy is the second pillar of the market-oriented reforms. Yet, its effect is not straightforward. Since autonomy implies a devolution of power, it is a typical situation of principal-agent problem, which is the risk for opportunistic behaviour by the agent, i.e. the school. What the literature shows is that only autonomy on certain functions has a positive impact on student's achievement, otherwise it will have a negative impact. Secondly, school autonomy needs accountability to work properly; otherwise, principal and agent will have divergent interests or asymmetric information, and so higher probability for agent opportunism. The functions that negatively impact on student's achievement if devolved to schools are formulating budget and teacher autonomy over the subject matter to be covered in class; by contrast, school autonomy in staffing decision and in hiring teachers impact positively on student's performance (Hanushek and Woessmann, 2011; Woessmann, 2003; Woessmann *et al.*, 2009). However, the interaction between school autonomy and accountability seems to "save" autonomy as a whole. In other words, when school autonomy embodies also the functions already mentioned as negatively associated with student's achievements, but eternal exit exams are in place, the positive effect is larger than the case with accountability but without formulating budget and teachers' autonomy[7] (Woessmann *et al.*, 2009). Therefore, the idea is that autonomy and accountability are complementary, since accountability prevents (or at least significantly reduces) opportunistic behaviours.

The last pillar of market-oriented reforms is choice. This word actually embodies many different configurations. However, what normally is tested when the presence of choice has been investigated is: competition among schools (especially between public and private sector), a comparison between public and private schools' performance and whether public funding is devote to

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[7] This simultaneous effect of school autonomy and external exams is captured by an interaction term of the two proxies.

the private sector as well. Fuchs and Woessmann (2007) found that private school management is positively associated with student's achievements, though this pattern is not uniform across countries (Vanderberghe and Robin, 2004). Interestingly, Toma (2005) found that this positive association of private schools to student's performance is independent from the contribution of public funding. On the contrary, according to Woessmann (2003; 2009), students perform better in countries where more schools are privately operated and where a higher share of public education spending goes to private institutions. Estimates with model containing a variable control for omitted variables, such as culture have been run also on this topic. West and Woessmann (2010), confirm a significant positive effect of the share of privately operated schools on student achievement, where the share of Catholics (the control variable for culture) is negatively related to student's achievement; this suggests that distinctive cultural features (such as Catholic countries) hardly drive the results. The presence of private sector in education is often pointed as a path to inequality (Allen, 2007; Hansen and Vignoles, 2005; Whitty, 1997). Yet, a consistent pattern of a recent literature across countries investigating the effect of institutional setting on equity shows an intriguing finding: shares of privately operated schools and shares of public funding are associated with a reduced dependence of student achievement on socio-economic background (Schuetz *et al.*, 2008; Hanushek and Woessmann, 2011; Woessmann *et al.*, 2009).

To sum up this evidence on the impact of accountability, autonomy and choice, it is worth to mention the recent, robust and influential work by Woessmann *et al.* (2009). Relying on PISA data, they estimate the impact of accountability, autonomy and choice and their interactions. What emerges from this study is striking: students in school systems with greater accountability, autonomy and choice perform substantially better – both on cognitive and non-cognitive skills – than students in school systems with less accountability, autonomy and choice. They highlight that these three factors are interrelated policies that can be mutually reinforcing. The most interesting finding is related to the impact on equity (which they measured as the dependence of the student's performance on his/her socio-economic background): "accountability, autonomy and choice are tides that lift all boats. [...] There is not a single case where a policy designed to introduced accountability, autonomy or choice into schooling benefits advantaged students to the detriment of disadvantaged students" (pp. 111).

1.5   Some data about educational systems in selected OECD countries

Despite of this empirical literature, several countries do not seem to will a change towards these reforms. The main reasons can be two: on the one hand any study, especially in the economics of education field, has some caveats, so

they can be disputed. On the other hand, it is the policy-maker who has to decide to implement a certain policy or not, according to their values. This is the case of Italy: a typical example where students' achievements are poor and accountability, autonomy and choice are present but mitigated. Moreover, Italy is one of the countries that showed a decreasing performance in the last ten years and even under the OECD average (OECD PISA, 2009). A glance to national data can make the reader aware of the Italian context.

Data has been collected on four categories: (i) the outcomes of the education systems; (ii) the demand side; (iii) the supply side and (iv) the role of stakeholders. The sources of those data are mainly two: OECD (2009) indicators and OECD PISA (2009)[8].

1.5.1 The outcomes

Some signals of performance are collected here: participation in the education process, the students' achievements and the schools' composition according to students' background. The figure 1.1 shows the first group of indicators.

Figure 1.1. The participation in the education system
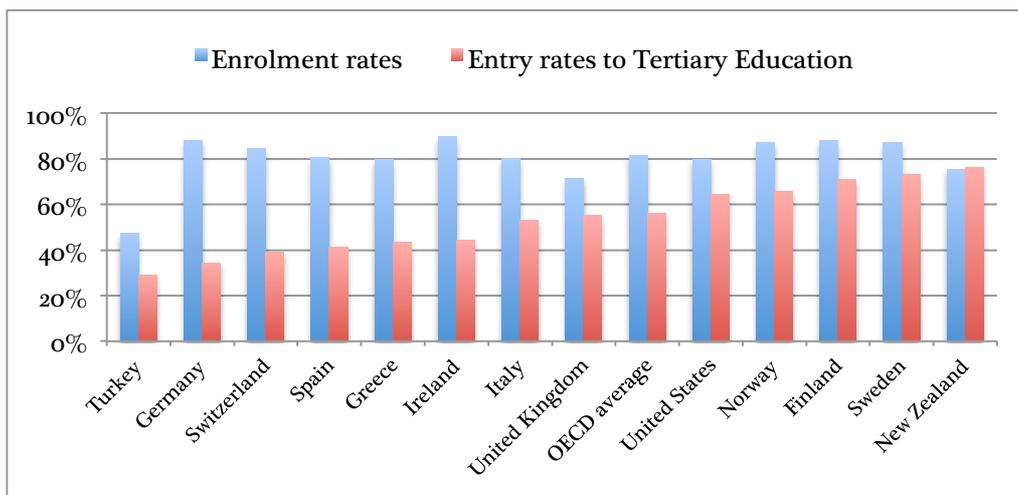
Source: OECD (2009), Tab. C1.2, Tab. A2.4.

Enrolment rates are not so different across countries. Apart from Turkey, New Zealand (NZ) and United Kingdom (UK), every country has at least an enrolment rate of 80% of 15-19 years population participating in school system. Another scenario is the entry rates to tertiary education. In contrast to enrolment rates, NZ stands in a better "position", with almost the 90% of students who come from the secondary school that enter in the tertiary education. Italy is under the OECD average, near to the UK, at about 50%.

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[8] In cases where some countries are not reported in every category, the reason is just the unavailability of the data

Figure 1.2. The results of PISA test (2006)
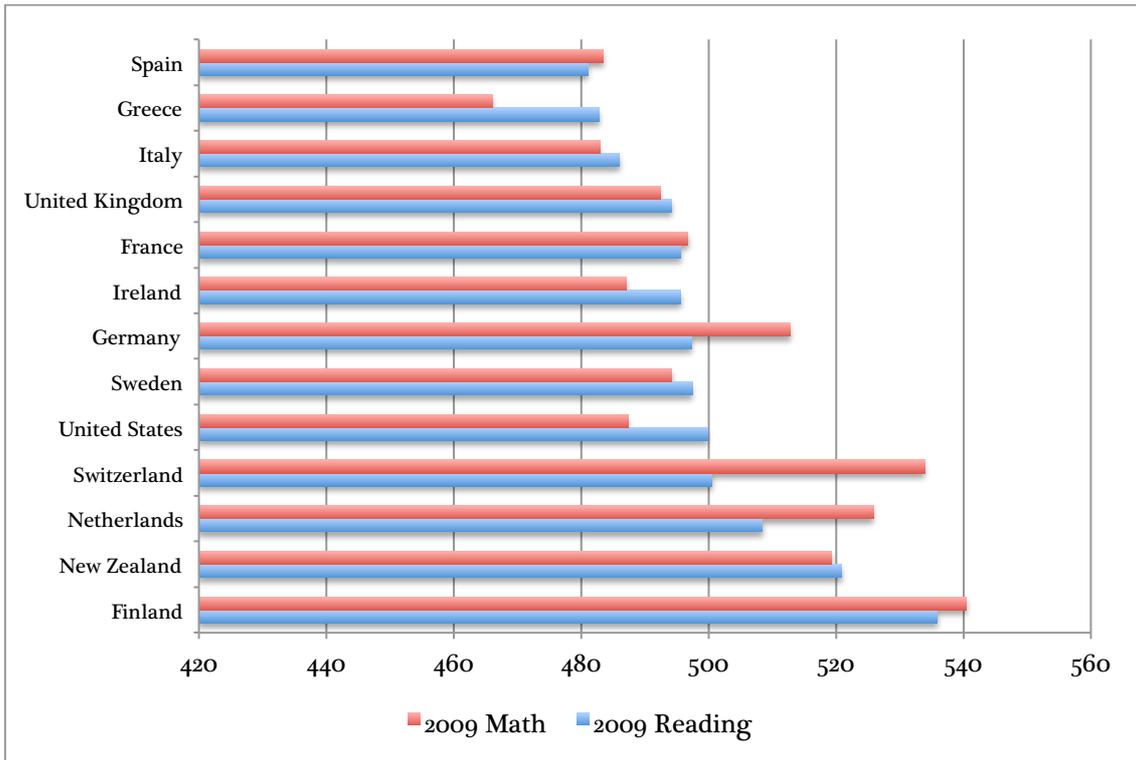
Source: OECD PISA (2009).

After the panoramic of how many people participate in education, their performance is considered. The results from PISA tests conducted in 2009 are reported in the figure 1.2. Italy is very near to the bottom of the considered countries' list. NZ is, again, near to the top, along with Finland.

As it is well known in the literature, students' background significantly affects their performance. Thus, especially where an open enrolment policy is operating, problems of *cream-skimming* or segregation can arise (Jenkins *et al.*, 2008). In the figure 1.3 the schools' variance in different countries is reported. The most total variation is in NZ, while Italy is a bit higher than the OECD average. Thus, one could characterise Sweden and NZ systems as being more unequal. More interestingly, in case of Sweden and NZ the majority of this variation relates to within school variance, while in the Italian case the between-school variance widely overcomes the within-school variance. In other words, the school you attend matters more in Italy than in Sweden and NZ, in terms of your PISA performance.

Figure 1.3. The schools' variance (between and within)
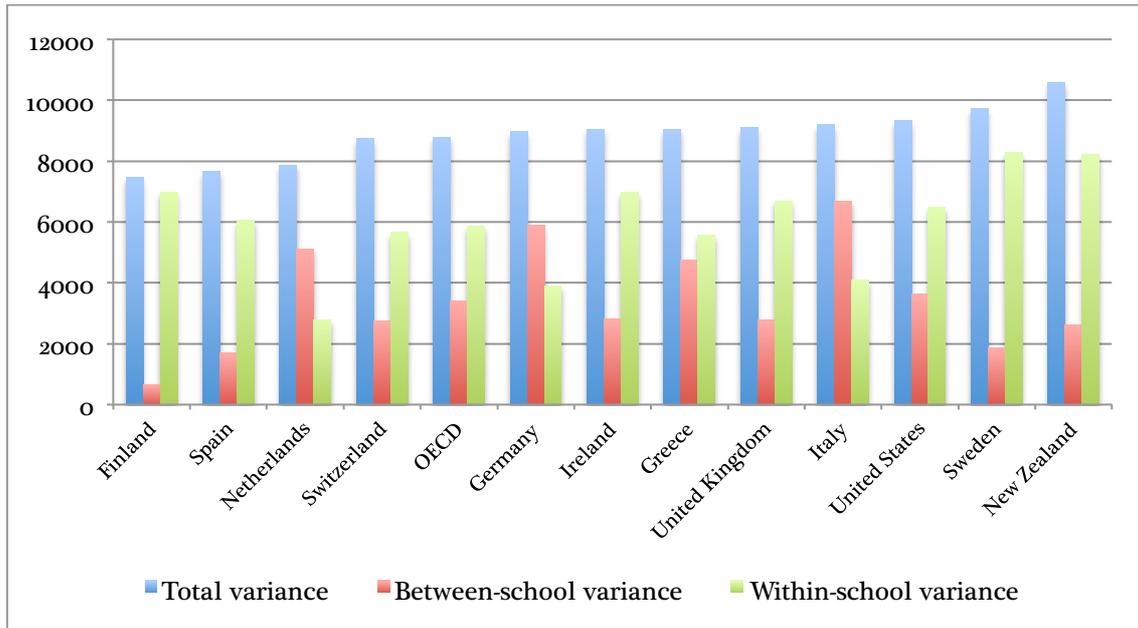
Source: OECD PISA (2009).

One could take as a proxy of students' performance also other indicators deriving from the labour market. Here, returns to education and employment rate are considered. The figure 1.4 depicts the trends in relative earnings by educational attainment, for 25-64 year-olds when upper secondary and post-secondary non-tertiary education are equal to 100. The most interesting difference across countries is not regarding to the "starting point" (below upper secondary). Rather, the values for tertiary education represent quite different scenarios. The labour markets of NZ, Sweden, Norway and Spain seem to not appreciate schools' outcome as other countries, including Italy. Remarkable is the distance, and therefore the "slope" of the returns, between the two returns' rate for US.

In the figure 1.5 the employment rates (number of 25-64 year-olds in employment as a percentage of the population aged 25 to 64), by level of educational attainment are ordered according to the difference between the tertiary education rate and the below upper secondary education rate. Thus, it is possible to highlight the growth of the employment rates according to the school degree. There is not a strong difference across country, especially for tertiary education employment rates, apart from Turkey, whose rate is quite low. Italy seems to have a positive employment rate, but it must underline the relative low primary education's return. Instead, NZ appears to be at the bottom now but, actually, NZ has the highest returns to education for below and upper secondary education. The highest tertiary education's employment rate is in Norway (90,4%) and Switzerland (90%).

Figure 1.4. The returns to education
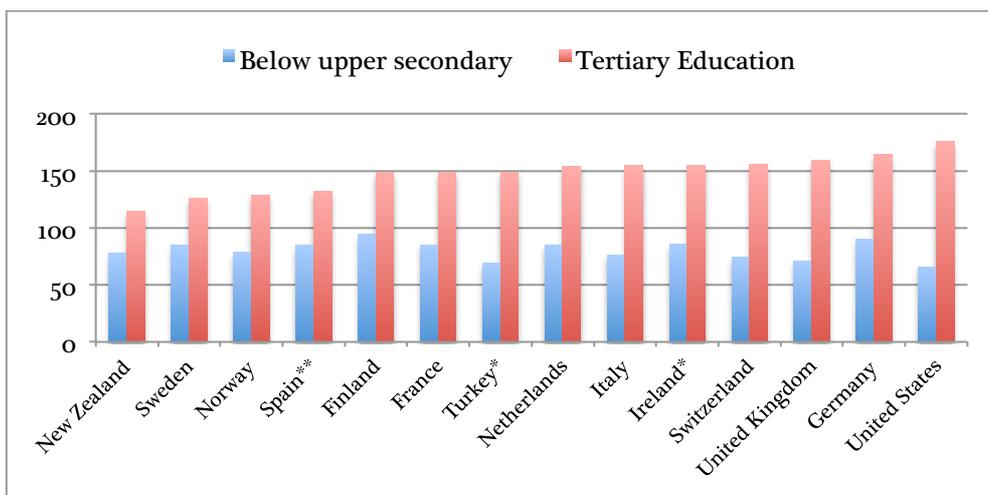
Source: OECD (2009), Tab. A7.2a.
* data for 2005
** data for 2004

Figure 1.5. The employment rates
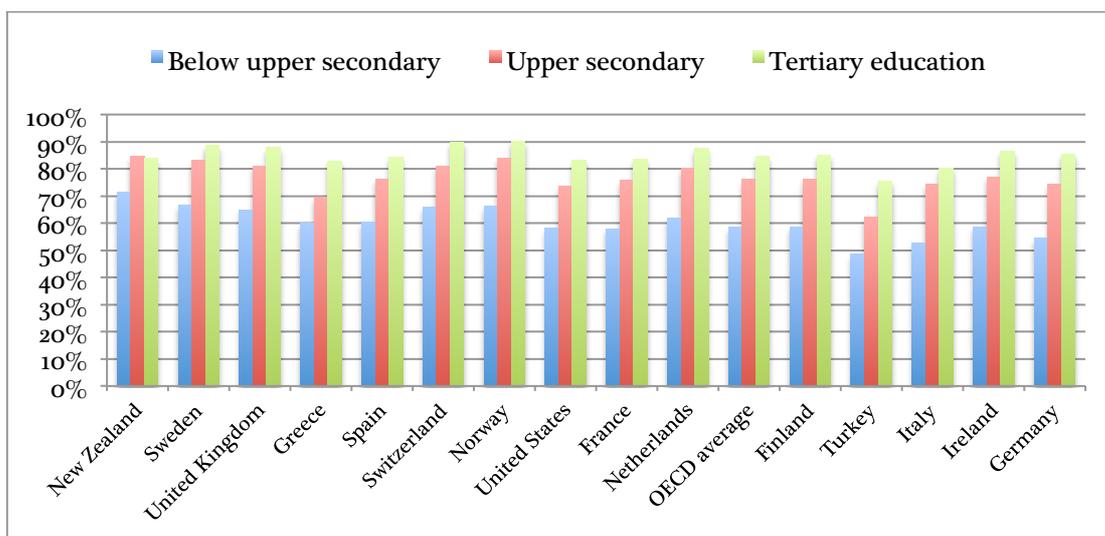
Source: OECD (2009), Tab. A6.2a.

Regarding the outcomes of educational systems, Italy does not appear so different in the international scenario, even though the only indicator where Italy is at the bottom is, probably, the most interesting, which is the PISA test. Moreover, no country appears to be the "best" in education outcomes.

Figure 1.6. The percentages of public and private schools
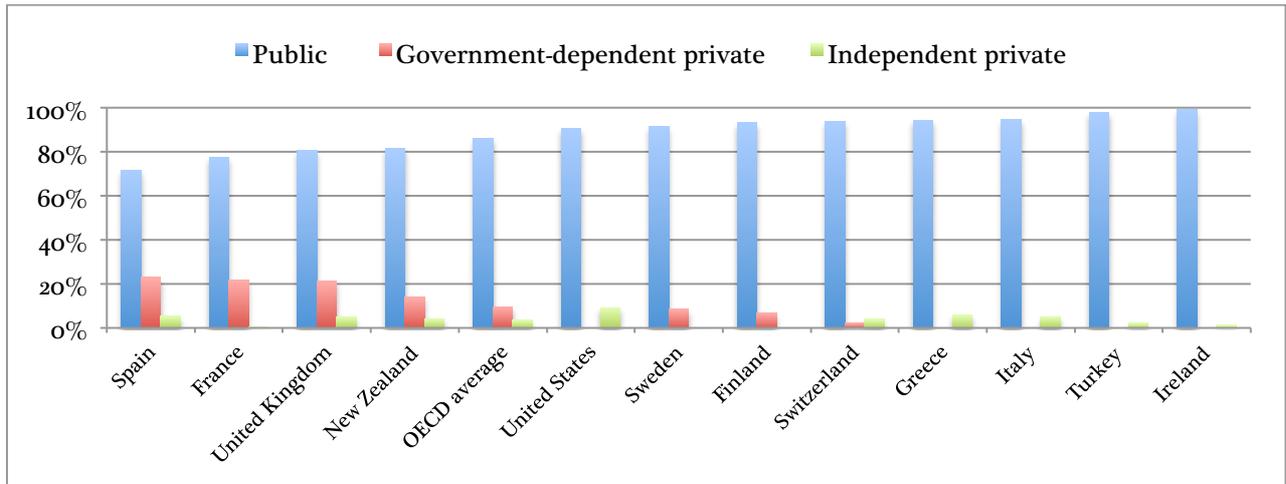
Source: OECD (2009), Tab. C1.5.

*A *government-dependent private* institution in one that receives more than 50% of its core funding from government agencies. An *independent private institution* is one that receives less than 50% of its core funding from government agencies (OECD, 2009).

1.5.2 The inputs

In the figure 1.6 the different proportions between public and private schools are shown. A part of the countries considered (Spain, France, UK and NZ) has a significant portion of private-government dependent schools (which means schools receiving considerable money from the government), while another part has not either private-government or private independent schools. Italy belongs to this second group of countries.

Figure 1.7. The annual expenditure for educational institutions per student (thousand of euro)
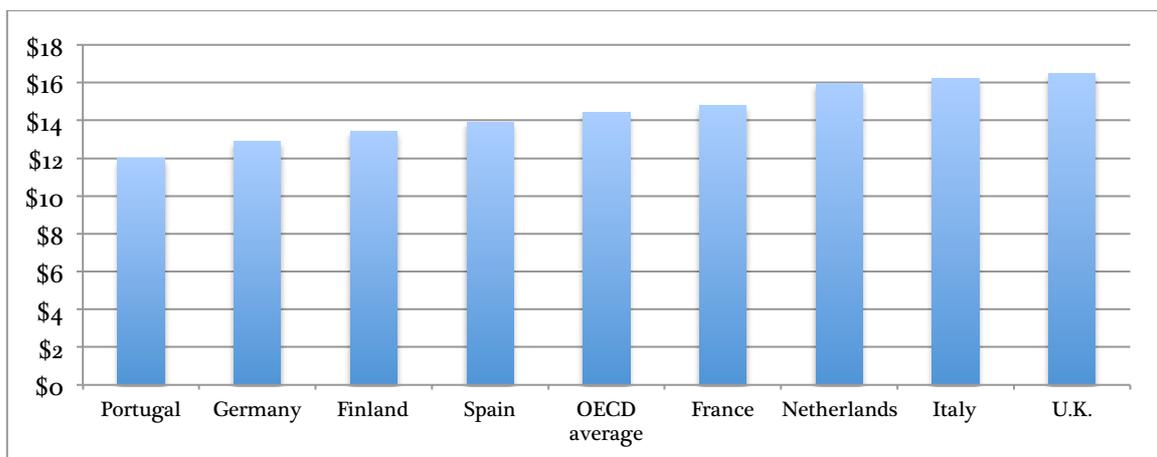
OECD (2009), Tab. B1.1a.

Figure 1.8. The student/teachers ratios and the classes' size
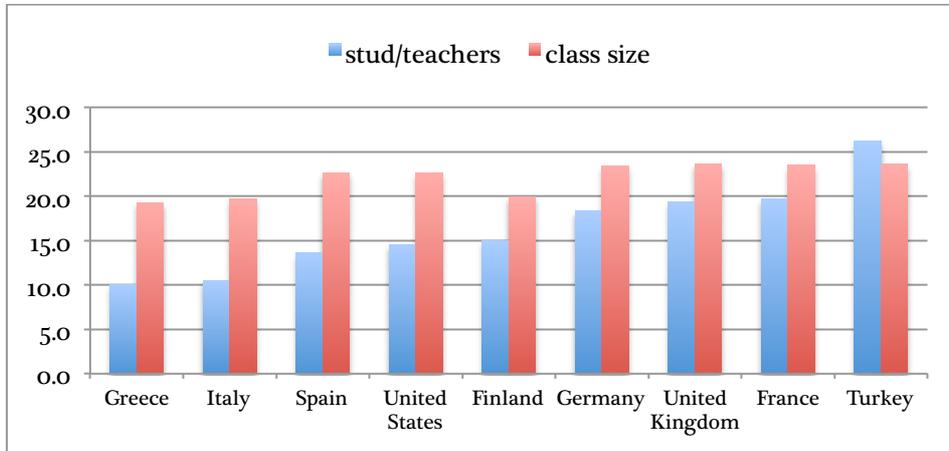
Source: OECD (2009), Tab. D2.2 (stud/teachers) and tab. D2.1 (classi size).

Some indicators regarding the expenditure per student, the teachers' salaries and the age are considered as well. In the figure 1.7 clearly appears that Italy is spending more than the OECD average. It is worth to comment these data along with the students/teachers ratio and the class size in the figure 8. While the class size does not differ significantly across the countries considered, there are important differences regarding the student/teachers ratio. It is interesting to see that UK and Italy are so near in figure 7 but so far in figure 1.8. This could be a reflection of the way through which money are employed. Indeed, Italy uses the 90% of resources for salaries (MIUR, 2010).

However, the most interesting differences of Italy come out from data of teachers (fig. 1.9). Italian teachers have the lowest and flattest progress line of salaries, along with Sweden. The scenario does not improve at all for Italy, regarding teachers' age. The figure 1.10 shows that Italy is the only country with almost no teachers less than 30 years old. Conversely, along with Germany, Italy is the country with most teachers that are between 50 and 59 years old.

What has to be highlighted in this section is that Italy spends more than other countries for education, but, by contrast, Italian teachers have the lowest salary.

Figure 1.9. The levels of teachers' salaries

Figure 1.10. The ages of teachers as a percentage
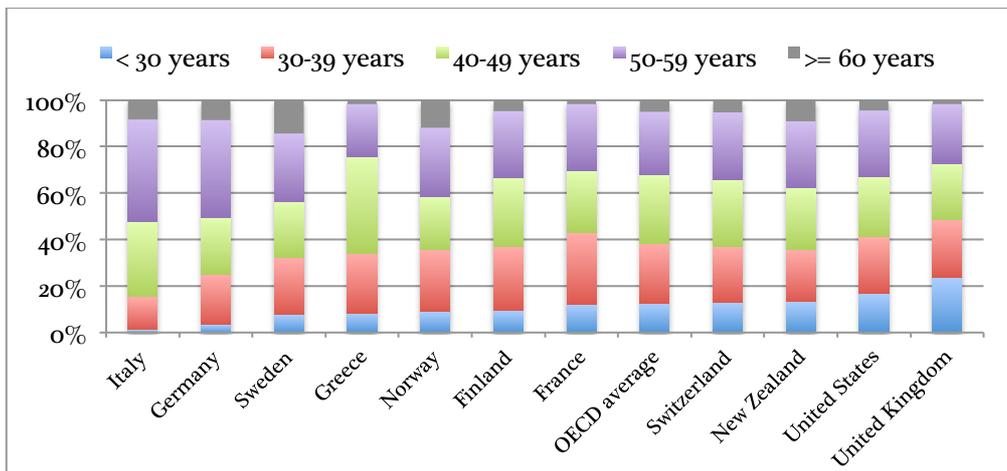
Figure 1.11. The answers to the school's questionnaire
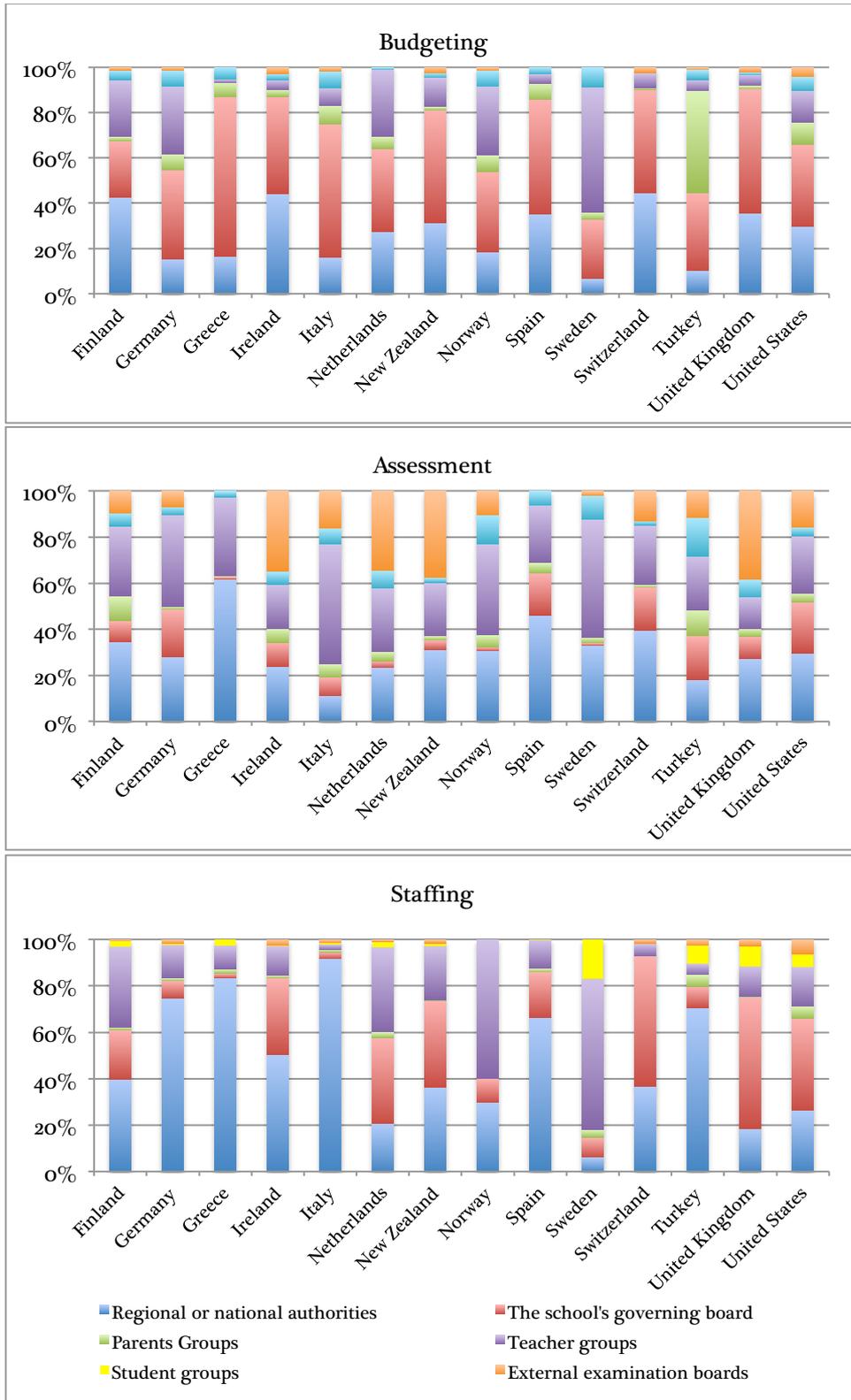
OECD PISA (2009), answers to school questionnaire, available at http://pisacountry.acer.edu.au/.

Finally, the data deriving from the school's questionnaire run by PISA (2009) are reported (fig. 1.11). Perhaps, these are the most interesting regarding school autonomy. In every chart in figure 11 there are the answers that schools gave to the questionnaire. The answers are reported as a percentage divided between the different stakeholders. Thus, for every function (i.e., budgeting, assessment and staffing), principals wrote the percentage of influence. According to the budgeting's chart, Italy would be quite an autonomous school, given that the school's governing body would influence for more than 50% regarding the other stakeholders. The assessment's chart has to be commented very carefully. Indeed, this chart says just, according to school, to what extent the different stakeholders deal with assessment, but there is no common definition across countries. Thus, what it is better to look at, according to the authors, is the percentages relating *external examination board* and *school's governing body*. Regarding the former, Italy is quite far from the best performers (UK, NZ and Netherlands), though there are countries, such as Germany, which has an even lower percentage. A similar scenario is for school's governing body, though the distance from the other countries is less important.

However, again, the most significant difference for Italy is regarding teachers. In the last chart in the figure 1.11, Italy (along with Greece) is the only country where almost everything has been deciding at government level (indeed, regional authorities, which are different from "regions", in Italy are integral part of the government).

A synthesis for Italy is that appears to be: (i) similar to other countries regarding the influence of school governing body in budgeting; (ii) in the middle regarding the assessment practice; (iii) the most different regarding staffing, because of the highest percentage of influence for the government.

To conclude this section devoted to national data, Italy has low indicators for students' performance, but the main problem does not seem to be the amount of expenditure. Rather, the teachers' management appears to be the most critical, since they have low salaries and the government manages them almost completely and directly.

1.6 Thesis research questions and objectives

The most evident problem of Italian educational system is its low school performance despite the huge amount of money devoted to it. Therefore, the first research question addressed in this thesis is: what does make the Italian school system so inefficient? In other words, which are the determinants of this inefficiency? Part of these causes can be easily associated to the composition of the expenditure. While Italy invests more than other countries in primary and secondary education (1.7), the same investment is almost exclusively focused on teachers' and non-teachers' salaries. Table 1.1 reports data about the composition

of the Ministry of Education's expenditures. Salaries cover more than 90% of total expenditure, and almost all the 45 billions of euro are current expenditure, so that the amount of resources devoted to investments regarding couple of years is negligible.

Table 1.1. The expenditure types for schools

Year	Mln euro (nominal value)	Current expenditures (%)	Capital expenditures (%)	Salaries	Intermediate consumption	Other current expenditures
2000	31,885	99.9	0.1	90.3	3.5	6.2
2001	38,223	99.4	0.6	89.5	2.9	7.6
2002	37,616	98.9	1.1	91.0	1.6	7.4
2003	41,334	99.2	0.8	89.6	2.8	7.6
2004	41,033	99.9	0.1	88.4	3.2	8.4
2005	40,480	99.9	0.1	89.8	3.0	7.2
2006	46,680	99.9	0.1	90.4	2.3	7.3
2007	43,291	99.8	0,2	89.7	3.3	7.0
2008	45,965	99.6	0.4	91.0	2.2	6.9
2009	45,382	99.7	0.3	90.9	2.0	7.1

Source: MIUR (2008, 2009, 2011).

However, the even more striking picture of the Italian educational system is its heterogeneity, which remains masked in the national perspective of data just mentioned before, not only in terms of expenditure but in terms of performance: *"Italy shows marked geographical variation in educational achievement: a key question is whether this is related to exogenous factor or to the characteristics of the education system"* (Boarini, 2009 - p. 51). This is the first issue addressed in the second chapter of this thesis, which aims at investigating the determinants of the (in)efficiency of the Italian educational system not by looking into the national procedure (such as for hiring teachers) but, rather, looking at how school system's actors are working in these conditions. In other words, the authors' hypothesis is that, even in the current situation some actors (regions, schools or even teachers) could be much more efficient (chapter second).

In this perspective, all the actors are not the same. The "nature" of the actor, such as private or public, could work in a different way, so that school types could achieve different targets. Indeed, the different nature mean without the doubt different resources and organization. While about 45 billions of euro are devoted to public sector, only 500 millions go to the private sector. Secondly, private schools have much more school autonomy than public schools (Agasisti *et al.*, 2012a). Therefore, a focus on the presence of the private sector and its outcomes compared to the public one has been conducted as well (chapter three).

Chapter four contains a different kind of inquiry, since it is a qualitative one. It is pretty known that in Italy (public) schools have a very weak autonomy, as also

OECD national data have shown. However, the hypothesis is that, this kind of school autonomy, which is formally the same for whole the country, does not mean that inside school principals behave in the manner. The point that the last inquiry wants to rise is that, regardless from the institutional setting, school's actors can decide how to work, which very essentially it consists in two alternatives for principals: giving up or doing whatever is in their power to (positively) affect circumstances. This choice is what makes a school accountable or not, even in a system where accountability is not explicitly requested. Although it was not possible to quantitatively link this last inquiry to the efficiency analyses, we do think that also this different "ethos" by schools' principals is one of the determinants of (in)efficiency of Italian schools or, at least, it must have some connections.

1.7   Outline of the thesis

In the next chapter the system efficiency is analysed at two levels: regions and schools. A well known problem in Italy is a wide difference in terms of socio-economics characteristics of its Regions, then the first analysis is focused on this question: in a comparative perspective, does the regional efficiency on education differ because of their structural differences (i.e. socio-economic factors)? Or is there a different productivity of public expenditure in this sector?

To estimate efficiency scores, a non-parametric technique called DEA (Data Envelopment Analysis) is used. The units of analysis are the 18 Italian Regions, and the focus is on the lower-secondary education. The teacher:students ratio and the PISA 2009 scores were chosen, respectively, as the input and the output. Then, a second-stage Tobit regression was used to detect the factors affecting efficiency. The results corroborate the difference between North and South of Italy (the Regions in the North outperform their counterparts in the South), even though there are some exceptions. What (should) alert the policy-maker is that the Regional socio-economic context appears as the key determinant of efficiency, rather than the school system.

Secondly, the school level has been considered. In this case only a Region has been chosen: Lombardy. Working at this level allowed to go more in depth of traditional efficiency measures. The aim of this analysis is twofold: (i) first, "baseline" efficiency scores are derived and related to a wider set of characteristics that can affect the performance of schools; (ii) second, a procedure is proposed to derive "adjusted" efficiency measures (i.e. "levelling" the out-of-control variables) to assess the managerial efficiency of the schools. Since the "intrusive" role of the context rose in the previous analysis, it is important to detect schools that, despite of the context, success in educating students. The quantitative approach is based again on two-stage DEA. In a first step, inputs are resources used by schools, while outputs are average scores

obtained in a national standardised test. In the second stage, efficiency scores are regressed against a set of external variables (e.g. percentage of disabled and immigrant students, school size, rural/urban area, etc.). The residuals and predicted values of the second stage regression are then used to "adjust" initial efficiency scores for taking "environment harshness" into account, and derive information about "managerial" efficiency. The results show that managerial efficiency is, on average, negatively related to baseline efficiency; that is, there is – again – a major role of external variables in affecting efficiency scores. The implication is that not only raw comparisons of schools' (average) achievement scores are misleading, but also input-output comparisons (efficiency approach) are not useful for policy purposes if external variables are not properly included in the analysis.

The debate about the comparison of public and private schools performance is of particular relevance in Italy – which is the issue discussed in the third chapter –, both from an academic and institutional perspective. With reference to the former, the empirical evidence from international datasets (especially OECD-PISA) and previous literature seems to suggest that public schools outperform private ones; it puts Italy among those few countries for which private schools provide less quality education than public ones (OECD, 2011). These results lead some scholars to argue that private schools in Italy have a "remedial" function, that is to assist lower quality, less motivated students instead of providing higher level education (Bertola *et al.*, 2004). However, such interpretation requires further testing, as it was based on studies that did not consider students' achievement as output, and refer to some specific grades (especially, high schools).

As for the institutional view, it is important to recall that some Italian Regions introduced voucher plans for stimulating attendance of private schools: it was especially the case of the biggest and richest region, named Lombardy; thus, the policy-making problem of evaluating the relative performances of the two types of school became relevant also for justifying or not this political orientation, which shall be described as to introduce the context of the analysis.

For the first time, a new dataset to analyse the relative performances of public and private schools in Italy has been used. Data come from the National Institute of the School System Evaluation (*Istituto nazionale per la valutazione del sistema educativo di istruzione e di formazione* – hereafter, INVALSI). INVALSI started in 2007 its activity of administering standardised tests for measuring students' achievement. The sample is limited to the schools located in a specific region, namely Lombardy, which is the most competitive area (between public and private sector) existing in Italy.

As for measuring the effect of attending a private school, we compared different techniques: IV regression and Propensity Score Matching. Both techniques allow us to overcome selection bias and endogeneity problems.

The main results, based on the preferred IV approach, are that private schooling attendance has a positive effect on Math scores for (relatively) richer students and those enrolled at school in a non-urban area, when considering grade 6 (also grade 5 is included in the analysis); instead, it exerts a negative effects on Math scores for students attending primary schools, especially for immigrant students, but a positive effect on Reading scores for disadvantaged students (those who are "relatively" poorer). These findings shed more light on the heterogeneity of the so called "private school effect", that is they claim for a more cautious interpretation of the role of private schools in the Italian context; in particular, they stress the importance of looking at this effect for different subpopulations of students and schools, as well as of taking into account heterogeneity across grades.

School autonomy is the last dimension analysed (chapter fourth). Autonomy does not necessary mean ruling out central regulation (Bolam, 1993). In many circumstances, governments still have to define either boundaries or goals of autonomy (Eck and Goodwin, 2010). The different extent of public regulation explains why the implementation of school autonomy has been very differentiated across countries (Glenn, 2005). An interesting perspective is that "formal" autonomy could be not intended "true" autonomy by the school principal's perception. In other words, there can be highly formally autonomous schools with a perception of low real autonomy by principals. *Vice versa*, in apparently non-autonomous schools, principals could feel capable to achieve their goals with an adequate level of freedom. In this context, Gawlik (2007b) found that, even in case of clearly autonomous schools, principals are constrained by public sector's influence. Finningan (2007), relying on a national survey and twelve schools case study, showed the tendency of States and authorizers to treat charter schools as they do traditional public schools. On the other hand, Adamowski *et al.* (2007) found that even in most of American public schools (which have less autonomy than private and charter schools), "despite the constraints they face […] principals feel that they have the ability to exercise effective leadership within the terms of their job as they see it" (p. 5). This means that detachment between formal and actual autonomy is possible also in strongly regulated systems.

The aim of this analysis is to show that, despite of weak formal autonomy, school principal's perception and willingness can determine different degrees of school's autonomy and proactivity even in very centralised systems (like the Italian educational system). The Italian setting is interesting because of its particular institutional characteristics: that is an "incomplete" school autonomy.

The methodology employed is a qualitative survey. Thirty-five Italian principals have filled in a non-standardised questionnaire. It has been constructed according to a theoretical framework, which embodies three critical dimensions emerging from the literature. The first group of questions were related to the governing body, the second to the school climate (intended as the relationship between principal and teachers) and the last group to accountability issues (i.e. evaluation policies and relationships with stakeholders and competition).

Three archetypes have been found:

- *Enterpreneurial* - the strategies to be followed and the tools to be used are defined well beyond what the law strictly prescribes. This character has a strong vision that allows creating and introducing new practices;
- *Chaotic* – many actors (principals, parents, teachers) argue their opinion but, at the end, there is not a shared decision at school level. Someone just gives it up;
- *Bureaucratic* – this character only observes the law. It does not feel to have to do anything without or beyond the law prescriptions.

A policy implication can be drawn from these results. More than ten years ago, Derouet (2000) pointed at recruitment and training of principals as one of the conditions required to give substance to school autonomy. More recently, Bush (2008) concludes an article in this way: "The best way to ensure the efficacy of leadership is to ensure that it is focused on classroom learning rather than being obsessed by budgets and HR practice" (p. 85). Our results challenge this idea and suggest that there is still a room to improve managerial attitude of schools' principals in the long way towards real autonomy for Italian schools.

Conclusively, the analysis showed a system – the Italian one – profoundly affected by the context. Thus, the contribution of this thesis consists in arguing that diversification process is not avoidable even in centralised systems. A set of indicators, which take into account all the diversity (such as in the analysis of adjusted efficiency), should be used in order to define school funding criteria and incentives/disincentives of the system. Otherwise the risk of wasting resources will become unsustainable in short-time. A concrete hypothesis concerns with standard cost. Every agency, in this case schools or regions in accordance to the policy-maker, should receive resources based on a formula. This was the choice of many countries, such as United Kingdom and Sweden. Through the formula policy-makers can pursue their objectives. For example, the English government established that at least 80% of the formula – constructed by each Local Education Authority – must depend on the number of pupils. In this case, the idea is to promote choice and competition. Whatever the objective, identifying a standard cost through a formula, is the best way to pursue it. Instead, in the Italian case, even if some formulae are formally adopted, the result is just following the historical distribution (CTFP, 2008). This

formula should also be extended to private schools, which in this analysis appeared performing, at least, as good as the public ones on average.

Finally and more importantly, what is a priority is to intervene on actors' motivation. The most used strategy around the world is decentralisation (Mitch, 2004). More specifically, many countries introduced school autonomy, in order to establish a more competitive system. Woessmann *et al.* (2009) show that the presence of school autonomy and national (and independent) evaluation system positively affects students' achievements. Then, the second suggestion rising from this thesis is to "liberalise" Italian school sector so that a stimulus to actors can be given. This is even more useful since the evaluation process has already started by INVALSI (national agency devote to evaluation of school system); so the remaining piece is just *real* school autonomy. Liberalising the school sector would mean: (i) attributing wide autonomy to schools, especially on staff matters and (ii) funding any type of schools according to a formula, which should takes into account enrolment but also contextual variables.

2. Technical and managerial efficiency in the Italian educational system. An analysis at region and school level

Abstract. The case of the Italian educational system is particularly interesting as far as the issue of efficiency is discussed. The Ministry of Education strictly regulates Italian schools, but their results are impressively different. This chapter contains an efficiency analysis of the Italian educational system in two steps. Firstly, the units of analysis are the 18 Italian Regions, with the focus on middle schools. Secondly, efficiency scores were derived for over 1,000 public schools located in Lombardy, focusing on primary and middle schools.

Both of these two analyses rely on the two-stage DEA (Data Envelopment Analysis) methodology. The second-stage Tobit regression was used to detect the factors affecting efficiency. The results corroborate the difference between the North and South of Italy. When looking at the Regional socio-economic context, GDP per capita appears as the key determinant of efficiency.

The second stage of the school level analysis went more in depth: the residuals and predicted values of the Tobit regression were used to "adjust" initial efficiency scores for taking "environment harshness" into account, and deriving information about "managerial" efficiency. The results show that managerial efficiency is, on average, negatively related to baseline efficiency. This depicts a paradox scenario, where "good" schools just enjoy advantaged conditions, while "bad" schools are indeed doing better than the "good" ones in terms of managerial efficiency.

2.1 Introduction

The intervention of the State in providing social services, including education, is universally agreed upon. However, since the 1950-60s the cost of welfare services as a whole has grown increasingly, up to the point where it became hard to sustain in the 1980s (Barr, 1992 and Malinvaud, 1994). The issue of sustainability of the system and the increasing focus on the importance of its results have led to new ideas: the progressive *devolution of powers* from the public sector to the schools (Bottani, 2000; Mitch, 2004 and Maroy, 2008) and stressing the link between *resources* and *performance* (Bartlett and Le Grand, 1993; Hood, 1995).

This chapter addresses both these issues through two efficiency analyses. The first one focuses on a system point of view. There are three main reasons for doing this kind of analysis in Italy. The first one has been already addressed by Boarini (2009 – p. 51): "Italy shows marked geographical variation in educational achievement: a key question is whether this is related to exogenous factor or to the characteristics of the education system". The figure 2.1 shows the Italian students' performance by regions. The gap between the northern and southern regions is impressive.

Figure 2.1 The Italian student's performance by regions compared to other countries, reading scores from OECD-PISA 2009
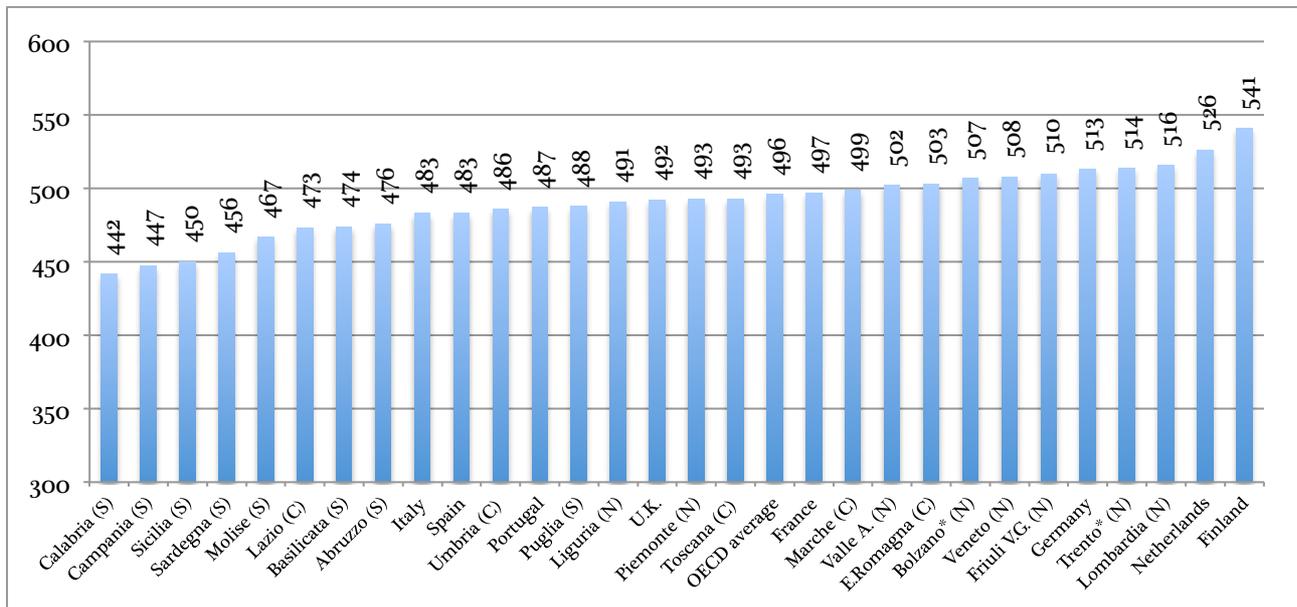
* Autonomous Province
(N) indicates regions in Northern Italy
(C) indicates regions in Central Italy
(S) indicates regions in Southern Italy

Source: OECD PISA (2009)

Secondly, the present context of dramatic constraints on public budgets imposes a reflection on the necessity of an efficient use of public money. The trend of revenues and expenditures of Italian public sector in figure 2.2 shows the relevance of efficiency in using public money: in 2008 the expenditures started rising again, and reducing the money spent in various sectors (including education) without compromising performance is now necessary. As the vast majority of students attend a public school in Italy (95%, source: MIUR, 2011), this issue is strictly related to the classical public finance problems of analysing public expenditures' efficiency, especially if one considers the relative poor performance on average of Italian schools and the significant heterogeneity among Regions, either regarding performance and expenditure. Moreover, this

approach is important also because the literature questioned whether public budgets are related to higher economic development, and educational expenditures are often cited as examples of growth-related; so that guaranteeing educational institutions' efficiency is of primary interest. Thus, it has been demonstrated that the use of public sector efficiency is related also to its core activities, among which education is particularly relevant (Afonso et al., 2005).

Figure 2.2 The revenues and expenditures of Italian public sector, as percentage of GDP
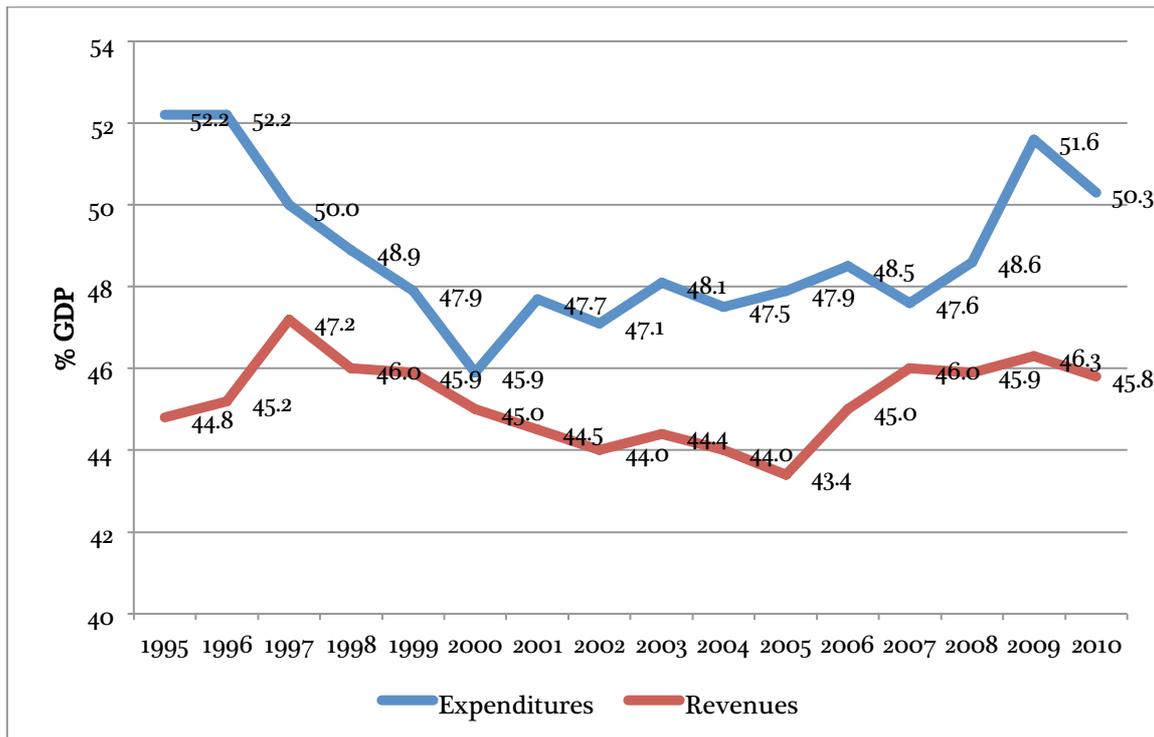
Source: Eurostat

The third reason deals with the institutional and political debate. Since a general institutional change is ongoing in Italy, that is, the decentralization of competencies from the State to the Regions (federalism), some insights are necessary about the efficiency of the educational system in a comparative perspective across Regions. This is even more important if the wide difference in terms of socio-economics characteristics among Italian Regions is considered.

In this efficiency system analysis (the first one), the key question is: in a comparative perspective, does the Regional efficiency on education differ because of their structural differences (i.e. socio-economic factors) or is there a different productivity of public expenditure in this sector? In other words, the idea is to estimate the efficiency of Italian regions but considering their different "starting point". In this way it is possible to detect which region could do better and which one cannot (for example, because it is already doing its best).

The limitation of looking at the region level is that prevents to understand what happens in the single schools. More importantly, the focus at the school level would allow for investigating the factors that, positively or negatively, affect students' performance. This is the aim of the second efficiency analysis, which has also some managerial implications. Turning to a public management perspective, understanding the drivers of efficiency is important to improve schools' performance. The literature on school-based management showed that principals can learn from the experience of other colleagues, and benchmarking exercises can improve the quality of overall educational system (Bolam, 1993; Bush, 1994; Coleman, 1994; Hallinger *et al.*, 1993).

This work was possible thanks to the evaluation of schools' performances recently developed in the Italian context. In 2007, a national committee – the *National Institute of School System Evaluation* (herafter, INVALSI) has been established with the specific objective of assessing the competences acquired by students during their educational careers, as well as the main determinants of the educational results – i.e. the role of schools. As a consequence, a national standardized test has been developed to assess students at different stages of their educational paths. For the first time, the new evaluation system was fully implemented in 2011/12, and the tests are administered at the end of 2nd and 5th classes of primary school (Grades 2 and 5), at the end of 1st and 3rd classes of middle school (Grades 6 and 8), and at the end of 2nd and 5th classes of high school (Grades 10 and 12). Since 2007/08, the tests were gradually introduced in a subset of grades. The availability of standardized achievement tests allows for schools' performance assessment in a variety of ways, while in the recent past it was impossible given the unreliability of output measures.

However, the availability of these new data does not make easy to estimate efficiency. The typical problem when analysing schools' efficiency is to disentangle the effects on performance due to (i) managerial practices and (ii) external (environmental) factors (e.g. Adam et al., 2011). Some characteristics are under the schools' controls (e.g. the dimension of classes, projects-related expenditure, etc.), and schools can affect the level of public expenditure through them. Yet, a number of these characteristics are externally determined (i.e. the average socio-economic status of students, the proportion of immigrant and disabled students, etc.), then it is logically wrong to attribute their impact on schools' performance to bad management. Thus, when assessing schools' efficiency, the role of external variables must be adequately included in the analysis. In this second analysis, "baseline" (or "initial", or "raw") efficiency scores are considered as the output/input ratio, while "managerial" (or "adjusted") efficiency is defined as the ability to transform inputs into outputs, after having considered the impact of external (out-of-control) variables.

The school level analysis focuses on a sample of Italian schools located in Lombardy: specifically, 583 primary and 479 middle schools. The choice of

limiting the analysis to a single Region makes easier to consider the impact of external variables, by avoiding the across-regions variance. The aim is twofold:

1. first, deriving "baseline" efficiency scores and relating them to a wider set of characteristics that can affect the performance of schools; this way, some indications can be obtained for policy makers interested in improving the educational level of the population;
2. second, a procedure is proposed to derive "adjusted" efficiency measures (i.e. "levelling" the out-of-control variables) to assess the managerial efficiency of the schools.

Both of two analyses rely on the two-stage DEA (Data Envelopment Analysis) methodology. In the regions' analysis the teacher:students ratio and the PISA 2009 scores[9] were chosen, respectively, as the input and the output. The units of analysis are the 18 Italian Regions, and the focus is on middle schools. Unfortunately, it was not possible to consider municipalities as unit of analysis. The main reason is that educational performance is not available at that level in PISA data[10]. Then, a second-stage Tobit regression was used to detect the factors affecting efficiency. The candidate factors are: the proportion of disabled and immigrant students, the gross domestic product (GDP) per capita, the proportion of adult population with a tertiary degree, and the percentage of students attending private schools.

Both analyses use a robust version of DEA, by following the bootstrapping procedure proposed by Simar & Wilson (2007). In the school level analysis, several specifications of the model (i.e. different combinations of inputs and outputs) were used to test results' reliability. As a further robustness check, a different technique (Stochastic Frontier Analysis, SFA) was employed to verify the validity of DEA-based efficiency scores. In the second stage, bootstrapped efficiency scores are regressed against a set of explanatory variables. The residuals of the second-stage regression were used to adjust baseline efficiency indexes and compare the relative role of managerial inefficiency and environment's harshness on schools' performance.

The results of these analyses corroborate the difference between North and South of Italy (the Regions in the North outperform their counterparts in the

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[9] PISA is the Programme for International Student Assessment realised by OECD. It is a survey of 15-year-olds in the principal industrialised countries. Every three years, it assesses how far students near the end of compulsory education have acquired some of the knowledge and skills. The subject areas tested by PISA are reading, mathematics and science, and the tests are carried out through multiple choices options. PISA scores are the most used indicators in literature regarding educational performance across countries.

[10] At the time in which this analysis was done, data from INVALSI were not relyable yet, since almost all Southern regions have been biased by cheating behaviours (INVALSI, 2009). Thus, the only relyable data were the PISA's ones, which are just at regional level.

South), even though there are some exceptions, and, more importantly, the Regional socio-economic context appears as a key determinant of efficiency.

At the school level, the results show that average schools' efficiency is quite high in the Region, but potential savings are nevertheless possible: overall, with the available resources, achievement scores could be raised (on average) of about 20%. Moreover, efficiency and equity – whose proxy were the scores' variance – are complementary in primary schools, that is, most efficient schools are those with lower internal variance of students' achievement scores. However, the same does not hold for middle schools' results in mathematics. Lastly, "managerial" efficiency is (on average) inversely related with baseline efficiency. In other words, several schools that turned out as efficient when not considering the role of external variables were actually favoured by their background characteristics, and they are not efficient from a pure managerial perspective.

The chapter is organized as follows: the next section gives a description of the Italian educational context. Then two sections are devoted to what already has been found in the literature regarding both the Italian dualism problem and the efficiency measures. The third section illustrates the methodology used, while the fourth one show which kind of data were employed in the analyses. The fifth section is devoted to the results. Afterward, a conclusive section summarizes the findings and discusses them.

2.2   The Italian educational system

Italian Regions are widely different in terms of socio-economic development. As it has been reported in table 2.1, Southern Italy has lower GDP per capita, a lower graduation rate and lower employment rate. Daniele and Malanima (2007) argue that the gap started between 1861 and 1913, by the unification of the country, and was confirmed after the Second World War (Brugnoli and Fachin, 2001), so it is an embedded issue. Italy is considered one of the best-known examples of a persistent and quantitatively important Regional divide (Maffezzoli, 2007). Indeed, Barro and Sala-I-Martin (2004) reported that the Regional inequality in Italy is the highest among all EU countries. Moreover, the economic gap has not shown any tendency to decrease over time (Marrocu *et al.*, 2000; Paci and Saba, 1997). The determinants of this diversity have been hugely investigated, and the differences in total factor productivity along with the quality of institutions seem to be important in explaining the situation (Aiello and Scoppa, 2000; Pigliaru, 2009).

Table 2.1. GDP, graduation rate and employment rate by Regions

Italian Regions		GDP[1]	Graduation rate[2]	Employment rate[3]
North	Piemonte	27,350.7	10.1	64
	Lombardia	31,743.1	11.5	65.7
	Veneto	28,856.0	9.8	63.4
	Friuli V.G.	28,248.7	9.1	64.6
	Liguria	26,858.0	13.0	63.4
Center	Emilia-Romagna	30,493.0	11.2	68.5
	Toscana	27,932.7	10.0	64.8
	Umbria	23,531.0	9.8	62.9
	Marche	25,640.5	9.8	63.7
	Lazio	29,837.5	14.5	59.4
South	Abruzzo	20,700.4	10.2	55.7
	Molise	20,097.6	9.9	52.2
	Campania	16,322.3	9.3	40.7
	Puglia	16,711.4	8,2	44.9
	Basilicata	18,586.8	7.7	48.4
	Calabria	16,897.9	9.1	43.1
	Sicilia	17,045.2	8.8	43.5
	Sardegna	19,986.1	7.1	50.8

[1] GDP per capita at market prices in 2009.
[2] Percentage of population with academic qualification (undergraduation, master and phd) in 2008.
[3] Percentage of population with an employment in 2009.
Source: elaborations on ISTAT (2010).

When considering education, the story does not change. According to P.I.S.A. data (as seen in figure 2.1) the gap between Northern and Southern Italy is wide[11]. Interestingly, according to OECD PISA (2009), Northern regions educational performance is better than OECD average. On the other hand, Southern regions performance is so low that makes Italian average score lie under the OECD average. Even Italian national evaluation corroborates this evidence (INVALSI, 2010).

Moreover, even though Italy is so diversified, the education system is very centralised. For example, let us consider the number of pupils per class in every Region that has been reported in figure 2.3[12]. In this case, there is no clear distinction between North and South and there is a very small variance: every Region lies between 18 and 22 pupils per class.

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[11] Several studies used PISA data to compare different institutional setting around the world (Fuchs and Woessmann, 2007; Woessmann *et al.*, 2009). Moreover, PISA data are used also for country-based analysis (Ammermueller, 2004; Escardibul and Villarroya, 2009; Machin and Vignoles, 2005; Woessmann 2004).
[12] The data source is MIUR – www.pubblica.istruzione.it.

Figure 2.3. The number of pupils per class among the Italian regions
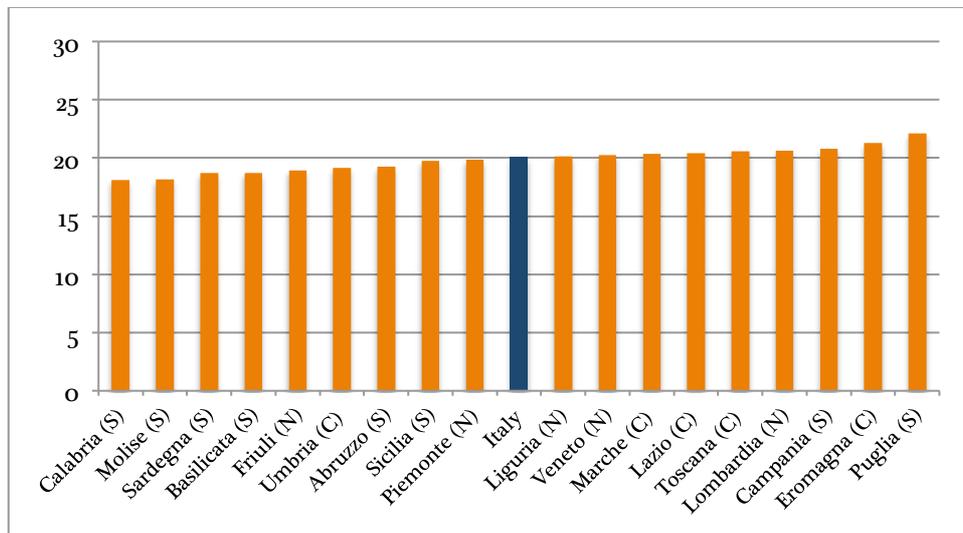
Indeed, there is weak school autonomy in Italy (Biondi *et al.*, 2009; Bertagna, 2009)[13]. Schools have low autonomy in comparison to other OECD countries on recruiting, pay-roll and dismissing of teachers, as it has been reported in table 2.2. The process through which teachers are recruited embodies three different actors: the Ministry of Education, University and Research (hereafter MIUR, which is the employer), *Regional Educational Agency* (USR) and *Provincial Educational Agency* (USP) – which are branches of MIUR, located in the Regions and Provinces – and, only lastly, the schools. The USR determines the number of classes and the USP the allocation of teachers between schools, according to their requests (Fontana and Petrina, 2001). It is worthwhile to note that schools request not a specific teacher but just a generic teacher of a given subject. In other words, they do not select their own teachers. Finally, teachers' salaries are determined and paid by the government. Thus, schools just manage facilities and integrative projects.

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[13] Law n. 59/1997, D.P.R. n. 275/1999, D.l. n. 44/2001.

Table 2.2. The autonomy and performance of Italian schools: comparison with other OECD countries (2009)

Selecting teachers for hire (% of decision's power)	Only principals and/or teachers	Both principals and/or teachers and Regional/national authority	Only Regional/national authority
Germany	29	36	34
Italy	9	10	82
Spain	31	3	66
Sweden	96	4	0
United Kingdom	90	9	0
United States	88	12	0
OECD average	61	14	25
Determining teachers' salary increases (% of decision's power)	School only	School and government	Government only
Germany	4	15	81
Italy	3	0	96
Spain	3	2	95
Sweden	69	22	9
United Kingdom	67	17	15
United States	18	6	75
OECD average	17	10	73
Formulating the school budget (% of decision's power)	School only	School and government	Government only
Germany	29	4	67
Italy	7	7	86
Spain	63	4	33
Sweden	64	20	16
United Kingdom	57	29	14
United States	54	29	16
OECD average	46	22	32
Performance (PISA scores 2009)	Reading	Mathematics	Science
Germany	497	513	520
Italy	486	483	489
Spain	481	483	488
Sweden	497	494	495
United Kingdom	494	492	514
United States	500	487	502
OECD average	499	499	501

Source: elaborations on OECD PISA (2009), Volume I, Table V.2.1 and Volume IV, Figure IV.3.3a.

With reference to school funding, several public actors deal with that:
- MIUR, which awards the resources for teachers, non-teachers personnel salaries, and facilities and operations funds;
- the Provinces, which own the schools' buildings; moreover, they have responsibility for buying the teaching equipments, furniture for schools and for paying electricity, light and gas (only for secondary schools);

- the Municipalities, which make sure of any additional service (i.e. transport and meals), and have the same responsibility as the Provinces but only regarding primary and lower-secondary schools.

The Regions have a role in the educational system as well, but only about vocational education. Moreover, they have responsibility for students aid, such as either scholarships or vouchers. The different contribution to education by all the actors is reported in table 2.3. As it is clear, MIUR covers the 86% of the education spending in the country (whose most part is absorbed by salaries – MIUR, 2009; 2011). Interestingly, the Regions that have higher education spending are located in Southern Italy.

Table 2.3. The expenditure per student by Regions (2008)

Regions*	Total in absolute values		Total in percentage	
	Public expenditure per student	Of which by provincies and municipalities	Public expenditure per student	Expenditure by provincies and municipalities
ITALY	6,810	923	86.45%	13.55%
Piemonte	7,010	1,141	83.72%	16.28%
Lombardia	6,934	1,228	82.29%	17.71%
Veneto	6,812	1,088	84.03%	15.97%
Friuli V.G.	7,655	1,267	83.45%	16.55%
Liguria	6,886	1,014	85.28%	14.72%
E. Romagna	6,722	1,335	80.29%	19.71%
Toscana	6,791	1,043	84.64%	15.36%
Umbria	6,874	788	88.54%	11.46%
Marche	6,613	808	87.78%	12.22%
Lazio	6,772	1,088	83.93%	16.07%
Abruzzo	6,864	761	88.91%	11.09%
Molise	7,646	1,027	86.57%	13.43%
Campania	6,458	569	91.19%	8.81%
Puglia	6,179	566	90.84%	9.16%
Basilicata	7,476	736	90.16%	9.84%
Calabria	7,564	728	90.38%	9.62%
Sicilia	6,496	615	90.53%	9.47%
Sardegna	7,407	689	90.70%	9.30%

* *Valle d'Aosta* and *Trentino Alto Adige* are special status Regions that have complete autonomy on this field, and was excluded.
Source: elaborations on MIUR (2009).

The amount of resources that schools receive for facilities and operations is partly determined through a formula and partly according to national agreements between the government and trade unions (funds devoted to the substitutions personnel). The formula takes into account the number of students, the school type and school size. The amount of these funds in 2009 were about 0.9 billions of euro for the funds for facilities and operations and 2.29

billions of euro, for the funds devoted to the substitutions personnel. Finally, another fund is devoted to the widening of schooling supply and to redistributive interventions, which is awarded according to MIUR's priorities, dealing with teacher training, disadvantaged areas and evaluation or innovation projects. Its amount is around 180 millions. Thus, all public funds, apart from the 12% awarded by local authorities, are defined at central level.

The main message of this section is the following one: despite of the centralisation of the system (weak school autonomy and very little amount of money devoted to non-staff expenditures) there is an impressive diversification among regions both for resource distribution and performance.

2.3   The contribution of the literature

2.3.1   The dualism North-South

The Italian North/South dualism is not a new occurence. A recent report about public services by *Banca d'Italia* argues that territorial differences in Italy do not deal only with education but also with the public services as a whole (Bripi *et al.*, 2011). Recently, the issue has been raised because this strong difference occurs despite the fact that the educational system is very centralised (Boarini, 2009; Bratti *et al.*, 2007; Brunello and Checchi, 2004).

As well as in other countries, Italian students' performances are affected by socio-economic background and other individual and schools factors. However, two aspects are particularly different from other countries: the choice of secondary school type (Boarini, 2009; Montanaro, 2008; Quintano *et al.*, 2009) and the Region in which students live: "the social environment where one was raised matters for the returns to education" (Brunello and Checchi, 2004 - p. 572)

Several studies have tried to shed more light on this diversity between North and South in the education field. Bratti *et al.* (2007) investigated in depth this point, finding confirmations about this gap. They begun by analyzing the context according to three categories: pupils and family factors, schools' resources and environmental factors. Regarding the first category they found a different situation between North and South for social status, parental education and material goods possession. Interestingly, they did not find any diversity for education expenditure, students:teachers and students:class ratios. They found, instead, a strong diversity according to the environmental factors: very different occupation rates and crime rates. Next, they analysed the variance (ANOVA) of Italian students' achievements (with PISA 2003 data). They found that individuals, schools and territorial (provinces) factors contribute similarly and importantly to explain the variance of students' achievements. Moreover, through an Ordinary Least Squares (OLS) model that included also some contextual variables (occupation rates, schools building status, expenditure for teachers, demographic indicators and social climate) they found that the

expenditure for teachers was not significant, while the occupation rates and local (Province level) literacy matter.

Thus, it appears that the context is a critical determinant of students' performance. Moreover, expenditure per student is not higher in the North than in the South of Italy (see table 2.3). The issue of efficiency is raised. As outlined by Bratti *et al.* (2007) and Boarini (2009), differences among Regions in students' performances are not explained by the quantity of resources. Boarini (2009) argued also that the low educational attainment and the higher turn-over rate of the teachers in the South are important determinant of the Italian gap. Specifically, her study expounds that: (i) an important driver of PISA 2006 results is the Region in which schools are located (even when contextual variables are included, Regional fixed effects are still significant); (ii) school level factors do not seem to matter for students' performance.

2.3.2 Measuring efficiency in education: an overview

There are different approaches to assess productivity and efficiency in education. These are (i) deterministic frontier approach and (ii) stochastic frontier approach. A related method was the definition of a deterministic statistical frontier (Barrow 1991, Cubbin & Zamani 1996). Using statistical techniques a deterministic frontier can be derived, and all deviations from this frontier are assumed to be the result of inefficiency. Through this technique, it is difficult to incorporate multiple outputs and this approach necessitates a large sample size for statistical reasons. The stochastic frontier removes some of the limitations of the deterministic frontier (Deller & Rudnicki, 1993, Bates 1997). Its biggest advantage is the introduction of a "disturbance term" representing noise, measurement error and exogenous shocks beyond the control of the production unit. The deviation from the efficient frontier is decomposed in two components: inefficiency and noise. On the other side, the deterministic frontier approach differs from both statistical approaches in that is nonparametric and from the stochastic frontier approach in that it is non-stochastic. DEA is an example of such methods (Charnes et al., 1978). One of the major advantages of this approach is that is fairly easy to incorporate multiple inputs and outputs into the analysis. Most of the studies about technical efficiency in education have used DEA. The pioneering studies by Bessent et al. (1982) pointed out some advantages of DEA over previously used techniques. These include: (i) the incorporation of multiple outputs and inputs, (ii) the possibility to avoid the specification of a parametric functional form for the production function, and (iii) the ability to identify sources of inefficiency for individual schools.

An important step in efficiency analyses is the choice of the input and output variables, as well as the definition of "external" factors associated with (in)efficiency. In the literature, two different strategies are adopted for this purpose. The first uses a two-stage estimation procedure. In the first stage, a

frontier model is estimated in which only controllable inputs are used in computing efficiency scores (i.e. financial and human resources). In analyses of schools, the most commonly used resource variables are measures of class size, pupil-teacher ratio or various types of spending per pupil. In the second stage, efficiency scores are regressed on uncontrollable factors such as: classroom teachers per pupil, support staff per pupil, administrative staff per pupil, proportion of qualified teachers, average teachers salary (Stiefel et al. 1999, Borge et al. 2005, Denaux, 2007, Rassouli, 2007, Muniz 2002, Maragos & Despotis, 2004, Jeon et al 2003, Ruggiero et al. 1999, Chakrabarty, 2009, Mante et al. 2002, Bradley et al. 2001, Ray, 1991, Noulas et al., 1998, Denaux et al., 2011). The difference between the computed efficiency score from the first stage and its predicted value from the second stage is used as an index for measuring the "pure technical efficiency", which could be attributable to management. This analysis refers to this concept as "managerial efficiency".

The second approach takes uncontrollable factors directly into account when computing efficiency scores. All factors are included in the model, without distinguishing between controllable and uncontrollable. Charnes et al., (1981), Smith & Mayston (1987), Deller & Rudnicki (1993), Thanassoulis & Dunstan (1994), Ruggiero (1996), and Chalos (1997) employed this approach.

Within both approaches, a number of variables have been used to quantify uncontrollable educational inputs, and especially the socioeconomic status of students. Some studies, such as Sengupta & Sfeir (1988), and McCarty & Yaisawarng (1993), used an index of parental socioeconomic background. Other related potential measures are: the proportion of minority and/or non-English speaking students (Ray, 1991); the number of students receiving free school meals (Barrow, 1991; Thanassoulis & Dunstan, 1994); the proportion of students from single-parent households (Smith & Mayston, 1987; Bates, 1997).

Other studies about the determinants of educational outcomes are structured by distinguishing between student variables and school variables (Mancebon et al., 2010, Tyagi et al., Mizala, 2002, Kim et al., 2006). At the student level, gender stands among the most important personal variables; household socio-cultural and socio-economic characteristics are strong determinants of educational outcomes; parental educational level and socio-professional category have also received much attention. The final set of variables at the student level concerns household resources and how students use them (Kang, 2007; Woessman, 2003). At the school level, general school characteristics are the first area of determinants. One of the most relevant factors is ownership type - i.e. private or public. Several variables describing the characteristics of school students or the classroom are included in the second area of school-level determinants. Another area of determinants at school level is their physical and human resources. For example, Portela & Camanho (2007) used three groups of variables: (i) those reflecting characteristics of pupils (prior attainment, social-economic

characteristics); (ii) those reflecting characteristics of the school (number of teaching and non-teaching staff, expenditure per pupil, size of school, or class size); (iii) those reflecting characteristics of teachers (their salary, experience, or level of education).

Some studies use groups of expenditure as inputs. Banker et al. (2004) condense these various categories into three broad groups of expenditures: (i) instruction, measured as the expenditures associated with all activities dealing directly with the interaction between teachers and students, including instruction aided with computers; (ii) administration, measured as the sum of expenditures related to instructional, campus and central administration and data processing services and (iii) support, measured as the sum of expenditures corresponding to instruction related services, student support services, student transportation, etc. Johnson & Ruggiero (2011) select four classes of expenditure per pupil as inputs: administrative, instructional, building operation and pupil support. Chakrabarty & Poggio (2008) used operating expenditure to measure cost inefficiency of Kansas public school district. Variables used to control for the school district cost environment are, among others, percentage of students belonging to a minority, percentage of students enrolled in a special education program, and percentage of students qualified for free and subsidized lunches.

In the large part of the literature, the choice of the output is pretty homogenous, and the vast majority of studies used tests scores (i.e. Ray, 1991, Johnson et al., 2011, Chakrabarty, 2009, Chakrabarty & Poggio, 2008, Agasisti, 2011b, Tyagi et al. 2009, Di Giacomo & Pennisi 2011, Mancebon et al. 2010, Borge et al. 2005, Cherchye et al., 2010, Rassouli, et al., 2007). Such choice represents today the standard for schools' efficiency analyses, albeit the economic literature also pointed out the relevance of non-cognitive skills (e.g. Cuhna et al., 2006).

Another important element is the unit of analysis. Often this factor does not coincide with the school but, in some studies, it refers to school district, Region, municipality (Banker et al., 2004, Johnson et al., 2011, Chakrabarty, 2009, Rassouli et al., 2007, Stiefel et al., 1999, Barbetta & Turati, 2003; Ruggiero et al., 1999).

Besides, in the large part of literature, the analysis of the efficiency is focused on a specific grade of school, to measure and compare the performance of schools at this level.

The literature about the efficiency of Italian schools is very limited and includes, to the best of the authors' knowledge, only three studies. Barbetta & Turati (2003) analyse a sample of middle (lower-secondary) schools located in an Italian region (Piedmont), and find that non-profit and private schools outperform their public counterparts. Moreover, a negative role of the share of immigrant and disabled students was detected, as well as the presence of (positive) scale effects. However, the paper used graduation rates as output, as standardized achievement tests were not available. Agasisti (2011b) used OECD-PISA 2006 data to investigate the efficiency of secondary schools, and more

precisely to give evidence of the positive role of competition among schools on efficiency. Lastly, Di Giacomo & Pennisi (2011) analysed new data about primary and middle schools, and evidenced the high variability among schools. The main determinants of schools' efficiency appear to be (i) the share of immigrant students and (ii) the share of untenured teachers.

In a broader perspective, the literature pointed out that the measurement of school's efficiency, in educational settings, is a particularly challenging task, given three characteristics of the educational process. Firstly, they employ multiple objectives and multiple outputs/outcomes; moreover, there are often different opinions regarding the goals and the relative importance of these goals. Secondly, many of the outputs of an educational organisation cannot be unambiguously measured and quantified. Lastly, it is very difficult to know and measure the correspondence relating inputs to outputs in the educational production "process" (Hanushek, 1986). In general, a school is considered to be efficient if, with the available resources, it achieves the highest possible results, measured through its students' achievement test scores. In this perspective, knowing the efficiency levels and the role of particular variables and socio-economic determinants on efficiency is a very important factor for school administrators and the policy-makers. To evaluate efficiency it is necessary taking into account not only variables under the schools' control, but non-discretionary variables, like socio-economic factors, a major element for explaining the variation in efficiency (Denaux, 2007; Rassouli-Currier, 2007; Ruggiero *et al.*, 1999). Another potential element, which has been underlined by previous contributions, is the institutional setting in which the schools operate. For instance, Bradley *et al.* (2001), Barbetta & Turati (2003), and Agasisti (2011a) analysed the potential role of competition among schools. All these authors suggest that higher levels of competition among public schools increase their productivity.

2.4   Methodology

This work relies on the idea of *technical* (or productive) efficiency (Farrell, 1957), meaning the ability of a school to transform inputs into outputs[14]. Thus, efficiency is defined as the ratio between (weighted) outputs and (weighted) inputs. A generic i_{th} school employs several inputs (financial and human resources, students' characteristics) to produce instruction; that is, the measure of educational output is the knowledge acquired by the students, as measured through standardized achievement tests. The use of achievement measures as a proxy for educational outputs is widespread and well accepted by the literature

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[14] More precisely, the notion of "internal efficiency" is used here, following the definition by Lockheed & Hanushek (1994): a comparison of learning (a non-monetary output of education) to the costs of educational inputs, thus measuring efficiency as cost-effectiveness.

(section §4.1). Efficient schools are those for which the ratio between outputs and inputs is highest – in other words, they produce the maximum level of output given the available inputs.

It is not considered, instead, what is called *allocative* efficiency, which means estimating also the ability of any unit of analysis (school or region, for example) to efficiently allocate their resources according to their relative prices. Since estimating allocative efficiency implies to introduce the input *prices*, it defines if the region/school is employing the most convenient combination of inputs, not just the best combination of inputs and outputs. Yet, allocative efficiency is not investigated here because of two main reasons: (i) Italian schools and regions do not have enough autonomy to select different inputs (especially, teachers); (ii) the Italian teachers' wage does not change at all within the country, since it is defined at central level by the MIUR and it depends almost exclusively on length of service (Barbieri *et al.*, 2011).

To estimate efficiency scores, Data Envelopment Analysis (DEA) is used. This is a nonparametric technique that considers each Region/school as a Decision Making Unit (DMU) using inputs to produce outputs (details in Cooper *et al.*, 2006). In the DEA model, technical efficiency is defined as the relative ability of each DMU (in this case, Regions or schools) in producing outputs; the term "relative" means that each unit is compared with any other homogeneous unit. The choice of a set of weights that combine several outputs and several inputs is the core of DEA analysis. DEA can be represented by a linear programming technique where each DMU tries to maximise the efficiency ratio (output over inputs) choosing the best set of weights. However, in the regional analysis just one input and one output were used, so that the efficiency score coincides with the (size-adjusted) output/input ratio. The efficiency score ranges between [0;1]: the units that obtained a score equal to 1 are efficient, while the inefficiency of the other Regions is calculated through the distance from the efficient frontier.

DEA mathematical formulation can deal with both constant returns to scale (CRS) and variable returns (VRS). In a constant return to scale (CRS) model, the single DMU's dimension has no importance in defining efficiency performance - that is, DMUs face the same efficiency frontier, independently of their relative size. The VRS results can be derived by introducing the dimension factor in DEA modelling: each unit is analysed with respect to another of the same "relative" size. Both CRS and VRS efficiency can be calculated for each unit. In this work, the VRS formulation was chosen to take into account the different relative size of the unit of analysis (regions/schools) since the literature pointed at economies of scale in case of schools with high enrolment rates (Baker, 2005). Moreover, there are two different specifications of a DEA model: input-oriented and output-oriented. In the input-oriented model, DMUs minimise inputs while maintaining the same level of output. On the contrary, in output-oriented models, DMUs

maximise their level of outputs while keeping inputs constant. The output-oriented approach was preferred.

A well-know shortcoming of DEA is that the method is deterministic; so all the deviance from the frontier is attributed to inefficiency, without considering the possibility of random noise. This is obviously a very strong assumption. Some methodological advancement allowed solving this problem, by defining a procedure to derive statistically robust efficiency scores through DEA. The method consists in bootstrapping DEA results, and was firstly proposed by Simar & Wilson (1998). The bootstrap procedure consists in re-sampling the observational data, to derive confidence intervals for the calculated efficiency scores (more details in Daraio & Simar, 2007). In this work, such a robust approach to derive DEA efficiency scores was used.

After having derived the efficiency scores, they have been regressed against a set of contextual variables, which capture potential explanations for efficiency differentials. This second-stage analysis was conducted through a Tobit regression. Tobit-like specification was preferred over the OLS because of the censored nature of efficiency scores, which are constrained between 0 and 1. The Tobit regression tests the impacts of a vector of covariates (x_i) on a dependent variable (y_i): then, it considers the existence of a latent variable y^*_i, which is unobservable, and defined as equal to y_i if its value is below a predefined value, or equal to this value otherwise (this is why it is a particular version of a more general censored model).

DEA is a non-parametric technique that allows the calculation of efficiency scores by constraining the ratio outputs/inputs in the range [0;1], and – as in the school level analysis, where multiple inputs were used – assigning weights to inputs and outputs for maximizing the score. Units that reach a score equal to 1 are efficient; the other units receive a score between 1 and 0, where the distance (1 – eff_score) measures the distance from the frontier of efficient units. Mathematically, the efficiency score is obtained by solving the following linear program:

$$\theta_k\left(x,y\right)=\left\{\theta\,|\,\theta_{x_0}\geq\sum_{i=1}^{n}\gamma_i x_i;y_0\leq\sum_{i=1}^{n}\gamma_i y_i;\gamma_i\geq 0;\sum_{i=1}^{n}\gamma_i=1;i=1,...,n\right\} \qquad (1)$$

where there are *n* units, *m* inputs x_i, s outputs y_i: γ_i is the weight associated to the single inputs and outputs, θ_i is the efficiency of the i_{th} school under analysis. The linear program must be solved for each unit. If the efficiency measure is $\theta_i<1$, then the i_{th} school can produce (1- θ_i) percent more outputs given its inputs. If θ_i turns out equal to 1, the unit (school) is efficient. An output oriented model has been chosen,

2.4.1 Estimating "managerial efficiency"

The inefficiency can also be the result of inadequate managerial (or educational) practices, as well as of external (un)favourable conditions. From a public finance perspective, it is then important to separate these two effects. For this purpose, it is important to condition baseline (raw) efficiency scores on external variables. In both the analysis (at region and school level), raw efficiency scores were regressed against a set of out-of-control (exogenous) variables. Specifically, in the analysis at school level, the residuals of the regression were used to "adjust" raw efficiency scores to obtain efficiency scores that only evaluate managerial inefficiency. Also in this case, an adequate way to estimate the environmental "harshness" contribution to efficiency is to use the Tobit regression. The residuals of the Tobit regression express the portion of efficiency that remained unexplained after the correction for exogenous factors; however, as they alternate in sign, a mathematical procedure is needed to generate adjusted efficiency scores confined in the range [0;1]. Following De Witte & Moesen (2010), the adjusted efficiency scores are calculated as:

$$Adjusted\_\theta_i = \varepsilon_i + \left(1 - \max \varepsilon_j\right)$$
$$j = 1,...,n$$

(2)

where ε are the residuals from the Tobit regression.

2.4.2 Robustness checks

With the aim of testing the robustness of results, different models are employed to verify if efficiency scores are sensitive to the choice of different inputs and outputs (these checks are related just to the school level analysis, since in the one a region level, just one input and one output were used). As outputs, scores in mathematics (Math) and reading are alternatively used. As inputs, we used four different combinations of the following variables:

- teachers:students ratio (teach_stud), to capture the intensity of resources utilized by the school;
- expenditure per student (exp_stud). This variable does not include the expenditure for staff, so that it does not overlap with teach_stud. Instead, it comprises all the expenditures for alternative teaching and cultural projects and activities. It is a proxy for resources invested in out-of-curriculum activities;
- average socio-economic conditions of students (ESCS). The variable has been built in congiunction with the OECD procedure in the PISA tests through information about parents' occupation, education, possessions and income (details in Campodifiori et al., 2010).

The inputs and outputs included in the four models are synthetized in table 2.4.

Table 2.4. DEA models: an overview

Model	Inputs	Outputs
Model 1A	Teach_stud	Reading
Model 1B	Teach_stud	Math
Model 2A	Teach_stud; Expend_Stud	Reading
Model 2B	Teach_stud; Expend_Stud	Math
Model 3A	Teach_stud; ESCS	Reading
Model 3B	Teach_stud; ESCS	Math
Model 4A	Teach_stud; Expend_Stud; ESCS	Reading
Model 4B	Teach_stud; Expend_Stud; ESCS	Math

The teachers:students ratio variable does not embody the number of people who teaches, but the number of full-time equivalent (FTE) positions. Importantly, this number is partially under the school control. Although it depends mainly on the number of students, the MIUR defines the precise criteria. However, schools can decide the number of classes but they must respect the maximum and minimum number of students per classes defined the national law (President of Republic Decree 20th March 2009, no. 81). Also for this reason, output oriented DEA approach has been chosen, since schools can just "maximise" outputs with fixed inputs.

Moreover, since ESCS is the school average of all students' ESCS in that school, this variable is expected to capture a school effect, rather than a student effect. More importantly, the choice of including ESCS among inputs is questionable, as public schools in Italy cannot select their students. Thus, the socio-economic composition of the student body is much more an external condition than a controlled factor. However, given the importance of students' socio-economic conditions on educational achievement, it has been included in the model to account for its major effect on output.

In the second stage the variables representing phenomenon out of school control were used. The number of students has been included as well in this stage for two reasons. Firstly, it is actually out of school control: Italian schools do not have power over students' selection. Secondly, this variable could capture some economies of scale.

Operationally, when "adjusting" efficiency scores in subsequent steps, models 2a and 2b are used (without ESCS); instead, when analysing the determinants of efficiency, models 4a and 4b are preferred. As shown in the section §5, the high correlations among the results make this approach safe.

2.5 Data

2.5.1 Data at regional level: sources and motivations

The data have been collected from different sources (table 2.5): (i) the MIUR; (ii) OECD and (iii) National Institute of Statistics (ISTAT). Since education is a dynamic process, the averages of the three years' values were used. They have been accumulated for 2007, 2008 and 2009, apart from the expenditure per student (which is not available for the other years) and the PISA 2009 scores.

Table 2.5. The sources of data

	MIUR[a]	OECD[b]	ISTAT[c]
Teachers: students ratio	X		
Percentage of immigrant students	X		
Percentage of disabled students	X		
Percentage of students enrolled in private schools	X		
Expenditure per student*	X		
GDP per capita			X
Graduation rate			X
Employment rate			X
PISA score in reading*		X	
PISA score in mathematics*		X	
PISA score in science*		X	

[a] http://oc4jesedati.pubblica.istruzione.it/Sgcnss/ and MIUR (2009).
[b] www.pisa.oecd.org
[c] www.istat.it and ISTAT (2010).
* Data only for 2009

The motivations for these variables follow a simple framework: inputs, outputs and the context or environment. Of course, the first relevant input is teachers; yet, just number of teachers could hide the different school size. For this reason the teachers:student ratio has been chosen. Another input is the amount of resources provided by the central government, again corrected by school size (i.e., number of students). The same inputs can work differently if the school intake varies across schools. That is why indicators about different "type" of students were collected as well: immigrant and disabled students. In order to capture the regions' educational performance, the most reliable and used indicator has been employed, which is OECD PISA (2009) scores. The context is a very wide dimension. On the one hand the presence of the private sector in a region is expected to affect public schools' performance (Hoxby, 1999). Moreover, the socio-economic profile does have an impact on students' achievements (OECD PISA, 2009). These alleged effects can be captured by the percentage of private schools in any region and by the regional GDP per capita. The latter is supposed, indeed, to capture two effects: the socio-economic context and the socio-economic background of students, too. The PISA (2009) indicator has not been chosen both because of its no statistically significance (at region

level) and because it could not proxy the context as well, but just the students' background. Conversley, if just ESCS indicator by PISA would have been used, GDP per capita could not be kept because of significant correlation between them. On the other hand, regions can differ also with respect to the stock of human capital and the performance of the labour market. A region with a high stock of human capital is supposed to better, or to "easily", educate students. Likewise, a labour market where demand and supply are well matched can be an insight of schools' outcome appreciation. These phenomena are supposed to be caught by the percentage of graduated people and the employment rate.

Table 2.6. The descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
teach_stud_avg	18	0.109	0.010	0.098	0.13
immigrant_avg	18	0.075	0.048	0.015	0.137
disabled_avg	18	0.031	0.004	0.022	0.041
gdp_avg	18	24,219.82	5,657.18	1,6705.80	32,870.1
literacy_avg	18	9.890	1.688	7.058	14.519
private_avg	18	0.035	0.027	0.002	0.1
employ_avg	18	57.612	9.178	42.32	69.674
pisa_read	18	484.858	20.979	447.96	521.63
pisa_math	18	481.768	22.502	442.069	515.839
pisa_science	18	487.682	25.481	442.717	525.651

The descriptive statistics of our data set are shown in table 2.6. They show a very low variance of the school system variables, apart from PISA scores (whose heterogeneity has been already discussed). The standard deviations for teachers:students ratio (teach_stud_avg), percentage of disabled (disabled_avg) and immigrant students (immigrant_avg) and percentage of students enrolled in private schools (private_avg) are impressive. On the other hand, the contextual variables have much more variability. The most different between regions are the employment rates (employ_avg) and the GDP per capita (gdp_avg). Finally, the percentage of population with academic qualification (literacy_avg) shows roughly 7% as the minimum and 14.5% as the maximum value. These data could say something in advance to our research questions, as only the environmental data seem to be different within the country.

As a consequence, a deeper description of the data is necessary in order to get an idea of the relations and the correlations between variables, and then to choose the input variables. Figure 2.4 shows the evident correlation between the expenditure per student and the teachers:students ratio (0.97). This is an important point, as data of expenditure per student is not available for all the three years considered. Finally, students:teachers ratio was chosen as a proxy for

the resources invested in education, which is the input of the DEA analysis, and PISA math score as the output[15].

Figure 2.4. The correlation between the expenditure per student and the teachers:students ratio
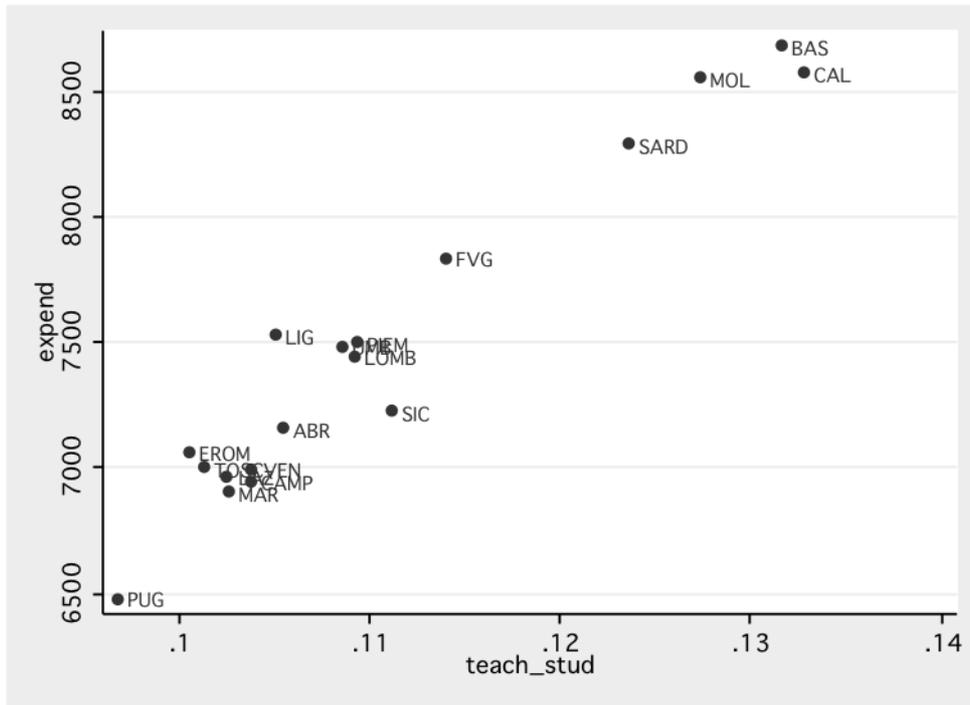
2.5.2 Data at school level

A new dataset for Italian schools has been used in this analysis. The original dataset comes from INVALSI, which runs standardized achievement tests (subjects: reading and mathematics) within the country since 2007. The data relating to the tests carried out in 2010 but only for the fifth grade of primary school (grade 5) and first grade of middle school (grade 6) are used in this work. All data refer only to the schools located in the Lombardy Region. Differently from the first implementation, the standardized tests administered in 2010 are reliable. Indeed, in 2007 and 2008 two main drawback biased the results. On the one hand, cheating behaviours in some schools were detected since the "too high" scores in some schools (INVALSI, 2009). Secondly, just a sample of schools was involved in the first application. Our dataset, instead, contains data of any student and any school of the Lombardy school system. Moreover, Lombardy is a region where cheating behaviours are almost absent (INVALSI, 2009; 2010; 2011).

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[15] The appendix 1.a in table 1.a.1 shows the strong correlation among all of three PISA tests, which are reading, mathematics and science. Thus, anyone of those fits the analysis.

The original datasets provided by INVALSI were two: one at student level and one at school level, and they were merged to include both types of information. The dataset at student level contains individual characteristics other than the score obtained in the test: gender, age, family background, nationality, parents' nationality, whether the student attended to nursery or kindergarten, and the municipality and province where he/she lives. There are many variables available for family background: work of father and mother and their education level. Moreover, the possession of particular goods[16] is considered as proxies for different economic and cultural contexts, which in turn have different impact on student's achievement. INVALSI created an indicator, called ESCS (indicator of socio-economic-cultural status) that takes into account all these variables (Campodifiori et al., 2010): parents' occupation and education and the possession of goods related to different socio-economic context. It is an indicator with mean equal to 0 and standard deviation equal to 1. The dataset at school level contains: school type (private or public), number of students, classes, immigrant students (both first and second generation), disabled students, rejected students, teachers (both open-ended and fixed-term contract), expenditure amount per school and the location.

These two dataset have been merged. This means that for every school the mean scores for reading, math, ESCS indicator and other variables have been computed.

The student level dataset originally contained data for 81,456 and 82,390 students, respectively, for primary and middle school. The school level dataset contained data for 1,050 and 900 schools, respectively, for primary and middle school.

We firstly eliminated the group of private schools. This choice is justified by the focus on public spending efficiency; since private schools receive a negligible amount of public money, they were not interesting for our purposes. Moreover, there are different variables that are not available for private schools. Then, some outliers have been dropped as well; the outliers were defined in terms of evident problems in data collection (i.e. missing data or material errors). After these operations, 583 and 479 observations remained, respectively, for primary and middle schools (a more detailed description of how we reduced the dataset is provided in the annex D, which shows that the final sample has the same distribution characteristics of the original one, despite the high number of dropped observations).

Some further variables were created in order to make some indicators comparable. First of all, it has been taken advantage of the student level data by computing some variables that capture some equity effects. The variance at school level for ESCS, reading and math scores have been computed and used as

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[16] More specifically, these "goods" include: a quiet place to study; a personal desk for homework; encyclopaedias; internet connection; burglar alarm; a room exclusively devoted to the student; more than one bathroom; more than one car in the family; more than one hundred books.

additional variables, which have been called ESCS_var, read_var and math_var. The last two ones are supposed to measure an equity effect. For example, in case of a school whose reading score is high, by controlling for read_var we can consider whether that school is tracking students (when read_var has a positive and significant coefficient) or not. In other words, it is possible to detect schools where the equity issue is tackled and schools where is neglected. The first one – ESCS_var – instead, allows to control for peer group effect at school level.

The expenditure per student (expendstud) and the teachers per students (teachstud) variables have been created. Likewise, the percentage of immigrant and disabled students (pimmigrant and pdisabled , respectively) were computed in order to make schools comparable. It is important to bear in mind that disabled students do not participate to the test. However, their impact is considered in the inputs, since the higher is the number of disabled students, the higher is the number of (positions) teachers. Therefore, the impact of disabled students is measured as an additional cost among inputs. The descriptive statistics of all variables used for both school levels are reported in table 2.7.

Table 2.7. The descriptive statistics

	Mean		T statistic	Std. Dev.		Min		Max	
Variable	Primary	Middle	Primary/Middle mean comparison	Primary	Middle	Primary	Middle	Primary	Middle
students	515.21	369.50	12.61	187.22	187.32	93	88	1338	1072
disabled	13.67	13.09	1.17	7.11	8.88	1	0	48	56
immigrant	73.45	50.35	12.70	52.27	37.82	1	0	297	292
immigrant1g	33.87	39.07	18.51	24.42	30.73	0	0	199	242
immigrant2g	39.58	11.28	3.90	32.04	10.68	0	0	184	81
rejected	1.34	15.03	-24.30	2.12	13.40	0	0	15	94
studentsf	249.52	176.81	12.93	91.81	89.60	36	44	663	481
cltot	26.01	16.71	17.78	8.96	7.86	5	5	63	45
studclass	19.78	21.84	-15.78	2.20	2.01	9.38	13.11	25.33	27.17
pimmigrant	0.14	0.14	8.03	0.08	0.08	0.01	0.00	0.61	0.71
pimmigrant1g	0.06	0.10	-13.57	0.04	0.06	0.00	0.00	0.25	0.55
pimmigrant2g	0.07	0.03	16.52	0.05	0.03	0.00	0.00	0.36	0.22
pdisabled	0.03	0.04	-10.61	0.01	0.02	0.00	0.00	0.09	0.14
prejected	0.00	0.04	-31.76	0.00	0.03	0.00	0.00	0.03	0.22
pstudentsf	0.48	0.48	2.82	0.03	0.03	0.39	0.24	0.56	0.58
teachers	53.70	38.65	13.35	18.75	17.71	9	12	121	109
teach_open	44.72	29.67	15.45	16.09	15.41	5	5	100	99
teach_fixed	8.99	8.97	0.05	5.31	4.88	0	1	33	29
teachstud	0.11	0.11	-2.11	0.02	0.02	0.07	0.07	0.36	0.35
pteachfixed	0.17	0.25	-13.14	0.08	0.11	0.00	0.02	0.54	0.67
expendstudent	582.97	854.37	-9.89	364.03	528.82	51.52	0	5198.56	4216.40
province	4.78	4.44		2.75	2.69	1	1	11	11
chiefcity	0.15	0.15		0.36	0.36	0	0	1	1
reading	68.87	63.07	23.70	4.29	3.55	53.86	51.24	81.01	76.36
math	62.89	54.41	30.10	4.80	4.26	50.47	45.28	78.93	66.46
ESCS	-0.04	-0.04	0.40	0.32	0.33	-0.76	-1.18	1.43	1.63
readingvar	16.13	14.35	13.62	2.43	1.65	8.89	9.49	32.39	20.28
mathvar	16.51	17.46	-9.46	1.81	1.35	11.00	13.71	30.39	21.32
ESCSvar	0.87	0.86	0.75	0.20	0.21	0.29	0.27	1.25	1.19

Primary schools, on average, employ less resources than middle schools: the expenditure per student is 583€ compared with 855€, albeit the teachers:students ratios are similar. Conversely, primary schools are higher (515 students against 370), with slightly less students per class. Moreover, in middle schools the share of untenured teachers is higher (25% versus 17%). Other inputs' characteristics are similar: students' socio-economic background (ESCS = -0.04), share of private students (14%), variance of ses (0.8). Primary schools perform better than middle schools: the average score in Reading is 69 (the scale is between 0;100) compared with 63, while in Math is 63 versus 54.5[17].

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[17] The dramatically low performance of middle schools in Math has been recently revealed also by other studies about the Italian educational system (FGA, 2011). However, it has to bear in mind that the data relates just on the first year of middle schools.

2.6   The results

2.6.1   The results from DEA at regional level

A DEA analysis has been run with teachers:students ratio as input and the PISA 2009 mathematic score as output. The results are shown in table 2.8. At a first glance, the DEA results corroborate what is already known, that is the North outperforms the South of Italy (INVALSI, 2010). However the focus here is not on "performance" but on "efficiency". Thus, a Region with good performance can be inefficient (due to high level of available inputs); conversely, a low-performer Region can be efficient anyway. Indeed, the *Piemonte* and *Puglia* Regions represent a sort of outlier from the North/South dualism point of view. Indeed, *Piemonte*, which has scored 0.943, is the worst out of the Northern Regions, while *Puglia* has an efficiency score (0.971, more than *Piemonte*) similar to the Northern Regions. In figure 2.5 the observed and efficient outputs are compared: the former is the OECD-PISA average score for each Region, while the latter is the (average) score that the same Region should obtain if efficient. The Regions have been ranked according to the difference between the two outputs. *Puglia* is the best efficient after *Emilia-Romagna*, while *Piemonte* is the worst out of the Northern Regions.

Table 2.8. The efficiency scores: DEA results

	Efficiency (DEA)	Efficiency (Bootstrap DEA)	Bias	Low.bound	Upp.bound
Piemonte	0.955	0.943	0.013	0.928	0.954
Lombardia	1.000	0.986	0.014	0.970	0.998
Veneto	0.996	0.984	0.013	0.966	0.995
Friuli V.G.	0.989	0.977	0.012	0.962	0.988
Liguria	0.958	0.947	0.011	0.933	0.958
E.Romagna	1.000	0.960	0.040	0.901	0.998
Toscana	0.976	0.958	0.018	0.925	0.975
Umbria	0.947	0.936	0.011	0.922	0.947
Marche	0.986	0.968	0.019	0.934	0.985
Lazio	0.930	0.917	0.013	0.898	0.929
Abruzzo	0.928	0.917	0.011	0.903	0.927
Molise	0.905	0.897	0.008	0.883	0.905
Campania	0.868	0.857	0.011	0.844	0.867
Puglia	0.971	0.932	0.038	0.875	0.969
Basilicata	0.920	0.912	0.008	0.897	0.920
Calabria	0.857	0.850	0.007	0.836	0.857
Sicilia	0.873	0.864	0.009	0.851	0.873
Sardegna	0.884	0.876	0.008	0.863	0.884

Figure 2.5. The comparison between observed output and efficient output
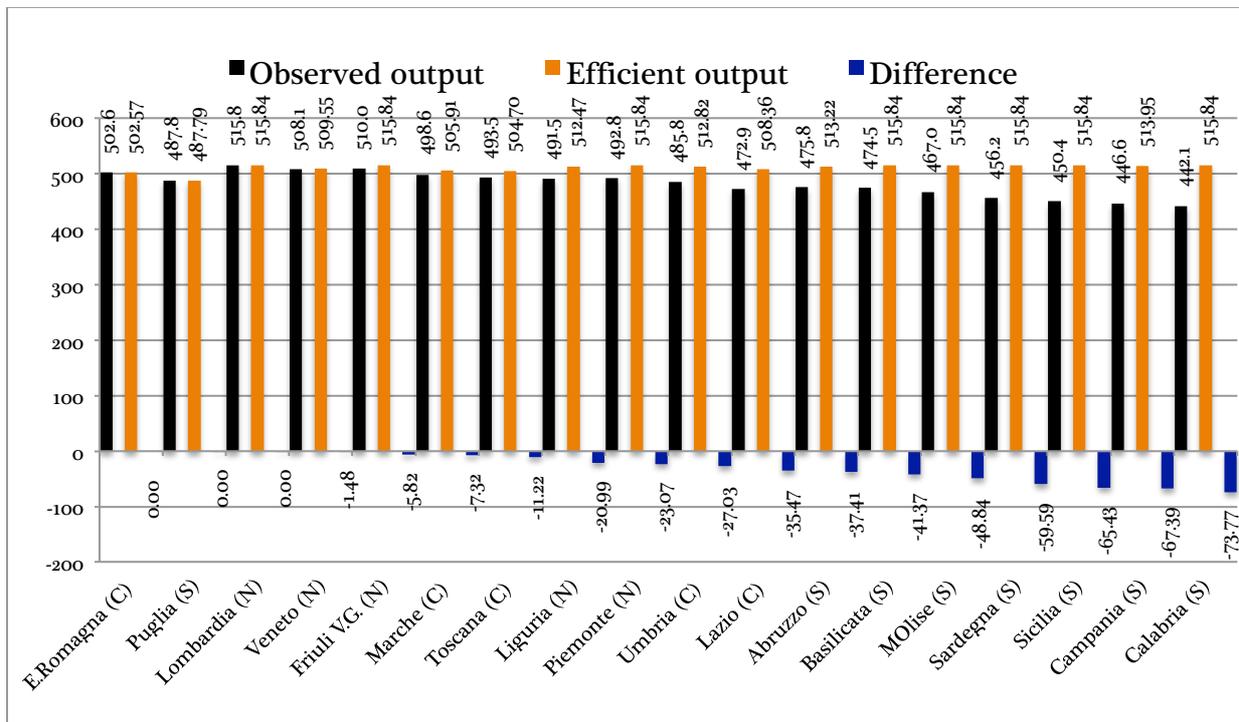
What is more interesting now, is to inquiry on the determinant of these (in)efficiencies. Before analyzing this topic by mean of a Tobit regression, some graphical correlations are shown between the efficiency scores estimated and some contextual variables (figure 2.6), which are: GDP per capita, percentage of students enrolled in privates schools (as an insight of either competition and wealth of the educational context), the percentage of graduated population (as a proxy of the differences of the human capital stock among Regions), the employment rate and, finally, the percentage of disabled and immigrant students. These are critical characteristics that potentially affect schools' performances.

Many of them show unexpected scenarios. The GDP graph shows a clear positive correlation with Math score, though *Puglia* and *Lazio* are two significant exceptions. The former, despite of its low GDP per capita, out-performs all the South Regions; the latter, despite of its high GDP per capita, performs as a South Region.

The correlation with the percentage of students enrolled in private schools is less clear. It seems positive, but with high variability. For example, at a relative high level of PISA score (around 500), four Regions are at different levels of students in private schools: *Marche* at 2%, *Toscana* at 3%, *Piemonte* at 6% and *Liguria* at 7%.

Figure 2.6. The correlation between PISA 2009 math score and contextual variables
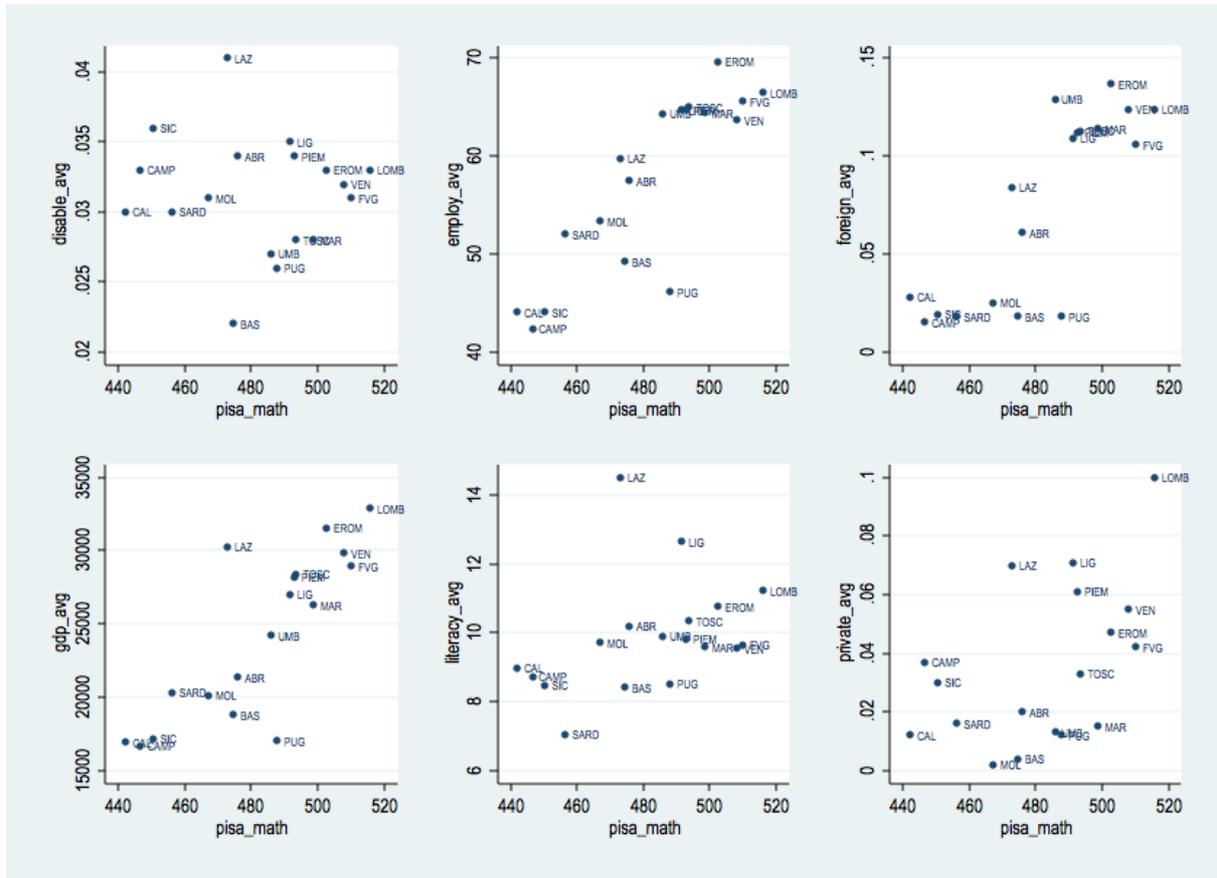
The correlation between PISA scores and the percentage of graduated population is positive, (as expected) though *Lazio* represents an important exception, since it has a high graduation rate with a relatively low PISA score. Similar considerations hold for employment rates.

Surprisingly, the number of immigrant students does not appear as negatively correlated with students' performance. In order to give a synthetic panoramic of all these correlations, the annex A reports the correlation matrix (table 2.a.2).

2.6.2 The results from the Tobit model: the determinants of regions' efficiency

The Tobit regression (table 2.9) suggests the effect of two contextual characteristics (the employment rates have not been included in the second stage because of multicollinearity with GPD per capita). First, the relationship between students' performance and the percentage of disabled students has a significant and negative coefficient. Thus, these results suggest that the critical characteristic of schools that really affect the performances is the number of disabled students, rather than immigrant students. The coefficient of the GDP per capita is positive, as the data suggested. Instead, the stock of regional human capital (the percentage of graduated population) and percentage of students

enrolled in private schools do not show any relationship with performances. The former results is surprising, as previous literature showed that socio-economic background of students matters in determining their performance. However, this result could be justified on the basis of two factors: (i) data are aggregated at regional level – so it could be the case that such relationship is weaker, and (ii) probably, GDP partially captures this effect.

Table 2.9. The second stage analysis: Tobit regression results

Variables	Coefficient	St Error	t	P>t	Beta coefficients
GDP per capita	0,000	0,000	1,900	0,082	0,664
% Private	0,194	0,341	0,570	0,580	0,121
Adult literacy	0,000	0,005	0,030	0,977	0,005
% Disabled students	-4,285	1,765	-2,430	0,032	-0,420
% Foreign students	0,220	0,260	0,850	0,413	0,243
Constant	0,912	0,061	15,000	0,000	.
F (5,12)	13,58				
Adjusted R^2	0,7873				

Summarizing, the Italian contradiction between inputs and outputs in the educational system has been confirmed: despite of uniformity of inputs within the country, the dispersion of the outputs is relevant. These findings allow for arguing that the different level of efficiency of the single regions causes this dispersion. In other words, some regions are wasting resources. The first explanation appears as to be the context. A better context is associated to better performance, and *vice versa*. So the next question is: what does this context have to make so different performances among regions? That is the aim of the deeper analysis that investigates at school level, as the next section shows.

2.6.3 Adjusted efficiency measures for Italian schools

2.6.3.1 *The efficiency of Lombardy schools*

The bootstrap DEA analysis (Table 2.10) reveals that the average efficiency scores of the Lombardy schools are pretty high both in primary and middle grades: the average (robust) score is around 0.80 in a distribution [0;1]. The scores are pretty similar according to all the different models: they range between [0.795; 0.858] for primary schools and [0.807; 0.839] for middle schools.

An important remark here is that bootstrap efficiency scores also have their own confidence intervals, so they allow statistical inference in a second stage (section §4.4.2.). Moreover, by looking at the scores and their intervals, it is possible to show that only a group of schools is actually more (or less) efficient than the average. Annex B contains four figures (figures 2.b.1-2.b.4) that illustrate how the

majority of schools present a confidence interval that intersects the line of average efficiency score (the elaborations are for models 3a and 3b, both grades).

Table 2.10. The efficiency scores

Models	Primary Schools		Middle Schools	
	Eff. Scores	Eff Scores via bootstrap	Eff. Scores	Eff.Scores via bootstrap
Model 1a	0.857	0.848	0.851	0.839
Model 1b	0.811	0.801	0.821	0.810
Model 2a	0.868	0.858	0.832	0.807
Model 2b	0.808	0.794	0.825	0.810
Model 3a	0.869	0.856	0.842	0.823
Model 3b	0.814	0.796	0.832	0.816
Model 4a	0.858	0.846	0.848	0.837
Model 4b	0.809	0.795	0.833	0.820

Notes. For each grade, the first column reports the mean efficiency scores as calculated through the traditional (deterministic) DEA procedure; the second column reports the bias-corrected average efficiency scores after the calculations through a bootstrap version of DEA (each model: 1,000 repetitions). All the elaborations have been run through the package FEAR within the statistical software R.

From a public finance perspective, a key point to be kept in mind is that these schools are not more (in)efficient than the average, as they turn out as statistically identical to that average. Moreover, it is possible to appreciate the difference of the confidence intervals according to the school grade and output measure. Figure 2.b.3, for example, shows that, in the middle schools, when considering the reading score as the output, the confidence intervals are impressively higher, which makes even harder to compare schools' efficiency and making credible schools rankings.

Models that consider Reading as output show higher efficiency scores than those for Mathematics – the difference is between 0.04 and 0.05. Correlations among different models show the consistency of results: they are always >0.9 for models with the same output (table 2.11).

Table 2.11. Correlations among DEA results

Panel A. Primary Schools

	Model 1a	Model 1b	Model 2a	Model 2b	Model 3a	Model 3b	Model 4a	Model 4b
Model 1a	1.000							
Model 1b	0.648	1.000						
Model 2a	*0.949*	0.632	1.000					
Model 2b	0.610	*0.946*	0.649	1.000				
Model 3a	*0.960*	0.629	*0.944*	0.613	1.000			
Model 3b	0.614	*0.952*	0.630	*0.929*	0.644	1.000		
Model 4a	*0.977*	0.636	*0.951*	0.608	*0.962*	0.613	1.000	
Model 4b	0.623	*0.967*	0.610	*0.934*	0.617	*0.939*	0.635	1.000

Panel B. Middle Schools

	Model 1a	Model 1b	Model 2a	Model 2b	Model 3a	Model 3b	Model 4a	Model 4b
Model 1a	1.000							
Model 1b	0.790	1.000						
Model 2a	*0.930*	0.754	1.000					
Model 2b	0.766	*0.980*	0.782	1.000				
Model 3a	*0.948*	0.760	*0.921*	0.759	1.000			
Model 3b	0.743	*0.946*	0.705	*0.943*	0.787	1.000		
Model 4a	*0.900*	0.738	*0.934*	0.745	*0.915*	0.703	1.000	
Model 4b	0.764	*0.973*	0.757	*0.973*	0.782	*0.959*	0.773	1.000

Notes. In italics, we underlined all the relevant correlations (i.e. those referring to the same output, Reading or Math).

An important point is to compare absolute *performance* – defined as the average score obtained by the school in the standardized tests – with the *efficiency* – defined as the performance level obtained by the school given its available input. For exploring the relationship between the two concepts, figure 2.7 plots one score against the other. The figures reveal two patterns. The first is that, on average, schools with higher performance are also the most efficient – as the plot is clearly upward sloped. Secondly, there are several schools that are relatively efficient despite their relatively low performance, as well as schools that are relatively inefficient despite their relatively high performance. The figures point out an important theme here, from a policy-making perspective: comparing raw performances of schools is misleading, as it is crucial to consider how much input is employed to obtain performance. As the literature showed, the use of rankings that do not consider the differential between inputs and outputs do not capture the differences among performances, but often due to mere differences of available resources; this point will be even clearer later when non-discretionary (external) variables will be included in the analysis.

Figure 2.7. The correlation between efficiency scores and performance

Panel A. Primary schools
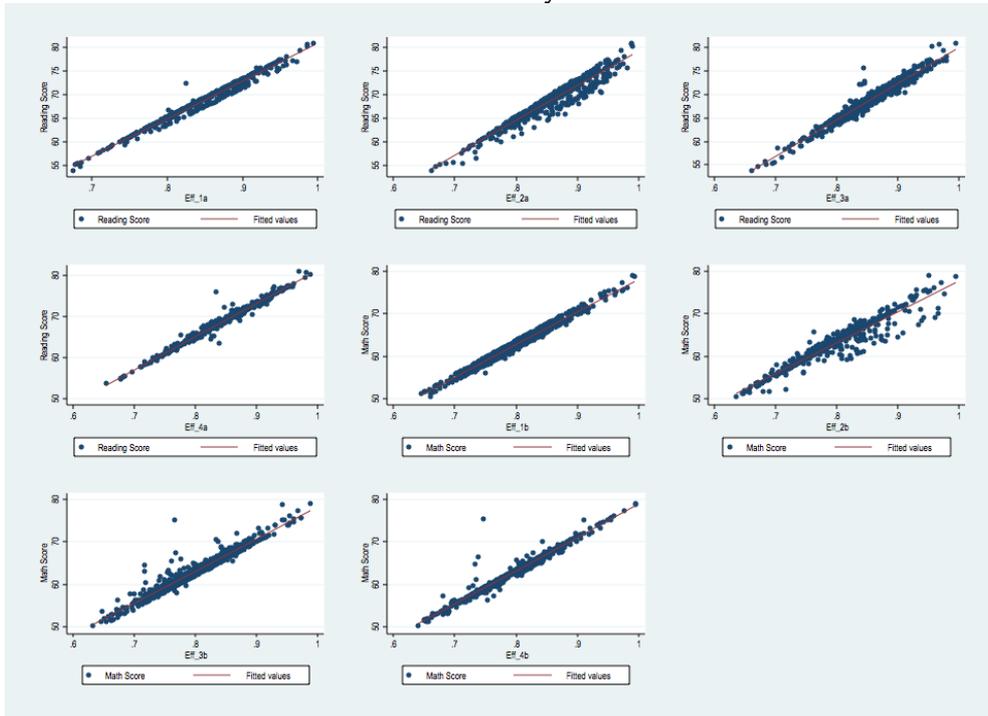
Panel B. Middle schools
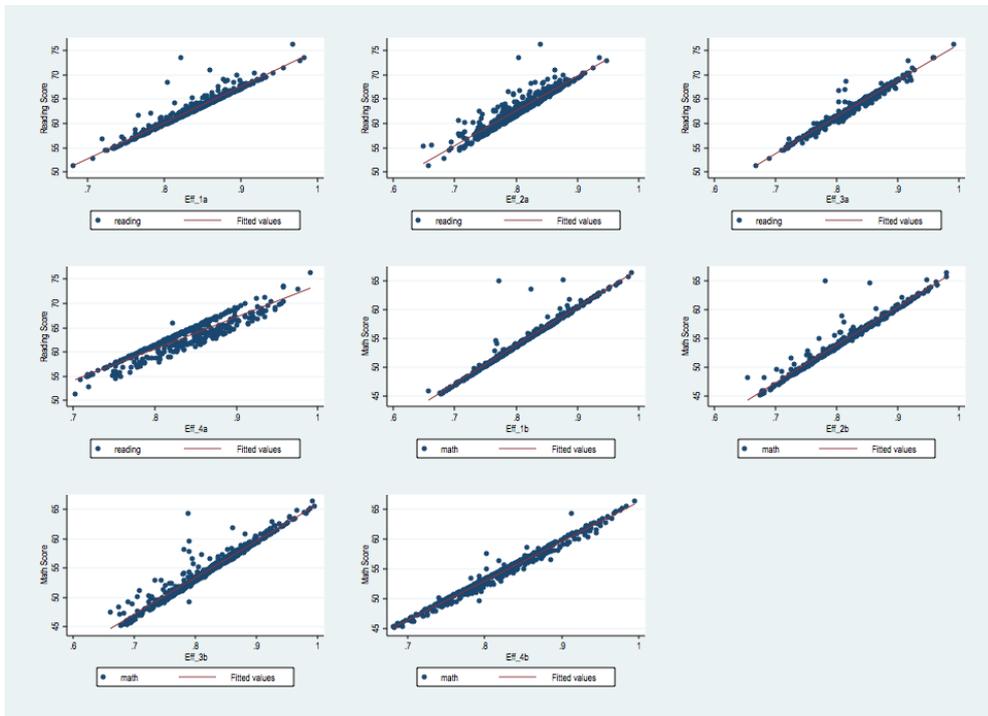
Notes. On the vertical axis, the absolute performance of each school is reported (Reading_score or Math_score), while the efficiency score is in the horizontal axis. The units are ordered in the horizontal axis on a positive (growing) scale. Fitted values are reported as linear predictions of y values, given the observed x level.

As a robustness check for the efficiency scores, a Stochastic Frontier Analysis (SFA) has been run with the same dataset. Some details about the methodology and the empirical analysis conducted are reported in annex C; however, a complete description is also provided in Agasisti et al. (2012b). The efficiency scores obtained via SFA are completely consistent with those obtained through the bootstrap DEA methodology (all the relevant correlations are >0.89; see table 2.c.1); thus, the efficiency scores should be considered as sufficiently robust to different specifications and methods.

2.6.3.2 *"Adjusted" efficiency scores: the role of external variables*

It has been widely acknowledged that proficiency rates without an adjustment for students' background characteristics may be misleading (Greene et al., 2010); analogously, schools' performances (average scores in tests) must be adjusted for taking their out-of-control features into account. The second-stage regression has been implemented here for this purpose, by including external variables as covariates. A Tobit specification was preferred to traditional OLS given that efficiency score (dependent variable) is right-side censored (maximum value = 1)[18]; this choice is in line with previous literature that adopted such a two-stage approach.

Firstly, the results of the Tobit regression are illustrated in the table 2.12. Panel A reports the results for models applied to the sample of primary schools, and Panel B for the application to the sample of middle schools. Some interesting patterns emerge. First, average socio-economic background of the student body (ESCS) turns out as strongly significant – it has been included only in models 1a/1b and 2a/2b where it is not considered as input. Its effects seem stronger for middle schools than for primary, thus suggesting that the composition of middle schools can be more influenced by segmentation than primary schools. Also the share of immigrant students is associated with worse school efficiency; in particular, this effect is stronger for models analysing Reading score as output. Moreover, the effect is also more accentuated for 1st generation immigrants than for 2nd generation. ESCS and the percentage of immigrants are the only variables that appear as influencing efficiency in all the models in both grades. Other variables have a role, but are limited to specific grades or subjects. For instance, the share of untenured teachers has a negative association with efficiency when considering primary schools, and mathematics as output; it would indicate that paying attention to teachers' expertise in this field can be crucial in elementary education.

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[18] Actually, there are not efficiency scores=1, as the bootstrap procedure led to all units having a score<1; however, the distribution of efficiency scores behave as a censored one, skewed towards 1.

Table 2.12. The results from Tobit regression

Panel a. Primary schools

Variables	Model_1a	Model_2a	Model_3a	Model_4a	Model_1b	Model_2b	Model_3b	Model_4b
ESCS	0.038*** (0.01)	0.042*** (0.01)			0.056*** (0.01)	0.064*** (0.01)		
students	0.000 (0.00)	0.000** (0.00)	0.000** (0.00)	0.000 (0.00)	0.000** (0.00)	0.000 (0.00)	0.000*** (0.00)	0.000* (0.00)
studclass	0.001 (0.00)	0.001 (0.00)	0.001 (0.00)	0.001 (0.00)	0.002 (0.00)	-0.000 (0.00)	-0.000 (0.00)	0.001 (0.00)
pstudentsf	-0.064 (0.06)	-0.075 (0.07)	-0.102 (0.06)	-0.087 (0.06)	-0.026 (0.09)	0.023 (0.09)	-0.047 (0.09)	-0.045 (0.09)
pimmigrant1g	-0.145** (0.06)	-0.120* (0.06)	-0.163** (0.06)	-0.158** (0.06)	-0.097 (0.08)	-0.061 (0.08)	-0.173* (0.08)	-0.152 (0.08)
pimmigrant2g	-0.055 (0.04)	-0.070 (0.04)	-0.100* (0.04)	-0.102* (0.04)	-0.041 (0.06)	-0.045 (0.06)	-0.104 (0.06)	-0.121* (0.06)
pdisabled	-0.247 (0.16)	-0.080 (0.16)	-0.255 (0.16)	-0.249 (0.16)	-0.152 (0.23)	0.013 (0.24)	-0.046 (0.24)	-0.045 (0.23)
prejected	0.928* (0.43)	0.524 (0.45)	0.306 (0.45)	0.532 (0.44)	0.024 (0.63)	0.032 (0.65)	-0.253 (0.65)	-0.342 (0.64)
readingvar	-0.013*** (0.00)	-0.013*** (0.00)	-0.013*** (0.00)	-0.013*** (0.00)				
ESCSvar	-0.007 (0.01)	-0.003 (0.01)	0.017* (0.01)	0.019* (0.01)	-0.012 (0.01)	-0.012 (0.01)	0.028* (0.01)	0.022 (0.01)
pteach_unt~e	-0.010 (0.02)	-0.022 (0.02)	-0.021 (0.02)	-0.014 (0.02)	-0.076* (0.03)	-0.069* (0.03)	-0.078* (0.03)	-0.073* (0.03)
expendstud	0.000 (0.00)			0.000 (0.00)	0.000** (0.00)			0.000* (0.00)
chiefcity	-0.001 (0.01)	0.005 (0.01)	0.016*** (0.00)	0.015** (0.00)	-0.009 (0.01)	-0.001 (0.01)	0.019** (0.01)	0.012 (0.01)
mathvar					-0.007*** (0.00)	-0.008*** (0.00)	-0.007*** (0.00)	-0.007*** (0.00)
_cons	1.057*** (0.04)	1.124*** (0.04)	1.128*** (0.04)	1.056*** (0.04)	0.890*** (0.06)	0.997*** (0.06)	1.002*** (0.06)	0.869*** (0.06)
Number of obs	583		583		583		583	
LR chi2(16)	435		420.13		377.7		393.11	
Prob > chi2	0		0		0		0	

Notes. *** for statistically significant at 1% level; ** 5%; * 10%.

All the elaborations have bee run through the Stata10 econometric package.

Variables' acronyms are reported; for details, see section §3.3.

Panel b. Middle schools

Variables	Model_1a	Model_2a	Model_3a	Model_4a	Model_1b	Model_2b	Model_3b	Model_4b
ESCS	0.057***	0.055***			0.075***	0.072***		
	(0.01)	(0.01)			(0.01)	(0.01)		
students	-0.000	-0.000**	-0.000	-0.000	-0.000	-0.000	0.000	0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
studclass	0.001	0.002	0.003**	0.003**	0.002	0.003	0.004**	0.004**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
pstudentsf	-0.015	-0.034	0.036	0.027	-0.053	-0.087	-0.010	-0.012
	(0.05)	(0.05)	(0.05)	(0.06)	(0.07)	(0.07)	(0.08)	(0.08)
pimmigrant1g	-0.135***	-0.141***	-0.222***	-0.216***	-0.280***	-0.300***	-0.413***	-0.396***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)
pimmigrant2g	-0.132	-0.107	-0.164*	-0.139	-0.021	0.001	-0.074	-0.078
	(0.07)	(0.07)	(0.07)	(0.08)	(0.10)	(0.10)	(0.11)	(0.11)
pdisabled	-0.041	-0.108	-0.269**	-0.242*	0.098	-0.071	-0.324*	-0.232
	(0.10)	(0.10)	(0.10)	(0.11)	(0.14)	(0.14)	(0.15)	(0.15)
prejected	-0.156**	-0.127*	-0.146*	-0.196**	-0.269**	-0.260**	-0.255**	-0.357***
	(0.06)	(0.06)	(0.06)	(0.07)	(0.09)	(0.09)	(0.09)	(0.09)
readingvar	-0.006***	-0.006***	-0.007***	-0.007***				
	(0.00)	(0.00)	(0.00)	(0.00)				
ESCSvar	-0.030***	-0.023**	0.008	0.010	-0.044***	-0.040**	0.004	0.004
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
pteach_unt~e	-0.033	-0.024	-0.041*	-0.061**	-0.012	-0.011	-0.025	-0.056*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
expendstud	0.000			0.000***	0.000			0.000
	(0.00)			(0.00)	(0.00)			(0.00)
chiefcity	0.001	0.005	0.027***	0.022***	-0.005	-0.000	0.024**	0.022**
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
mathvar					0.006**	0.005**	0.006**	0.005**
					(0.00)	(0.00)	(0.00)	(0.00)
_cons	0.992***	0.945***	0.919***	0.911***	0.764***	0.784***	0.744***	0.767***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.06)	(0.06)	(0.06)	(0.06)
Number of obs.	478		478		478		478	
LR chi2(22)	311.23		289.30		273.07		261.28	
Prob > chi2	0.000		0.000		0.000		0.000	

Notes. *** for statistically significant at 1% level; ** 5%; * 10%.
All the elaborations have bee run through the Stata10 econometric package.
Variables' acronyms are reported; for details, see section §3.3.

The share of disabled students has not a role in explaining efficiency; the very limited number of these students probably drives this finding. The variable capturing urban areas also is statistically associated with higher efficiency. As underlined by regional scientists, this effect could be related to a better cultural environment in comparison with suburbs or rural areas (e.g. Brasington, 2002, debates the differences of educational results between urban and rural areas). However, what is really interesting is to analyse associations with (i) variance in proficiency scores (reading_var; math_var) and with (ii) variance of ESCS within the school (ESCS_var). With reference to the former, variance in proficiency scores is negatively related to efficiency for primary schools; the effect is small but statistically significant – and is higher for reading than for mathematics. A different picture emerges from middle schools; the association is still an inverse one (albeit attenuated in magnitude) for reading, but positive for mathematics.

The potential explanation is that favouring uniform achievement in the school pays for efficiency in primary schools, while fostering the best achievers pays for efficiency in middle schools – but only for mathematics, as "equity" is still positively related to efficiency for reading. Another interesting result is for the variance of ESCS; in the preferred specifications (models 3 and 4, a/b), it is positively related to efficiency in primary schools, while it is not significant for middle schools. Thus, the results suggest that a more diverse socio-economic background of students within the primary school can positively influence its efficiency. A possible explanation for this could be related to tracking phenomena. Indeed, a recent report on the relationship between class design and student's achievements has already showed the negative association of "informal tracking" with proficiency scores, especially in Italian middle schools (FGA, 2011).

In a further step, a subset of the external variables has been selected, and the second-stage Tobit regression has been ran only with those variables. A model without ESCS among inputs has been used for this purpose (models 2a and 2b) and this variable was included among regressors. Thus, the subset of external variables represents factors that measure "environmental harshness", in other words characteristics beyond of the school that undermine its performance. Then, the residuals are used to derive a measure of "managerial" efficiency; that eliminates the impact of external variables, by following the De Witte & Moesen (2010) approach. Figure 2.8 reports two-way graphics in which DEA initial scores are plotted against "adjusted" DEA scores. The pattern that emerges is interesting, as there is a clear inverse relationship between the two measures; this evidence suggests that several schools which appeared as efficient at a first glance, actually benefited from more favourable environments that "masked" their relative inefficiency. In contrast, a group of schools, which appeared as relatively inefficient, were penalized by their environmental harshness. Obviously, there is also a group of schools whose (in)efficiency was real, and did not change their relative position to the efficiency frontier after the adjustment procedure, as well as "truly efficient" schools. To verify whether this explanation is valid, the distributions of the variables appeared as the most relevant determinants of schools' efficiency were compared. More specifically, technical and managerial efficient schools were considered (schools were considered "efficient" if its efficiency score is higher than the median value). The idea is that among technical efficient schools there should be a higher level of student's background and a lower percentage of immigrant students than among managerial efficient schools. Remind that these variables were not employed in the first-stage models 2a and 2b, therefore they did not contribute to the efficiency estimation.

Figure 2.8. The correlation between "baseline" efficiency and "adjusted" efficiency

Panel A. Primary schools
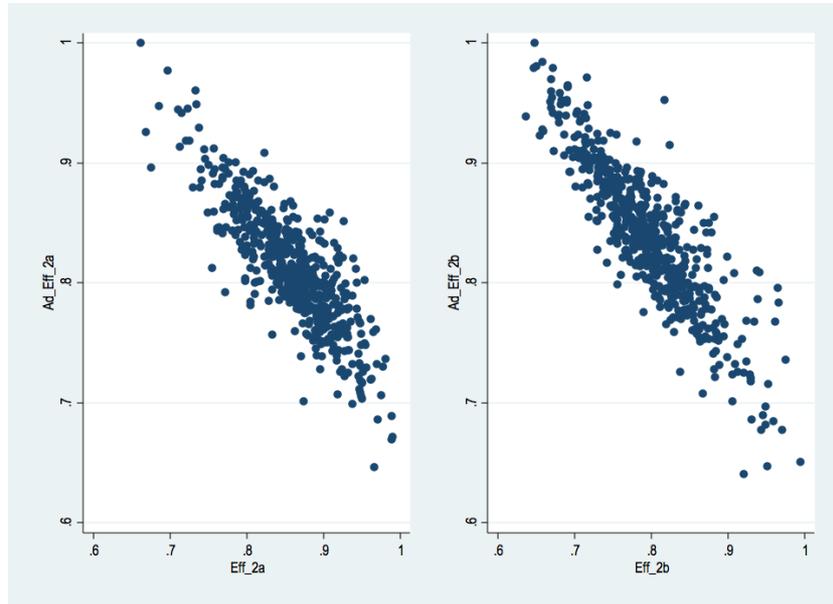
Panel B. Middle schools
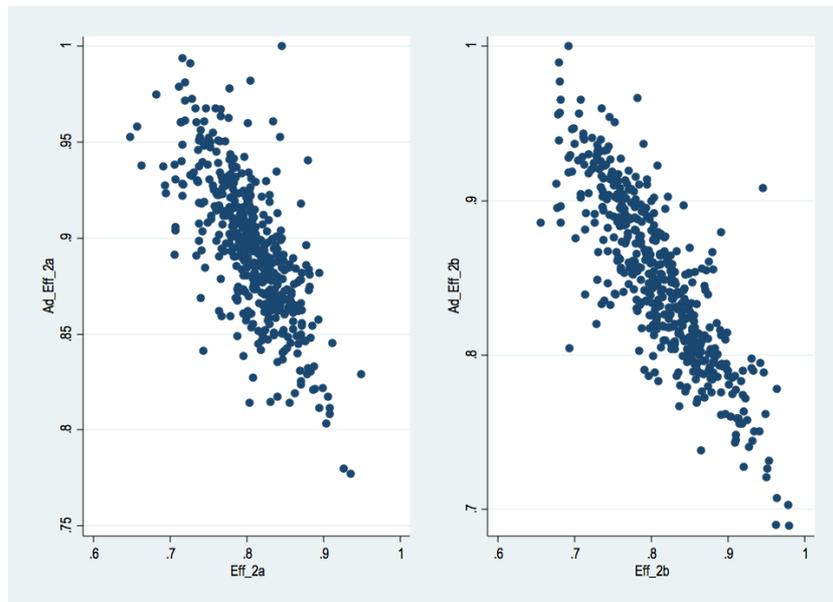
Notes. "Baseline" efficiency is defined as the efficiency score derived from (bootstrap) DEA calculations, while "adjusted" (managerial) efficiency is calculated by correcting DEA scores with residuals from a second-stage Tobit regression. The latter aims at analyzing the effect of external variables on efficiency (see section §4.2). The figures are based on calculations realized on models 2a and 2b, both grades.

The results of such comparison are presented in figure 2.9. Apart from the case of student's background for primary schools, the scenario just hypothesized can be appreciated, especially for middle schools for model 2b, where the difference between technical and managerial efficient schools is evident, in terms of students' background level. In other words, managerial efficient schools were characterized by less favourable environmental conditions (i.e. lower ESCS and higher percentage of immigrant students); this was the cause of their low technical efficiency, indeed. Summarizing, the adjusted DEA approach provides fairer measure of efficiency, better identifying those schools with higher managerial efficiency.

Figure 2.9. The comparison between technical and managerial efficient schools (student's background and percentage of immigrant students)

Panel a. Primary Schools
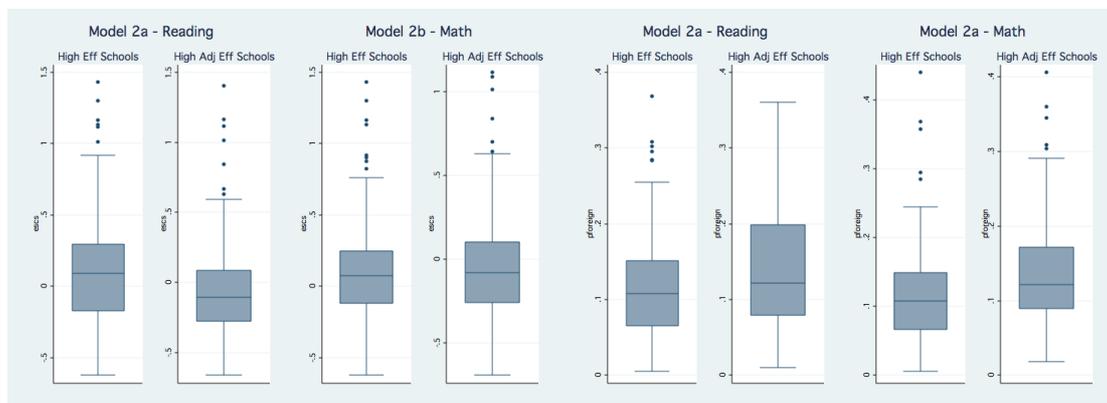
Panel b. Middle Schools
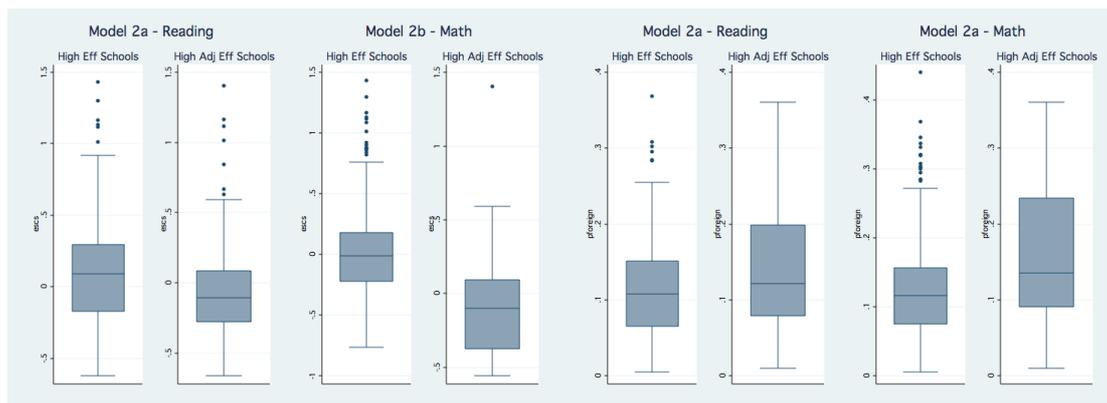
2.7   Concluding remarks

The analysis conducted in this chapter confirms the Italian contradiction between inputs and outputs in the educational system: despite of uniformity of inputs across the country, the dispersion of the outputs is relevant. In accordance to our result, this means that it is not the system who drives the

students' achievements - but the context. Since the government control appears as not enough to efficiently lead the system, probably a more decentralized setting could allow regions to implement the necessary tools to mitigate the "harmfulness" of the local environment. That is also what Woessmann *et al.* (2009) already showed: the institutional settings based on autonomy and accountability are associated to better student's performance.

However, two exceptions rose: *Piemonte* and *Puglia*. They are, respectively, a bad and a good example of efficiency. Let us focus on the latter, as it can indicate some good practices. *Puglia* has: (i) the lower GDP per capita (after *Campania*), (ii) the second from the bottom graduation rate and (iii) the third from the bottom employment rate. Despite this, *Puglia* outperforms, in terms of efficiency, every Southern Regions which means it does not waste money. *Puglia* is the most efficient region after *Emilia-Romagna*. Some further research focusing on this region could detect the good practices needed, especially in this period characterized by call for sustainability of public expenditure.

Moreover, the determinants of this diversity among regions have been investigated, following an interest in this topic, which was previously studied by other authors (Boarini, 2009; Bratti *et al.*, 2007). Among several variables that could matter for variance in educational outputs, the economic difference between Regions appeared to be the most important. The irrelevance of immigrant students is quite unexpected. Indeed, this is an insight on the migration phenomenon. Migrants just move towards more developed areas. That could be the reason why in Italy there are very few immigrant students in Southern regions than in the Northern ones. Then the presence of these students could be interpreted as a sign of wellness of an area. This would explain the not significant coefficient of the percentage of immigrant students. Even if immigrant students were associated with low achievements, the goodness of the environment (such as GDP) would mitigate the situation. Lastly, the percentage of immigrant students is low, then their influence on the average regional score is limited.

However, the relevance of the GDP is hard to be interpreted, especially considering the high correlation with PISA scores showed in figure 2.6. The implication of this situation is critical. As it has been reported at the beginning of this chapter, the economic difference between North and South of Italy have not decreased since the 60-70s. Thus, it is plausible to argue that the different economic development of the Italian Regions severely influences the educational achievements (Di Liberto, 2006). Since our results corroborate this statement, the risk is a problematic path where the low economic development biases the achievements, which, in turn, biases the economic development. The crucial point, then, is to answer to the question: "*could it be that growth causes education, rather than education causing growth?*" (Wolf, 2002 - p. 44). The hypothesis of the authors is that it is education that causes growth. With

reference to the Italian case, this point has already been addressed in the literature. For instance, Gagliardi and Percoco (2011) found that the North/South dualism has a root in the larger human capital stock in North in the late 19th century.

The consequent implication is: should we implement policies devoted to the economic development (such as fiscal policies) or should we focus on the educational improvements (such as a new teacher recruiting system)?

Specially if the second hypothesis is considered, then an inquiry on the factors that positively or negatively make schools improving their performance can be particularly relevant, because it can give results which can suggest to the policymaker the way in which intervene into the educational system. That is why a second efficiency analysis has been proposed.

This study analysed the efficiency of more than 500 primary and 450 middle schools located in the Lombardy Region (Italy). Two aspects are in common with the just discussed analysis at regional level: on the one hand, efficiency is defined in its technical sense, which is the ability to transform inputs (human and financial resources) into outputs (educational achievement as measured through standardized tests); on the other hand, a two-stage procedure, employing a bootstrapped version of DEA and a Tobit regression, has been used. What makes different this analysis respect to the previous one is that the "managerial" efficiency has been investigated – in other words, taking into account the impact of external (out-of-control) variables on educational efficiency.

Table 2.13. Potential output's improvements – calculations based on efficiency scores

Models	Primary Schools			Middle Schools		
	Output	Slack	Potential improvement	Output	Slack	Potential improvement
Model_1a	68.872	12.305	18%	63.066	12.102	20%
Model_1b	62.890	15.586	26%	54.413	12.737	24%
Model_2a	68.872	11.373	17%	63.066	15.154	24%
Model_2b	62.890	16.277	27%	54.413	12.789	24%
Model_3a	68.872	11.373	17%	63.066	15.154	24%
Model_3b	62.890	16.141	26%	54.413	12.294	23%
Model_4a	68.872	12.485	19%	63.066	12.361	20%
Model_4b	62.890	16.192	26%	54.413	11.947	23%

Notes. For each unit (school), we calculated the "potential" output by using the (bootstrap corrected) efficiency score as a measure for comparing the ith school with its own efficient target. The slack is defined as the difference between the "potential" output and the observed one. Potential improvements are calculated as ratios between model-specific slacks and observed outputs. The figures reported here are averages for the sample of schools, for each grade separately.

The results show that, on average, the efficiency of Lombardy schools is quite high: it is about 0.80 out of 1. However, this finding highlights that savings are therefore possible, or alternatively, the achievement scores can be increased by using in a more productive way the same amount of resources. In the table 2.13

the potential average improvements of outputs based on our efficiency analyses have been calculated. We did not calculate input savings as the efficiency model used is output oriented, and it defines how much output can be realised given the (fixed) amount of inputs. Higher (absolute) margins of improvement stand for primary schools, even though in relative terms they are more relevant for middle schools; the latter could improve the average scores of about 20%-24% given their level of available resources.

The information about potential output expansion is particularly important, in the light of policy-making, given the particular economic period in which it is necessary to increase the productivity of public budgets. Nevertheless, it is also important to underline that such productivity gains could be realized only by implementing coherent policies and reforms. For instance, the MIUR reports that the largest part of national public expenditure is devoted to staff salaries (about 91%; see MIUR, 2011); as they are tenured civil servants, it is not possible to compress this expenditure. As a consequence, the teacher:students ratio must be treated as fixed costs in the short to medium term. However, schools should be gain flexibility and discretion in using their resources. In particular they should have more autonomy in managing the human resources – i.e. by creating smaller/larger classes than those defined by national regulations. Besides, in this work it was not investigated how effectively the resources are used, as it has only looked at the efficiency of the process – so the focus was not, for instance, on whether financial and human resources have the same or different marginal impacts on students' results. In other words, there was no control for school leadership. Despite of the mitigated school autonomy, the difference in terms of managerial efficiency must be linked to this dimension in some way. Further research could introduce a qualitative "third stage", through interviewing the most managerial efficient and inefficient schools' principals to investigate potential "omitted variables" which explain their (in)efficiency. Indeed, what exactly the residuals captured is not known, so any additional pieces of information would be critical.

Another key result of this analysis is that some characteristics of the educational process have a different role in primary and middle education. For example, the second-stage regression revealed that efficiency and equity are complementary in primary education: the schools with higher efficiency scores are those in which the dispersion of achievement scores (variance) is lower. Instead, the same result does not hold for mathematics scores in middle schools: in this case, efficiency is positively related with higher variance in achievement scores. Moreover, the share of untenured teachers is negatively related with mathematics scores in primary schools, while it does not have effects in the analyses for middle schools. Such heterogeneity among grades should suggest to policy-makers a wider attention to the potential efficiency/equity trade-offs.

The most important piece of innovation in this work is the investigation of managerial efficiency. By using residuals of the second-stage regression, the study showed that baseline DEA efficiency scores are inversely related with "adjusted" DEA efficiency scores, the latter eliminating the effects of external (out-of-control) variables. In other words, if schools are assessed only on the basis of their (controllable) inputs and outputs, the results are misleading: the schools that turn out as relatively efficient are actually those that benefit from better environments. Indeed, the analysis revealed that efficient schools under baseline DEA analyses have student with better socio-economic background and lower shares of immigrant students. To properly evaluate (managerial) efficiency, instead, it is necessary to adjust baseline results with the marginal impacts of external (out-of-control) variables. This result has a clear policy implication. For instance, if a policy-maker desires using efficiency scores for some policies (e.g. allocation of public resources), it should use adjusted efficiency scores, not baseline ones; otherwise, it would only reward background schools' conditions, not their real results. Moreover, the implication is important also for defining the information to be provided to parents and the wider public. As the literature pointed out previously, the raw schools' performances alone provide distorted information, as it is instead necessary to make families aware of the decisive role played by external conditions. This work confirms this view, and suggests that it could be the case that inverse relation can exist between apparent (baseline) and actual (managerial) efficiency.

The essential pieces of information derived from this chapter are as clear as dramatic. The performances of the Italian educational system are not led by the system itself but by the context – the main finding from the analysis at regional level. Indeed, the disparities coming from the population still remain in the school system or even become worse during the educational path – the main finding from the analysis at school level. In other words, regions as well as schools do not have the same "starting point", and, more dramatically, the circumstance does not improve over time. As a consequence, a region or a school that is located in a disadvantaged area will not be able to educate properly (on average), or at least, will not do it as a region or a school located in an advantaged area. If one thinks that equity is one of the principal aims of education, this is a profound problem.

Annex 2.a. More on PISA scores

Table 2.a.1. The correlation between PISA scores

	pisa_read	pisa_math	pisa_science
pisa_read	1.0000		
pisa_math	0.9877	1.0000	
pisa_science	0.9907	0.9764	1.0000

Table 2.a.2. The correlations between PISA scores and contextual variables

	pisa_math	immigrant_avg	disabled_avg	gdp_avg	literacy_avg	private_avg	employ_avg
pisa_math	1.0000						
immigrant_avg	0.8236	1.0000					
disable_avg	-0.0774	0.1766	1.0000				
gdp_avg	0.8209	0.9073	0.3392	1.0000			
literacy_avg	0.3549	0.5448	0.6189	0.6500	1.0000		
private_avg	0.5002	0.5753	0.6383	0.7383	0.6539	1.0000	
employ_avg	0.8536	0.9505	0.1555	0.9293	0.5422	0.5279	1.0000

Annex 2.b. Efficiency scores obtained through Bootstrap DEA: a graphical illustration

Figure 2.b.1. Efficiency scores via Bootstrap DEA – primary schools (Output: Reading_score)
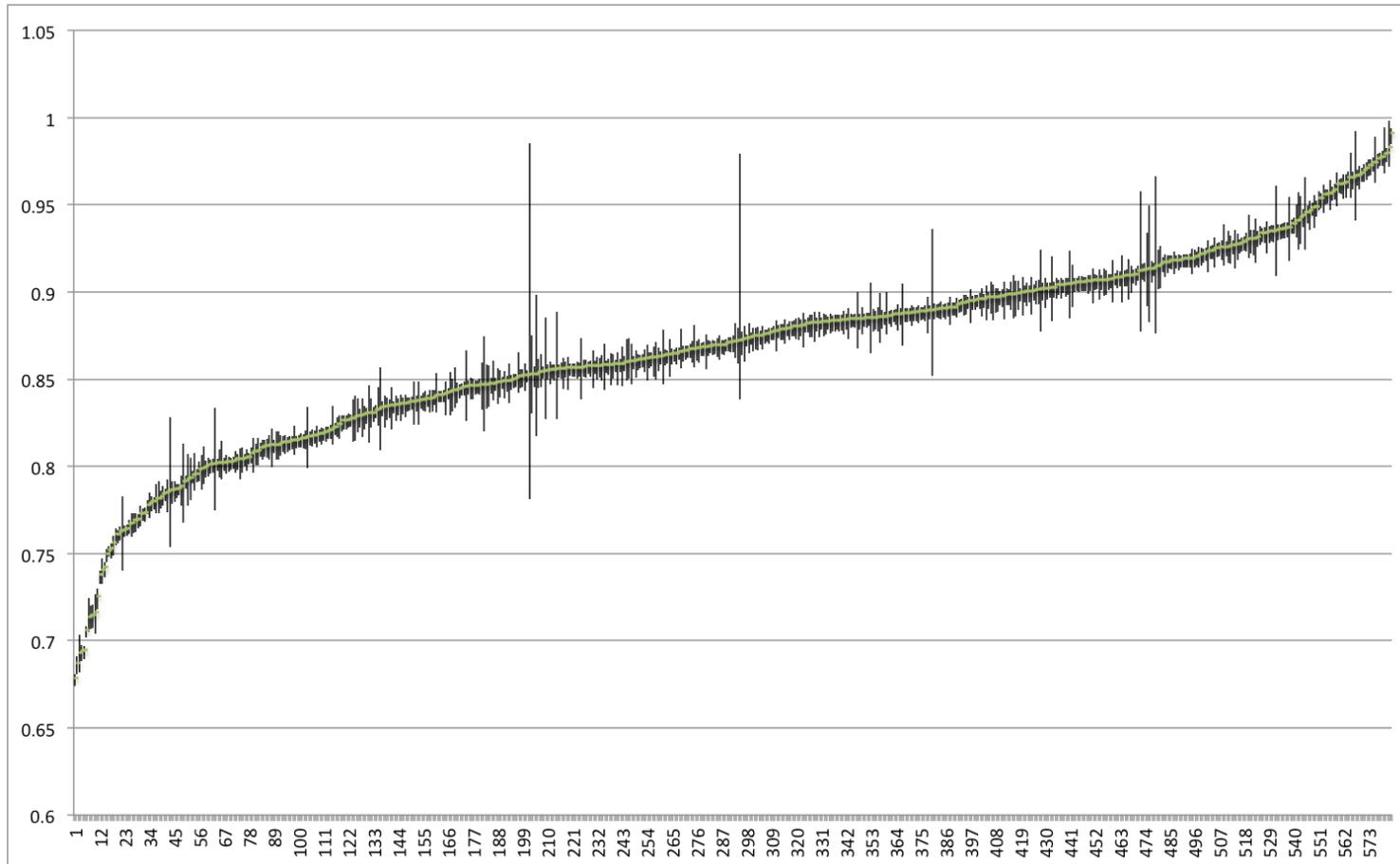
Notes. The results refer to the model 3a. In the horizontal axis. schools are reported – sorted by bias-corrected efficiency score. The red line indicates the overall average efficiency score. Scores are calculated through the package FEAR and software R.

Figure 2.b.2. Efficiency scores via Bootstrap DEA – primary schools (Output: Math_score)
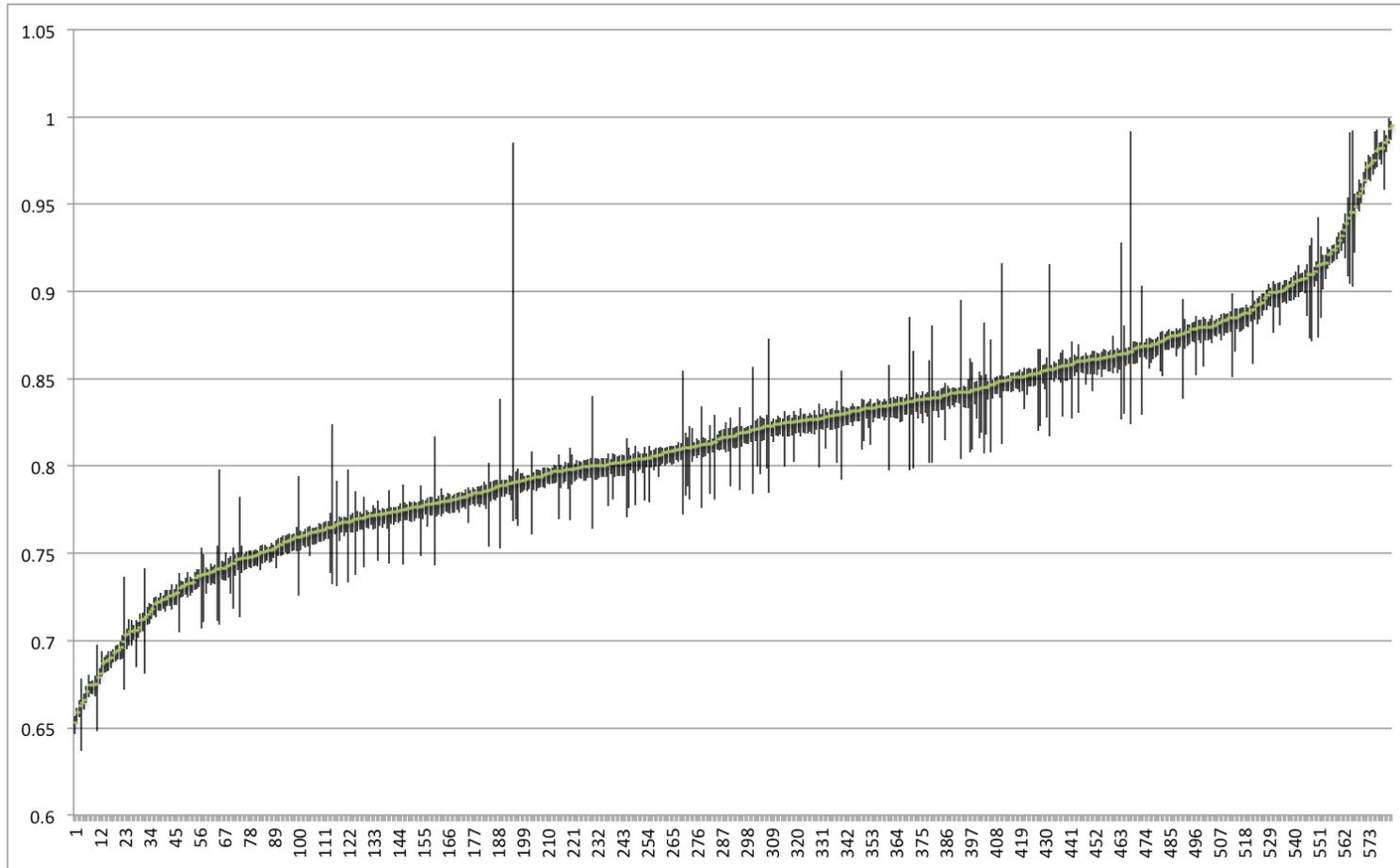
Notes. The results refer to the model 3b. In the horizontal axis. schools are reported – sorted by bias-corrected efficiency score. The red line indicates the overall average efficiency score. Scores are calculated through the package FEAR and software R.

Figure 2.b.3. Efficiency scores via Bootstrap DEA – middle schools (Output: Reading_score)
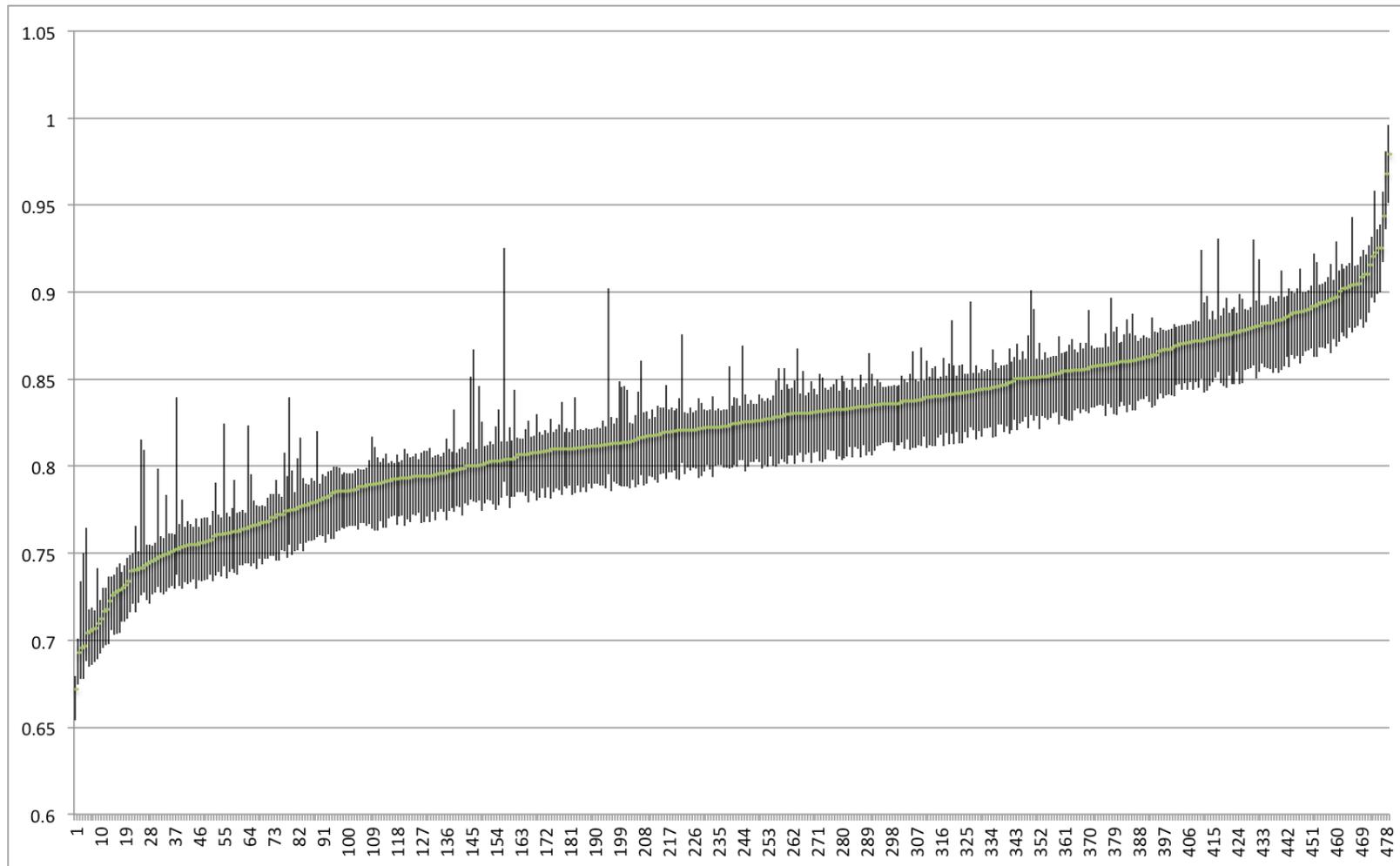
Notes. The results refer to the model 3a. In the horizontal axis. schools are reported – sorted by bias-corrected efficiency score. The red line indicates the overall average efficiency score. Scores are calculated through the package FEAR and software R.

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Figure 2.b.4. Efficiency scores via Bootstrap DEA – middle schools (Output: Math_score)
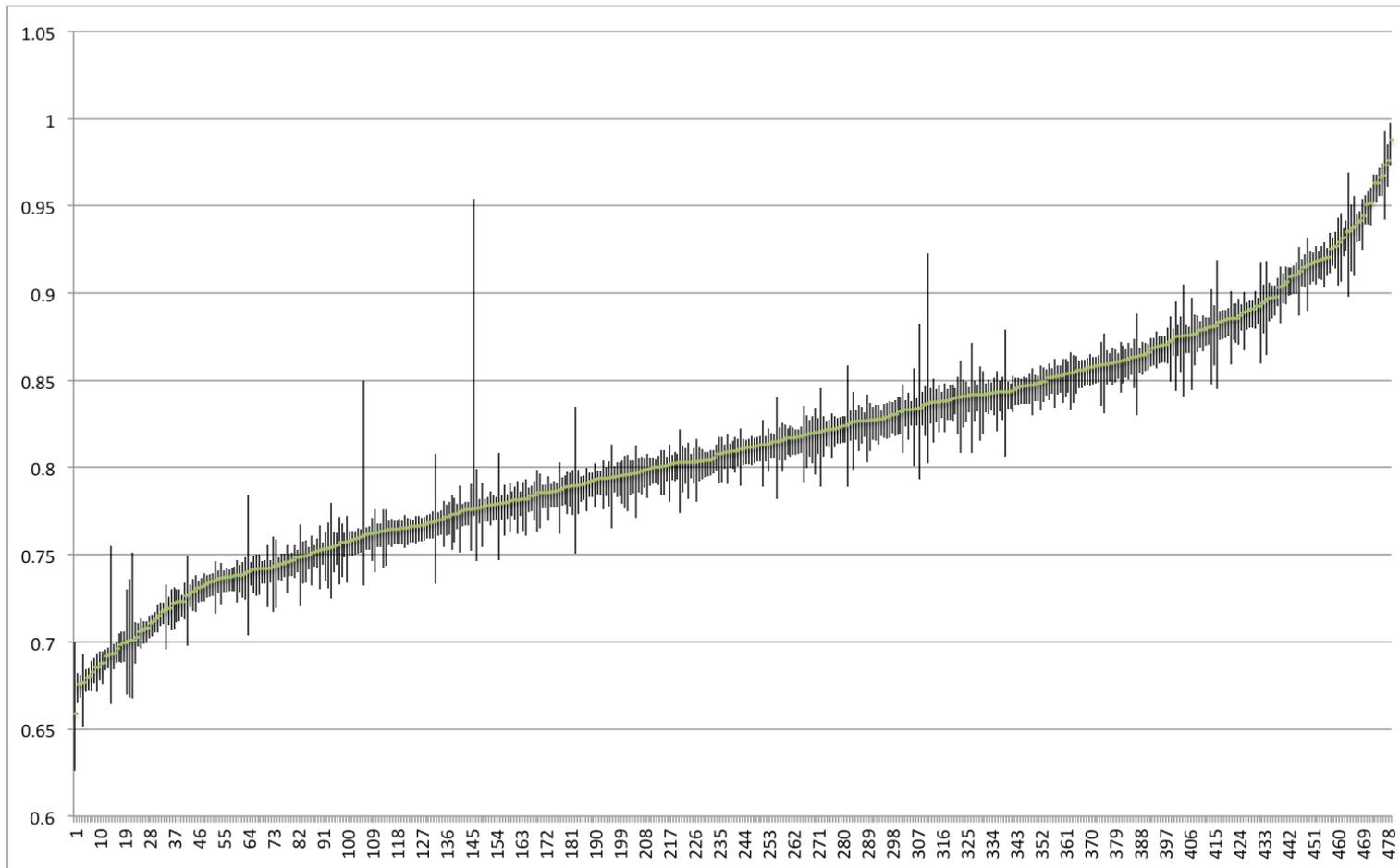
Notes. The results refer to the model 3b. In the horizontal axis. schools are reported – sorted by bias-corrected efficiency score. The red line indicates the overall average efficiency score. Scores are calculated through the package FEAR and software R.

Annex 2.c. Efficiency scores through Stochastic Frontier Analysis

A translog production function was specified to derive efficiency scores through SFA; the (average) achievement score is the output. Mathematically. the following equation has been estimated:

$$\ln Y_i = \sum_{m=1}^{3} \alpha_m \ln x_{mi} + \frac{1}{2} \sum_{m=1}^{3} \sum_{n=1}^{3} \alpha_{mn} \ln x_{mi} \ln x_{ni} + \varepsilon_i \qquad \text{(A1)}$$

where m inputs are considered (see models 2a/b; 3a/b; 4a/b – table 2.1 in the paper); Y_i is the average achievement score of the ith school; Escs which originally presents values <0. was rescaled to positive valued before taking its logs. The error term is decomposed to consider the inefficiency term as well the stochastic error; so that $\varepsilon_i = u_i + v_i$ where u_i accounts for the former, and v_i for the latter.

The complete results for the application of SFA to the sample of schools is in Agasisti *et al.* (2012b); here what is important to note is that the results are all similar to those obtained through DEA. To show this similitude, table 2.b.1 reports the correlations among different set of results.

Table 2.c.1. Correlations among efficiency scores (DEA and SFA)

Panel a. Primary schools

	Model 2a (DEA)	Model 2b (DEA)	Model 3a (DEA)	Model 3b (DEA)	Model 4a (DEA)	Model 4b (DEA)	Model 2b (SFA)	Model 2a (SFA)	Model 3b (SFA)	Model 3a (SFA)	Model 4b (SFA)	Model 4a (SFA)
Model 2a (DEA)	1.000											
Model 2b (DEA)	0.676	1.000										
Model 3a (DEA)	0.963	0.676	1.000									
Model 3b (DEA)	0.641	0.965	0.662	1.000								
Model 4a (DEA)	0.935	0.648	0.937	0.635	1.000							
Model 4b (DEA)	0.615	0.932	0.623	0.928	0.666	1.000						
Model 2b (SFA)	0.639	**0.949**	0.642	0.931	0.616	0.900	1.000					
Model 2a (SFA)	0.582	0.917	0.579	**0.895**	0.540	0.867	0.965	1.000				
Model 3b (SFA)	0.580	0.915	0.578	0.893	0.540	**0.866**	0.965	0.999	1.000			
Model 3a (SFA)	**0.947**	0.635	0.944	0.616	0.917	0.593	0.640	0.573	0.572	1.000		
Model 4b (SFA)	0.905	0.584	**0.896**	0.561	0.851	0.540	0.589	0.594	0.591	0.954	1.000	
Model 4a (SFA)	0.903	0.584	0.896	0.561	**0.852**	0.542	0.590	0.596	0.595	0.953	0.999	1.000

Notes: the corresponding DEA-SFA models are reported in bold

Panel b. Middle schools

	Model 2a (DEA)	Model 2b (DEA)	Model 3a (DEA)	Model 3b (DEA)	Model 4a (DEA)	Model 4b (DEA)	Model 2b (SFA)	Model 2a (SFA)	Model 3b (SFA)	Model 3a (SFA)	Model 4b (SFA)	Model 4a (SFA)
Model 2a (DEA)	1.000											
Model 2b (DEA)	0.748	1.000										
Model 3a (DEA)	0.926	0.704	1.000									
Model 3b (DEA)	0.734	0.983	0.738	1.000								
Model 4a (DEA)	0.965	0.729	0.935	0.729	1.000							
Model 4b (DEA)	0.710	0.961	0.653	0.948	0.727	1.000						
Model 2b (SFA)	0.740	**0.982**	0.711	0.972	0.734	0.949	1.000					
Model 2a (SFA)	0.676	0.956	0.656	**0.947**	0.673	0.924	0.976	1.000				
Model 3b (SFA)	0.665	0.948	0.645	0.938	0.664	**0.916**	0.971	0.997	1.000			
Model 3a (SFA)	**0.963**	0.739	0.912	0.729	0.954	0.711	0.755	0.689	0.683	1.000		
Model 4b (SFA)	0.905	0.712	**0.871**	0.709	0.901	0.683	0.729	0.735	0.729	0.933	1.000	
Model 4a (SFA)	0.898	0.709	0.850	0.699	**0.892**	0.684	0.727	0.730	0.731	0.933	0.991	1.000

Notes: the corresponding DEA-SFA models are reported in bold

Annex 2.d. The comparison between the original dataset and the one actually used: some descriptive statistics

In this annex we report how some variables of interest do distribute before and after the process of "cleaning" data.

The original datasets were three: one at student level (81,456 and 82,390 observations for primary and middle schools respectively), one at school level (1,050 and 900 observations for primary and middle schools respectively) and the last one containing just public schools teachers (at school level). Firstly, dataset at school and student level were merged.

Next, the dataset containing public schools teachers was merged as well. In this stage we lost further observations. The reason is the complex mechanism of teachers' allocation among schools. We have just full-time positions rather than number of teachers effectively. Thus, there could be the cases like a small school, which is indeed branches of another one, where we have just the total number of teachers of the main school. However, out of the 1,050 observations of primary schools teachers' dataset 231 were missing value. Out of the 900 observations of middle schools, the missing values were 182.

Since we investigate efficiency we did need data about expenditure. In primary schools dataset missing value for this variable were 219, while 263 in case of middle schools. Most of them were private schools since they do not have to give this information publicly.

Finally, some outliers have been dropped too. Schools with an average score either of reading or math under 50 or 45, respectively, were dropped. They were just 4 and 22 observations in primary and middle schools respectively.

At the end we had two datasets at school level, one for primary and one for middle schools, with respectively, 583 and 479 schools. In figures A1 and A2 we compared the distribution of the datasets before and after these operations according to the following variables:

- reading/math scores;
- number of students (school size);
- expenditure;
- percentage of immigrant students;
- ESCS index (school average).

Overall, it emerges that the distribution is clearly consistent for the (i) proficiency scores (both reading and math), (ii) number of students and (iii) the proportion of immigrant students. The distribution of expenditure nearly overlaps, because many of missing observation were related to this variable – then the most part of observations were deleted on the basis of such dimension. Escs index distribution is slightly different in that original dataset contains school with a wider variation around the peak (which is centred at zero). However, the *ex post* distribution is normally distributed as well, and it is just more narrow so that the (original) variation properties should be safely guaranteed.

Figure 2.d.1. The comparison between the original and final datasets – primary Schools
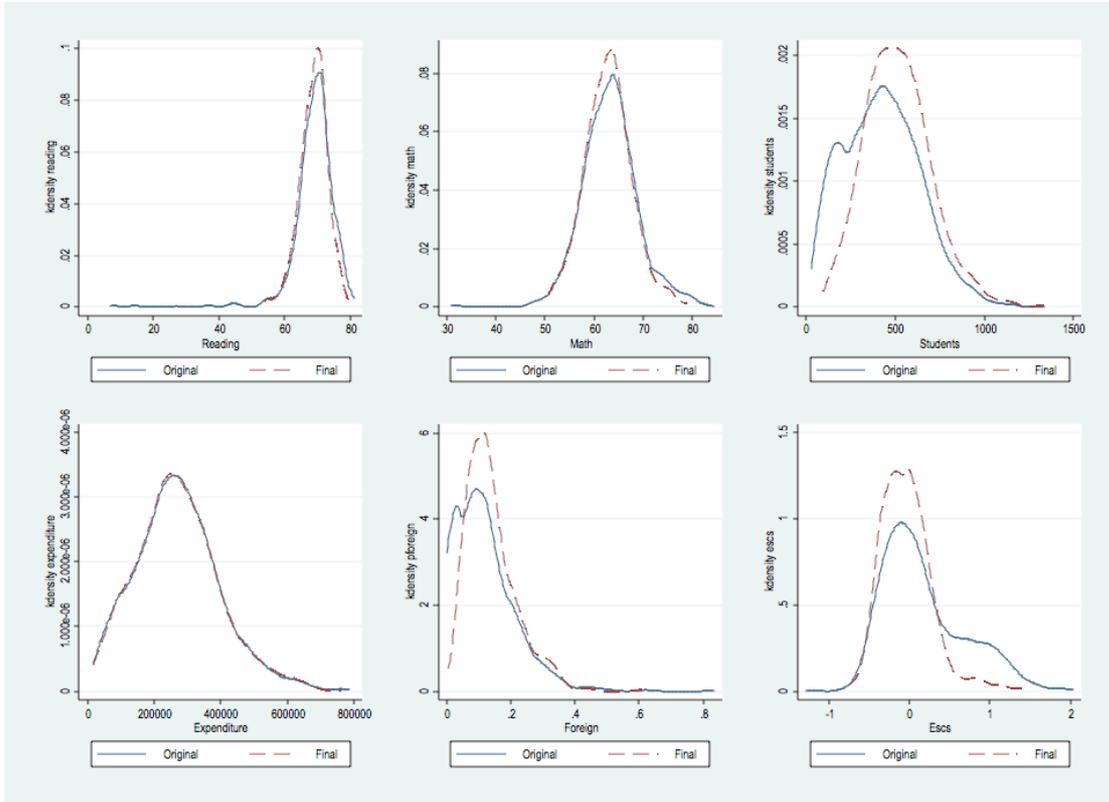
Figure 2.d.2. The comparison between the original and final datasets – middle Schools
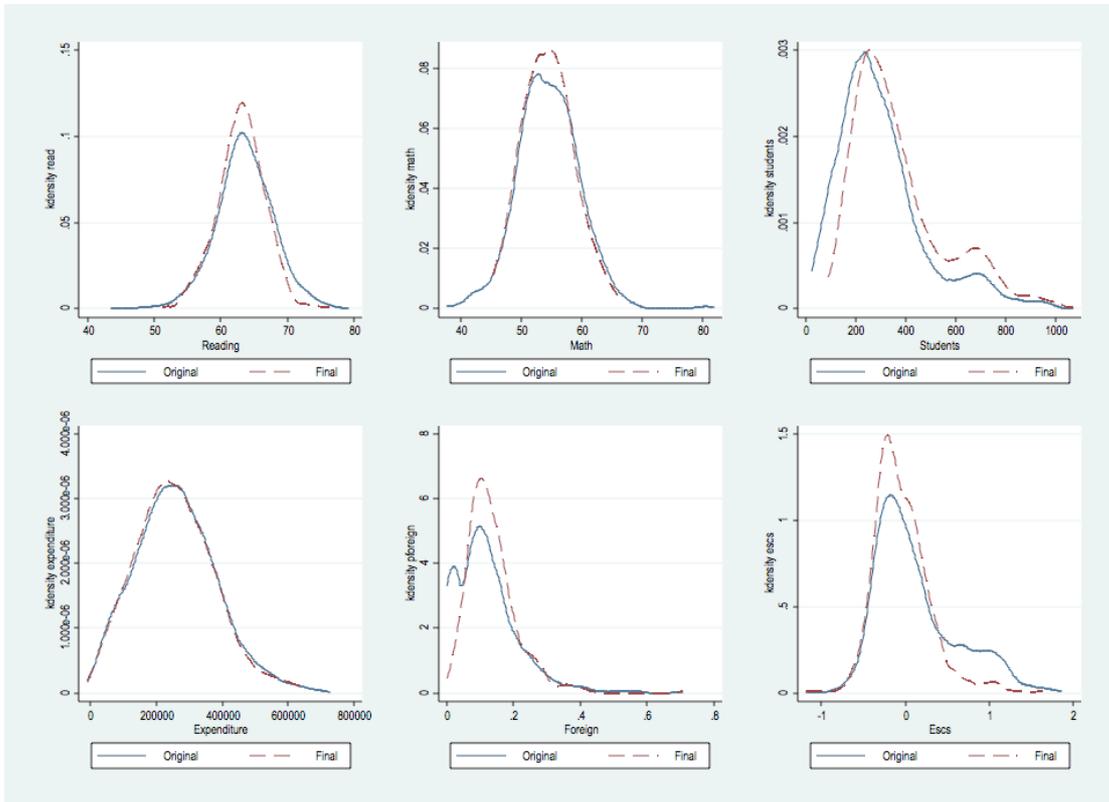
3. The heterogeneity of private school effect. A comparison between public and private school in Lombardy.

Abstract. The comparison between public and private schools' performance is fiercely debated. In this chapter the differentials between public and private schools' performances are empirically investigated in the most important Italian Region (Lombardy). Since 2008/09, the Lombardy Region has introduced *Dote Scuola*, a new voucher program that aims at unifying the existing subsidies for students. Its main characteristics and outcomes are described, especially the new design, which does not intervene *ex post* anymore but at the time of choice. The comparison between students attending public or private schools employs a novel dataset comprising 74,265 students in 1,050 primary schools (grade 5) and 74,538 students in 900 middle schools (grade 6) and relies on Instrument Variables, taking advantage of a particular characteristic of the voucher plan implemented in the Region. The results show that, on average, there is not a statistically significant "private school effect". When exploring the potential heterogeneity of such effect, it has been found that private schooling is associated with lower performances in math and reading in the case of immigrant students. However, private schooling is also positively associated with reading scores for disadvantaged students, at grade 5, and with math scores for students in non-urban areas and those who have a socioeconomic indicator above the mean, at grade 6. Suggestive explanations and policy implications are then derived. The main message is that the effect of attending a private school is likely to be heterogeneous and strongly dependent upon students' characteristics.

3.1   Introduction

The comparison between public and private schools' performance is fiercely debated. The Friedman's (1955) idea of freedom of choice pushing towards competition led to increasing claim for market-oriented school systems (Chubb & Moe, 1990; Hoxby, 1998). The typical policy suggested – which in some cases was also implemented, such as in the U.S.A., Sweden, Chile – is the adoption of voucher schemes (Barrow & Rouse, 2008). The framework behind such policy is that private schools perform better than public ones, and that competition will provide good incentives to improve the overall performance of the educational system (for a deep discussion about the theoretical basis for school choice, see

Hoxby, 2003). Although the idea is appealing, especially for poor families who cannot afford private schooling, it is hard to demonstrate the first assumption, which is the better quality of private education. At the heart of problem there is a methodological obstacle that is the likely endogeneity of school choice: the pupils are not randomly assigned to schools, but through parents' choice, a potential self-sorting problems is generated. In other words, even after observing that private schools usually obtain better results than their public counterparts (Bosker, 2011), the question is: do private schools have just a better school intake (in terms of pupils quality and motivation) or do they really outperform public schools?

This debate is of particular relevance in Italy, both from an academic and institutional perspective. With reference to the former, the empirical evidence from international datasets (especially OECD-PISA) and previous literature seems to suggest that public schools outperform private ones, when students' background is properly taken into account; such characteristic puts Italy among those few countries for which private schools provide less quality education than public ones (OECD, 2011). These results lead some scholars to argue that private schools in Italy have a "remedial" function, that is to assist lower quality, less motivated students instead of providing higher level education (Bertola *et al.*, 2004). However, this interpretation requires further testing, as it was based on studies that did not consider students' achievement as output, and refer to some specific grades (especially, high schools). Thus, there is space to improve the quality of academic analyses on this ground.

As for the institutional view, it is important to recall that only some Italian Regions introduced voucher plans for stimulating attendance of private schools, including Lombardy. Indeed, in Italy, the public support to education has been implemented through the typical welfare state approach: free public supply of the service and provision of subsidies. Basically, the tools for the right to education (hereafter, RTE) are country-based: funded and regulated by the Ministry of Education, University and of Research (MIUR), but provided by the Regions (Law 10 March 2000, No. 62). The two typical subsidies defined are scholarship and grant for school books. The principal criterion of this kind of subsidies is income. The aim is redistribution. Although national regulation includes students attending private schools, the amount of resources devoted does not allow for providing sums per capita sufficient to affect the choice between public and private schools[19].

On the other hand, the school voucher (SV) introduced in Lombardy aims at freedom of choice. The Lombardy region was the first one to implement this

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[19] In 2010/11 12,8 millions of euro were awarded to Lombardy. Given the number of beneficiaries (about 130.000) the real contribution per capita was roughly 100 euro (*Decreto Direttore Generale, Direzione per lo Studente, l'Integrazione, la Partecipazione e la Comunicazione del MIUR of 16 July 2010, Fondi alle Regioni per borse di studio*); quite far from the real amount of expenditure a family is supposed to afford in case of private school.

kind of policy in 2000. Then, other seven regions started with analogue policies (Agasisti, 2008). The target of these policies is students attending private schools. In 2001, the endorsement of the Consitution Reform (Fifth Title) – Constitutional Law 18 October 2001, No. 3 – exclusively attributed RTE policies to Regions.

In 2008, Lombardy introduced a new tool for supporting students, called *Dote Scuola* (School Dowry). It replaces the old interventions based on the separation between equity tools and freedom of choice tools. The different settings of RTE and SV have been merged and the procedure for applying has been unified. Previously, different tools had different procedures with different deadlines.

The next section of this chapter shows the characteristics and first outcomes from *Dote Scuola* by comparing between the data in 2008 (last year before the introduction of Dote Scuola), 2009 and 2010. In order to give an idea of the dimension of this policy, its first impact on funding, on the number of beneficiaries, on the contributions amount is described.

Thus, the policy-making problem of evaluating the relative performances of the two types of school became relevant also for justifying (or not) this political orientation.

For the first time, we used a new dataset to analyse the relative performances of public and private schools in Italy. Data come from the *National Institute of School System Evaluation* (herafter, INVALSI). INVALSI started in 2007 its activity of administering standardized tests for measuring students' achievement. Unfortunately, no panel data are available (as students' identity has not been retained by INVALSI until 2011), so our study is based on a cross-section of 74,265 students attending grade 5 (last year of primary school) and 74,538 students at grade 6 (first year of middle school), academic year 2009/10. The sample is limited to the schools located in a specific region, namely Lombardy[20]. The choice of focusing on a single region makes results limited to a specific case within the Italian context, not extendable to the whole country straightforwardly. However, it also eliminates some confounding effects, which are typical in the Italian context, as the performances of students and schools are very different across regions (the well-known North/South gap clearly see in the previous chapter): Invalsi (2010) reports that between-regions variance accounts for 40% of total variance between-schools in terms of achievement scores. Data contain some detailed information about students' background characteristics, as well as school-level information.

To anticipate the main results, based on an Instrumental Variables (IV) approach, it has been found that private schooling attendance has a positive effect on Math and Reading scores for (relatively) richer students and those

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[20] Since many years, the choice of focusing on a specific area is often used in the literature about the comparison of private and public schools. Coulson (2009) in his meta-analysis reports many studies, which specifically target limited areas; for instance, Rouse (1998) – Milwaukee. The recent study by Angrist et al. (2011) deals with charter schools in Massachusetts.

enrolled at school in a non-urban area, when considering grade 6. Instead, it exerts a negative effect on Math scores for students attending primary schools (grade 5) for immigrant students, but a positive effect on Reading scores for disadvantaged students (those who are "relatively" poorer). These findings shed more light on the heterogeneity of the so called "private school effect", that is they claim for a more cautious interpretation of the role of private schools in the Italian context. In particular, they stress the importance of looking at this effect for different subpopulations of students and schools, as well as of taking into account heterogeneity across grades. One-fits-all conclusions about the role and effects of private schooling in Italy tend to provide an unreliable picture.

The remainder of the chapter is organised as follows. The next section gives a wide and detailed description of the context, especially regarding the voucher policy in force in Lombardy. This preliminary focus is necessary because the data regarding the expenditure of vouchers was used as instrument to estimate the probability to be enrolled in a private school. The third section reviews the relevant literature as a background for our analysis. The fourth one illustrates the different methodological approaches and data, while the fifth section contains the results. The sixth provides additional robustness checks and further analyses. Finally, the last section debates the main findings, suggests policy implications and concludes.

3.2 The innovation of Lombardy policy of *Dote Scuola*

3.2.1 The Italian institutional context

The Italian educational system cannot be considered as a market-oriented setting, as it is characterised by (i) the lack of instruments for fostering parents' choice (vouchers, tax credits, charter schools, etc.), (ii) low school autonomy and (iii) intrusive regulation by the national government – as in procedures for hiring teachers, the content of the subjects, the organisation of curricular activities, the composition of governing bodies.

More than 90% of Italian schools belong to the public sector; differently from other countries, it should be mentioned that selective schools do not exist, and private schools have a particular status: they are accredited as public schools, but a negligible amount of money is devolved to them, hence they set student fees that only advantaged families can afford. A national public fund is devoted to private schools and it is managed by the Ministry of Education, University and Research (hereafter, MIUR); but this fund is just about 500 millions euro – compared with the Ministry's expenditure for public schools, about 43 billions euro. In terms of expenditure per student, the Ministry's spending is about 6,000€ for public and 500€ for private schools, on average. As the (annual) fee at private schools is about 3,000€ per student (even less for primary schools), on average private schools seem to cost much less than the public ones – it must be

kept in mind that this is a raw comparison, because the information about how many resources private schools are able to raise is not available. One explanation could rely upon the different organizational setting, as private schools (whether religious or not) benefit more autonomy than public ones: they can make decisions about hiring and paying teachers and staff, composition of governing bodies, articulation of their curricular and extracurricular activities. As a consequence, salaries are lower in private than in public schools; and the number of teachers and non-teaching staff employed is also lower.

Moreover, within the public educational sector there is no diversity. For example, it is not the case as in England, with different school types, like community schools, academy schools, trust schools, voluntary-aided or voluntary-controlled schools, special schools and grammar schools. In the English case, all these schools have differences regarding the level of autonomy, the religious status and the admission requirements. Similarly, the introduction of charter schools in the US, has led more choice within the public sector. Instead, in Italy some kind of difference can be seen at the upper-secondary level (grades 9-13), while in the primary and middle schools – the grades considered in this paper – there is no difference between school types.

To sum up the organisation of the Italian educational sector, on the one hand there is the "State sector", which is (formally) undifferentiated within the country; on the other hand there is the "private sector", which is quite differentiated. It is possible to find schools that belong to the Roman Catholic Church, schools that belong to other religious institutions, schools that belong to no profit enterprises, which can be (or cannot be) religious-oriented. Unfortunately, the MIUR does not collect any detailed information regarding the specific status of all these organizations, so it is not possible to compare students also within the private sector, and not just between public and private sector.

Italian families have the right to choose (even within the public educational sector) any school they want and, normally, they get it: there are no prescribed catchment areas, nor oversubscribed schools. It can seldom happen that some schools are oversubscribed, but the number of pupils rejected is negligible. Yet, when it happens, schools use their own criteria, which are: proximity, siblings, and disabled students. Only in residual cases (virtually none) a lottery is used. Rejected students go to the second choice school. Thus, in Italy there is "no choice" between public and private schools (as high fees prevent disadvantaged families to choose), but families can decide among public schools. However, the public sector does not supply diversity of schools and there is no publicly available information at school level; hardly families are aware of differences in terms of performance.

As anticipated, Italian public schools have weak autonomy. For instance, schools have no power over recruiting, pay-roll and dismissing of teachers. The process

through which teachers are recruited is quite complicated. It embodies three different actors: the national government (that is the employer), *Ufficio Scolastico Regionale* (USR), and *Ufficio Scolastico Provinciale* (USP) – a sort of local education authorities at region and province level, respectively. The first determines the number of classes and the second the allocation between schools, given their requests (Fontana & Petrina, 2001). It is worthwhile to notice that schools request not a particular person but just somebody teaching a certain subject. In other words, they do not select their own teachers. Teachers' salaries are determined and paid by the government, apart from short-term contracts. Schools just manage facilities, integrative projects and the possibility to collect money by private or local public institutions. As a result, Italian school funding deals only with facilities. Until 2006 USR distributed funds of facilities but, since 2007, the competence has been attributed to the government. The amount of resources that schools receive for that is determined in part through a formula, and in part according to national agreements between (i) the government (or USR and USP according to different matters) and (ii) trade unions. The formula takes account of the number of students (disabled students are weighted for additional funding), the school type and school size. Lastly, there is another national fund "for the widening of schooling supply and for redistributive interventions", which is distributed according to ministerial priorities, dealing with teacher training, disadvantaged areas and evaluation or innovation projects. Its amount is around 180 millions and, moreover, not all of this funding has been distributed directly to schools, roughly: one-fourth via USR, one-fourth via the MIUR, and one-half to schools. Therefore, the proportion of budget that is managed by the school is pretty low, as 97% of total expenditures are related to salaries of teachers and administrative/support staff (MIUR, 2010).

The educational system in Lombardy, instead, has certain peculiar characteristics that make it different from the other Italian Regions, because of two main reasons: i) the extent of private schooling and ii) the (regional) policies implemented. With reference to the former, in Italy there are, on average, more than 90% of public schools and more than 94% of students attend to those schools, while in Lombardy the corresponding numbers are 86% and 90%. Second, and more importantly, since 2000 Lombardy region implemented a voucher scheme. With a regional law, the Lombardy government has introduced a SV program, with the aim of reducing the economic obstacles that prevent student participation to private schools. This was a direct grant directed to students attending primary and secondary school in Lombardy. The next sections are devoted to describe these schemes, especially the last one introduced, which is called *Dote Scuola.*

3.2.2 The interventions before Dote Scuola

Up to 2008 Lombardy Region has implemented the support for students with a variety of instruments, some funded by regional resources (regional instruments) and some by national resources (national instruments). The first group was devoted to those who attend schools located in Lombardy, regardless of place of residence, while the latter had as eligible resident students only. In parallel with these traditional measures of RTE, Lombardy has also introduced - as well as other regions - a SV.

The regional instruments were *grants and assistance for school transport for disabled students* and study cheque[21]. Apart from the study cheque, the Municipalities were in charge of the subsidies provision. With regard to the assistance to the disabled students, the necessary conditions for obtaining the subsidy were: certificated need of support for the autonomy and personal communication for pupils with physical disability, mental or sensory structures certified by the competent delivery of specific material for teaching differential and specialized equipment, transportation to and from school.

Study cheque was granted to deserving students from disadvantaged families and students in their last year of middle school and secondary school. These regional instruments were completely funded by regional resources: every year the region allocates the resources.

The national instruments were: scholarships and grants for schoolbooks. *Scholarships* were devoted to disadvantaged students. Eligible expenses dealt with fees, transport, meals and didactic integrations.

Grants for schoolbooks were devoted to disadvantaged students, but with lower income threshold[22]. The Region stated entry requirements annually and transmitted the operational guidelines to Municipalities.

Resources for national instruments are defined annually. The criterion is the same for every instrument: the percentage of families whose income lies under 15.493,71€ (30 million of lire, before introducing the single European currency). In the first year of introduction of these subsidies about 130 millions and 100 millions of euro were allocated for scholarship and grant for schoolbooks, respectively. The criterion is still operating. Table 3.1 reports the trend of national resources allocated for Lombardy since 2008 to 2010.

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[21] They all were regulated by the Regional Law 20 March 1980, No 31.
[22] Schoolbooks were completely free in case of primary school.

Table 3.1. National resources allocated by the government for scholarships and schoolbooks grants since 2005 to 2010 (thousands of nominal euro)

Scholarships	2005		2006		2007		2008		2009		2010	
	a.v.	%	a.v.	%	a.v.	%	a.v.	%	a.v.	%	a.v.	%
Lombardy	8,954	5.78%	8,954	5.78%	8,954	5.78%	8,954	5.78%	10,628	5.78%	12,819	5.78%
Italy	154,937	100%	154,937	100%	154,937	100%	154,937	100%	119,580	100%	117,327	100%

Schoolbooks grants	2005		2006		2007		2008		2009		2010	
	a.v.	%	a.v.	%	a.v.	%	a.v.	%	a.v.	%	a.v.	%
Lombardy	5,563	5.39%	5,563	5.39%	5,437	5.26%	7,998	7.74%	7,998	7.74%	6,369	8.22%
Italy	103,291	100%	103,291	100%	103,291	100%	103,291	100%	103,291	100%	77,468	100%

Source: elaborations on Lombardy Region data.

The amount of the national allocation has been stable over time, apart from decreasing in the last year. Compared to the total national expenditure, the dynamic of the resources for Lombardy was perfectly stable with regard to scholarships (5.78% for all years under review), while grants for schoolbooks was slightly increasing (from 5% to 8%).

Finally, with the Regional Law of January 5 2000, No 1, Lombardy Region introduced the SV, with the aim of removing the economic obstacles that prevent student participation in the education system as a whole, so as to favour freedom of choice in education. This was a direct grant for the benefit of all students attending primary and secondary school in Lombardy.

The income threshold requested to be eligible for SV consisted of the ratio between income of family members and an index taking into account the number of family members. If this indicator was lower than 8.348,74 €, the SV amount covered the 50% of fees, while the amount was equal to the 25% if the indicator was lower than 46.697,62 €, which was the cap to apply for the SV[23].

The costs incurred by families were eligible only if they exceeded a threshold value of 208 €. The voucher amount could not be less than 52 € and over € 1,050 (excluding students with disabilities whose ceiling was equal to 1,400 €). The introduction of the franchise excluded almost entirely, the families that support very low costs for the education of children, i.e. families whose children are enrolled in state schools. The reason for this exclusion is that for such families the freedom of choice has been constrained by economic reasons, considering the free access and frequency of state schools.

An overview of the tools used and the expenditure, with reference to 2008, is shown in Table 3.2. Beside the disabled students subsidy and the study cheque that represent instruments with limited objectives, there are two main

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[23] Lombardy Region defines the threshold every year. These ones were into force in 2008.

interventions of support for the student population as a whole. On the one hand, the SV, which has about 65,000 students beneficiaries (attending private schools), whose average grant was around 700 €. On the other hand, two tools that meet the same requirements (scholarship and grant to textbooks were not mutually exclusive), with about 70,000[24] beneficiaries and whose contribution to the total potential cannot exceed 400 €.

It is worth to anticipate what will be shown later: beyond the remarkable difference in the amount of grants, that is inevitably linked to the equally distant cost between the state school and on equal terms, until 2007/08 supporting tools to the students reached almost the same proportion (such as 50% each) of the population of beneficiaries enrolled in school among the state and private sector. Instead, the enrolment scenario is: 90% of the student population attends public school and only 10% of the private school. This configuration is a clear sign of political persuasion to encourage freedom of choice between public and private schools.

Table 3.2. Expenditure and modality of target selection, by instrument type, 2008

Data of 2008	Number of beneficiaries	Expenditure	Subsidy amount (on average)	Target
Transports and assistance to disabled students	805	5,885,608	1,219*	Municipalities apply to the Region in according to the certificated requests received.
Study cheque	6,161	1,314,500	515	Students never repeated a year, whose mark in the previous year was 7,5/10 on average or similar in case of lower secondary school
Scholarship	30,707	6,937,712	150	Students whose family income is under 15.493,71€ as ISEE indicator. Expenses refundable: fees, transports, meals.
Grant for schoolbooks	42,722	5,478,860	134 (middle s.) 244 (secondary s.)	Students whose family income is under 10.632,94€ as ISEE indicator.
School Voucher	64,593	45,130,985	339 (public s.) 703.69 (private s.)	Students whose Regional Income Indicator is under 46.697,62 € (for a voucher amount of 25% of fees) or under a 8.438 € (for a voucher amount of 50%).

* Resources allocated per Municipality

Source: elaborations on Lombardy Region data (DG IFL).

It is necessary to note that, apart form the SV, the bulk of resources was earmarked for subsidies with lower amounts per capita. The only instruments with significant amounts are those relating to school transport and care of the

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[24] Actually, this number is the result of an incorrect sum because of the cumulation of the two instruments. However, a more precise estimate will be displayed later.

disabled students and the study cheque. The most general tool was also the one whose per capita contribution was very low. Indeed, scholarships potentially could include different charges for the completion of compulsory schooling of pupils. Moreover, all these contributions were paid as reimbursement of expenses incurred. This is a critical point for subsidies devoted to disadvantaged individuals.

These two aspects - fragmentation and paucity of contributions and the provision *ex post* – made the policymaker reflect on the effectiveness and efficiency of spending. Particularly for SV, if the goal is to encourage freedom of choice, a grant reimbursement hardly will involve economically disadvantaged individuals, since it is just assumed that they are able to anticipate the tuition. This is the direction that moved the Lombardy Region with the introduction of the *Dote Scuola*.

3.2.3   The interventions since 2009: the Dote Scuola

In accordance to the Regional Law 6 August 2007, No 19, the Lombardy Region introduced a new policy instrument, called *Dote Scuola*. The idea is to support families through a single instrument and, therefore, also through a single administrative procedure, overcoming the strong fragmentation of existing tools and characterised by numerous calls, different access requirements, and different deadlines.

All interventions previously used are now part of an instrument inserted in three different levels (Figure 3.1): (i) *Dote* for the permanence in the educational system (hereafter, *Dote-equity*), (ii) *Dote* for deserving students (hereafter, *dote-merit*), (iii) *Dote* for freedom of choice (hereafter, *Dote-SV*). For convenience of exposition, next they shall be called Dote-equity, Dote-merit and Dote-SV (the old school voucher). This articulation of the *Dote Scuola* was chosen according to the objectives set by the Lombardy Region, namely: the increase in school participation, increasing freedom of choice and, finally, rewarding academic merit. At the same time Lombardy Region pursued a simplification of procedures, even if this initiative cannot be separated by several constraints defined by national legislation for some tools (scholarships and grants for textbooks), particularly with respect to the threshold ISEE[25].

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[25] ISEE means Indicator for Equivalent Economic Situation. It is a national indicator used in order to be eligible for a wide set of subsidies, other than education.

Figure 3.1. School Dowry and its components
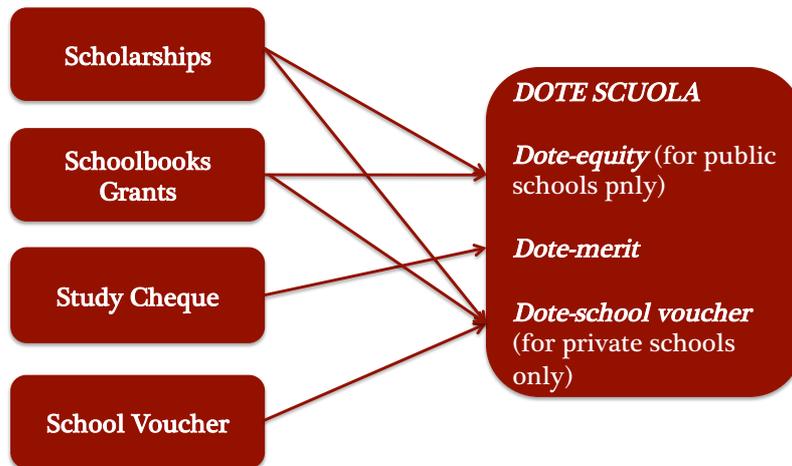
The Dote-equity comprises grants for schoolbooks and a part of scholarships. It is aimed at families that have an ISEE indicator minor than € 15,458 with only children enrolled in state schools (primary and secondary school). Sums are paid fixed: 120 € per year for primary schools, 220 € for the lower secondary school, and 320 € for the upper secondary school.

Study cheque were simply converted on the Dote-merit, which consists of the provision of € 500 for students attending first the fourth class of the upper secondary school and the delivery of 1,000 € for students attending the third year of lower secondary school and fifth year of upper secondary school. This intervention is aimed at both students enrolled either in state schools or private schools. Potential beneficiaries of this grant are the families whose ISEE indicator is minor than € 20,000, with the exception of students who get the title at the end of the upper secondary school with a mark of 100 cum laude, for which submitting ISEE certification is not requested. Two separate rankings are generated: in the first one there are students who have completed the secondary school with a final grade equivalent to *good* (or equivalent assessment otherwise expressed) inserted following the ISEE increasing order; the second of those students who concluded respectively I, II, III and IV year of the upper secondary school and who have achieved a final average of at least *7.5* (or equivalent assessment otherwise expressed), placed in descending order of grade point average. In this case the ISEE indicator only serves as a requirement of eligibility and is used only in case of equal marks.

Finally, the Dote-SV largely recovered SV but also a part of scholarship and grant for textbooks. Moreover, there is an innovation in the Dote-SV, that is the possibility to have access to an integrative amount (*Dote-integration*), i.e., the possibility to receive a further contribution to the SV. As in the previous years, the families entitled to receive the Dote-SV were those with an income indicator

below € 46,597. The two brackets, with respect to income deductions for the amount and also the minimum (280€) and maximum (1,050€) roofs already used, remain. Among these families, those who are below the threshold of € 15,458 ISEE may ask the Dote-integration, which consists of providing additional 500 € for primary schools, 700 € for the lower secondary school, and 1,000 € for the upper secondary school.

3.2.4   The main innovations introduced by Dote Scuola

Comparing the implementation of previous interventions with those of *Dote Scuola* there are two major differences. Firstly, and certainly the most important, the provision of financial assistance is no longer *ex-post*, but *ex ante*, i.e. before the school year begins. The transition to an *ex ante* provision can eliminate the uncertainty of the families to receive the grant in the time they make their choice, in part, by solving the liquidity problem. The reimburse mechanism was more likely to be ineffective, as the voucher was granted when the choice was already made. This created a strong discrimination based on income between households receiving and attenuating the progressive nature of the instrument. Poorest families could consider too risky to enrol their children at a private school: although they could enjoy a refund equal to half of their expenditure, they are not sure about obtaining such sums.

The other difference is the modality of contributions provision. Before *Dote Scuola* introduction, all consisted in a sum of money transferred to the family's bank account. In this regard, while the provision of a cash-equivalent benefit allows to transfer to the beneficiary an amount that he/she decides how to spend, on the other side it does not allow to see what that amount is spent for, i.e. whether the voucher was intended for direct spending on education or the beneficiary decided to buy other goods. Payment of *Dote Scuola*, instead, consists of paper vouchers[26], which are expendable at the same (private) school or at a distribution network of goods and services identified by the service provider. Through the system of vouchers, managed by a single provider in collaboration with the Region, the full traceability of expenditure is possible[27].

3.2.5   The first outcomes of Dote Scuola

3.2.5.1   Methodological premise

The General Directorate for Education Training and Employment (DGIFL) of the Lombardy Region has made available the data broken down by educational level (primary school, middle school, and secondary school). For 2009 and 2010 the operation was quite easy, since the information system of the *Dote Scuola* is designed to process the data in this way.

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[26] In particular, the Dote-SV is delivered directly to schools: upon the voucher is written the family entitled and the amount. In the case of Dote-integration, Dote-merit and Dote-equity, a number of vouchers (whose amount is € 25 each up to the sum) is given to the family.
[27] Unfortunately, these data are not available.

Much more complex was making such analysis for 2008. In particular, the first obstacle was processing grants for schoolbooks, which are managed by individual municipalities, and not by the Lombardy Region, so the aggregation of the data related to individual students was unfeasible. This difficulty affected the ability to define how many students received assistance from RTE in 2008, because of a possible overlap between the beneficiaries of a scholarship (or SV) and those who have also received grants for schoolbooks (these interventions were not mutually exclusive). The data was then estimated, thanks to a feature of the application to access the two contributions. Indeed, in one case (scholarships), the income limit for an ISEE entrance was approximately € 15,000, while in the case of schoolbooks that limit was an ISEE of approximately € 10,000. Then the number of grant recipients for schoolbooks and only the number of beneficiaries of a scholarship with ISEE but less than 10,000 € to 15,000 € have been summed. Note that this overlap does not occur in the case of beneficiaries enrolled in primary schools, for which the supply of schoolbooks is free (by law).

Secondly, an overview of the policy has been provided by defining the following variables: (i) the number of beneficiaries, defined as the number of students (and not the number of families) in receipt of a contribution (2008) or a *Dote* (2009 and 2010), (ii) total expenditure, as the sum of contributions granted (2008) or as the sum of the value of dowries conferred (2009 and 2010), (iii) the average amount, calculated as the ratio of (ii) and (i). Then the distribution of the average contribution for different income groups of beneficiaries has been analysed.

3.2.5.2   *The beneficiaries*

Overall, in 2008 there were 60,000 beneficiaries, while in 2009 (*Dote Scuola*) the number has risen to over 100,000. It is clear that the unification of the application procedures for obtaining a subsidy highlighted a part of a previously unexpressed demand, due to the considerable fragmentation between different types of contributions.

Similar to SV, the Dote-merit did not change the number of beneficiaries who first obtained the study cheque. This is due to the fact that the number of beneficiaries depends on the marks obtained. An important aspect is the re-balancing of the number of beneficiaries who brought the Dote system (Figure 3.2), more consistent with the structure of the Lombardy school system (where the system is more common in state schools than private schools).

Figure 3.2. The comparison between public and private school sector:

Beneficiaries and expenditure, 2008 and 2010
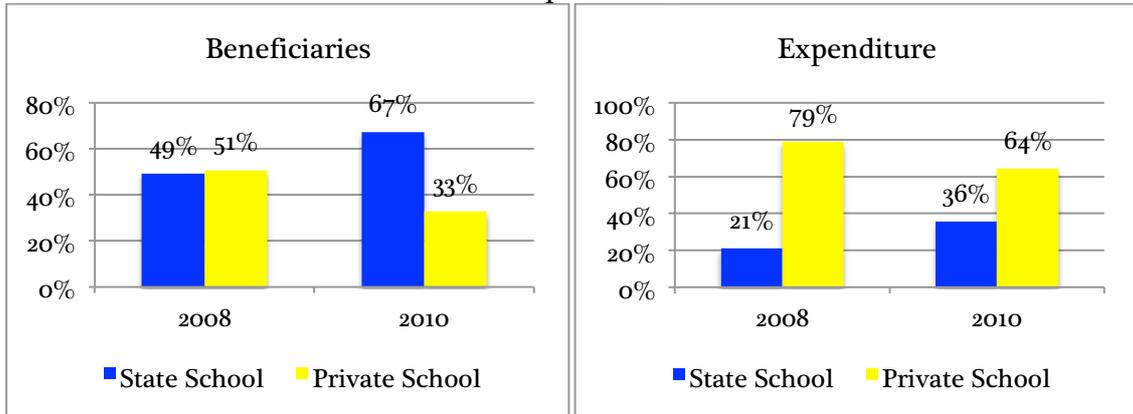
Before describing the vouchers amount, it is useful to focus on the three-year trend (2008 to 2010) of beneficiaries (Table 3.3). Regarding beneficiaries of the former SV, there is a substantial confirmation of the number. However, the evolution of their number reached a "stationary point", characterized by a sort of "universalistic" intervention, which affects over 60% of the total population attending private schools. On the other hand, the number of students attending a private school and who received the Dote-integration significantly increased (more than doubled). In 2007/08, less than 3,000 students received the integration in the form of grants for schoolbooks or scholarships. With the *Dote Scuola* system this number exceeded 6,000 students. The phenomenon can be attributed to administrative simplification. Probably, before the *Dote* system, families were already involved in the application to get the SV, and did not pay attention to the possibility of requesting an additional contribution, whose amount was also very low.

Table 3.3. The comparison of expenditure and beneficiaries before (2008) and after (2009 and 2010) Dowry School

	2008			2009			2010		
	Beneficiaries	Expenditure	Average amount	Beneficiaries	Expenditure	Average amount	Beneficiaries	Expenditure	Average amount
School Voucher (SV)									
State School	886	301,101	340		776	301			
Private School	63,707	44,829,884	704	61,440	44,777,038	729	67,299	50,226,841	746
	64,593	45,130,985	699	61,440	44,777,814	729			
Scholarship and schoolbooks grants*/dowry-equity and dowry-integration									
State School	58,765	8,631,311	147	103,784	21,327,380	205	152,010	30,554,200	201
Private School	2,967	1,644,863	554	6,188	4,432,920	716	6,969	4,945,900	710
	61,732	10,276,174	166	109,972	25,760,300	234	158,979	35,500,100	223
Total to State School	59,651	8,932,413	150	103,784	21,328,156	206	152,010	30,554,200	201
Total to Private School	66,674	46,474,747	697	67,628	49,209,958	728	74,268	55,172,741	743
Total Dowry	126,325	55,407,160		171,412	70,538,114		226,278	85,726,941	

Source: elaborations on Lombardy Region data (DG IFL).

Figure 3.3. The trend of *Dote Scuola* beneficiaries 2008-2010

(index numbers)
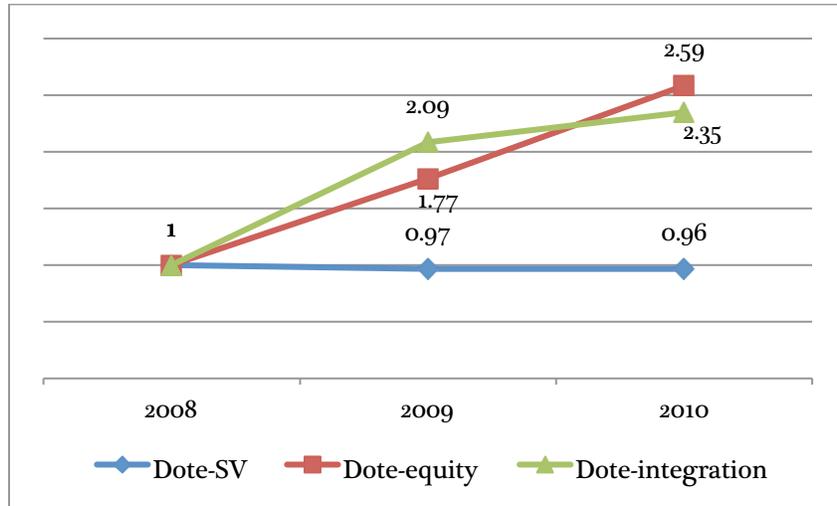
Source: elaborations on Lombardy Region data (DG IFL).

This explanation also seems to be behind the clearer phenomenon of *Dote Scuola*, i.e. the strong increase of beneficiaries enrolled in state schools. What emerges in figure 3.3 is the impressive growth of beneficiaries of the Dote-integration, but above all of the Dote-equity. Considering the data, it seems to emerge the idea of a demand, which has been always "hidden" by the pre-Dote system. Firstly, it did not anticipate the money but repaid it, through a fragmented process. Secondly, the increase of the beneficiaries of the Dote-integration seems to suggest that, although the population of interest in this instrument is now completely achieved, the cost it claims is still significantly higher than that supplied with the SV. Therefore, families are sensitive to the possibility of further contributions to support their spending.

3.2.5.3 The amount of subsidies

While the overall average amount (ratio between the expenditure for the Dote and beneficiaries), provides only very general information on the intensity of financial policies, it is more interesting to observe the average amount made by school grade. As for the SV, the Dote increased the average amount, due to the greater number of beneficiaries of the Dote-integration. A complementary explanation is linked to the increase of tuition fee, which should require an *ad hoc* analysis in the near future. As for beneficiaries enrolled in state schools, the

average contribution remained virtually unchanged for the students of primary schools, while it increased for students in secondary schools, particularly upper secondary school. This change is coherent with the objectives: the amount increase should be concentrated where the school expenses (eg, schoolbooks, teaching materials, etc..) are more significant (for example, the subsidy of 120 € is consistent with the needs of primary school, whose tuition fees are virtually nil).

The Dote-SV differs from other tools not only for determining the amount to be paid (which is not defined *a priori* from the region, but depends on the amount of the fees set by schools), but also for its target. The feared risk is that the Dote-SV turns out to be a subsidy only to advantaged families. Therefore, the analysis of the relationship between the average paid amount and the level of family income is important. Figure 3.4 shows that the amount will be higher in later grades (over 60% of upper secondary school beneficiaries receives a contribution between € 875 and € 1,050). This phenomenon reflects the strong diversification of the lines between school levels, particularly for upper secondary schools. It is also clear that certain kinds of amounts are not present: the lower end (up to 175 €) is almost absent, while contributions from € 175 to € 525 (second and third tier) are significantly present only in primary school. They might be some "equilibrium points" of the "market" that have been consolidated over time. This could indicate a different willingness of families to pay between primary and secondary school.

Figure 3.4. The distribution of the average amount of dowry-SV, by school grade, 2009
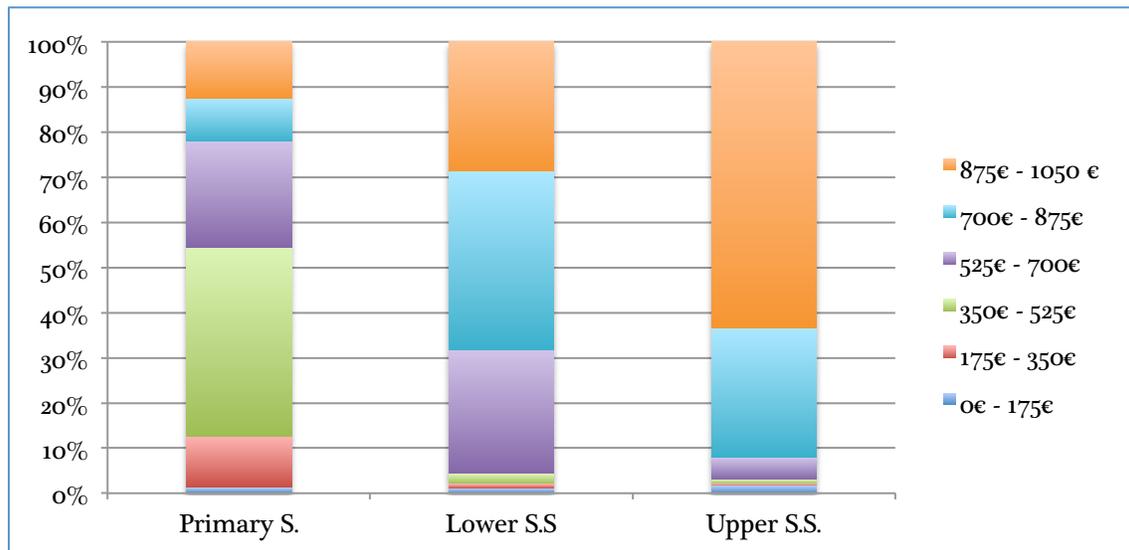
Source: elaborations on Lombardy Region data (DG IFL).

Figure 3.5. The distribution of the average amount of dowry-SV to respect with beneficiaries' income (regional indicator), 2009
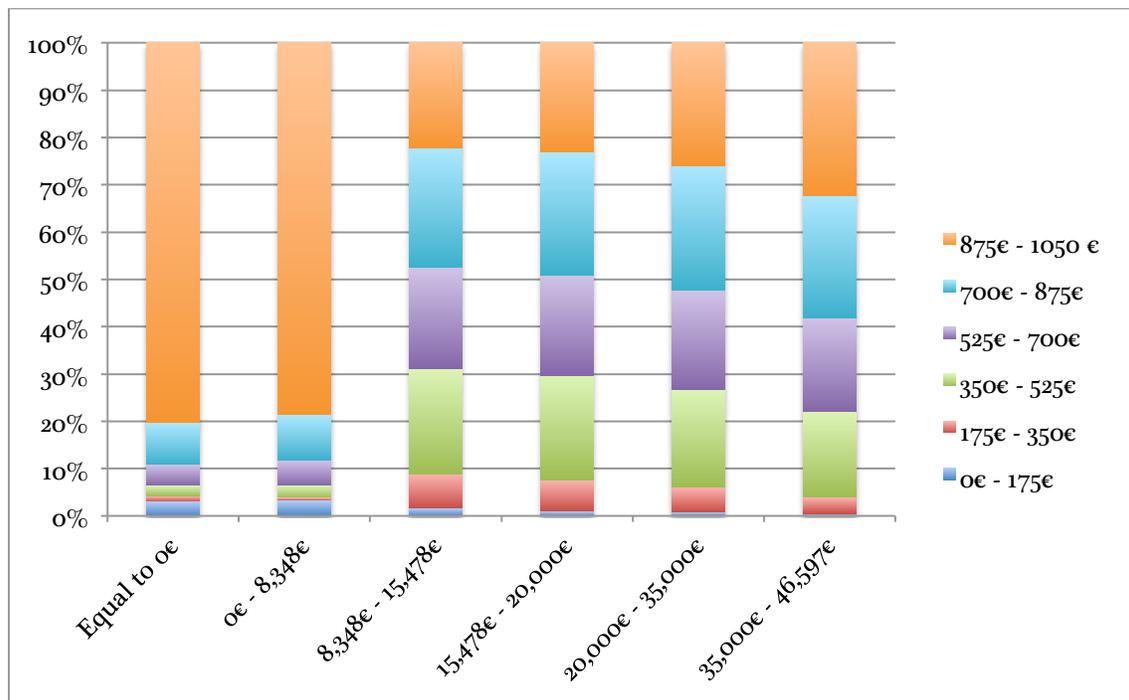
Source: elaborations on Lombardy Region data.

Regarding the link between the contributions of the Dote-SV and the income of beneficiary families, remember that the amount is 50% of the costs (fees) for families whose income lies under € 8,348 and 25% for higher incomes. Therefore, it should emerge a decrease of the amounts paid after this level of income.

Figure 3.5 confirms the expectations. About two-thirds of beneficiaries of the first two columns obtained up to € 1,050; the ones over € 8,348 obtained an amount between € 525 and € 825.

Figure 3.6. The distribution of the average amount of dowry-SV to respect with beneficiaries' income by each school grade, 2009
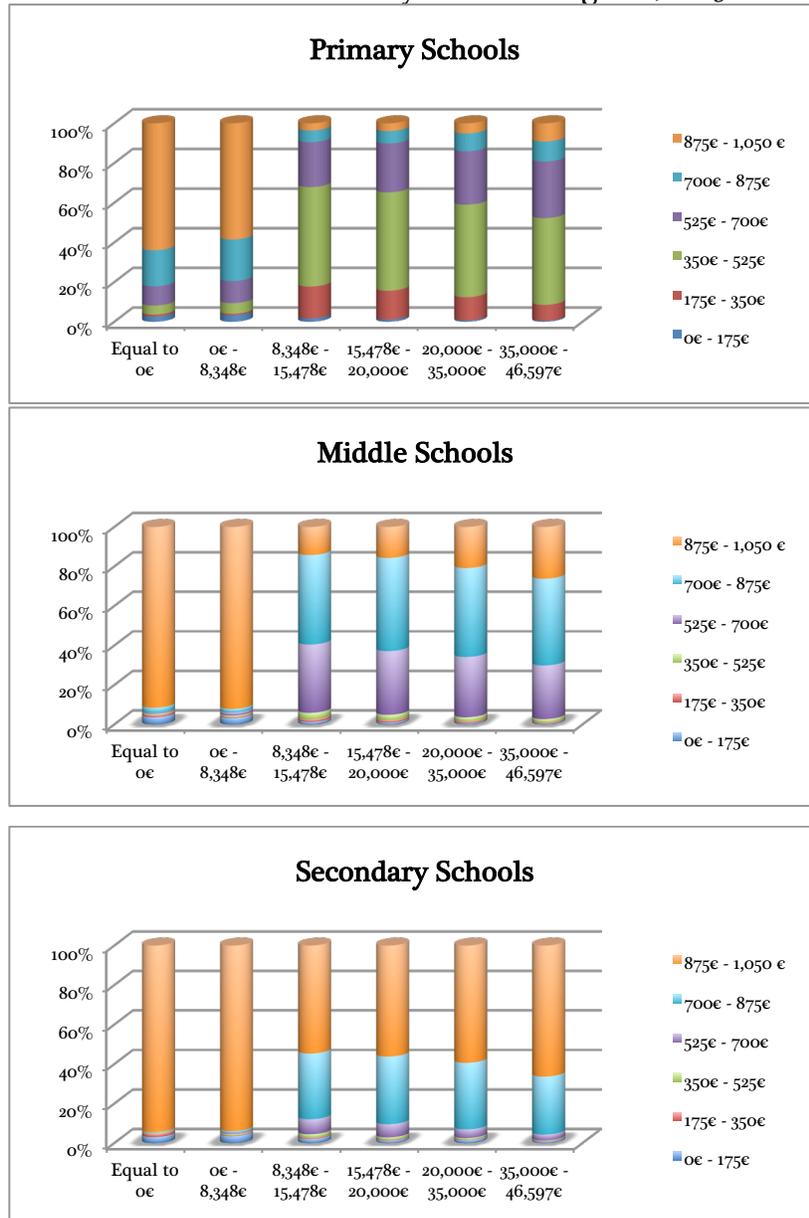
Figure 3.6 instead, inserts again the distinction by school grade. In general, it confirms a strong difference between primary and secondary school. It has to be highlighted the different magnitude of the lines between school levels. In the upper secondary school it is evident that the fees exceed € 2,000 (since the upper limit of the Dote-SV to 1,050 €), while primary school fees are, on average, much lower. The behaviour of the upper secondary schools is actually predictable. It should be taken into account when, in every field, the ceilings are fixed. The risk is always to make the prices levitate, fees in this case, up to the maximum level allowed. On the other hand, it should be noted the behaviour of primary schools, which do not seem to adopt the same actions.

Since an explicit aim of policy is to further increase the choice of families who would like to rely on a private school, but cannot afford it, the trend of the average amount of the instrument introduced for this purpose - the Dote-integration – has been analysed with respect to ISEE income brackets. What is expected by such a policy is a decreasing trend of the average contribution relative to income. In the graph in Figure 3.7, although there is a decreasing trend of amount for ISEE from zero to 5,000 €, and an increasing trend from € 685 to € 720, the amount trend is relatively stable. However, all these families incomes lie under € 15,493 ISEE. Therefore, it seems to be consistent with the objective of the policy.

Figure 3.7. The average amount of dowry-integration
and the beneficiaries' income, 2009
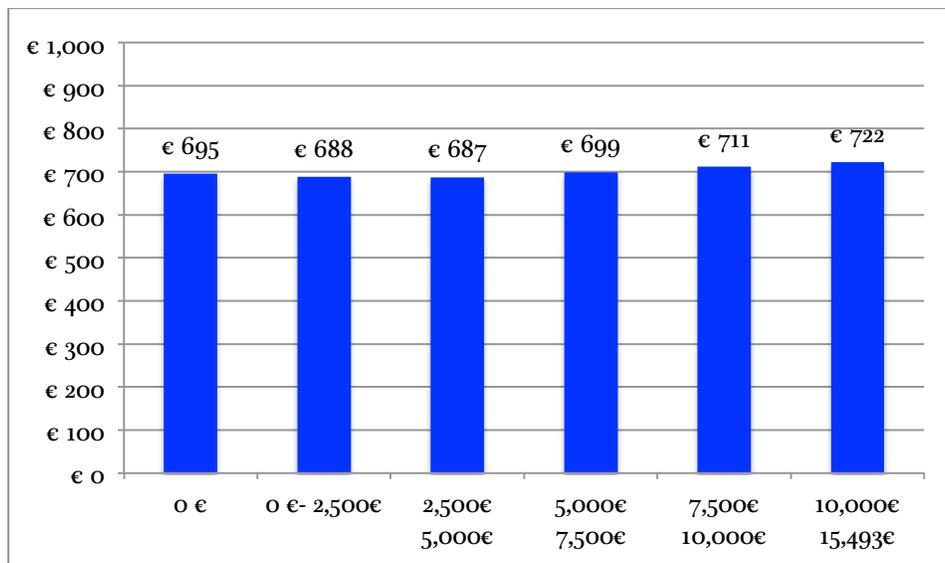
3.2.5.4 The expenditure as a whole

It has been analysed the trend of spending since the introduction of the Dote to 2010, apart from the Dote-merit, whose data of the last year are not available. However, this lack is negligible since the dimension of this tool is quite low and stable.

The expenditure (Dote-SV, Dote-equity and Dote-integration) has significantly increased (approximately 45% compared to 2008, but proportionally less than the increase in the total number of beneficiaries (which has grown of 74%). This is due to the fact that the increase was concentrated mainly on the students attending state schools, which receive less than the average per capita amount in comparison to the total. However, this difference is probably also attributed to the maximum of the contribution of the SV (which could not exceed € 1,050).

It may be also noted that before the *Dote Scuola*, state resources were not entirely expended. Table 3.4 shows the resources allocated to regional and state level for scholarships and grants for schoolbooks (subsequently included in the through the already described manner in Dote-equity). In 2008 regional spending on these tools (dedicated to students attending both state and non-state school) was about 10 millions of euro, compared with the 17 millions transferred from the government. With the introduction of the *Dote Scuola*, state resources became insufficient to cover the whole demand emerged: 26 millions of euro in 2009 and 35 millions in 2010 compared with only 18 obtained. Therefore, in order to deliver to the families what they were entitled to, the region had to undertake a reorganization of its resources. Concretely, for the provision of Dote-equity, as of 2009 (year of introduction of the *Dote Scuola*) 44.4 millions have been spent, of which 18.6 and 25.7 millions received by the State. In 2010, the region further increased its budget, adding 35.5 to 19.2 millions available.

Table 3.4. National and regional resources available since 2008 to 2010 (thousand of nominal euro)

	2008		2009		2010	
	a.v.	%	a.v.	%	a.v.	%
National resources	16,952	62.3%	18,627	42.0%	19,187	35.1%
Regional resources	10,276	37.7%	25,760	58.0%	35,500	64.9%
Total	27,228	100%	44,387	100%	54,688	100%

Sources: elaborations on Lombardy Region data (DG IFL), D.P.C.M. No. 106/2001 and D.P.C.M. No. 320/1999 and Ministry implementation decrees.

Figure 3.8. The expenditure trend of dote-SV, dote-equity and dote-integration, 2008-2010 (index numbers)
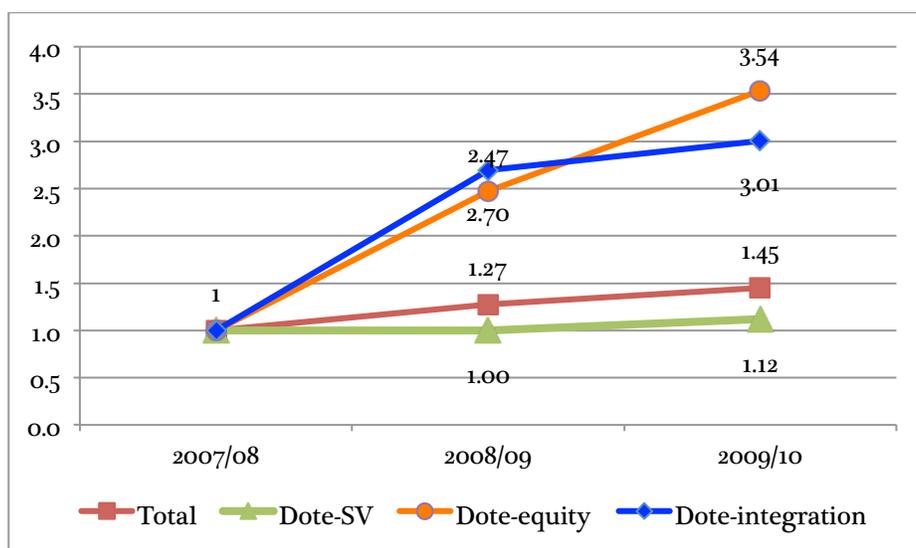
In summary, the introduction of the *Dote Scuola* brought out a dizzying number of beneficiaries. Only considering the Dote-equity, more than 70 millions euros have been absorbed in two years (Table 3.4).

However, looking at the spending trends of different tools (Figure 3.8), it appears that the major determinant of growth in spending is attributable to Dote-equity (which rose from 10.2 € to 35.5 millions euros, table 3.3). Moreover, this expenditure is expected to grow further, if it is assumed that in the long-term the Dote-SV and Dote-equity beneficiaries will be increasingly closer to the relative sizes of enrolment in private and state schools in Lombardy. Indeed, while the population of Lombardy on the private and state schools is, respectively 19% and 81% of the student population (Table 3.5), among the beneficiaries of the Dote, the ratio is respectively 30% and 70%. It is therefore reasonable to expect a further increase of demand that would result in the allocation of additional resources. Considering the relationship between beneficiaries and students enrolled, it seems clear that, unlike the case of Dote-SV, the target population of the Dote-equity still represents a small percentage compared to that potential. Indeed, the relationship between beneficiaries and students enrolled (in 2009) is 62% for Dote-SV (on 61,440 out of 98,189), compared to only 10% of the Dote-equity (152,010 out of 981,220).

Table 3.5. State and private school sectors, 2009

	State Schools		Private Schools		Students attending to State Schools		Students attending to Private Schools	
	a.v.	in %	a.v.	in %	a.v.	in %	a.v.	in %
Lombardy	4.581	86,4%	722	13,6%	981.220	90,9%	98.189	9,1%
ITALY[a]	33.644	90,1%	3.713	9,9%	6.871.889	94,3%	418.386	5,7%

[a] It embodies also schools directly managed by *Valle d'Aosta* and *Trentino Alto Adige* ("Equiparate a Statale"). These regions have more autonomy than other regions.

Source: MIUR (http://oc4jesedati.pubblica.istruzione.it/Sgcnss/index.jsp).

Figure 3.9 reports the distribution of expenditure of the Dote-integration and Dote-equity compared to the income levels and the number of potential beneficiaries of the Lombardy Region (those who could make the request of the *Dote Scuola*, regardless of whether they requested it or not[28]), again sorted by income groups. It emerges that the expenditure follows the same trend of potential beneficiary population. This means, for example, for beneficiaries with incomes equal to zero ISEE, that less than 2.5 millions of euro have been spent, because it is the less numerous "group".

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[28] ISEE is also a sort of certification necessary to obtain almost any kind of subsidies (i.e. health service). Therefore, having the number families that have presented this certificate is a proxy of the potential beneficiaries for *Dote Scuola*. More specifically, data used are ISEE certificates of Lombardy in 2007. That is why the expenditure for SV had to be excluded, given that another indicator is used in that case, as described before.

Figure 3.9. The distribution of the expenditure (in millions of euro) of School Dowry (2009) and by income level (ISEE) (2007)
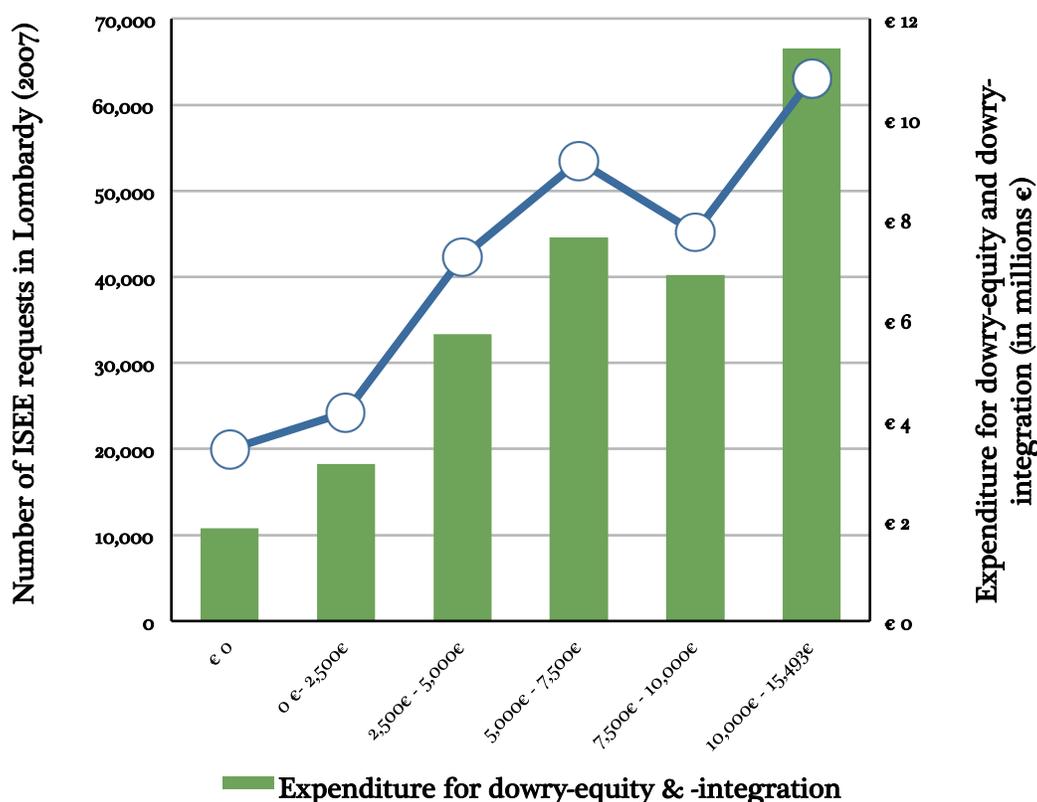
3.2.6 Lombardy as fertile context for heterogeneity of school providers

This section suggests some basic considerations on the macro effects associated with the introduction of the *Dote Scuola*. First, administrative simplification, namely the unification of the different contributions into a single application process, encouraged a substantial increase in requests. These data should lead to a reflection on the possibility of managerial reforms in the administration of student welfare interventions that are based more on principles of "good governance" than of policy change. It is, indeed, not only the result of decentralization, but also the rethinking of the technologies and service processes organization that need to be provided to citizens (Carbognin, 2010).

Secondly, a change particularly favourable for households was the anticipation of the contribution at the beginning of the school year. It is worth recalling here

that both the RTE tools and SV were received by families after the beginning of the school year, or even at its conclusion. Two aspects are relevant in this respect. On the one hand, perception of families may have changed considerably with reference to the "cost" of education for their children. Let us consider, for example, the SV. In the previous system, households paid the full amount of fees and were subsequently recovered. Therefore, the cost of private education significantly influenced the determinants of the choice. With *Dote Scuola*, the same families pay the price exclusively for SV. If the perception of "value" of the service purchased changed as a result of this shift of "prices", it is likely that this change also affects the expectations and evaluations of families themselves. This aspect should be dedicated a specific survey of beneficiary households. On the other hand, the anticipation of the contribution could have a significant influence on the choices of families.

The application for *Dote Scuola* is scheduled in January, with reference to the school year that begins in September, coinciding with the pre-registration. It is at this time that families make their own choice: the awareness of the opportunity of a financial contribution is relevant in order to take a more conscious and fulfilled decision. Consider, for example, a disadvantaged family whishing to enrol their children in a private school: in the previous system, liquidity constraints would force the family to prefer a state school, while with *Dote Scuola* the same family could assess the "net" price in a private education. It is not automatic this shift of choice, but presumably the evaluations will be slightly different in the two cases. However, these effects can be detected only in the medium term (anyway, it is already noticeable that the number of beneficiaries of the Dote-SV grown up by about 6,000 units in 2010).

In this concern, the most problematic aspect is that, unlike the U.S. experience similar to the type of school voucher programs, SV does not cover more than 50% of tuition fees. This is an element that, although it may be an economical "relief", it can hardly bring real equality of opportunity and, therefore, a genuine competition. However, it is not reasonable to consider only the economic dimensions among the relevant aspects of the choice between a state and private school. This makes the Lombardy a fertile context for heterogeneity of schools providers and more competition. Actually, there are also ideology or religious reasons, as well as attention to safety and sensitivity to the discipline (Ribolzi, 2000).

The most compelling data are those arising from the Dote-integration, specifically introduced to provide a further contribution to disadvantaged families who would like to turn to private schools, which receive on average 700 € more, in

addition to the Dote-SV (this value reflects the different amounts for the three school levels: 500 for primary schools, 700 for lower secondary school and 1,000 for upper secondary school).

However, some questions remain unanswered, for a full assessment of the policy in the near future. The financial sustainability of the initiative should be monitored carefully, particularly for two reasons. The first regards the growing trend of beneficiaries, which could further increase, as noticed in the analysis of members. The second is that, even now, the resources allocated by central government are not sufficient to guarantee the payment of contributions to all those entitled to it. In order to afford in the medium and long term the financial burden of such high and potentially growing demand, it is possible to act on several aspects: (i) restricting the audience of beneficiaries (eg., Limiting the income threshold for access, imposing conditions, etc..), (ii) deciding to allocate further resources for this growing public policy, (iii) requesting additional state financial support, even for experimental purposes, or more firmly in line with the process of federalism tax under discussion (Bordignon and Fountain, 2010 and Poggi, 2010). Whatever the solution would be, it is undoubtedly necessary a political reflection in the near future to ensure the continuation of this experience.

Finally, it should be noted that the initiative of the *Dote Scuola* configures a role for the region, which goes far beyond a role of providing tools to support families, but is linked to the tasks of "adjustment" of the education field (Poggi, 2004 and Violins, 2007). To carry out these tasks, it is essential to increase the information at disposal of the region. For example, it is a serious handicap that the region does not have any detailed information about schools (number of teachers, students, success of the courses, etc..) also with reference to sources of funding (for example, the Region should know the amount of the tuition fee of private schools).

3.3   Investigating private schooling effect

Comparisons between public and private schools have been conducted since the Coleman Report (Coleman *et al.*, 1982). Yet, to date it is not clear whether private education *per se* is better. At the basis of this open debate in the literature, there is the difficulty to obtain unbiased estimations, which can be summarised in two main methodological issues. Firstly, it is difficult to control for variables that affect student's performance apart from measurable dimensions. In other words, the student's performance (measured by the score from a standardised test) could be much more related to the individual student's characteristics than the

contribution of the school. More simply, the aim is to consider that school intakes between public and private students are different in terms of socioeconomic background, ability and intrinsic motivation. Moreover, even in cases where such data are available (i.e. parents background and occupations) some of them remain not measurable, as motivation and innate ability. The second problem is that it is impossible to compare the performance of a single student at the same time but in two different schools; in other words, it is impossible to have a pure counterfactual. The recent literature took advantage from newly developed methodological instruments (i.e. Angrist & Pischke, 2009; Murnane & Willett, 2011) and faced these issues in different ways, either for national or cross-national analysis, cross-section or panel data settings.

3.3.1 Comparisons across different countries

A number of previous studies attempted at analysing the relative performance of private and public schools in different countries, with the aim to obtain overall information in an international perspective. Somers *et al.* (2004) analysed private schools effectiveness across Latin America countries. They relied on a multilevel model, separating variance at student and school level. Controlling for family background and peer group, other than school type, they did not find difference between public and private schools. This contribution especially pointed at highlighting how important is considering peer effects, while previous literature failed to control for this factor (and limited itself to individual-level students' features). Vandenberghe & Robin (2004) extended the cross-countries analysis by including also some European countries. They used different methodologies: Ordinary Least Squares (OLS), Instrumental Variable (IV), Heckman methods and propensity score matching (PSM). The authors employed many variables such as: percentage of girls enrolled in the school, students with siblings in the same school, whether student's father is an immigrant and the school location (urban/non-urban area). They found a significant and positive effect through any methods just in some countries (Belgium and Brazil), while for others (Mexico, Denmark and Spain) the propensity score matching results were not significant. Some contradictory results between IV and Heckman models and PSM have been found, as well across countries. Relying on OECD data, Dronkers & Robert (2008) compared the different school type's performance of sixteen European countries other than US and New Zealand, by means of multilevel models. They were able to control for students' and principals' perception about their schools' climate. The results are that only some school types (government-dependent) have a higher net educational achievement than comparable public schools with the

same social composition, and their suggested explanation stays in a better school climate.

The interested reader could also refer to Coulson (2009) who, through a meta-analysis, reviewed more than 150 statistical comparisons across different countries and concludes that, in most cases, private and market schools outperform public ones.

3.3.2 Country specific studies

McEwan (2001) investigated the effectiveness of public, catholic and non-religious private schools in Chile, where a voucher system was implemented in 1980. He follows a Heckman approach where in the first stage he estimates the probability of being enrolled in a private school through a multinomial logit model. The number of schools per square kilometre of each type of municipality has been chosen as instrument. Controlling also for peer group effect, he found that all private schools types lost their advantage apart from Catholic schools. Also Anand *et al.* (2009) relied on the Chile case. In order to overcome the selection bias problem they take advantage of the provision of scholarships to low-income students (through a random fashion) attending to free schools in order to give them the opportunity to enrol to fee-charging private voucher schools. They used scholarships to identify a treatment group. The empirical strategy is based on three subsequent steps: estimating the probability to receive a scholarship, through a logit model; estimating a multinomial logit model for school choice (probability of being enrolled in a private school); finally, PSM to compare the outcomes of students in the treatment and control groups. The findings show that private schools outperform public schools.

The issue of private school effectiveness is debated in the UK as well, where the educational system is significantly differentiated, as most religious schools are not private. Gibbons & Silva (2011) precisely address this case. The comparison is between Faith and Secular schools, both funded by the government. Since the requirement for going in a Faith school is the religion, much more focus has been devoted to this dimension. The authors tried to distinguish between the specific effects of religious affiliation on academic achievement from the effects of a private education. In order to overcome the selection bias they carried out a bounding exercise. They used fixed-effects models, and estimate the Faith-primary school effect in two pupil subgroups: the "stayers" and the "switchers". The first ones remain in a Faith school also for the secondary school, while the second ones change. According to the authors, the regression based on stayers provides an upper bound of school effect while the switcher regression provides a lower bound. Their findings suggest that all of the advantage of Faith schooling

can be explained by differences between pupils who attend Faith schools and those who do not.

Many studies focused on the US case. There is a wide literature in this field (an overview is provided by Sander & Cohen-Zada, 2010 and Zimmer & Buddin, 2010), part of which specifically refers to Catholic private schools (Evans & Schwab, 1995; Goldhaber, 1996; Neal, 1997; Figlio & Stone, 1997; Nguyen & Taylor, 2003). Among many others, the contribution by Nguyen *et al.* (2006) is particularly interesting, as the authors use panel data techniques to estimate the effect of Catholic schooling through PSM and difference-in-difference models. Differently from many studies, they also used the change in test score over time (gains) as dependent variable, other than the cross sectional scores (levels). They found positive and significant Catholic schooling effect, albeit these findings are not confirmed by the difference-in-difference results.

Another stream of US research compares charter schools with traditional public schools. Angrist *et al.* (2010) use a two-stage approach (2SLS) for comparing charter and public schools in Boston. They take advantage of the fact that charter schools admit students through a lottery and that some schools are oversubscribed. Therefore, they have all students who would have liked to attend a charter school but not all of them attend actually. As a consequence, treatment and control groups are well defined. The randomly assigned lottery is used as instrument. In the second stage the dependent variable is students' scores in a certain year in a certain grade. They found positive and significant effects of attending charter schools. Abdulkadiroglu *et al.* (2011) analysed the Boston case as well, but considering also Pilot schools (which are similar to public schools but have more autonomy). They use an IV approach relying on the lottery admission system, and it results that charter schools outperform pilot and traditional public schools. Angrist *et al.* (2011) go more in depth in this same analysis. They compared also charter schools located in urban or non-urban areas. Basically, the empirical strategy again follows a two-stage regression. Firstly, they conduct a semi-parametric analysis of heterogeneous potential outcomes that assigns a role to variation in no-treatment counterfactuals and to charter applicants' demographic characteristics and baseline scores. Then they attempt to isolate school-level characteristics that might explain differences in charter school effectiveness. The authors found that urban charter schools boost achievement beyond urban non-charter students. Student demographics explain some of these gains; yet, non-urban charter schools are uniformly ineffective. Moreover, there is significant heterogeneity among urban charter schools.

3.3.3   Previous studies on Italian private schools

The issue of relative public and private schools' performance also received attention in Italy. To date, the academic literature concludes that Italian private schools, on average, attract less talented (but richer) students, and attributes to these schools a "remedial" function.

Brunello & Checchi (2005) pointed at four pieces of evidence supporting this idea. First, by estimating a probit model on the probability of enrolment in remedial programs they found a positive and significant impact of a dummy for students enrolled in a private school (after conditioning for family background). Second, through an ordered probit model they found that the quantity of homework at private schools is lower than at public ones. Third, since the percentage of older (i.e., not regular) students increases in private schools during upper secondary school, the authors argue that private schools attract students "in trouble", those who switch during the academic year to attend to easier schools. Finally, they performed both OLS and IV regressions considering PISA 2000 literacy score as dependent variable; in the IV approach, they chose two instruments namely household wealth and preference for cultural activities. They found a negative and significant impact of the dummy private school on student achievement. Overall, these results are not free from some drawbacks. First, since private institutions provide the most part of remedial programs, the first finding is expectable; while no evidence is provided about the proportion of private schools that cannot be classified as "remedial" (as it is difficult to identify *a priori* different types of private schools). Thus, it can be the case that the results are driven by the particular sample of schools included in the study. Further, the "quantity of homework" is a partial indicator of student motivation and quality. Lastly, the main drawback of the quantitative approach is the hardly reliable sample of PISA: it is not representative at school level, and it defines Italian schools in a questionable manner (see, for instance, the discussion in Agasisti & Vittadini, 2012).

Some studies inferred public and private schools students' performance relying on their performance at university. Bertola & Checchi (2004) used a dataset of the Milan University, which includes all students enrolled in the 1999-2000 academic year. They performed IV models by using the university student's performance as independent variable and as dependent variables the school type he/she attended, his/her "ability" (measured by the secondary school exit marks) and other control variables. Different variables were used as performance (output), such as (i) average (university) exam mark and (ii) the number of passed exams per year. As instrument they used a measure of economic wealth. Importantly, they

distinguished school type not just between ownership, but they further considered public high schools, private confessional high schools, private lay high schools, public vocational schools, private confessional vocational schools and private lay vocational schools. Through their analysis they found that the different school types perform according to the ranking just mentioned. Moreover, when they allow for self-sorting of students in different types of secondary schools, they find that the attendance of private schools improve the performance of a subgroup of students whose choice of private school attendance is correlated with family wealth. They conclude that private schools play just a remedial role for students from wealthier families.

Bertola *et al.* (2007) compare students who attend private and public schools, in terms of (i) probability of college enrolment and (ii) observed earnings once entered the job market. More specifically, they firstly estimate the probability of attending a private school through a probit model, whose covariates are individual (observable) characteristics and the (unobservable) student's ability. Secondly, through both probit IV and Heckman approaches, they estimate the probability of attending a university. They used two instruments: (i) whether grandfather or grandmother completed secondary school or college as household financial resources and (ii) the availability of private lessons as a trigger to private school enrolment. The authors found that attending private schools has a negative (or no) significant impact on both dependent variables. Some weaknesses of this study are related to the quality of data, derived from interviews. Moreover, the indicator used for student's talent is questionable; since the grading was not uniform across schools, (i.e., the marks do not derive from standardised tests, but are subjective judgments of teachers) any robust comparison is hardly feasible (Checchi & Jappelli, 2004).

Di Pietro & Cutillo (2006) investigated the influence of Italian Catholic schools[29] on university enrolment and university drop out. They adopted a bivariate probit approach; the model consisted in two equations – a school attendance and a university enrolment equation – which were performed jointly and simultaneously using maximum likelihood. Firstly, they estimate the probability of being enrolled in a Catholic school and of being enrolled at a university by relying on three instruments. Secondly, in order to model university drop out risk, they again estimate a two-equation model: (i) a university enrolment equation (which is the same of the first stage) and (ii) a dropout equation. With reference to the first stage, they choose the proportion of people living in the

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[29] However, the definition of "Catholic school" is weird, and it probably refers to all the private schools.

relative Province and who reported visiting a place of religious worship at least once per week as instrument. In the second stage, they used the number of siblings and a dummy variable recording whether the individual's grandfather has either a high school degree or a university degree. The most interesting finding is a positive and significant coefficient for students deriving from Catholic schools in the university enrolment equation, while non-significant effects have been found through the drop out equation. Moreover, they found a negative relationship between the unobservable factors associated with school choice and Catholic school attendance. Since this holds true even when controlling for school quality and peer effects, the authors argue that the positive effect of Catholic schools on university participation cannot be attributed to high quality school inputs but to other factors. However, two principal drawbacks of this study should be carefully borne in mind. Firstly, they relied just on 548 students attending Catholic schools for the whole country. Secondly, the variables used to capture the school quality effect is questionable, as they used the average class size for final year students and the proportion of students in double or triple shifts at a high school due to school congestion.

Brunello & Rocco (2008) addressed the public/private issue with a different approach. They considered two different equilibrium points through a micro-economic model, similar to the one by Epple & Romano (1998). The model assumes just one public and one private school and no liquidity constraints for households. They added that there could be not only an equilibrium point where public schools offer low quality education and private ones offer high quality education, but also a reverse one could exist. In an empirical exercise, by replacing in the model estimates regarding the return of increase in grading standards to earnings, the student's ability, the number of private and public schools, the public expenditure for public education and the average income both for US and Italy, it turned out the two different equilibrium points. In case of US the equilibrium is the one with high quality private schools while in case of Italy with low quality private schools. The basic idea is that when educational standards are low in public sector (US), then private sector will offer high quality education, while the reverse would occur otherwise (Italy). However, the assumption regarding just one school per school type – drawback explicitly admitted by the authors – excludes any kind of heterogeneity, which, instead, was considered by previous studies (Bertola & Checchi, 2004; Brunello & Checchi, 2005) and was explicitly modelled in this chapter from an empirical perspective.

Finally, in a recent study focusing devolution powers to Regions in education, also Turati *et al.* (2011) argue that Italian public schools outperform the private

ones. However, the study suffers a main problem due to too few observations (at best 40 private schools for the whole country).

3.3.4 The contribution to the literature

The results from previous studies about different countries are mixed at best; and the evidence provided is still sparse. More importantly, the literature about Italian private schools currently suffers a main limitation, which is the lack of data about the most immediate and direct output of schools' activities, i.e. achievement.

The work presented in this chapter innovates in several directions. First, the heterogeneity of private schools' effect has been explicitly modelled. The idea is that private schools can outperform public ones under certain circumstances but not in others, i.e. in urban contexts, and they can benefit some types of students but not others, i.e. immigrants versus Italians, or relatively poorest/richest. Moreover, given that the dataset comprises both primary and middle schools, it can be investigated whether the private school effect is different in two separate grades (5 and 6) – which is another source of potential heterogeneity. With special reference to the Italian previous literature, a new dataset provided by INVALSI was used, which contains student-level achievement scores – while other papers chose more "indirect" output variables, like enrolling at university or dropping-out. Therefore, the effects of private schooling are investigated on the most direct measure of schools' outputs. Moreover, the dataset contains all the students enrolled at grade 5 and 6 in an Italian region in the reference year (2009/10), so the analysis does not suffer of potential inconsistencies due to the selection of the sample (as other studies that extracted data for students enrolled at a single university). Lastly, primary schooling was considered as well, while the most part of previous studies analyse secondary schools (an exception is represented by Jepson, 2003); to the best of authors' knowledge, it is the first research studying the private school effect at primary education level in Italy.

3.4   The source of data

Data come from INVALSI, which runs standardized tests within the country since 2007; tested subjects are reading (R) and mathematics (M). The tests are carried out at the second and fifth (last) grade of primary schools (grades 2 and 5), at the first and third one for middle schools (grades 6 and 8) and at second and fifth (last) for secondary schools (grades 10 and 13). In this paper, we use data for grades 5 and 6. Indeed, also data for grade 2 were at disposal of authors, but the socio-economic indicator reflecting students' background was not collected at that

level; as our purpose is explicitly to control for this feature, we had to choose not to include that grade.

The original datasets were two: one at student-level and one at school-level, and they were merged by using (anonymous, but coded) information about the students. The dataset at student-level contains individual background characteristics such as: gender, age, family background, nationality, parents' nationality, whether the student attended to nursery or kindergarten (preschool education), whether the student repeated one or more years, and the municipality and province where he/she lives. There are also many variables reflecting family's background, such as the parents' job and their educational level, together with an indicator for the possession of particular goods[30], considered as proxies for different economic and cultural contexts, which in turn have different impact on student's achievement. INVALSI created an indicator, called ESCS (Economic, Social and Cultural Status) that takes into account all these variables (Campodifiori *et al.*, 2010): parents' occupation and education, and the possession of goods related to different socio-economic context[31]. Lastly, student-level information also reports the score obtained in the standardized tests (Math and Reading)[32]. The dataset at school level contains: school type (private or public), number of students, classes, immigrant students (both first and second generation), disabled students, rejected students, teachers and the location. A complete list of the variables is contained in table 3.6, which also provides a short description and metric for each of them.

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[30] More specifically, these "goods" concern: a quiet place to study; a personal desk for homework; encyclopaedias; internet connection; burglar alarm; a room exclusively devoted to the student; more than one bathroom; more than one car in the family; more than one hundred books at home.

[31] This indicator was built to have mean equal to 0 and standard deviation equal to 1.

[32] The values are expressed in the range [0;100] as a percentage of right answers.

Table 3.6. Variable list and definitions

Name	Definition
Dependent Variables	
math	The individual math score obtained in 2009/10 [0;100]
read	The individual reading score obtained in 2009/10 [0;100]
private	Dummy variable that takes the value 1 in case of private school and 0 in case of public school
Student's characteristics	
nursery	Dummy variable that takes the value 1 if the student attended to nursery and 0 otherwise
kinderg	Dummy variable that takes the value 1 if the student attended to kindergarten and 0 otherwise
born_father, born_mother	Dummy variable that takes a value in according to the place where the student's father/mother bore. It takes the value: 1 in case of Italy; 2 in case of European Union Country; 3 otherwise
edu_father, edu_mother	Categorical variable that takes a value in according to the place where the student's father/mother bore. It takes the value: 1 in case of primary school; 2 in case of middle school; 3 in case of vocational school; 4 in case of secondary school; 5 in case of higher education; 6 in case of PhD.
job_father, job_mother	Categorical variable that takes a value in according to the work type that of the student's father/mother. It takes the value: 1 in case of unemployed; 2 in case of housewife; 3 in case of professor, army officer or manager; 4 in case of entrepreneur; 5 in case of dependent professionist, physician, lawyer or researcher; 6 in case of artisan, retailer or mechanic; 7 in case of teacher or office worker; 8 in case of worker; 9 in case of retired.
gender	Dummy variable that takes the value 1 if the student is a female and 0 otherwise
year	Categorical variable that takes a value in according to the student's date of birth. It takes the value: 1 in case 1995 or before; 2 in case of 1996; 3 in case of 1997; 4 in case of 1998; 5 in case of 1999; 6 in case of 2000 and onward.
born	Categorical variable that takes a value in according to the place where the student was born. It takes the value: 1 in case of Italy; 2 in case of European Union Country; 3 otherwise
ontime	Categorical variable that takes a value in according to the time in which the student enrolled in the school comparing with supposed time (by the law). It takes the value: 1 in case of regular; 2 in case of early enrolment; 3 in case of later enrolment
citizenship	Categorical variable that takes a value in according to the student's citizenship. It takes the value: 1 in case of Italian; 2 in case of first generation foreign; 3 in case of second generation foreign
ESCS	Indicator of the economic, social and cultural student's background

School's characteristics	
class	Number of classes per school
pupils	Number of pupils per school
teach_tot	Number of teachers per school
pupils_class	Number of pupils per class
pdisabled	Percentage of disabled students per school
teach_stud	Teachers:students ratio
prejected	Percentage of rejected students per school
pforeign	Percentage of foreign students per school
Contextual Variables	
v_sum_non-urban	Total amount of voucher resources awarded in the non-urban area of each province
v_sum_unnon-urban	Total amount of voucher resources awarded in the urban area of each province
v_avg_non-urban	Average amount of single voucher awarded in the non-urban area of each province
v_avg_unnon-urban	Average amount of single voucher awarded in the urban area of each province
v_avg_tot	Average amount of single voucher awarded in each province
v_sum_tot	Total amount of voucher resources awarded in each province
citizen	Number of inhabitants in each province
prov	Dummy variable that takes a value in according to province where the student lives. It takes value from 1 to 11, for each province
urban	Dummy variable that takes the value 1 in case of the school is located in an urban area and 0 in case of non-urban area

After the merging of the two datasets, a procedure for cleaning the resulting one has been undertaken. At the end, the sample contains data for 74,265 and 74,538 students, 1,050 and 900 schools, for grade 5 and 6 respectively.

Table 3.7. Descriptive statistics, by school type

| Variables | Primary Schools | | | | | | Middle Schools | | | | | |
| | Public Schools | | | Private Schools | | | Public Schools | | | Private Schools | | |
	Obs.	Mean	St.Dev.	Obs.	Mean	St.Dev.	N	mean	sd	Obs	Mean	St.Dev.
read	72,228	**68.51**	17.03	7,020	**70.80**	16.25	74,335	**62.88**	15.03	7831	**67.67**	12.92
math	71,436	**62.63**	17.28	6,961	**65.07**	16.10	74,300	**54.03**	18.08	7835	**58.21**	17.19
nursery	48,688	**0.23**	0.42	4,148	**0.30**	0.46	49,519	**0.23**	0.42	4646	**0.26**	0.44
kinderg	66,811	**0.97**	0.18	6,168	**0.99**	0.10	60,991	**0.96**	0.20	6513	**0.98**	0.13
edu_father	58,192	**3.20**	1.38	5,851	**4.21**	1.47	56,356	**3.17**	1.38	6351	**4.10**	1.48
job_father	58,743	**6.45**	1.68	6,162	**5.48**	1.54	56,631	**6.44**	1.70	6973	**5.52**	1.53
edu_mother	59,077	**3.37**	1.34	5,907	**4.27**	1.36	57,226	**3.31**	1.34	6405	**4.18**	1.37
job_mother	60,267	**5.14**	2.50	6,257	**5.17**	2.10	58,149	**5.12**	2.52	7089	**5.18**	2.12
gender	73,704	**0.49**	0.50	7,124	**0.49**	0.50	73,664	**0.48**	0.50	7730	**0.48**	0.50
year	73,785	**4.00**	0.29	7,134	**4.06**	0.28	73,674	**3.93**	0.39	7799	**4.03**	0.28
born	72,018	**1.21**	0.71	6,988	**1.08**	0.42	72,498	**1.28**	0.80	7648	**1.07**	0.41
citizenship	73,195	**1.21**	0.55	7,131	**1.07**	0.35	73,558	**1.22**	0.53	7817	**1.05**	0.30
ESCS	72,228	**-0.03**	0.95	7,020	**0.77**	0.93	74,335	**-0.01**	0.95	7831	**0.84**	0.93
class	74,265	**28.20**	8.95	7,191	**9.21**	4.04	74,538	**19.21**	8.69	7852	**7.70**	3.43
pupils	74,265	**562.34**	188.03	7,191	**206.80**	89.96	74,538	**429.40**	207.61	7852	**190.15**	96.49
urban	74,265	**0.19**	0.39	7,191	**0.50**	0.50	74,538	**0.20**	0.40	7852	**0.46**	0.50
pupils_class	74,265	**19.93**	2.07	7,191	**22.50**	3.25	74,538	**22.11**	1.81	7852	**24.11**	3.40
pforeign	74,265	**0.15**	0.08	7,191	**0.02**	0.04	74,538	**0.14**	0.08	7852	**0.01**	0.02
pdisabled	74,265	**0.03**	0.01	7,191	**0.01**	0.02	74,538	**0.04**	0.02	7852	**0.02**	0.02
prejected	74,265	**0.00**	0.00	7,191	**0.00**	0.00	74,538	**0.04**	0.03	7852	**0.01**	0.02
teach_stud	74,265	**0.10**	0.02	7,191	**0.08**	0.03	74,538	**0.11**	0.02	7852	**0.11**	0.04

Table 3.7 reports the descriptive statistics of our dataset - separated by students attending to public and private schools; figure 3.10 shows histograms from categorical variables. Raw students' performances, on average, are slightly higher for those students attending a private school, while the standard deviation is similar across school-types – suggesting heterogeneity within sub-sectors. Some background characteristics are similar between the two groups (for instance, the percentage of students who attended a nursery or kindergarten); while others reveal striking differences, as the educational levels of parents that reveal how students in private schools come from more educated families. This noticeable difference is made evident through the indicator for overall social, economic and cultural status (ESCS), where the distance between the two groups is particularly marked (ESCS is around -0.01 for public schools,

0.77 for private). Therefore, also the difference in terms of immigrant students' share is clear, with 14% in public schools and 2% in private. Turning to school-level characteristics, size matters in that public schools are, on average, larger than private ones (more than two times bigger indeed). When looking at the teachers:students ratio as a proxy of resource intensity, such divergences are not evident instead.

Figure 3.10. Descriptive statistics – histograms from categorical variables

Panel A. Primary schools – grade 5
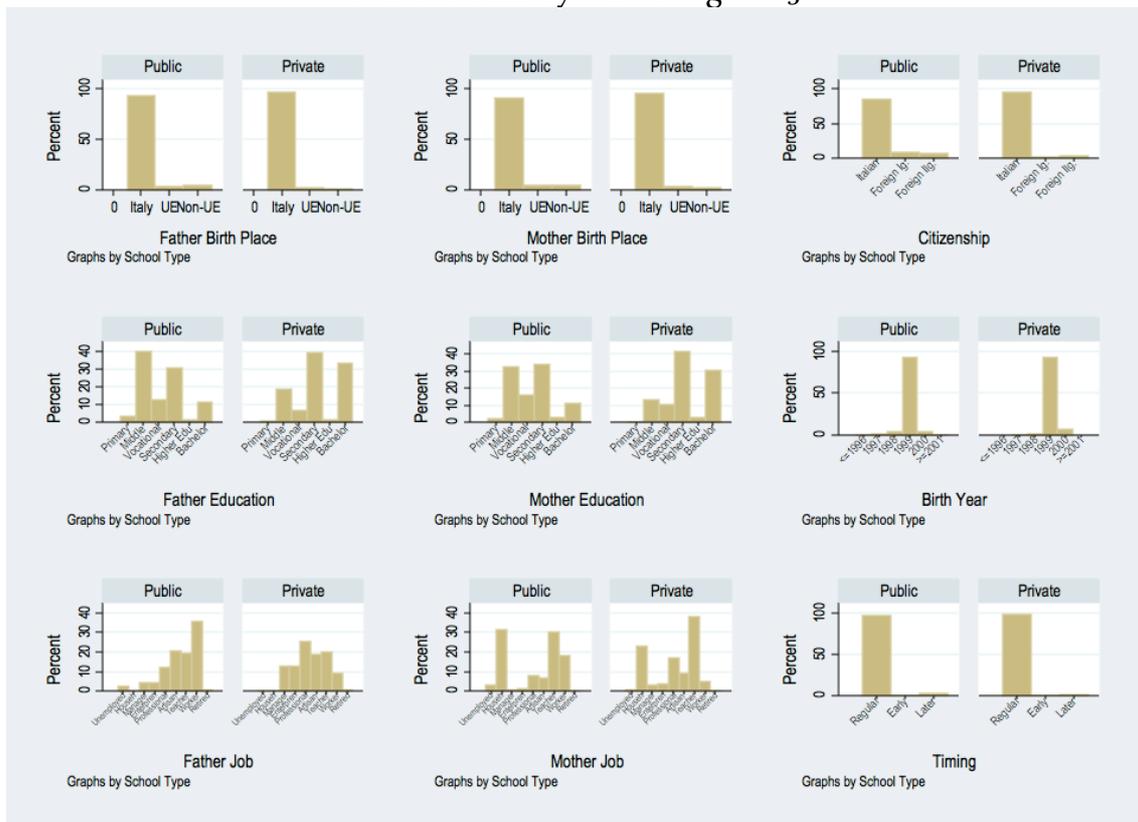
Panel B. Middle schools – grade 6
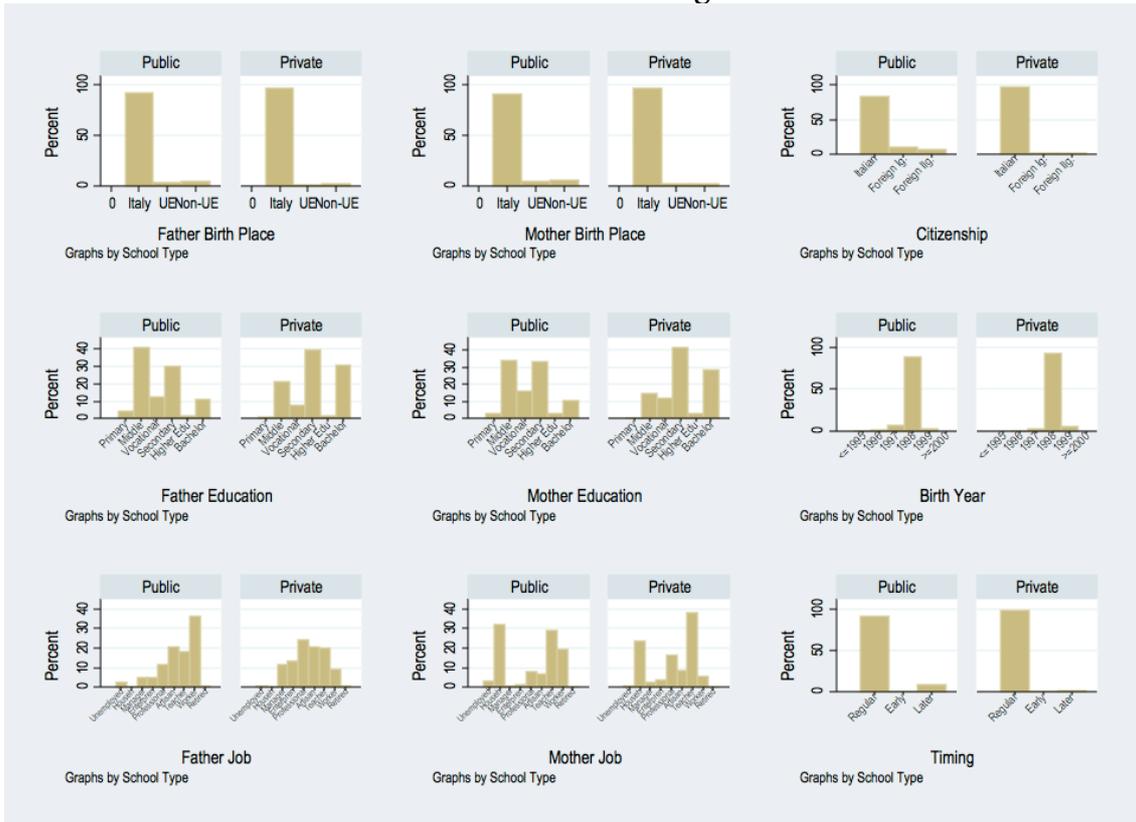
In a descriptive perspective, it is also useful to refer not only to average values, but also to look at the entire distribution of the variables. For this purpose, boxplots are used with the aim of indicating the different moments of the distribution (the box representing 25th and 75th percentiles, and the whiskers 10th and 90th). From the panel A of the figure 3.11, it is clear that all the different characteristics of the private (primary) schools described above – higher ESCS, smaller size, lower share of foreign students – are determined by a real different distribution, with a small number of outliers. Interestingly, it looks like the output variable's distribution is narrower for private schools, suggesting higher homogeneity but also the existence of a relevant number of (negative) outliers. Almost the same holds for middle schools (panel B), with even more accentuated differences when considering ESCS and the share of immigrant students.

Figure 3.11. Descriptive statistics, overall distributions, by school type

Panel A. Primary schools – grade 5
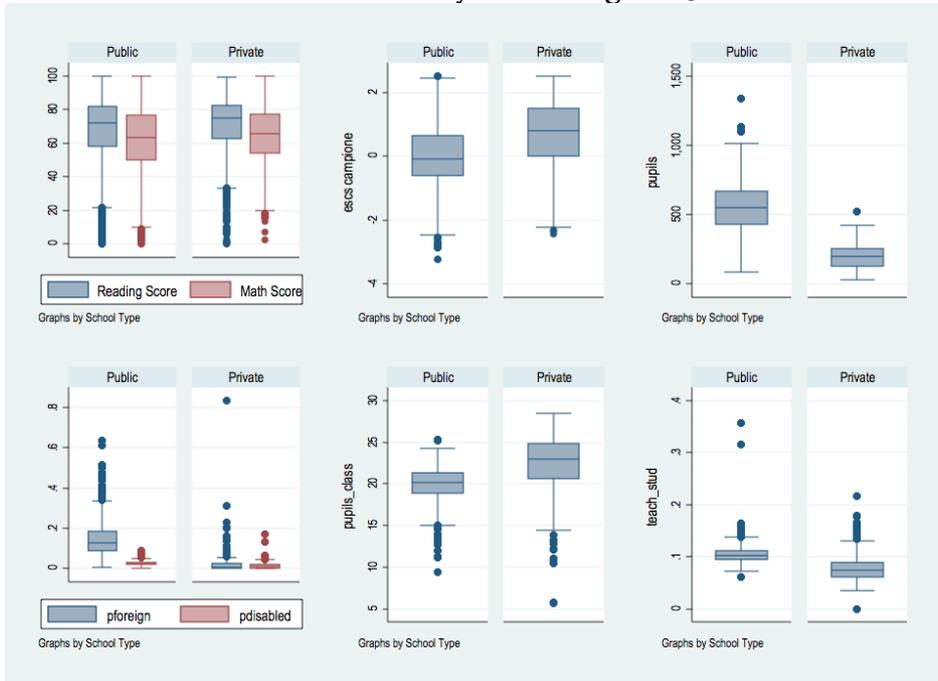
Panel B. Middle schools – grade 6
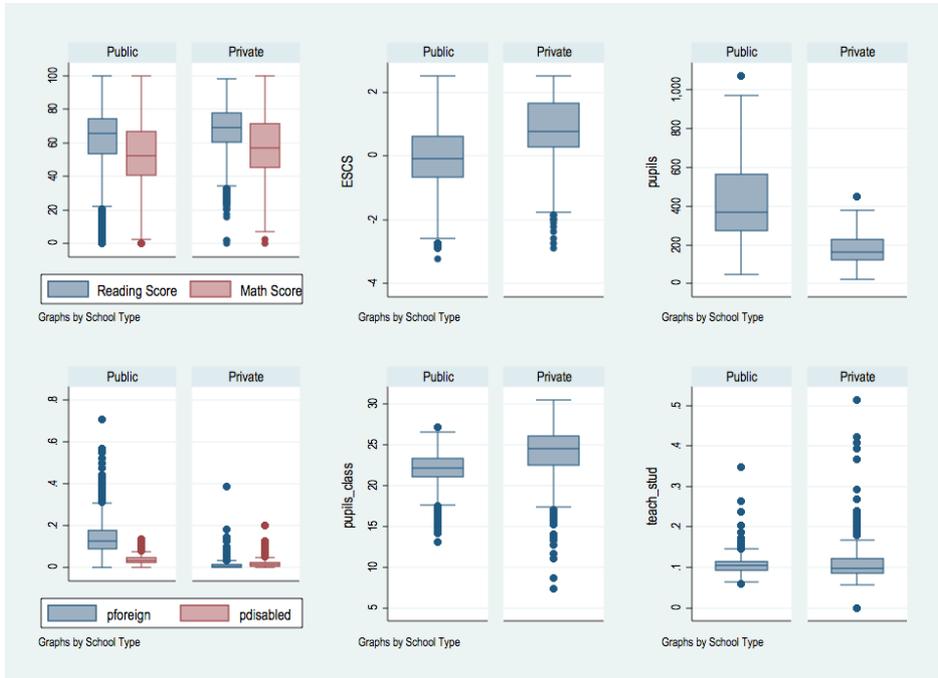
Finally, some further descriptive insights of the data are useful to understand the Italian context and the main relationships between variables. First, the correlation between students' performance and background is well known. Figure 3.12 simply describes this relationship, by plotting the two variables one against each other. It is clear that the background of students attending private schools is higher than the students in public schools, while the correlation of students' background and proficiency scores seems to be quite similar both in public and in private schools, though for private schools the slope of the regression line is lower. A potential reason for this difference could be related to the lower variation of students' background in private schools. Second, another aspect of potential interest is the school's location. Figure 3.13 shows a comparison of students' performance by separating cases in which the school is located in an urban or non-urban area; however, the figure does not show any relevant difference.

To sum up, descriptive statistics point out a (slight) advantage of private schools in terms of performances, but also a much better socio-economic background of their students. It is difficult to straightforwardly understand whether higher performances are due to better schooling or better student intakes. In this paper two methodologies are applied to disentangle compositional effects and school effectiveness, keeping into account the endogeneity of school choice.

Figure 3.12. The correlation between proficiency scores and students' background

Panel a. Primary schools
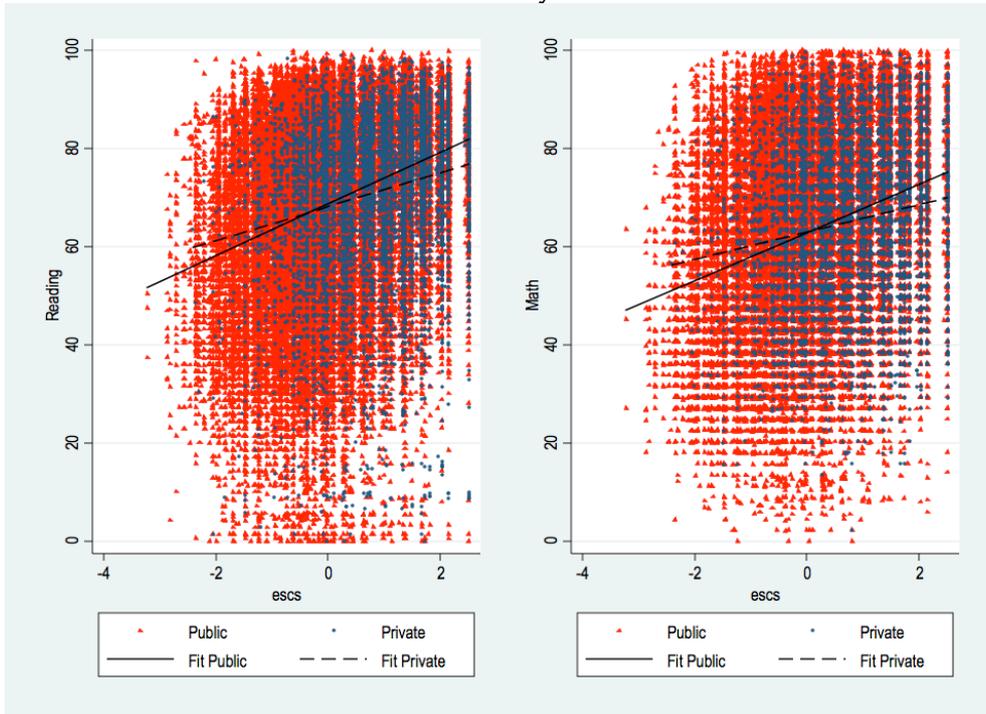
Panel b. Middle schools
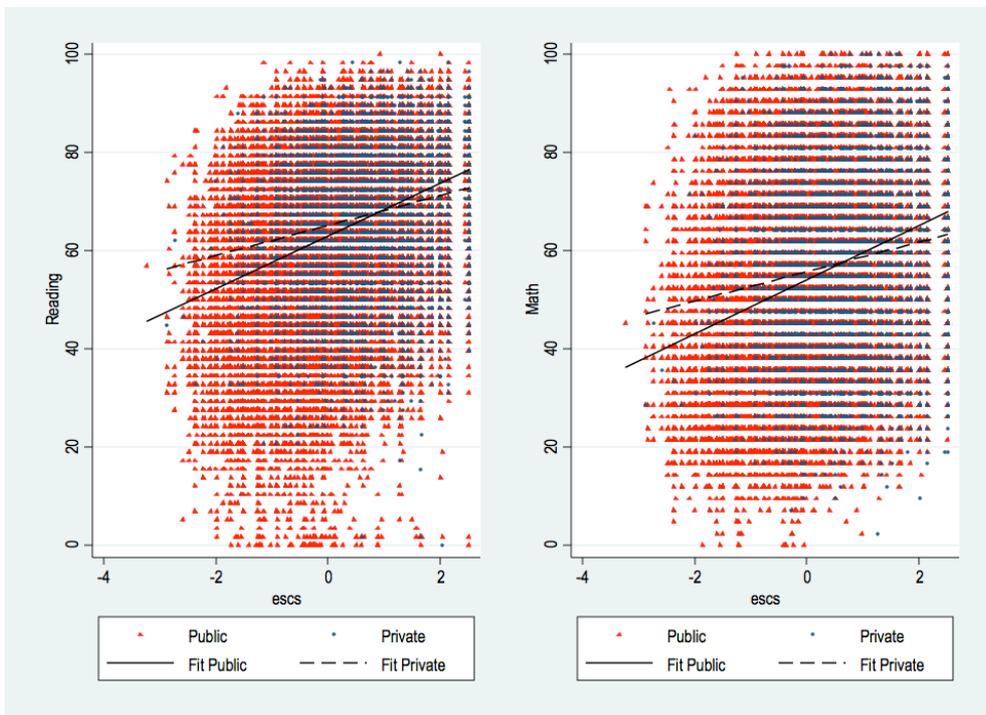
Figure 3.13. The comparison of students' performance between public and private schools and between urban and non-urban area

Panel a. Primary schools
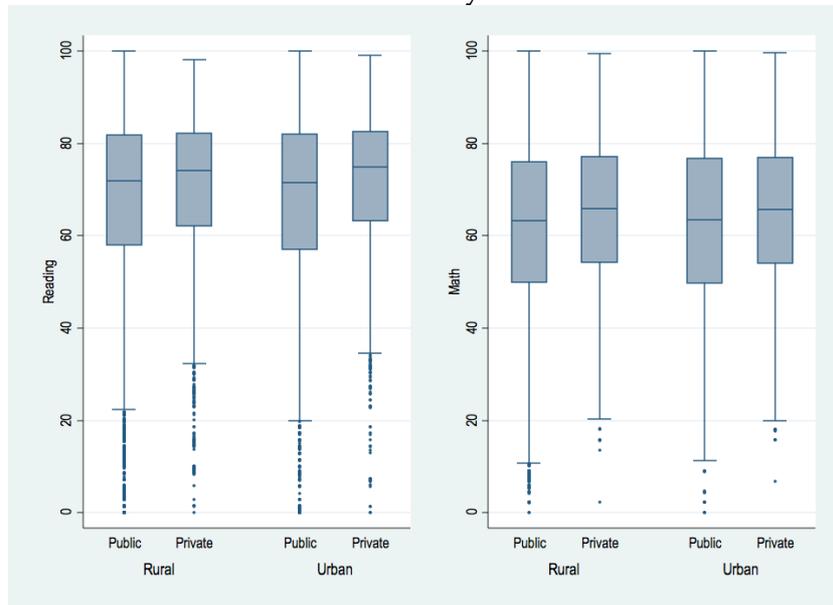
Panel b. Middle schools
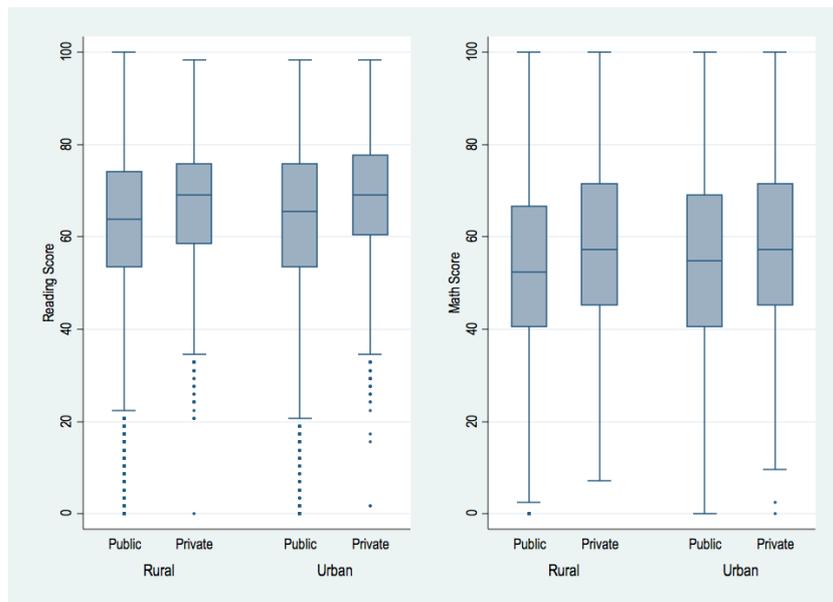
3.5   Methodology and estimation strategy

As previously explained, the aim of this work is to estimate the effect (more precisely, the *treatment effect*) of private schooling on students' achievement. Many prior studies did not properly control for student, family and peer characteristics. Thus, any systematic difference between students enrolled in private schools (i.e. "treated" students) and those enrolled in public ones might explain a great portion of the observed difference in achievement between the two types of students (e.g. differences in the composition of students). Moreover, once controlled such characteristics, there might still be a difference in schools' resources and organizational characteristics. Finally, once schools' characteristics are included in the model, there is still necessity to account for unobserved heterogeneity. In the methodological perspective, the questions are: is the estimated effect of private schooling reliable? Does it reflect the contribution of private schools to students' achievement or only the effect of unobserved variables related to students, families, peers and/or schools?

3.5.1   Instrumental variables (IV) approach

A potentially baseline to estimate the impact of private schooling on students' achievement with cross-section data is represented by OLS regression:

$$Y_i = \beta PRIV + \lambda X_i + \varepsilon_i \qquad\qquad (1)$$

where Y_i is the achievement of student i; $PRIV_i$ is a dummy variable that equals one whether the student i attends a private school; X_i is a vector of variables representing student and family characteristics; and ε_i is the usual error term, which is assumed to be uncorrelated with $PRIV_i$. If the latter assumption holds, i.e. there are not variables not included in the model that are correlated with $PRIV_i$, we can consistently estimate eq. (1) through OLS estimation.[33,34] Conversely, OLS estimates are likely to be biased (e.g. a non-random selection process in students' distribution between private and public schools might "confound" the private schooling effect).

To address this unobserved heterogeneity issue (endogeneity), a two-step IV approach is used, which is indeed widely employed in studies about the relative performances of students in private and public schools (for similar applications, see e.g. Vandenberghe & Robin, 2004; Di Pietro & Cutillo, 2006; Gibbons & Silva,

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[33] However, even though this assumption holds, there is still another problem related to the standard errors of our estimation. Suppose that peer characteristics and/or school-level characteristics have to be observed. If such variables are inserted in the model to remove a potential correlation between them (included in ε_i when they are not included in the vector X_i), the standard errors of the model have to be clustered, usually at school level.

[34] It is worth noting that in OLS estimation, the average treatment effect on treated (ATT) and the average treatment effect (ATE) are equivalent (for more details, see Heckman and Navarro-Lozano, 2003).

2011). The model is composed by two equations: (i) an "attendance equation" estimated through probit (to describe the probability of attending a private school, given the observable characteristics); and (ii) an "achievement equation" estimated through OLS.

As regards the first equation, the likelihood to attend a private school is given by the following equation:

$$PRIV_I = \alpha_1 X_{1i} + \alpha_2 X_{2i} + \alpha_3 Z_i + \varepsilon_{1i} \tag{2}$$

where $PRIV_i$ is a dummy variable that equals one whether the student i attends a private school (0 otherwise); X_{1i} and X_{2i} are two vectors of student-level and family-level characteristics, respectively; Z_i represents the exclusion restriction (explained in the next sub-section) acting as a source of randomness in treatment assignment;[35] and ε_{1i} is the usual (potentially heteroskedastic) error term. Student-level characteristics include: gender, living in urban or non-urban area, nationality and parents' nationality. Family-level characteristics include the indicator for socioeconomic condition, ESCS.

The second equation is modeled in two versions. The first version is given by the following expression:

$$Y_i = \gamma_1 X_{1i} + \gamma_2 X_{2i} + \beta PRIV_i + \varepsilon_{2i} \tag{3}$$

where $PRIV_i$ is the predicted probability of attending a private school, obtained in the first equation. X_{1i} and X_{2i} are two vectors of student-level and family-level characteristics, respectively; and ε_{2i} is the usual (potentially heteroskedastic) error term. Standard errors of equation (3) are bootstrapped: the covariance matrix of the final parameters must take into account of the sampling variation introduced in the two stages of the estimation. In order to decide the exact number of replications the rule of thumb suggested by Efron & Tibshirani (1993) is applied.

In the second (extended) version of the second equation, we control for school-level variables (X_{3i}) and peer effects (X_{4i}):

$$Y_i = \gamma_1 X_{1i} + \gamma_2 X_{2i} + \gamma_3 X_{3i} + \gamma_4 X_{4i} + \beta PRIV_i + \varepsilon_{2i} \tag{4}$$

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[35] The first equation must include at least one variable that is not included in the second equation. This variable acts as exclusion restriction, i.e. it is correlated with the likelihood to attend a private school but it is not correlated to students' achievement. Alternatively, to identify our model resting on the often 'implausible-in-practice' assumption that private school attendance is a non-linear function of the independent variables included in both equations is needed (for an application, see Somers et al., 2004).

Among school-level variables, we include the number of pupils per class, the percentage of immigrant students, the percentage of disabled students, teachers-students ratio, and the percentage of rejected students. As peer effect, the index ESCS at class-level has been included.[36,37] In this last specification, the bootstrapped standard errors have been clustered at class level.

3.5.2   Choosing the instrument: the expenditure for vouchers

Despite its fascinating methodological characteristics, the implementation of a credible IV strategy is extremely challenging. In our setting, the main difficulty relies on finding a variable, which is related to the probability of attending a private school, but unrelated with the students' achievement. As suggested by Stock *et al.* (2002, p. 518): "Finding exogenous instruments is hard work, and the features that make an instrument plausibly exogenous, such as occurring sufficiently far in the past to satisfy a first-order condition or the as-if random coincidence that lies behind a quasi experiment, can also work to make the instrument weak". However, for this purpose, it has been taken in advantage of a peculiar characteristic of the school voucher system in the Lombardy Region.

First, it is necessary to specify that the institutional settings inhibit private schools to receive public money; thus they are allowed to charge tuition fees. This financial constrain actually prevents many families (especially those in economic difficulties) to enrol. Lombardy was the first Italian region that implemented a voucher scheme in the year 2000/01, with the explicit aim to stimulate enrolment to private schools. The political rationale for such policy is that many parents desire to opt for private schools, but they cannot because of financial obstacles; so that, they should receive public money to exert their choice. The criterion for vouchers eligibility is twofold: (i) to be enrolled in a private school, and (ii) to be subjected to a "means test". With reference to the latter, only families with an economic indicator below a pre-determined threshold (46,500€/equivalent) can receive the voucher. This limit is pretty high; the effect is that the percentage of students who received a voucher was about 70% of the target population – those attending private schools. However, setting a threshold prevents all students attending a private school to receive the voucher; this feature of the plan is extremely important, as it will be used to introduce random variation in the selection equation to identify the probability of enrolling to a private school.

Overall, in 2009/10, about 100,000 students attended a private school in Lombardy (around 9% of the whole student population). The practical functioning of the voucher plan is quite simple. All families who trust to meet the economic requirement (financial indicator under the threshold *and* with

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[36] Through the inclusion of peer effects, it is possible to estimate the 'type B effect' (Somers et al., 2004).

[37] In the annex A2, the results when considering ESCS at school level instead than at class level are also reported. The results turn as completely unaffected by this choice.

children attending a private school) can send (online) an application to the regional government, and if eligible, the chosen school will receive a voucher covering 25% of the up-front fee (a maximum limit was set at 1,050€/per student). For the families with the lowest financial indicator (<8,500€/equivalent), a further contribution is available (the *Dote-integration* of a fixed amount: 500€ for primary schools, 700€ for middle schools, 1,000€ for secondary schools).

One relevant feature for the strategy is that attending a private school is a prerequisite for obtaining the voucher. That is, the hypothesis is that, all other factors equal, the availability of vouchers for those attending private schools does stimulate families to evaluate this opportunity; and, at the margin, some families can decide for going private. At the same time, there is not any particular reason for which this higher probability to attend a private school should be related to higher achievement scores.

Moreover, for being a credible instrument, the incentive to attend private schools should be not uniform, but heterogeneous across Region's subunits (Provinces)[38]. For this purpose, one argument is that, while the voucher plan is uniform, the geographical distribution of private schools is not. So that, families are likely to respond differently to the incentive, and this source of variation is related to the probability of attending a private school but again not to students' achievement. Moreover, the distribution of incomes across Provinces is also heterogeneous: for instance, the average "income per capita" ranges between 25,000€ per worker (Milan) and 15,000€ (Lodi) (source: Lombardy Region Statistical Office, data are available on request from the authors). Hence, the threshold set for obtaining a voucher introduces a source of variation that can be used to estimate the probability to attend a private school, combining this information with that of available private schools.

Therefore, we use the following indicator as the instrument for attending private school: Expenditure_inhabitants (expenditure per voucher at Province level/number of inhabitants at Province level). As the literature pointed out that the instrument itself could potentially suffer of endogeneity problems, data for 2008/09 instead of 2009/10 have been collected, as the 1-year lag can reduce its potential correlation with decisions made by parents in the reference year. The choice of considering the previous year is also consistent with the mechanism thought for the instrument: parents observe the funding level at year t-1, and then make decisions about their children's enrolment for the year t. Data were collected from the Lombardy Regional Government; table 3.8 tabulated the values taken by this variable (as well as its components, the expenditure level and the number of inhabitants) for the 11 Lombardy Provinces, together with the "density" of private schools in such Provinces (number of private schools for every 1,000 students).

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[38] Provinces are administrative entities nested into Regions.

Table 3.8. The expenditure for vouchers in the Lombardy Provinces, 2008/09

Province	Inhabitants	Primary Schools			Middle Schools		
		Expend (total) for vouchers (€)	Expend _Inhab.	Private Schools Density (#private schools/inhab. *1,000)	Expend (total) for vouchers (€)	Expend_ Inhab.	Private Schools Density (#private schools/inhab.* 1,000)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Bergamo	1,098,740	2,109,071	1.92	0.58	2,052,122	1.87	0.74
Brescia	1,256,025	1,219,187	0.97	0.41	1,355,943	1.08	0.61
Como	594,988	925,782	1.56	0.48	877,448	1.47	0.74
Cremona	363,606	357,813	0.98	0.52	245,829	0.68	0.32
Lecco	340,167	717,664	2.11	0.57	697,520	2.05	0.85
Lodi	227,655	207,678	0.91	0.50	177,375	0.78	0.48
Milano	4,006,330	7,228,495	1.80	0.64	5,960,591	1.49	0.83
Mantova	415,442	83,240	0.20	0.16	68,104	0.16	0.19
Pavia	548,307	349,715	0.64	0.36	248,515	0.45	0.38
Sondrio	183,169	75,495	0.41	0.12	40,791	0.22	0.18
Varese	883,285	1,210,869	1.37	0.50	1,337,172	1.51	0.75

Notes. The number of inhabitants was extracted by the Regional Statistical Agency. The expenditure for vouchers has been collected from the Regional Government Office for Education. The number of private schools has been crosschecked in the dataset and in the Ministry of Education dataset. The expenditures refer to academic year 2008/09 and not to 2009/10. The use of a lagged measure for this variable (that has been used as an instrument) reduces its potential endogeneity.

As can be seen, there is variance among Provinces in the expenditure for vouchers, so this variance has been exploited to instrument the propensity to attend a private school. It is interesting to note that variance exists in several dimensions: across Provinces – with some of them attracted higher proportion of expenditures (net of the number of inhabitants), and across grades – with less intensity of the expenditure at grade 6. Moreover, the density of private schools shows a relevant variance, which seems also related to the instrument. The figure 3.14 plots one variable against the other, and a clear upward slope is detectable. However, good correlations have been found among the instrument, the density of private schools and the share of students enrolled in private schools, by Province (table 3.9).

Figure 3.14. The relationship between
the instrument (expenditures per vouchers / #inhabitants) and the density of private schools, by Province
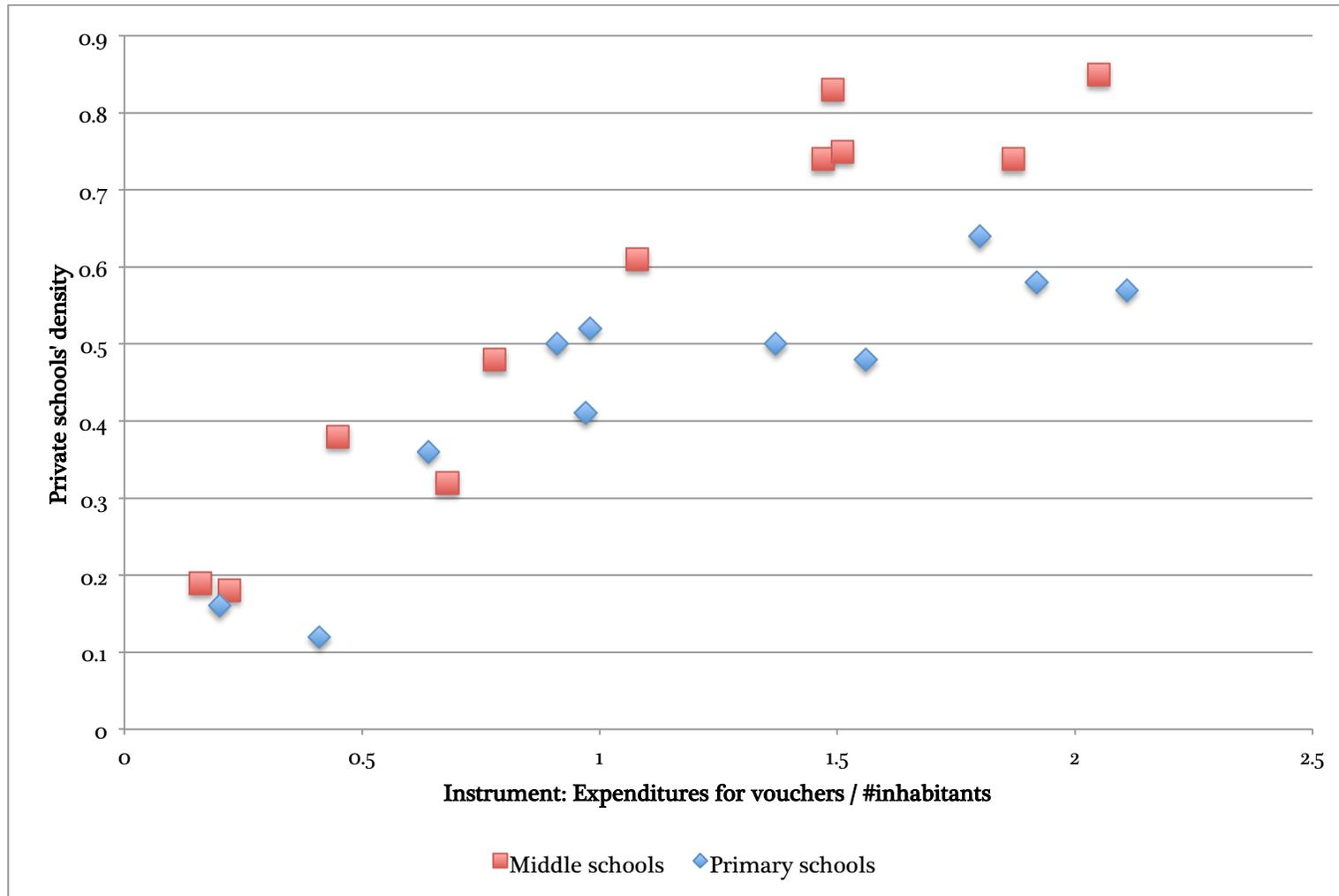
Table 3.9. Figures about the instrument, the density of private schools and the share of students enrolled in private schools

	Primary schools			Middle schools		
Province	% enrolled in private schools	Instrument	Private schools' density	% enrolled in private schools	Instrument	Private schools' density
	(1)	(2)	(3)	(4)	(5)	(6)
BG	0.10	1.92	0.58	0.12	1.87	0.74
BS	0.07	0.97	0.41	0.08	1.08	0.61
CO	0.07	1.56	0.48	0.10	1.47	0.74
CR	0.08	0.98	0.52	0.05	0.68	0.32
LC	0.10	2.11	0.57	0.14	2.05	0.85
LO	0.09	0.91	0.50	0.05	0.78	0.48
MI	0.11	1.80	0.64	0.11	1.49	0.83
MN	0.01	0.20	0.16	0.01	0.16	0.19
PV	0.05	0.64	0.36	0.04	0.45	0.38
SO	0.01	0.41	0.12	0.01	0.22	0.18
VA	0.08	1.37	0.50	0.12	1.51	0.75
Correlations	(1)	(2)	(3)	(4)	(5)	(6)
(1)	1.000					
(2)	**0.882**	1.000				
(3)	**0.986**	**0.866**	1.000			
(4)	0.845	0.955	0.828	1.000		
(5)	0.840	0.975	0.814	**0.986**	1.000	
(6)	0.846	0.933	0.828	**0.977**	**0.958**	1.000

Notes: in bold, the relevant correlations (by grade). Data about the share of schools enrolled in private schools were crosschecked between our dataset and the data from the Ministry of Education. See table 3.5 for other notes.

After the theoretical justification of our instrument, it has been tested whether it is relevant from an empirical point of view. In "first-stage" regressions, all values of the statistic related to the instrument are above the critical value of 10 (Staiger & Stock, 1997), pointing to a stronger relevance of our instrument.[39] It has been also tested a different version of the instrument, namely the expenditures for voucher divided by the number of students (by Province), but its explanatory power is not statistically significant in first-stage equations (z-values <10); the suspect is that the original instrument is preferable as it is more exogenous to the context of the analyses (results in Annex A1).

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[39] Stock et al. (2002) show a table (p. 522) in which they provide critical values of first stage F statistic to detect weak instruments in relation to the number of instruments employed to instrument one endogenous variable. In this case the critical value is 8.96 because Wald tests in first-stage regressions are performed on one instrument. However, such critical values rely on the assumption of homoskedastic serially uncorrelated errors. Conversely, the estimation is robust to heteroskedasticity and autocorrelation among residuals.

3.6   Results

The results are presented in three different subsections. The first contains the (average) estimated performances' differentials between public and private schools for the whole students' population of the Lombardy Region. The second and third sections deal with our intuition that the private school effect can be heterogeneous, depending on some relevant students' characteristics (like citizenship, location in urban/non-urban area, socio-economic background). Given the arguments described in the previous section, the preferred estimations are those based on the IV approach, and much of the discussion relies on these. However, with the aim of providing a wider picture of the results, also OLS results are reported. In general, OLS estimations are biased, as they did not consier self-selection of students in private schools; as expected, when controlling for this through the adequate IV approach, the results change significantly – and IV results are considered reliable.

All tables in this section are structured as follows. They are divided in two parts (panels): the first panel (A) contains results from regressions that include student-level variables only (that is, OLS and IV regressions include only student-level data among the regressors), while the second panel (B) includes also school-level variables. The organization of the tables makes it easier to consider "raw" effects in panels A, and "net" effects in panels B, as in the latter compositional variables of schools (i.e. their students' average socio-economic background) are taken explicitly into account. Only the Average Treatment on Treated (ATT) effect of attending a private school is reported. ATT coefficients are reported with their t-values (z when adequate). The regressions, when necessary, have standard errors adjusted at school/class level for considering the clustered nature of data. General robustness checks are provided to test the reliability of the results: (i) the use of an alternative instrument (Annex A1), and (ii) the substitution of ESCS at class level with ESCS at school level (Annex A2). "Beta coefficients" are reported, which are calculated by standardizing variables to have their variances equal to 1. This is the most common way to report results, as the magnitude of the effect can be easily interpreted as how many standard deviations a dependent variable (in this case, test score) will change, per standard deviation increase in the independent variable (in this case, attending a private school). Lastly, it is important to point out that in some elaborations some observations are missing, given that observations with missing values in one or more of the variables are excluded. However, a check for potential differences between population and sample has been done (namely, the distribution across Provinces, and the proportion of students attending private schools), and chi-square tests reveal that the sample

does not lose the ability to represent the original population (results are available upon request).

3.6.1 Comparing the performances of private and public schools: a first glance

Table 3.10 reports the estimated effect of attending a private school at grade 5 (primary schools). The first column for both Reading and Math scores reports a negative coefficient, thus suggesting that attending a private school has a negative effect on students' outcome. This result seems in line with previous studies about Italy. IV estimates, however, reports negative coefficients that are not statistically significant (Panel B); the interpretation is that Panel A indicates a compositional effect. Some explanation is needed here. Along all the paper, the estimations in which student-level variables only are used have been separated from those where we also included school-level variables. In the IV approach case, it means that the second-stage regression (that in which the predicted probability to attend a private school is among covariates) includes student-level variables in Panel A, and both student and school-level variables in Panel B[40]. As school-level variables include information about compositional effects (i.e. the students' average socioeconomic background), a difference in the estimated effect of attending a private school between Panel A and B can be attributed to the explanatory power captured by school variables – others than the "treatment" private-school effect. In this case of reading scores, for instance, the second stage regression with school-level covariates shows that the average ESCS (measured at class level) has a negative impact on students' achievement; so that the regression without such variable (panel A) attributed this negative effect to the dummy "Private".

Overall, the results for grade 5 show no "private school effect" for reading and math scores; potential explanations for this finding are discussed in the next section. Table 3.11 reports the estimated effect of attending a private school at grade 6 (middle schools). The first column for both Reading and Math scores reports the well-known negative coefficient. While IV results deriving from regressions with student-level variables only evidenced a positive effect of private (even statistically significant for Math, and equal to 0.18 sd, which is pretty high), when including school-level compositional variables such effect disappears. The interpretation is that the advantages related to attending private schools actually masked a compositional effect of these schools (in terms of better socio-economic average conditions).

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[40] However, the probability to attend a private school is always computed with reference to student-level variables only plus the instrument.

Table 3.10. The impact of attending a private school:

Primary schools (grade 5)

	Reading		Math	
Panel A: student-level characteristics				
	(1) OLS	(2) IV	(3) OLS	(4) IV
ATT	-0.1288***	-0.2857***	-.0945***	-0.2595***
t	-10.33	-	-7.58	-
z	-	-3.39	-	-3.07
Panel B: student and school-level characteristics				
	Reading		Math	
	(1) OLS	(2) IV	(3) OLS	(4) IV
ATT	-0.1945***	-0.2043	-0.1036***	-0.2526
t	-4.74	-	-2.85	-
z	-	-1.47	-	-1.59

Notes: ***, ** and * indicate $p < 0.01$, $p < 0.05$ $p < 0.10$, respectively. In columns 1 and 3, estimates are derived from OLS regressions. In Panel B, robust standard errors are clustered at school-level. In columns 2 and 4, estimates are derived from IV regressions with robust clustered standard errors at school-level. At the first step, the predicted probability to attend a private school is derived through probit estimation with robust standard errors. At the second step, standard errors are bootstrapped (200 replications).

Table 3.11. The impact of attending a private school:

Middle schools (grade 6)

	Reading		Math	
Panel A: student-level characteristics				
	(1) OLS	(2) IV	(3) OLS	(4) IV
ATT	-0.0276**	0.0631	-0.0495***	0.1830**
t	-2.51	-	-4.06	-
z	-	0.99	-	2.54
Panel B: student and school-level characteristics				
	Reading		Math	
	(1) OLS	(2) IV	(3) OLS	(4) IV
ATT	-0.1649***	-0.0978	-0.1679***	0.0648
t	-5.99	-	-4.79	-
z	-	-0.87	-	0.54

Notes: ***, ** and * indicate $p < 0.01$, $p < 0.05$ $p < 0.10$, respectively. In columns 1 and 3, estimates are derived from OLS regressions. In Panel B, robust standard errors are clustered at school-level. In columns 2 and 4, estimates are derived from IV regressions with robust clustered standard errors at school-level. At the first step, the predicted probability to attend a private school is derived through probit estimation with robust standard errors. At the second step, standard errors are bootstrapped (200 replications).

To sum up this first part of results, it seems to be no evidence of a positive "private school effect". However, results from previous studies about Italian students, which found a negative effect associated with attendance of private schooling, are neither confirmed.

3.6.2 More on the "private school" effect: heterogeneity

The intuition is that the effect of attending a private school can be differentiated across subgroups. More specifically, it can be tested whether ATT is different in case of (i) school's location (non-urban/urban area), (ii) citizenship (Italian; immigrant), and (iii) socioeconomic status (ESCS index below/above the mean, which is equal to 0).

The results for primary schools show no particular patterns (tables 3.12a,b; 3.13a,b; 3.14a,b). Generally, the OLS estimations report negative coefficients related to the private school effect, but as they are biased no comments are provided for them.

Table 3.12. The impact of attending a private school:
Primary schools (grade 5)

a. Urban schools

	Panel A: student-level characteristics			
	Reading		Math	
	(1) OLS	(2) IV	(3) OLS	(4) IV
ATT	-0.0577***	-0.2885	-0.1023***	-0.0969
t	-3.25	-	-5.44	-
z	-	-1.56	-	-0.52
	Panel B: student and school-level characteristics			
	Reading		Math	
	(1) OLS	(2) IV	(3) OLS	(4) IV
ATT	-0.1398***	-0.2398	-0.1284**	-0.0850
t	-2.83	-	-2.52	-
z	-	-0.75	-	-0.23

b. Non-urban schools

	Panel A: student-level characteristics			
	Reading		Math	
	(1) OLS	(2) IV	(3) OLS	(4) IV
ATT	-0.1869***	-0.6023***	-0.0798***	0.1018
t	-10.66	-	-4.77	-
z	-	-4.51	-	0.70
	Panel B: student and school-level characteristics			
	Reading		Math	
	(1) OLS	(2) IV	(3) OLS	(4) IV
ATT	-0.2450***	-0.4374	-0.0815	0.0086
t	-3.95	-	-1.60	-
z	-	-1.57	-	0.03

Notes: ***, ** and * indicate $p < 0.01$, $p < 0.05$ $p < 0.10$, respectively. In columns 1 and 3, estimates are derived from OLS regressions. In Panel B, robust standard errors are clustered at school-level. In columns 2 and 4, estimates are derived from IV regressions with robust clustered standard errors at school-level. At the first step, the predicted probability to attend a private school is derived through probit estimation with robust standard errors. At the second step, standard errors are bootstrapped (200 replications).

Table 3.13. The impact of attending a private school:

Primary schools (grade 5)

a. Italian students

	Panel A: student-level characteristics				
	Reading			Math	
	(1) OLS	(2) IV	(3) OLS		(4) IV
ATT	-0.1348***	-0.2801***	-0.0982***		-0.1398
t	-10.66		-7.70		-
z	-	-2.95	-		-1.41
	Panel B: student and school-level characteristics				
	Reading			Math	
	(1) OLS	(2) IV	(3) OLS		(4) IV
ATT	-0.1894***	-0.1041	-0.1078***		-0.1036
t	-4.52	-	-2.87		-
z	-	-0.70	-		-0.58

b. Immigrant students

	Panel A: student-level characteristics				
	Reading			Math	
	(1) OLS	(2) IV	(3) OLS		(4) IV
ATT	0.0755	-0.5375	0.0719		-0.9445**
t	1.06	-	1.14		-
z	-	-1.28	-		-2.11
	Panel B: student and school-level characteristics				
	Reading			Math	
	(1) OLS	(2) IV	(3) OLS		(4) IV
ATT	-0.0237	-0.9184*	0.0491		-1.1745**
t	-0.20	-	0.64		-
z	-	-1.65	-		-2.14

Notes: ***, ** and * indicate $p < 0.01$, $p < 0.05$ $p < 0.10$, respectively. In columns 1 and 3, estimates are derived from OLS regressions. In Panel B, robust standard errors are clustered at school-level. In columns 2 and 4, estimates are derived from IV regressions with robust clustered standard errors at school-level. At the first step, the predicted probability to attend a private school is derived through probit estimation with robust standard errors. At the second step, standard errors are bootstrapped (200 replications).

Table 3.14. The impact of attending a private school: Primary schools (grade 5)

a. Students with ESCS<0

	Panel A: student-level characteristics			
	Reading		Math	
	(1) OLS	(2) IV	(3) OLS	(4) IV
ATT	-0.0822***	0.5607***	0.0046	0.1187
t	-3.26		0.19	-
z	-	2.29	-	0.43
	Panel B: student and school-level characteristics			
	Reading		Math	
	(1) OLS	(2) IV	(3) OLS	(4) IV
ATT	-0.1807***	0.7074*	-0.0179	0.0626
t	-3.35	-	-0.38	-
z	-	1.81	-	0.16

b. Students with ESCS>0

	Panel A: student-level characteristics			
	Reading		Math	
	(1) OLS	(2) IV	(3) OLS	(4) IV
ATT	-0.1377***	-0.0013	-0.1253***	0.1032
t	-9.62	-	-8.58	-
z	-	-0.01	-	0.79
	Panel B: student and school-level characteristics			
	Reading		Math	
	(1) OLS	(2) IV	(3) OLS	(4) IV
ATT	-0.1830***	0.1622	-0.1340***	0.0726
t	-4.32	-	-3.40	-
z	-	0.79	-	0.29

Notes: ***, ** and * indicate $p < 0.01$, $p < 0.05$ $p < 0.10$, respectively. In columns 1 and 3, estimates are derived from OLS regressions. In Panel B, robust standard errors are clustered at school-level. In columns 2 and 4, estimates are derived from IV regressions with robust clustered standard errors at school-level. At the first step, the predicted probability to attend a private school is derived through probit estimation with robust standard errors. At the second step, standard errors are bootstrapped (200 replications).

The remarkable result is that IV estimates suggest that attending a private school is statistically associated with lower performances for immigrant students. Here, the statistical significance is still not high (10% level for Reading scores, 5% for Math) but the magnitude is really high (ranging from 0.9 to 1.2 s.d.). Lastly, heterogenous effects for reading are detected in the two separate groups of "relatively rich" and "relatively poor" students (ESCS indicator above/below the mean, which is equal to 0): attending a private school seems beneficial for less advantaged students, and the magnitude of the effect is large (around 0.7 s.d.).

Then, the analysis focuses on middle schools. Tables 3.15a,b contain the estimates for the schools located in urban and non-urban area. It is important to recall that the former refers to the location in the leading city of the Province, so there are 11 urban areas, and 11 corresponding non-urban. Here, it turns out that attending a private school is beneficial for students in non-urban area; while Panel A suggests that part of this effect is driven by compositional effects, IV estimates are still positive after controlling for school-level factors for math scores. The effect is quite large (0.42 s.d.) compared with other school-level variables (e.g. the percentage of foreign students, that is -0.33 s.d.) and even individual characteristics, like ESCS (0.24 s.d.).

The results for the immigrants and Italian students are separately presented in the table 3.16a,b. In this case, the findings are less intriguing, as there are not statistically significant results (apart from the likely biased OLS negative coefficients).

Lastly, the picture that emerges from the comparison between students who are relatively well-off (ESCS>0) and those who are in a relative socio-economic difficulty (ESCS<0) reveals some interesting patterns (table 3.17a,b). First, attending a private school is not associated with higher performances for the less favourite students. This result is in contrast with previous literature, especially in the US, which found benefits for students from poorest families. Our results suggest quite the contrary, that is more favoured students (ESCS>0) do obtain a relative advantage from attending a private school. This latter effect seems not to be driven exclusively by compositional characteristics of the school (see that it is also likely to exist, panel A) but it is an independent effect when considering math score as output. Indeed, the ATT estimate is about 0.37 s.d. net of school level variables; the magnitude of the effect is high (in comparison with the percentage of foreign students, that is -0.11 s.d., even not statistically significant; and ESCS, which is equal to 0.16 s.d.) and it is statistically significant at 5% level.

Table 3.15. The impact of attending a private school: Middle schools (grade 6)

a. Urban schools

	Panel A: student-level characteristics			
	Reading		Math	
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	-0.0330*	-0.2325	-0.0416**	0.0121
t	-1.85	-	-2.11	-
z	-	-1.46	-	0.07
	Panel B: student and school-level characteristics			
	Reading		Math	
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	-0.2184***	-0.3759	-0.1652**	-0.0003
t	-4.46	-	-2.30	-
z	-	-1.37	-	-0.00

B. Non-urban Schools

	Panel A: student-level characteristics			
	Reading		Math	
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	-0.0232*	0.2989***	-0.0513***	0.6081***
t	-1.65	-	-3.30	-
z	-	3.34	-	6.94
	Panel B: student and school-level characteristics			
	Reading		Math	
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	-0.1170***	0.1037	-0.1512***	0.4216***
t	-3.56	-	-4.02	-
z	-	0.74	-	2.66

Notes: ***, ** and * indicate p < 0.01, p < 0.05 p < 0.10, respectively. In columns 1 and 3, estimates are derived from OLS regressions. In Panel B, robust standard errors are clustered at school-level. In columns 2 and 4, estimates are derived from IV regressions with robust clustered standard errors at school-level. At the first step, the predicted probability to attend a private school is derived through probit estimation with robust standard errors. At the second step, standard errors are bootstrapped (200 replications).

Table 3.16. The impact of attending a private school: Middle schools (grade 6)

a. Italian students

	Reading		Math	
Panel A: student-level characteristics				
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	-0.0381***	0.0626	-0.0591***	0.1508*
t	-3.42	-	-4.76	-
z	-	0.88	-	1.88
Panel B: student and school-level characteristics				
	Reading		Math	
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	-0.1562***	-0.0615	-0.1781***	0.0476
t	-5.57	-	-4.83	-
z	-	-0.52	-	0.31

b. Immigrant students

	Reading		Math	
Panel A: student characteristics				
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ATT	0.3401***	0.0716	0.2077***	0.0050
t	5.02	-	3.16	-
z	-	0.16	-	0.01
Panel B: student and school characteristics				
	Reading		Math	
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
	OLS	IV	OLS	IV
ATT	0.0697	-0.5611	0.0658	-0.3766
t	0.78	-	0.90	-
z	-	-1.19	-	-0.91

Notes: ***, ** and * indicate p < 0.01, p < 0.05 p < 0.10, respectively. In columns 1 and 3, estimates are derived from OLS regressions. In Panel B, robust standard errors are clustered at school-level. In columns 2 and 4, estimates are derived from IV regressions with robust clustered standard errors at school-level. At the first step, the predicted probability to attend a private school is derived through probit estimation with robust standard errors. At the second step, standard errors are bootstrapped (200 replications).

Table 3.17. The impact of attending a private school: Middle schools (grade 6)

a. Students with ESCS<0

	Panel A: student-level characteristics			
	Reading		Math	
	(1) OLS	(2) IV	(3) OLS	(4) IV
ATT	0.1004***	0.0488	0.0742***	0.1675**
t	4.34	-	3.02	-
z	-	0.83	-	2.42
	Panel B: student and school-level characteristics			
	Reading		Math	
	(1) OLS	(2) IV	(3) OLS	(4) IV
ATT	-0.0671	-0.1091	-0.0648	0.0520
t	-1.64	-	-1.56	-
z	-	-1.04	-	0.46

b. Students with ESCS>0

	Panel A: student characteristics			
	Reading		Math	
	(1) OLS	(2) IV	(3) OLS	(4) IV
ATT	-0.0597***	0.2891***	-0.0820***	0.4076***
t	-4.78	-	-5.84	-
z	-	3.32	-	4.03
	Panel B: student and school characteristics			
	Reading		Math	
	(1) OLS	(2) IV	(3) OLS	(4) IV
ATT	-0.1759***	0.2116	-0.1970***	0.3778**
t	-6.14	-	-5.04	-
z	-	1.46	-	2.04

Notes: ***, ** and * indicate p < 0.01, p < 0.05 p < 0.10, respectively. In columns 1 and 3, estimates are derived from OLS regressions. In Panel B, robust standard errors are clustered at school-level. In columns 2 and 4, estimates are derived from IV regressions with robust clustered standard errors at school-level. At the first step, the predicted probability to attend a private school is derived through probit estimation with robust standard errors. At the second step, standard errors are bootstrapped (200 replications).

Overall, the picture that emerges from analyses on primary schools is that heterogeneity of private schooling does exist: it has been found that immigrant students perform worse in private than in public schools. The magnitude of these negative effects is relevant, even huge for immigrants (ranging from 0.9 to 1.1 s.d.). At the same time, private schooling is related to higher reading performances for disadvantaged students. From the findings about middle schools, it could be also that there is a quite heterogeneous effect of private schooling on students' outcomes (achievement), but with a different direction. Indeed, our findings reveal that attending a private school is beneficial on math

scores (i) for students enrolled in schools located in non-urban areas, or (ii) for those with higher ESCS (>0). The magnitude of these effects is also high (between 0.37 and 0.42 s.d.) and statistically significant. Given these results, it is difficult to build a unitary picture of the "private school effect"; rather, it makes sense to consider heterogeneity as the keyword here. While the previous literature about Italian education aimed at concluding that *"(…) private schools appear to play a remedial role (…), they increase the performance of students from rich families, but their value added seems to be the recovery of less brilliant students rather than across-the-board high quality education"* (Bertola & Checchi, 2004; p.97), here it has been provided evidence that the story seems more complex, and that the role of private schooling is likely to be heterogeneous and dependent on differences among students, classes and schools.

3.6.3   More on heterogeneity

Some further analyses have been performed about the different impact associated with the attendance of a private school.

First, the effect for immigrant students have been investigated more in depth, as they represent a particularly important sample for the Italian context. As immigrants suffer some well-known problems in their educational career (related to difficulties in language and worse socio-economic background), it is important to test whether attending a private school could be beneficial for them. While the results from the estimates do not provide any evidence in this direction, a look is given at potential differences between first-generation immigrants (sons of immigrants, born in a foreign country) and second-generation immigrants (sons of immigrants, born in Italy). Table 3.18 reports the results by distinguishing the private school effects for the two groups[41].

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[41] IV estimates suffer the low powerfulness of the instrument in the first-stage (z-values <10), but it may be due to the small number of foreign students so this has not been considered as a major problem.

Table 3.18. The impact of attending a private school:

First-generation and second-generation immigrant students

	Reading	Math
	IV	IV
Primary schools (grade 5)		
1st generation immigrant students	-2.2089* (-1.70)	-2.0506* (-1.79)
2nd generation immigrant students	-0.3655 (-0.70)	-0.6469 (-1.26)
Middle schools (grade 6)		
1st generation immigrant students	-1.2238 (-1.17)	-0.8773 (-1.07)
2nd generation immigrant students	0.9050* (1.79)	0.3035 (0.57)

Notes: ***, ** and * indicate $p < 0.01$, $p < 0.05$ $p < 0.10$, respectively. Estimates are derived from IV regressions with robust clustered standard errors at school-level. At the first step, the predicted probability to attend a private school is derived through probit estimation with robust standard errors. At the second step, standard errors are bootstrapped (200 replications).

The results are interesting as they depict an intriguing story. On one side, the negative effect associated with the attendance of a private school is confirmed for immigrant students at grade 5; however, this effect is confined to first-generation immigrants, suggesting that they receive more attention into public schools, which educate every year a large number of immigrant students so they can benefit from experience with this group of special-needs students. On the other side, private school effect is positive (for reading) for second-generation immigrants at grade 6; this result probably suggests that these students, who are better integrated in the society, actually benefit from private schooling. Overall, the results about private school effects for immigrant students reveal another source of heterogeneity, which is related to the different status of these students – namely the "degree of integration" into the society; such differentiation should be borne in mind by policy-makers when defining interventions for improving the educational performance of immigrant students.

Second, we considered the potential heterogeneity of private schooling effect at different points of the socioeconomic background's (ESCS) distribution. For this purpose, we replicated our IV estimates in the following subgroups of students, according to their ESCS's percentiles: 90th, 75/90th, 50/75th, 25/50th, 10/25th, 10th. It is important to note here that the meaning of the results, and their interpretation, is

different from what has been analysed in the previous section, when students with ESCS higher or lower than zero were compared. Indeed, in the latter case, the results reveal whether private schooling has a different effect on (relatively) rich and poor students, considering their absolute socioeconomic condition. Instead, here the aim is to understand whether is there a private school effect for students at different point of the ESCS distribution; this information is useful as the ESCS distributions between students attending public and private schools are significantly different. By looking the figure 2.11 (panels a,b), it could be noted that ESCS mean is around 0 for students attending public schools, while it is around 0.7 for students attending private counterparts. Consequently, the results here show whether (relatively) richer students attending private schools obtain higher results than students attending public schools in different percentiles of the ESCS distribution. Table 3.19 reports these estimates.

The findings interestingly reveal that, when considering grade 5 (primary schools), there is a positive effect of private schools on reading achievement, for the better-off students (>90th percentile, and 50/75th percentile). These results seem contradictory with the baseline figures reported in table 3.14, which underlined a positive effect for worse-off students (ESCS<0). However, the number of students attending private schools with a ESCS<0 is very low, so baseline results can be highly determined by this skewed distribution. Nevertheless estimates at the lowest percentiles of the ESCS distribution have a low statistical power because of the small number of students from disadvantaged background attending private schools, but they report a positive effect (albeit not statistically significant) also on students between 10th and 50th percentile.

Turning to grade 6 (middle schools), there is a positive and statistically significant private school effect on math achievement, almost on the entire distribution (but not at the extremes), as well as positive effects at the some percentiles for reading. In general, it looks like that private schooling exerts a positive effect on students' achievement at grade 6, even though such effect is generally higher at lower points of the ESCS distribution. On the other side, the only positive effect at grade 5 is limited to reading at the higher points of the distribution (>50th percentile).

Once again, the main message from this further analysis is that private schooling's effect is very heterogeneous.

3.6.4. The hypothesis of compositional effect

Before concluding this section, it is worth to consider the possibility of some composition effects at school level. This possibility was investigated through Propensity Score Matching (PSM). Indeed, a potential drawback of OLS and IV estimations is the assumed uniformity of the treatment (i.e. the private schooling)

effect across the distribution of the variables included in the model. The basic idea behind the application of PSM procedure is to estimate the probability to attend a private school, through a logit or a probit model. Then, the effect of private schooling on students' achievement are estimated after having matched each student enrolled in private schools with one or more students enrolled in public schools.

In doing so, a common support has to be imposed. More specifically, for each group of students (students attending private schools and those enrolled in public ones), it has been looked at the overlap in the distributions of the estimated probabilities to attend private schools; if in some regions of the two distributions of students enrolled in private schools and matched students attending public schools there is no overlap, it is not possible to identify and consistently estimate the treatment effect of private schooling in those regions.

Then, whether using replacement of observations or not, has to be chosen, which in this analysis was the matching-with-replacement. As regards this latter issue, balancing tests suggested by Smith & Todd (2005) were performed on the variables included in the PSM procedure. These tests look at the standardized bias for each variable included in the PSM procedure, i.e. the difference in means between students enrolled in private schools and matched students enrolled in public schools divided by the average variances of the focal variable for both groups of students. The idea behind these balancing tests is that both groups of students with the same predicted probability to attend a private school must show the same distribution of variables included in PSM procedure. In order to investigate the presence of composition effect at school level, also school variables (such as pupil per class, ESCS at school level, immigrant and disable students at school level) were used to match students. Unfortunately, once school variables are added, these balancing tests are not satisfactory anymore. In other words, private and public schools are so different that prevent to match students. Therefore, it was not possible to investigate, in a reliable way, compositional effects.

Table 3.19. The impact of attending a private school: Results for different points of the ESCS distribution

	Reading	Math
	IV	IV
Primary schools		
Mostly advantaged students (ESCS >= 90th percentile)	0.4828* (1.84)	0.1972 (0.67)
Advantaged students (75th percentile <= ESCS < 90th percentile)	-0.0056 (-0.02)	0.1075 (0.28)
Average students (50th percentile <= ESCS < 75th percentile)	0.7737*** (2.58)	0.4617 (1.25)
Average students (25th percentile <= ESCS < 50th percentile)	*0.5116 (0.99)*	*-0.2744 (-0.56)*
Disadvantaged students (10th percentile <= ESCS < 25th percentile)	*0.6056 (0.56)*	*-1.1497 (-0.99)*
Mostly disadvantaged students (ESCS < 10th percentile)	*-0.8956 (-0.50)*	*-3.6958*** (-2.73)*
Middle schools		
Mostly advantaged students (ESCS >= 90th percentile)	0.1051 (0.45)	0.2927 (1.01)
Advantaged students (75th percentile <= ESCS < 90th percentile)	0.3576* (1.85)	0.5010** (2.40)
Average students (50th percentile <= ESCS < 75th percentile)	0.3325 (1.39)	0.4899** (1.96)
Average students (25th percentile <= ESCS < 50th percentile)	1.0174*** (2.74)	1.3928*** (3.76)
Disadvantaged students (10th percentile <= ESCS < 25th percentile)	*1.7364*** (2.95)*	*2.0996*** (3.34)*
Mostly disadvantaged students (ESCS < 10th percentile)	*-1.3526 (-1.08)*	*-0.1413 (-0.13)*

Notes: ***, ** and * indicate p < 0.01, p < 0.05 p < 0.10, respectively. Estimates are derived from IV regressions with robust clustered standard errors at school-level. At the first step, the predicted probability to attend a private school is derived through probit estimation with robust standard errors. At the second step, standard errors are bootstrapped (200 replications). In bold, estimates considered as not robust because of the rule defined by Staiger & Stock (1997).

Table 3.20. The impact of attending a private school: A synthesis of the results

ATT (Average Treatment on Treated) - Private schooling	Grade 5		Grade 6	
	Reading	Math	Reading	Math
Overall effect	no	no	no	no
Heterogeneity (1)				
Urban schools	no	no	no	no
Non-urban schools	no	no	no	+
Italian students	no	no	no	no
Immigrant students	yes/-	yes/-	no	no
Students with ESCS<0	yes/+	no	no	no
Students with ESCS>0	no	no	no	yes/+
Heterogeneity (2)				
1st generation immigrants	yes/-	yes/-	yes/+	no
2nd generation immigrants	no	no	no	no
Mostly advantaged students (ESCS>90th percentile)	no	no	no	no
Advantaged students (75th - 90th percentile)	no	no	yes/+	yes/+
Average students (50th - 75th percentile)	yes/+	no	no	yes/+
Average students (25th - 50th percentile)	n.v.	n.v.	yes/+	yes/+
Disadvantaged students (10th - 25th percentile)	n.v.	n.v.	n.v.	n.v.
Mostly disadvantaged students (ESCS<10th percentile)	n.v.	n.v.	n.v.	n.v.

Legend: no = no statistically significant effect; yes/+: positive and statistically significant effect; yes/-: negative and statistically significant effect; n.v.: not valid estimation.

3.7   Discussion and concluding remarks

The present chapter investigated the relative performance of public and private schools located in an Italian Region, by analysing 74,265 students in 1,050 primary schools (grade 5) and 74,358 students in 900 middle schools (grade 6) – reference year: 2009/10. Employing an IV approach we found that, overall, private schooling attendance is associated with worse academic results in primary-level and better results in middle-level education. The (negative) effects especially hold for foreign students, when considering grade 5, while there is a positive effect for less advantaged students (ESCS<0); the positive effects at grade 6 are for (relatively) better-off students and those attending a non urban-school. These impacts are statistically significant when using math score as output, except for the effect on reading score for students enrolled in non-urban middle private schools. A synthetic and qualitative glance to the results is contained in table 3.20.

The main finding of this research is that the so-called "private school effect" does not exist as a whole, but it is likely to be heterogeneous depending on students, classes and students' characteristics. The investigation of such heterogeneity should become an increasingly important focus when comparing private and public schools.

A key point is also related to the different estimates for primary and middle schools, as there seems to be a positive association between private schooling and performance, for grade 6 and negative for grade 5 (net of heterogeneous effects). With the aim of providing an intuitive preliminary argument towards that objective, the initial distributions of test scores across grades (5/6) and school types (private/public) have been considered. The (kernel) densities of scores are reported in the appendix 3.b (figures 3.b.1 and 3.b.2)[42]. Obviously, it is hard to infer anything robust from simple distributions. Nevertheless, there is an interesting pattern to note in these figures. While for primary schools the distributions of public and private schools' performances almost overlap (with only a small higher peak for the former), when looking to middle-level education the private schools' distribution of test scores seems to be slightly shifted to the right than the public schools' distribution (especially, for math). A potential suggestive interpretation should be that there are no "raw" differences in test score between private and public primary schools, so that as the former have better background, they are relatively worse than the latter all other else equal. On the contrary, private middle schools outperform their public counterparts – as the distribution shown – but this effect is lower when the confounding compositional variables are equalized. A related story is that public schools' quality is higher at primary than at middle-level of education, so that

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[42] Figure 3.b.3 reports the same distributions by means of boxplots.

the relative performance of private schools (which in this interpretation is similar in the two grades) results higher for middle and lower for primary-level education.

Another specific point related to differences across grades is that the results for primary schools are based on comparison among students who attended those schools for five years; while students at grade 6 attended their middle school only for one year. As we cannot control for prior achievement – this is unavailable information – this must be kept in mind, as estimations of "private school effects" at grade 6 can be affected by unobservable differences in the type of education attended at primary education-level. The lack of prior achievement is, however, a minor problem if a positive relationship between a student's SES and academic results can be trust; if it is the case (as demonstrated in this paper and in the literature), the (available) indicator of SES partly contains information also about previous students' performances.

Even after having obtained credible results about the effects of private schooling on students' achievement, a key question remains unanswered: why do private schools influence (positively or negatively) the performance of students? The economic literature provided good pieces of empirical evidences on the direction of the effects, but did not go into deeper explanations of particular school characteristics that "make the difference" – with the exception of the socio-economic composition. This is a limitation of the economics of education in this field, and the present chapter suffers this limitation too. As a direction for future research, we believe that school-level variables included in the empirical analyses should be improved (i.e. should measure more sophisticated schools' processes and features) also through positive contaminations with other disciplines. In this perspective, two streams of the literature appear as particularly promising for potential integration: the "educational effectiveness" approach (Scheerens & Bosker, 1997) and the study of "academic optimism" as a latent concept (a good summary in contained in Hoy, 2012).

The findings of this work have two clear policy consequences. The first is that agencies that are in charge of evaluating schools should consider compositional variables and institution-level factors for "adjusting" their performances. It has been demonstrated in this chapter that simple OLS estimates fail to account for schools' compositional effects. Especially when agencies (or the Ministry) intend using school-level (average) academic results for economic and organisational rewards or punishments, this methodological shortcoming should be born in mind. The second policy implication deals with the provision of information to parents. It is not clear whether the Italian families' perception of private schools is of better or worse quality institutions; in both cases, it is unlikely that such perceptions are based on solid and robust scientific evidence. If it is the case, all the arguments in favour of competition among schools are questionable, as the market mechanism requires as much information as possible for the "clients".

This problem is exacerbated by the fact that scores in standardized tests at school level are confidential, so the citizens cannot access them. Recently, many schools decided to disclosure their score; but as information about school's composition is generally missing, then the result itself is only a (very) partial piece of the true "school effect". This paper demonstrates how this problem is particularly affecting the comparison between private and public schools, and this will affect the families' awareness when making their educational choices.

The political and institutional debate in favour or against the introduction of market mechanisms in the educational system is still open in Italy. Recently, some members of the Government and the Parliament proposed to start a deregulation process in the educational sector, towards a School Based Management approach; if it will happen, robust information about the relative performances of private and public schools will become crucial. The present contribution can be interpreted as a step towards this objective; and the main message is that "private school effect" is likely to be heterogeneous, and it requires broad information, numbers and statistics to be correctly evaluated across grades and different subgroups of students and schools.

Annex 3.a. Robustness check: alternative instrument

Table 3.a.1 Estimates when using expenditures:#students (€)

	Reading		Math	
	IV	z	IV	z
Primary schools				
Overall effect	-0.5038*** (-3.41)	*2.26*	-0.5459*** (-3.67)	*2.26*
Urban schools	-0.7111* (-1.74)	*0.05*	0.0058 (0.02)	*0.05*
Rural schools	-1.5686*** (-5.74)	*2.71*	-0.8368*** (-3.31)	*2.71*
Italian students	-0.5953*** (-3.48)	*1.71*	-0.5700*** (-2.91)	*1.71*
Immigrant students	-0.9419* (-1.65)	*2.42*	-0.9761* (-1.87)	*2.42*
Advantaged students (ESCS>0)	0.0682 (0.20)	*4.56*	-0.0449 (-0.14)	*4.56*
Disadvantaged students (ESCS<0)	0.0190 (0.05)	*-2.44*	-0.7732** (-2.01)	*-2.44*
Middle schools				
Overall effect	-0.5054*** (-4.26)	*7.57*	-0.4067*** (-3.39)	*7.57*
Urban schools	-0.7441** (-2.54)	*-4.13*	0.0169 (0.05)	*-4.13*
Rural schools	-0.6342*** (-3.52)	*12.11*	-0.2039 (-0.99)	*12.11*
Italian students	-0.7677*** (-4.71)	*7.40*	-0.8649*** (-5.03)	*7.40*
Immigrant students	-0.5918 (-1.19)	*1.46*	-0.3170 (-0.81)	*1.46*
Advantaged students (ESCS>0)	0.2363 (0.83)	*5.27*	0.2782 (0.98)	*5.27*
Disadvantaged students (ESCS<0)	0.4762 (1.17)	*5.86*	0.6745 (1.61)	*5.86*

Notes: ***, ** and * indicate $p < 0.01$, $p < 0.05$ $p < 0.10$, respectively. Estimates are derived from IV regressions with robust clustered standard errors at school-level. At the first step, the predicted probability to attend a private school is derived through probit estimation with robust standard errors. At the second step, standard errors are bootstrapped (200 replications). In italics, we reported values for which the Staiger & Stock (1997) rule is not respected (z-value <0); it is important to note that almost all elaborations do not respect such rule, so they must be considered as not valid. Standard errors reported among brackets

Annex 3.b. Robustness checks: using ESCS-school instead of ESCS-class

Table 3.b.1. Estimates when including ESCS-school among controls (instead of ESCS-class)

	Reading		Math	
	IV	z	IV	z
Primary schools				
Overall effect	-0.1364 (-0.90)	20.27	-0.1871 (-1.13)	20.27
Urban schools	-0.1280 (-0.39)	10.11	0.0208 (0.05)	10.11
Rural schools	-0.3994 (-1.50)	17.68	0.0447 (0.18)	17.68
Italian students	-0.0210 (-0.13)	20.17	-0.0164 (-0.09)	20.17
Immigrant students	-0.8714 (-1.53)	*2.88*	**-1.1771** (-2.28)	*2.88*
Advantaged students (ESCS>0)	0.2031 (0.95)	18.68	0.1098 (0.48)	18.68
Disadvantaged students (ESCS<0)	**0.6578* (1.65)**	*9.10*	0.0093 (0.03)	*9.10*
Middle schools				
Overall effect	-0.0547 (-0.49)	30.84	0.1172 (1.01)	30.84
Urban schools	-0.2040 (-0.77)	10.27	0.1732 (0.53)	10.27
Rural schools	0.0952 (0.68)	29.78	**0.4085*** (2.63)**	29.78
Italian students	-0.0138 (-0.11)	30.91	0.1075 (0.69)	30.91
Immigrant students	-0.5921 (-1.26)	*3.06*	-0.3840 (-0.94)	*3.06*
Advantaged students (ESCS>0)	0.2185 (1.58)	25.20	**0.3870** (2.01)**	25.20
Disadvantaged students (ESCS<0)	**1.2444*** (4.39)**	17.81	**1.6680*** (5.18)**	17.81

Notes: ***, ** and * indicate p < 0.01, p < 0.05 p < 0.10, respectively. Estimates are derived from IV regressions with robust clustered standard errors at school-level. At the first step, the predicted probability to attend a private school is derived through probit estimation with robust standard errors. At the second step, standard errors are bootstrapped (200 replications). In italics, we reported values for which the Staiger & Stock (1997) rule is not respected (z-value <0). Standard errors reported among brackets.

Annex 3.c. Test scores' distributions, by subject, grade, school-type

Figure 3.c.1. Test scores' distribution (reading), by grade
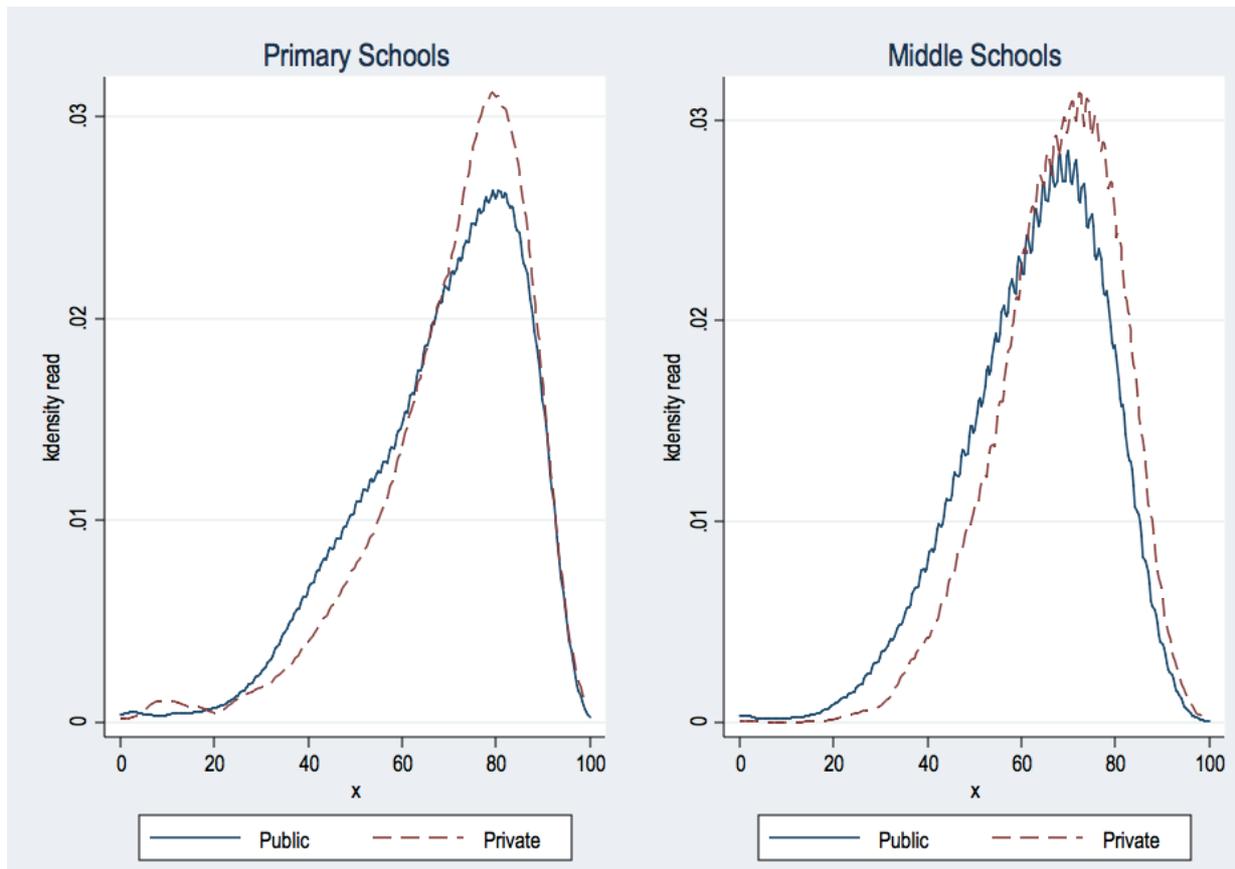
Figure 3.c.2. Test scores' distribution (math), by grade
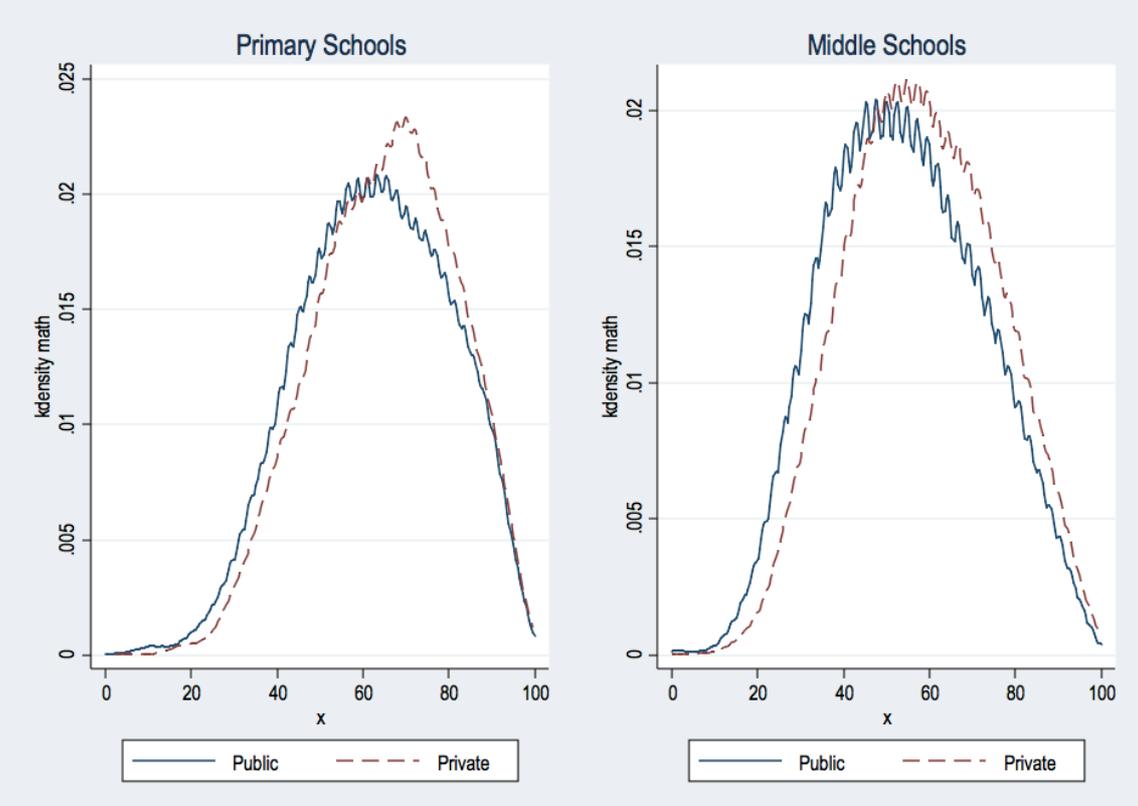
Figure 3.c.3. Test scores' distribution, by grade and type (public/private), through boxplots
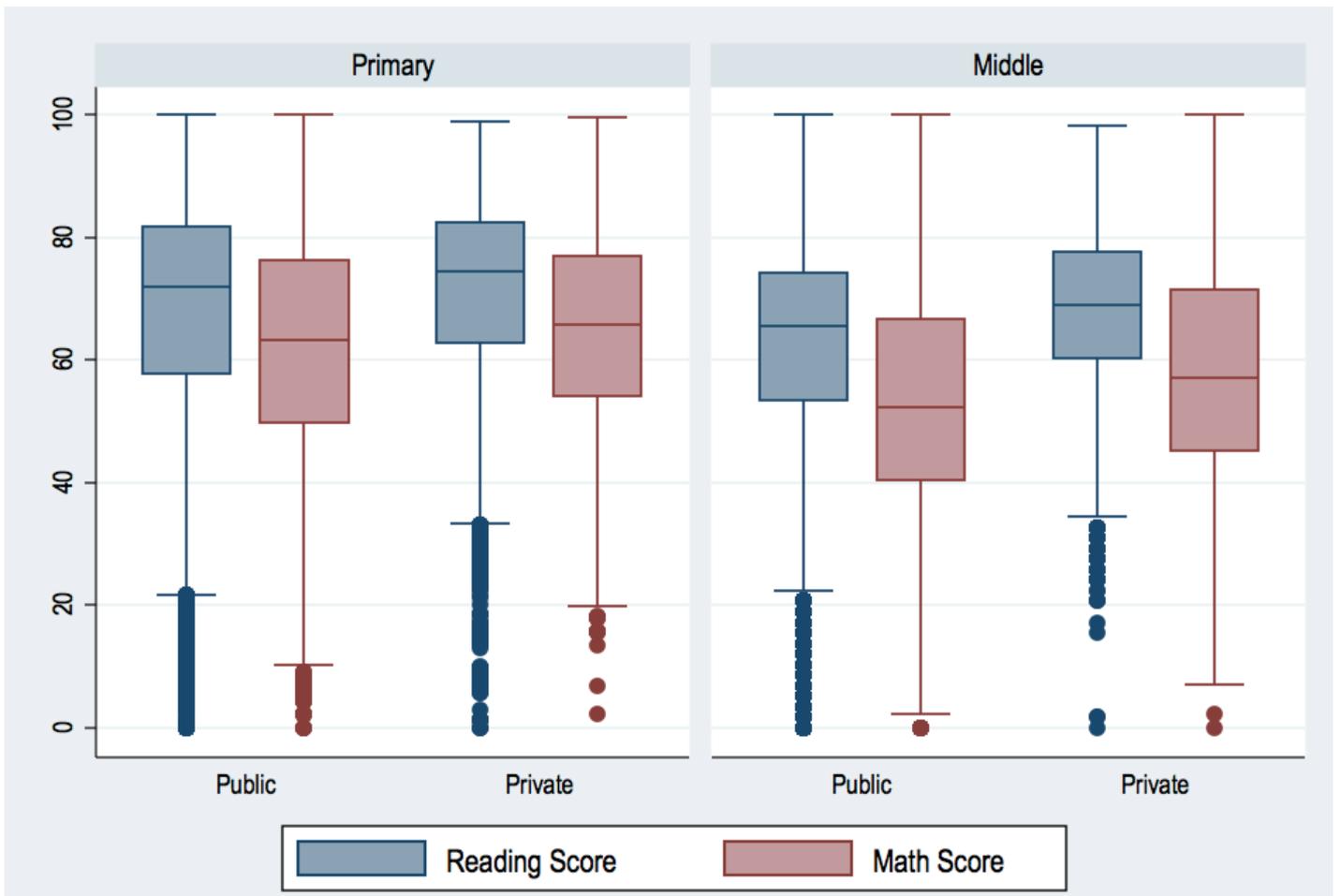
4. The paradox of the Italian case: a centralized system versus a diversified autonomy among schools

Abstract. The aim of this chapter is to examine the difference between formal and actual school autonomy in the Italian educational system. The Italian case is characterised by low levels of school autonomy. It is interesting to consider whether heterogeneity of patterns is possible in this context. A description of this heterogeneity is provided through archetypes.

The methodology is a qualitative survey conducted among school principals. A non-standardised questionnaire was completed by 35 principals. The collected data were examined in accordance with the framework dimensions (different features of school autonomy) and three archetypes were identified.

The archetypes of principals are three: (i) entrepreneurial – the strategies followed and the tools used are broader than those that the law prescribes, (ii) chaotic – different actors express their opinions but, ultimately, there is no shared decision at the school level, and (iii) bureaucratic – the school's principal thinks that nothing can be done without legal prescription.

Through a new case (the Italian educational system), this chapter contributes to the stream of literature on the disconnect between formal and actual school autonomy. This work can help policy-makers to improve understanding of the characteristics and internal heterogeneity of the educational system.

4.1   Introduction

This chapter inserts a final puzzle of this analysis of the Italian educational system. So far it has been investigated the efficiency of the system, both at national and at school level. It has been found that the impressive heterogeneity of results comes from an analogue heterogeneity of resources. Moreover, this diversity cannot be explained by the common keyword of public and private schools, as the third chapter showed. Therefore, the driver of this heterogeneity must be somewhere else. The hypothesis of this chapter is that human behaviour is a crucial determinant of this outcome. Indeed, the Italian institutional setting should not lead to this diversity, since very weak autonomy is devoted to schools. That is why there is a paradox situation where the system is thought as uniform but the outcome is impressively diverse.

Differently from Italy, many countries have introduced school autonomy to improve students' performance. Autonomy can be understood as freedom "reduced" by the constraints imposed by an authority (Wohlstetter *et al.*, 1995). The concept of school autonomy is related to schools' ability to self-determine relevant matters, such as objectives and activities to be conducted. It refers to domains such as governance, personnel, curriculum, instructional methods, disciplinary policies, budgeting, facilities and student admission. The original concept, by Chubb and Moe (1990), is that the fewer the constraints that must be observed by schools, the greater schools' ability will be to provide what is needed by families and students. In other words, autonomy should allow schools to create new tools and implement practices according to different contexts. Countries such as England, New Zealand, Australia and Sweden have embraced this idea (Hirsh, 1995; Whitty, 1997). A similar reform process, but with different degrees of autonomy, was involved in the implementation of charter schools[43] in the United States (Vergari, 2007).

These reforms have led to a new institutional setting, which researchers call school-based management (Dimmock, 1993; Mohrman *et al.*, 1994; Wohlstetter and Griffin, 1998). This new asset implies several changes, especially for principals. They should have a high-level capacity for strategic planning and for marketing: schools have to offer programmes and services to meet a wider range of student and community needs (Caldwell, 1993; 2005). In other words, leadership is necessary also in education (Bush, 2008; Coleman, 1994). Moreover, as the power is supposed to shift from the government to the schools, actors who have "right to know" (parents, teachers' employers, provider of resources, unions) will turn to school much more than before, which implies an increasing accountability for schools (Bush, 1994).

The international evidence confirms the (economic) hypothesis underlying these reforms: the greater a school's autonomy is, the greater its students' achievements are (Hoxby, 1999; Nechyba, 2003). However, the evidence also demonstrates the multidimensionality of school autonomy and the differing impacts on performance of different levels of autonomy. Woessmann (2001; 2003) and Fuchs and Woessmann (2007) found a positive impact of autonomous schools on purchases of supplies, hiring and rewarding teachers and choosing textbooks and instructional methods. By contrast, in a more recent study, Woessmann *et al.* (2009) found a negative effect for autonomous schools in formulating budgets. These authors argue, "The effects of school autonomy may be complex and depend on the specific decision-making area, as well as on the complementary institutional framework" (p. 15).

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[43] The charter school concept offers parents and educators the opportunity to go to a public body for a contract, under which they establish an autonomous school that children can choose to attend without charge (Kolderie, 1992).

The institutional setting plays a role because school autonomy does not necessary exclude central regulation (Bolam, 1993). In many circumstances, governments must define either the boundaries or the goals of autonomy (Eck and Goodwin, 2010). The different levels of public regulation explain why the implementation of school autonomy has varied across countries (Glenn, 2005). Depending on the number of constraints and the domains to which they apply, high and low degrees of school autonomy have been identified in different educational sectors (Bottani, 2000; Finningan, 2007; Gawlik, 2007a and Whitty, 1997). Moreover, the extent to which autonomy corresponds to schools' ability to manage their operations autonomously is not completely clear (Eck and Goodwin, 2010). A recent report by the Fordham Institute stated, "Despite the importance of autonomy […] amazingly little is known about how free […] schools are" (Brinson and Rosch, 2010 – p. 7).

A potentially interesting perspective is that "formal" autonomy may not be perceived as "true" autonomy by school principals. In other words, there may be schools with high formal autonomy in which the principals perceive low actual autonomy. Likewise, in apparently non-autonomous schools, principals may feel capable of achieving their goals with an adequate level of freedom.

In this context, Gawlik (2007b) analysed variations in the degree and amount of autonomy experienced by principals in charter and traditional public schools. She found that, even in the case of clearly autonomous schools, principals are constrained by the public sector's influence. Finningan (2007) used a national survey and a case study of 12 schools to demonstrate the tendency of states and authorisers to treat charter schools as they do traditional public schools. This scenario was addressed from a legal perspective by Gottlieb (2009), which showed that charter and public schools are required to follow very similar public rules. In contrast, Adamowski *et al.* (2007) found that even in most American public schools (which have less autonomy than private and charter schools), "despite the constraints they face […] principals feel that they have the ability to exercise effective leadership within the terms of their job as they see it" (p. 5). Thus, detachment between formal and actual autonomy is possible even in strongly regulated systems.

The aim of this chapter is to show that, despite weak formal autonomy, school principals' perceptions and willingness can determine different degrees of school autonomy and proactivity, even in the very centralised Italian educational system.

The Italian setting is interesting because of its specific institutional characteristics. "Incomplete" school autonomy has been implemented in Italy (Viteritti, 2009). Through three case studies, Bracci (2009) described the Italian situation as a paradox in which responsibilities are delegated to schools, but no effective decisional powers are in the hands of principals. However, Italian principals do not appear passive. Despite of the lack of power, they use "symbolic

languages and rituals as means to conform partner actions to their vision"
(Paletta and Vidoni, 2006 – p. 67).

The methodology employed is a qualitative survey. Thirty-five Italian principals completed a non-standardised questionnaire. The questionnaire was constructed according to a theoretical framework that included three critical dimensions emerging from the literature. The first group of questions were related to the governing body, the second to the relationship between principals and teachers and the last group to accountability issues (i.e., evaluation policies and relationships with stakeholders and competition).

The chapter is organised as follows. The next section introduces the reader to the school autonomy issue. The third one describes the conceptual framework used for this inquiry. The fourth section explains the methodology, which is called qualitative survey. The fifth section shows the results and the last one discusses them.

Figure 4.1. The conceptual framework for school autonomy
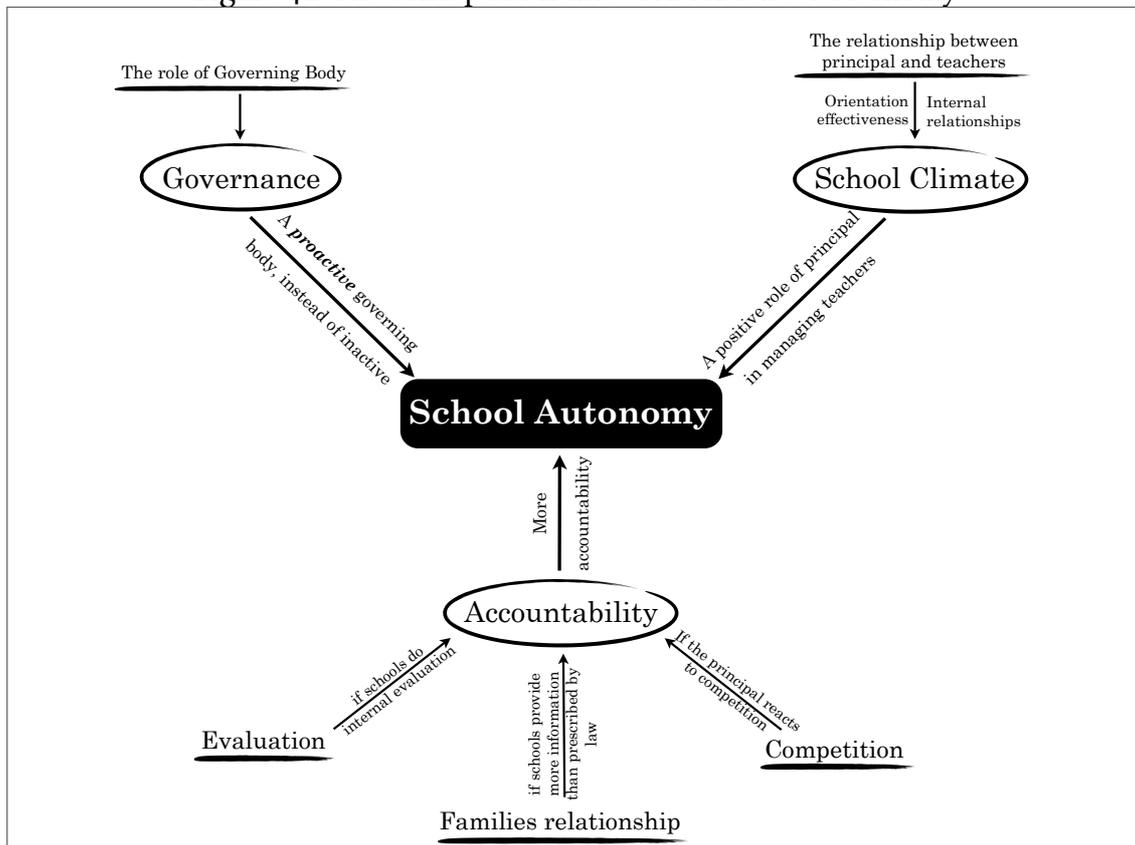
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4.2 A conceptual framework for school autonomy

To identify the critical categories of different patterns of behaviours in schools, we conceptualise the meaning of "school autonomy" in a theoretical framework based on the previous literature (figure 4.1); the definition is subsequently used to analyse whether different degrees of school autonomy and proactivity are possible also in the Italian strictly regulated educational system. The underlying idea is that the degree of autonomy can be heterogeneous among schools and depends on the different characteristics of principals. To analyse different patterns of autonomy, the framework refers to three main dimensions: governance (with special reference to governing bodies), school climate (relationship between principal and teachers) and accountability (openness towards evaluation, assessment and transparency).

4.2.1 Governance.

Governing bodies deal with reconciling the demands of different actors within the governing body itself and between the governing body and the school as a whole. There is potential for conflict and debate (Pascal, 1989), which is likely to be an important driver of heterogeneity. Bush and Gamage (2001) highlight the different *kinds* of governing bodies that can arise in this situation. On one hand, there may be an *inactive* governing body, in which governors fulfil only their minimum statutory role and delegate most of their responsibilities to professional staff. On the other hand, in a *proactive* governing body, governors want to be directly involved in all policy matters and may seek to influence operational management.

4.2.2 School climate

The climate of a school is another critical dimension through which schools can exhibit different patterns and behaviours. In turn, school climate can be related to different sub-dimensions. Scheerens (2000) considered climate in terms of effectiveness orientation and good internal relationships. Both of these dimensions depend on the institutional setting. An autonomous school should have the ability to hire teachers, to pay them according to their performance and to dismiss teachers who are not performing well. In schools with low school autonomy, these categories are strongly mitigated, if not absent. These practices can provide important insights into effectiveness orientation. Moreover, the way in which principals rely on these tools affects internal relationships. Knowledge of principals' opinions about what they do (or wish to do) to improve teachers' performance (*effectiveness orientation*) provides insights about the climate of a school (Purkey and Smith, 1983; Scheerens, 1991). Crucial aspects of this relationship include teachers' freedom to use different tools or practices, the extent to which principals intervene in teachers' activities and how principals view these behaviours. This information can provide insights into consensus and

cooperative planning with and among teachers (Scheerens, 1990). Thus, this information provides insights into *internal relationships* among school's actors.

4.2.3 Accountability

This dimension is crucial when investigating school autonomy. The influential work by Woessmann *et al.* (2009) demonstrated that the interaction between autonomy and accountability is particularly relevant for students' performance. These authors argue that these two elements are complementary for improving performance.

From a theoretical viewpoint, school autonomy is a principal-agent problem (Laffont and Martimort, 2002) whose basic characteristic is asymmetric information (between government and schools and/or between schools and families), which can lead to opportunistic behaviour. For example, schools could refuse to thoroughly respect the content requested by the government or could refuse to devote the same effort to every student (teaching to very clever students is more "convenient", from a strictly utilitarian point of view). Accountability plays a role at this level by providing *information* and, at least partially, offsetting the asymmetry.

The question is, information for whom? The essential characteristic of accountability is the evaluation of performance and its public availability. This process provides information to the government, which can verify whether schools are doing what the government expects. It also provides information to families, who can verify whether their children are learning as they claim; if not, they can choose another school that better meets their needs. This information becomes the incentive for schools' actors and stakeholders to take more responsibility for their actions.

Given these critical categories of accountability, the information provided to families, the role of evaluation practices and perceived competition have been considered critical sub-dimensions to identify different patterns across schools. By observing a school's behaviour in some of these circumstances, it is possible to indirectly determine the extent to which principals value accountability. For example, internal evaluation practices adopted by schools with low autonomy are considered to indicate willingness to be as accountable as possible. Likewise, the voluntary provision of information to parents is indicates a school that wants to be responsive. With reference to competition, there may be competitive pressures even in systems with no strong incentives. A clear example involves the reputation of schools. If a school is losing students because of low scores on standardised tests, the principal may be disappointed, even in a non-competitive system. The principal may then attempt to react in some way (an accountable principal) or may not address the issue (a non-accountable principal).

4.3   Italian background

Italian school autonomy is rather weak (Biondi *et al.*, 2009; Bertagna, 2009), although various laws (legge Bassanini – laws n. 537/1993 and n. 59/1997) have allowed for a greater degree of school autonomy (Buratti, 1995). Schools have been almost unaffected by this reform because subsequent decrees have decisively mitigated the power delegated to them.

In 1998, the responsibility for allocating teachers to schools was delegated to local education authorities, called the Regional Educational Agency and the Provincial Educational Agency. However, this was not an actual delegation because these local authorities are branches of the Ministry of Education; that is, they are Ministry agencies located in regions and provinces. In 1999, the regulation on school autonomy was approved (D.P.R. n. 275/1999), but it explicitly excluded the recruitment of teachers and non-teaching personnel and the potential for schools to influence local rankings by hiring teachers. In the local rankings, at the province level, teachers are positioned according to a score that reflects teaching experience (i.e., age). Thus, the more time a teacher has spent teaching, the higher his/her score is in the local rankings and the higher the probability to be assumed. Therefore, teacher's ability and results, are likely to be independent from the selection of a teacher by the school.

Moreover, the process by which teachers are recruited is quite complicated. It involves the government (which is the legal employer), Regional and Provincial Educational Agencies and, finally, the schools. The government determines the number of classes and the local agencies the teachers' allocation among schools, given their requirements (Fontana and Petrina, 2001). It is important to underline that schools do not request a particular teacher; rather, they request a generic teacher of a given subject. Local agencies cannot select teachers because they must consider the local rankings defined by the government. In summary, schools have no power over teachers. Teachers' wages are determined and paid directly by the national government. Currently, Italian schools manage facilities and integrative projects and have the ability to collect money from private or local institutions. Thus, Italian school autonomy has been called a "functional autonomy"; the government provides schools with some functions but without executive powers (Cocconi, 2003).

Table 4.1 shows information about school autonomy in different OECD countries as obtained from the OECD through answers provided in a survey of school principals. For every function (i.e., budgeting, staffing and salaries), principals reported the percentage of their direct influence (compared with that of either regional or national government). Italy shows a lower percentage in every function, confirming that the educational setting is characterised by a low degree of school autonomy and strong regulation by the Ministry of Education.

Table 4.1. The school autonomy in the OECD countries according to PISA 2009

(% of decision's power, for each category)

Selecting teachers for hire	Only principals and/or teachers	Both principals and/or teachers and regional/national authority	Only regional/national authority
Germany	29	36	34
Italy	9	10	82
Spain	31	3	66
Sweden	96	4	0
United Kingdom	90	9	0
United States	88	12	0
OECD average	61	14	25
Formulating the school budget	School only	School and government	Government only
Germany	29	4	67
Italy	7	7	86
Spain	63	4	33
Sweden	64	20	16
United Kingdom	57	29	14
United States	54	29	16
OECD average	46	22	32

Source: authors' elaborations on OECD PISA (2009), Volume IV, figure IV.3.3a.

4.4 The methodology: a qualitative survey

A qualitative survey is the methodological approach that best suits our objectives because this methodology aims to determine the *diversity* of a topic of interest within a given population. What makes a qualitative survey different from a (traditional) quantitative survey is its aim. Traditional surveys aim to describe the distribution (frequencies, means or other parameters) of a sample, so the statistical representativeness of the sample, the data quality and the precision of estimates (in terms of confidence limits) are the main issues. A qualitative survey, in contrast, aims to examine the diversity among the units involved in the investigation. This type of survey does not count the number of people with the same characteristics (the value of a variable); it identifies meaningful variation within the population (De Vaus, 2002; Fink, 2003; Jansen, 2010). Operationally, the questionnaire contains a high number of open questions and differently than a traditional quantitative survey, the answers are interpreted qualitatively, which is more similar to interpreting answers to interviews.

Different types of qualitative surveys are available. A survey may be *open* (or inductive), in which objects/topics, dimensions and categories are identified through the interpretation of raw data. Alternatively, the *pre-structured* (or deductive) approach can be used, in which main topics, dimensions and categories are predefined and the aim is to determine which of the predefined

characteristics exist empirically in the population. In this chapter, a mixed qualitative survey approach is used: categories are predefined by relying on the school autonomy framework presented in section 2 and the results are inductive and illustrate different "categories" (archetypes) of school autonomy. The survey design depends on the *knowledge aims* (Dul and Hak, 2008) and specifies the "material object" (topic) to be studied, the "formal object" (i.e., the aspects of the topic (meaning and patterns)), the empirical domain to be covered and the unit to be observed (Jansen, 2010). The material object of our study is school autonomy. The empirical domain includes Italian primary and secondary schools and the observed unit is school principals.

Thirty-five (35) principals completed the questionnaire on March 2010. In a first stage, we contacted seventy (70) principals. We chose the sample because of their interest. We contacted principals who are confident with academic research and with the context of economics and management of education. This was judged as a proxy for their honesty in completing the questionnaire. By selecting only principals with this "characteristic" could be argued that it biases the results. However, the degree of diversification of the answers to the questionnaire, which shall be discussed in the results section, make the results credible.

The respondents were from different schools with different grade levels: 16 were from upper-secondary schools, 3 were from lower-secondary schools, 3 were from primary schools and 15 were from Comprehensive Institutes, a type of school that includes several grades (normally, primary school and middle school).

A brief description of the design of the questionnaire is provided in annex 1. The key aspects of the questionnaire were the principals' desires and experiences. Hence, the questionnaire did not ask whether the schools did certain things but rather whether the respondents agreed with certain practices and whether they acted as prescribed by law or performed additional activities because "they want to".

The questionnaire was divided into four sections. The first section involved basic school characteristics: whether the school was a primary or secondary school, the school type, number of students, number of teachers and number of non-teaching staff employed.

The second section asked four questions about how the governing body worked, such as who the members were and who made the decisions. The aim of these questions was to ask the principals to distinguish between formal and substantial processes.

In the third section, five questions were devoted to the school climate, including salaries. This section examined whether the school made any attempt to diversify salaries, such as reasons for paying (or attempting to pay) or not paying (or not attempting to pay) for performance. From these questions, it is

possible to obtain information about the principals' ideas of their roles, the role of incentives in their school and the type of incentive (such as money-based or motivation-based incentives).

Finally, questions about accountability included three sub-categories: relationship with families, evaluation and competition. The distinction between information that schools must provide and information that schools want to provide to families was investigated through a question that asked about the aim of supplementary information. Through this question, it was possible to obtain an informal and indirect indication of the relationship between schools and families. Principals were asked what kinds of pressure they received from parents and how they addressed these pressures. Pressure from parents may have several meanings; it may be "positive", such as encouraging teachers and principals, or "negative", such as protesting against any reports about their child. With reference to evaluation, the questionnaire aimed to determine whether schools evaluate themselves beyond what is prescribed by law, why they do so and what results they obtain.

Further information was requested about whether school principals "felt" competition from other schools in the same geographical area. To obtain the most information possible, principals were invited to add any comments they wished to the questionnaire.

Once the data were collected, they were examined in accordance with the framework dimensions (governance, school climate and accountability) and *archetypes* were identified. Archetypes are defined in this chapter according to Greenwood and Hinings (1993 - pp. 1055): "The pattern of organisational design is a function of an underlying interpretive scheme, or set of beliefs and values, that is embodied in an organisation's structures and systems. *An archetype is thus a set of structures and systems that consistently embodies a single interpretive scheme.*"

4.5 The results: entrepreneurial, chaotic and bureaucratic archetypes

Merging the available evidence from the questionnaires, three archetypes are proposed as a result of this study:

- *Entrepreneurial* - the strategies to be followed and the tools to be used are defined well beyond what the law strictly prescribes. This type has a strong vision that allows the creation and introduction of new practices: *"We start with a meeting with the teacher. Then we assign him/her a tutor. Thirdly, we propose that he/she attend to a training course. Finally, we ask him/her to move."*

- *Chaotic* – many actors (principals, parents, teachers) argue their opinions but, in the end, there is no shared decision at the school level. One party simply gives up: *"Teachers totally agree with the principal's proposals, while parents are very combative and uncompromising regarding the laws and regulations' applications."*

- *Bureaucratic* – this type only observes the law. It does not feel that anything must be done without or beyond the law's prescriptions: *"Informal tools are a matter of personal sensitivity. I prefer to not put any pressure and to adhere to formal regulations."*

We now motivate these findings by showing how these different archetypes are coherent with the dimension of school autonomy.

Our analysis of the principals' answers related to the first dimension, governance, showed that principals were classified into two types: formal governing bodies and "substantial" bodies. Substantial means that there is real discussion within the governing body about important topics, which may be either productive or inconclusive. Deeper analysis of this issue indicated that "discussion" may have two possible outcomes: (i) a shared decision that takes into account the different concerns of governing body members or (ii) a sterile discussion, in which "*the law of who shouts the loudest is applied*". Of course, in the case of no discussion, hierarchy sorts out these issues by leaving any decision in the principal's hands.

The analysis of the school climate was conducted in accordance with the framework of orientation effectiveness and the relationship between principals and teachers. Questions intended to investigate the former element asked about the tools used by the principal to improve both students' and teachers' performance. Principals who showed entrepreneurial behaviour listed a series of tools and strategies to achieve their objectives: "*We assign a tutor to the teachers; we also rely on subject departments to promote dialogue between teachers.*" However, we also found principals who told us the opposite story, that there is no proper relationship between principal and teachers: "*No one cares about what a teacher does in the classroom.*" When problems must be addressed, a potential alternative is the "formal" option, in which the principal acts only in cases indicated by law, such as cases of violence.

The answers to questions about teachers' freedom best identified the differences among principals. The analysis of these answers identified two extremes of a continuum. On one side, there is no real freedom for teachers in teaching content. On the other side, there is total freedom (here, principals consider "total" freedom to be "too much" freedom). According to bureaucratic principals, teachers must obey national law ("*content is prescriptive*"), but they

can choose their teaching methodology. By contrast, chaotic principals argue that because there is no shared purpose, teachers can do whatever they want. The entrepreneurial case is a compromise between these two extremes. Entrepreneurial principals acknowledge freedom in teaching as long as teachers achieve the school's objectives. In some cases, the objectives are defined in the disciplinary departments (which are themselves an exercise of autonomy, as they are not mandatory).

In accordance with this framework, the analysis of accountability includes three dimensions: evaluation, relationship with families and competition. Interestingly, with reference to the evaluation, the critical difference is not whether principals rely on internal evaluation; most of them rely on these practices. The difference is the *aim* and the *conception* of the role of evaluation. Entrepreneurial principals conduct evaluation practices to improve relationships and processes: "*We use evaluation to motivate people.*" By contrast, bureaucratic principals describe the evaluation process as formal when "*school quality is not affected in a positive way*" because "*no one cares about the results of the evaluation.*" The chaotic principals, who do not rely on evaluation, indicated a strong opposition that prevented them from conducting proper evaluations: "*Most teachers snub evaluation.*"

The relationship between schools and families differs by principal. Bureaucratic principals argued that there was not a proper link between schools and parents. In the opposite case, entrepreneurial principals, a strong link has been documented: "*The school is perceived as a 'school of a community', which is under judgment constantly.*" However, this link can also be problematic; in the chaotic case, parents rarely intervene in school processes because they are afraid of retaliation by teachers.

Interestingly, the dimension that showed the least diversity between archetypes was competition (therefore, the answers to this set of questions are not reported in table 4.2). The majority of the principals said that they faced competition in terms of enrolment. Only seven respondents said that they did not face any competition because of a lack of competitors in the neighbourhood, the absence of autonomy or the good reputation of the school. However, reactions to competition, when it is perceived, involve very different strategies across schools and sometimes even a different strategy for each school. These strategies may involve promoting the actions of schools to create a feeling of belonging; self-evaluation; and rejecting students when necessary and not being too "generous". All of these attempts were reported by only the entrepreneurial principals, whereas bureaucratic and chaotic principals did not provide comments in addition to the *yes* or *no* answers to the question about competition.

A summary of the results is provided in table 4.2. Some sentences from the interviewees that followed the questionnaire are reported in the corresponding cells and synthesise the prevailing opinions.

Table 4.2. The archetypes and the framework categories

	Entrepreneurial	Chaotic	Bureaucratic
Governing Body	Decisions are shared and made according to objectives	The strongest will decide ("jungle")	Only the principal makes every decision (hierarchic)
	- *The will of the principal is never against the board because the ultimate goal is the quality of the service.*	• *The law of who shouts the loudest is applied.*	• *Normally, the board listens to the principal's decisions.*
Relationship between Principal and Teachers	Wide freedom for teachers shared with governors	Total freedom for teachers	Absence of teachers' freedom
	• *The decisions about teaching are made in the disciplinary departments.* • *The teachers have freedom on the content for the different modules as long as they are functional for the attainment of skills provided by educational profile, cultural and professional address.*	• *They have too much freedom, I would say. There is not a sharing of purpose.*	• *Teachers cannot decide on the content in any way. You can choose the most appropriate method, but the content is prescriptive. It is a Gordian knot because the parents scrupulously adhere to the curriculum. If a teacher does not complete that, he/she is considered incompetent.*
	Several attempts to improve the situation	There is no proper relationship	Legal procedures are used to improve the situation
	• *We try to explain to teachers their drawbacks and, if they accept, we help them to improve themselves.* • *We assign a tutor to teachers. We also rely on subject departments to promote dialogue between teachers.*	• *No one cares what a teacher does in the classroom, how, what he/she teaches, or how he/she relates to students and families. The key is, "No one creates any problems. Each for himself and God for us all."*	• *Some kinds of interventions are provided by the law, but principals use them only in extreme cases.*
Accountability	Internal evaluation to improve relationships and processes	No evaluation because of opposition	Evaluation by request
	• *The evaluation prevented anarchy from completely destroying the school.* • *We use evaluation to motivate people.*	• *Most teachers snub both internal and external evaluation* • *There is too much opposition against evaluation by everyone, especially the teachers.*	• *School quality is not affected in a positive way. Only the bureaucracy, cumbersome and lengthy, has increased. No one cares about the results of the evaluation.*
	Strong link between school and families	Problematic link between school and families	Absent link between school and families
	• *The school is perceived as the "school of the community" and the teachers as the tools of the community, which are under judgment constantly.* • *We always try to involve parents. We think that involves more sharing and support of what we do.*	• *The parents know they cannot do anything. Even if they could, they are afraid of retaliation.*	• *The parents have no chance to participate in the student's educational path.*

We have described how different archetypes were identified, but it is also important to determine how these archetypes are distributed among the respondents, which is reported in figure 4.2. The majority of the respondents (19 respondents) reflected the entrepreneurial archetype. It seems to be a positive sign: even in a context of strong regulation characterised by low school autonomy, it is possible to find principals (and schools) that are committed to certain ambitious objectives. Of course, if the institutional system does not support these configurations, chaotic or bureaucratic patterns can arise. With reference to our analysis, seven principals approximated the bureaucratic archetype and five principals reflected the chaotic archetype.

Figure 4.2. The distribution of archetypes
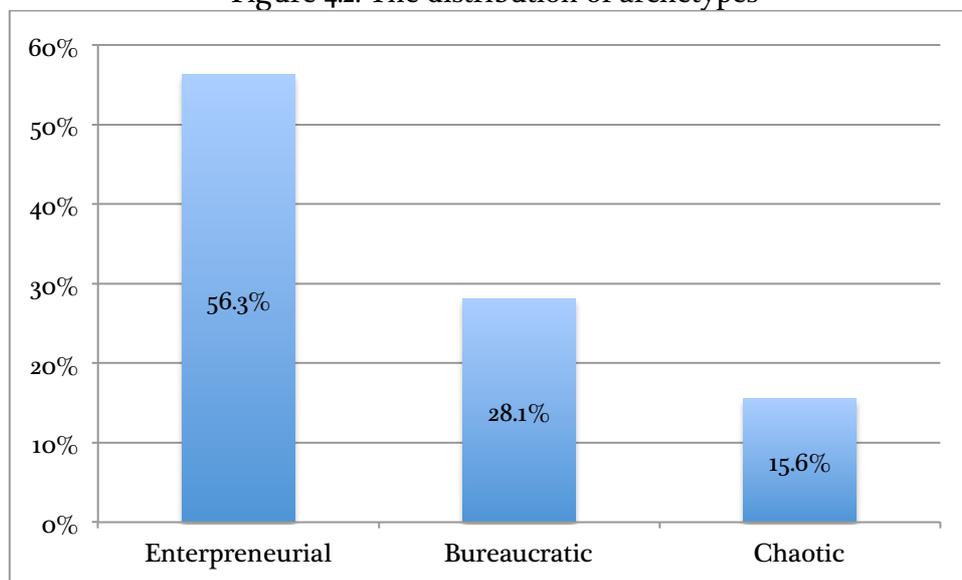
It is noteworthy that these archetypes are consistent along the dimensions of the framework. For example, a principal who behaves as an entrepreneur in the governance dimension does so in the others dimensions as well. The same is true for the other archetypes. This makes the results "robust" in the sense that the principals who did not provide "coherent" answers are not included in any archetypes. This is the case for the two remaining principals, who provided very brief answers. Although these responses make it difficult to understand their perspectives, they nevertheless provide a sort of result. These principals were in situations in which they would like to do something new or to improve the situation, so they displayed some "entrepreneurial" characteristics, but they felt that they were prevented by the context and consequently gave up. For instance, regarding discipline policies, a respondent wrote, "*The educational intervention is a pipe dream; a faster procedure for sanctions for the 'hardest students' should be designed.*" In the other case, the principal was absent, which means that he/she was in charge of more than one school, which is difficult to manage.

A brief analysis of matches between the archetypes and the schools' characteristics is of potential interest. As table 4.3 shows, the majority of the "entrepreneurial principals" belonged to the Comprehensive Institutes. This may be because such schools are more complicated to manage because they include different grades (primary and middle grades). Thus, an entrepreneurial approach is more appropriate to manage complexities that may arise when combining the activities and objectives of different types of schools.

Another interesting result arises from consideration of different funding sources. Whether a school raises money from stakeholders is unrelated to archetypes, though half of them fall in the entrepreneurial one. Our interpretation is that it is not relevant whether a school collects money; rather, how the school uses its resources is relevant. The schools' amount of money is not correlated with any specific archetype (data are available upon request). In other words, schools with certain funding structures may behave differently according to the "type" of principal, or the archetype that he/she reflects.

Table 4.3. The matching between archetypes, fund raising and school type

		Enterpreneurial	Chaotic	Bureaucratic	Total*
Funding Contributions	YES	15	5	4	24
	NO	3	1	5	9
School Type	Primary School	1	0	0	1
	Middle School	0	2	2	4
	High School	6	2	6	14
	Comprehensive	11	1	1	13

* In case of funding contributions the respondents are 33, given that two respondents did not answer to that question. In case of school type, three respondents did not answer.

4.6   Conclusions

The aim of this inquiry was to examine the difference between "formal" and "real" school autonomy. More precisely, a case characterised by high regulation, the Italian educational system, was considered to determine whether heterogeneity of patterns of school autonomy is possible in this context. Moreover, a description of this heterogeneity was provided through archetypes. Fischer and Fischer (2009) found different patterns of behaviour among principals. Through a different methodology – a quantitative survey – they suggested four types of principals: (i) innovator leaders, (ii) moderate leaders, (iii) undecided and (iv) ultra-conservatives. Interestingly, these groups are quite similar to the archetypes identified in this chapter.

However, this analysis has some limitations. First, the number of principals involved does not allow us to argue that this diversity occurs throughout the entire Italian educational system. However, this chapter documents the presence

of various patterns of school autonomy in a strictly regulated system. Second, we considered only actors who were interested in the research. On the one hand, we believe that this is a positive point; interest in the research should provide an incentive to be honest in completing the questionnaires. On the other hand, by selecting only certain categories of individuals ("interested" individuals), we excluded information about all other categories of potential respondents. Thus, one could say that the archetypes we have identified are only the archetypes of principals interested in education research or in research on school autonomy. In this case, the archetypes described, especially the bureaucratic archetype, become even more meaningful because principals who are interested in this research behave differently than those who do not care to reflect on their own experience.

A policy implication can be drawn from the results of this inquiry. Because implementing school autonomy is difficult (Eck and Goodwin, 2010), the correct balance between administrative and teaching responsibilities is an open issue. More than ten years ago, Derouet (2000) noted the recruitment and training of head teachers (principals) as one of the conditions necessary to provide substance to school autonomy. This issue does not seem to have been overcome in the Italian context. Bush (2008) concludes an article in this way: "The best way to ensure the efficacy of leadership is to ensure that it is focused on classroom learning rather than being obsessed by budgets and HR practice" (p. 85). Our results challenge this idea and suggest that there is room to improve the managerial attitudes of school principals on the long path towards real autonomy for Italian schools.

Annex 4.a. The questionnaire used for the qualitative survey

We are seeking the views of head teachers in Italy. The survey is anonymous and we value your frankness.
As such, we would be grateful if you could complete the following survey as best you can and email to:
XXXX
Please could you tell us about the characteristics of your school:

I) Primary _____Secondary school _____
II) School type and status:
III) Number of students enrolled:
IV) Number of teachers employed:
V) Number of non-teaching staff employed:
VI) Approximately what is the total annual budget for your school?
VII) What percentage of these funds is under your control, without constraints?
VIII) If you have some restrictions on how you spend the funds where do these restrictions derive from? *[i.e. government, trade union...?]*
IX) Do you receive funding from non state sources?
X) If yes:
      i. from whom?
      ii. how much?

Governing Body

We are interested in the roles and powers of Headteacher and the Governing Body, beyond what is prescribed by law.

1) What types of individuals do you have as members of your governing body?

2) Do the decisions of the governing body generally reflect the will of the Headteacher or is there a real influence from any members?

3) Given your previous answer, can you provide any comments on the differences between the formal powers of the governing body and the real power exercised by that body?

4) Does your governing body discuss and make decisions about disciplinary matters? To what extent are discipline matters dealt with only by the headteacher?

If you have any other comments you wish to make on this issue please do so here:

_____

School Climate (Relationship between Principal and Teachers)

5) Given the constraints of the National Curriculum, to what extent can teachers determine the content of what they teach at your school?

6) To what extent do you, as Headteacher, have autonomy over teacher recruitment, salary and teacher dismissal?

7) What role does the local authority or central government play in the selection and recruitment of teachers in your school?

8) Suppose a teacher was performing very badly, which tools can you use in order to manage this situation? [Please, distinguish between tools formally prescribed by law and more informal methods]

9) In several countries schools have some autonomy to pay by performance, do you do that in your school?

 a. If yes, does it, in your opinion, work in the sense that it improves teacher performance?

 b. If not, why not?

 c. If you do this but feel It does not work, why is this?

 d. If you previously paid teachers according to performance but do not do so now, why did you stop doing so?

 e. If you do not currently pay teachers according performance but you wish to do so, which are the obstacles that prevent you from doing so?

If you have any other comments you wish to make on this issue please do so here:

_____

Accountability
Information to parents

10) What information about your school do you routinely provide to parents?

11) Do you provide any other information to parents, beyond what is prescribed by law?

a. If yes, which is your aim in doing that?

b. If not, why not?

c. If you did provide additional information but do not do so anymore, why did you stop?

d. If you do not currently provide additional information to parents but you wish to do so, what are the obstacles that prevent you from doing so?

If you have any other comments you wish to make on this issue please do so here:

_____

Pressure of parents

12) Do you feel that your school and your teachers are subject to certain pressures from parents?

If yes, what kind of pressures: e.g. about performance or discipline?
How do you manage such pressures?

If you have any other comments you wish to make on this issue please do so here:

_____

Evaluation

13) All schools in England are subject to evaluation by OFSTED. What, in your opinion, are the positive and/or negative effects of this?

14) What kinds of internal evaluation of your school`s performance do you undertake?

15) Does internal performance evaluation lead to real improvement in school performance, in your opinion?

16) Supposing a student was performing very badly, which tools can and would you use in order to change that situation?

If you have any other comments you wish to make on this issue please do so here:

_____

Competition

17) Does your school face or has your school ever faced any sort of "competition" from other schools?

a) If yes, what kind of competitive pressures does your school face and how do you deal with such pressures?

b) If no, is it because of a lack of real presence of "competitors" in the neighborhood or other factors?

If you have any other comments you wish to make on this issue please do so here:

_____

CHAPTER 5

5. Conclusion

This thesis has presented new evidence on the performance of the Italian educational system and on the behavior of the actors operating in that system: the principals. In doing so it contributes to the quantitative literature on cost-efficiency analyses, public versus private schools' performance and it contributes also to the qualitative literature on school autonomy and accountability.

This conclusion will draw together the research findings from preceding chapters and discuss the implications of these results for policy-maker. The limitations of the study shall be considered as well.

5.1 School efficiency

The analysis has been done both at regional and school level. The first one is an analysis of the system, while the second one is just devoted to a part of the system (Lombardy Region). Both these analysis show advantages and disadvantages. The advantage of a system analysis is that nothing belonging to the system is discarded, but on the other hand, looking at the entire system implies a high level of simplification. Indeed, the best compromise would have been choosing provinces or municipalities as unit of analysis. Unfortunately, the availability of the data did not allow for that. However, the regional analysis has given some relevant pieces of information. The gap between the North and the South of the country is not offset at all by the educational system, which, indeed, follows the "starting point" of every single region. Yet, in some way, this is what is already known; the point is why? What does prevent the school system to cultivate the talent of the students, beyond the context, the town where he or she was born? The answer from the region analysis is striking: the context itself. Apart from disabled students, it has not found any internal factor of the school affecting efficiency: the presence of the private sector and the share of immigrant students have come out as not significantly different from zero. That means the context is more effective than the school.

Of course, this finding suffers from some limitation, especially the restricted sample, which in turn prevented to check for some latent variable, which could explain both differences in efficiency and GDP.

For these reasons, a deeper analysis has been done in order to look into the schools and find out what makes these schools performing in so different way, which is the most important advantage of the school level inquiry. The disadvantage is that data at school level were available only for one region, which is Lombardy. This obviously means that the findings from the Lombardy analysis are not extendable to the rest of the country. However, bearing in mind that Lombardy is one of the top performers in terms of student's achievements (INVALSI, 2011), has a significant share of immigrant students (*ibidem*) and is one of the most efficient regions in terms of public services (Birpi et al., 2011), is a good guideline for figuring out what can happen in other regions.

The first improvement deriving from this dataset is the possibility to look at the schools' intake. In other words, the wide concept of "context" has been decomposed in the student's background, the urban (or not) city, the share of immigrant and disabled students in every school (not just the average of the region). Moreover, relevant aspects of schools have been used: the share of untenured teachers, the variation of student's achievements within schools and the expenditure per student.

More importantly, the school level analysis has included two different grades (5 and 6). A key result is that student's background and the percentage of immigrant students (first generation) are the most relevant determinants of schools' efficiency. The first determinant is a confirmation of the context relevance, which was found in the regional analysis (specifically, GDP per capita). Instead, the effect of immigrant students is something it could not be found in the regional analysis, because of the very lower percentage of these students in Southern regions. Therefore, this is something that regional analysis failed to detect. However, since these factors are not under the school control and other determinants more relevant than student's background and immigrant students[44] were not found, it is hard to think that schools are offsetting, or even making worse, the "starting point" presented by the context.

This argument has been confirmed by the comparison between technical and managerial efficient school. This comparison showed that these two groups of schools differed just in student's background and percentage of immigrant students. For this reason, schools that appeared as (technically) efficient were managerially inefficient. In other words, the technically efficient schools were just the ones with the most advantaged "starting point". This result has a clear policy implication. For instance, if a policy-maker desires using efficiency scores for some policies (e.g. allocation of public resources), it should use adjusted efficiency scores, not baseline ones; otherwise, it would only reward background schools' conditions, not their real results. Moreover, the implication is important

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[44] The effect of rejected students holded just for middle schools, coefficients for reading and math variance are negligible, and the effect of urban area and untenured teachers are significant only for two alternative models.

also for defining the information to be provided to parents and the wider public. As the literature pointed out previously, the raw schools' performances alone provide distorted information, as it is instead necessary to make families aware of the decisive role played by external conditions. This work confirms this view, and suggests that it could be the case that inverse relation can exist between apparent (technical) and actual (managerial) efficiency.

The essential pieces of information derived from the educational efficiency analyses are as clear as dramatic. The performances of the Italian educational system are not led by the system itself but by the context – more specifically, GDP per capita, according to the analysis at regional level. Indeed, the disparities coming from the population still remain in the school system – schools with better school's intake perform better and *viceversa*, as the regional analysis showed - or even become worse during the educational path – since the efficiency scores decline in middle school. Bear in mind that this is the case of Lombardy; probably, other regions, such as in the South, suffers even more from this influence of the context. In other words, regions as well as schools do not have the same "starting point" – such as better student's background and few immigrant students – and, more dramatically, the circumstance does not improve in the next grade. As a consequence, a region or a school that is located in a disadvantaged area will not be able to educate properly (on average) or, at least, will not do it as a region or a school located in an advantaged area. If one thinks that equity is one of the principal aims of education, this is a profound problem.

5.2 Public versus private schools

The third chapter contributes to the huge debate in academic and institutional literature about public and private schools: who is doing better? Addressing this issue started decades ago, with the Coleman report (Coleman et al., 1982). The reasons at the basis of this main question were the declining student's achievement in the public schools of United States since the 70s (Friedman, 1962; Hoxby, 2003). If the fact that private schools showed higher performance scores is also considered, it is clear that knowing the answer to that question was necessary both for governments and families. Indeed, the debate enormously increased when reforms oriented to the private sector were proposed.

This issue raised also in Italy, especially at the beginning of 2000, when the government offered scholarships regardless from the type of school the students attend and, more importantly, when regions were allowed for implementing policies in the education field. Indeed, several regions, especially Lombardy, started introducing voucher scheme for students attending private schools. Because of these new policies, the Italian debate grew quickly and the academic literature started analyzing private schools and comparing them with public

ones. The main finding was the public schools outperform private ones, because they just attract low talented and richer students, which were not able to remain in the public school. However, all these studies (which have already been discussed in the second chapter) suffer from lack of data.

This study, instead, relies on huge data (74,265 students in 1,050 primary schools and 74,358 students in 900 middle schools), so that the results are robust. The finding is something pretty new regarding the academic debate. Firstly, it has come out that there is not just one winner; the answer to the main question is not straightforward. This is different from the previous studies: public and private schools are not significantly different, in terms of student's achievements. However, the amount of resources invested in the two sectors is pretty different. In terms of expenditure per student, the MIUR's spending is about 6,000€ for public and 500€ for private schools, on average (total amounts are 43 billions and 500 millions of euro respectively). As the (annual) fee at private schools is between 3,000€ and 5,000€ per student (even less for primary schools), on average private schools seem to cost much less than the public ones, but achieving roughly the same results, so in terms of efficiency, private schools appear to outperform public one. This is just a suggestion, given that this kind of analysis it was not feasible in chapter 2 because of lack of data regarding expenditure per student at school level. The reason is that private schools do not have to report their balance sheet to the MIUR. Indeed, Italian private schools rely on a complete different organization: they have autonomy on recruiting teachers, payroll and resource allocation. Future research could try to mind these data gap and investigating the efficiency of public and private sector.

Secondly, heterogeneity effect has been found, depending on students, classes and students' characteristics. More specifically, private schooling attendance is associated with worse academic results in primary-level and better results in middle-level education. The (negative) effects especially hold for foreign students, when considering primary school, while there is a positive effect for less advantaged students. The positive effects at grade 6 are for better-off students and those attending a non urban-school. These impacts are statistically significant when using math score as output, except for the effect on reading score for students enrolled in non-urban middle private schools. Thirdly, the "private school effect" is different in primary respect to middle schools: the effect seems to be positive just for middle schools. This can be interpreted in two ways. On the one hand, it could be that there are no "raw" differences in test score between private and public primary schools, so that as the former have better background, they are relatively worse than the latter all other else equal. On the other hand, private middle schools outperform their public counterparts – as the distribution shown – but this effect is lower when the confounding compositional variables are equalized. A related story is that public schools'

quality is higher at primary than at middle-level of education, so that the relative performance of private schools (which in this interpretation is similar in the two grades) results higher for middle and lower for primary-level education. In other words, it has to be careful in arguing that private school are better in middle schools and worse in primary schools.

Even after having obtained credible results about the effects of private schooling on students' achievement, a key question remains unanswered: why do private schools influence (positively or negatively) the performance of students? The economic literature provided good pieces of empirical evidences on the direction of the effects, but did not go into deeper explanations of particular school characteristics that "make the difference" – with the exception of the socio-economic composition. This is a limitation of the economics of education in this field, and the present chapter suffers this limitation too. As a direction for future research, we believe that school-level variables included in the empirical analyses should be improved (i.e. should measure more sophisticated schools' processes and features) also through positive contaminations with other disciplines. In this perspective, two streams of the literature appear as particularly promising for potential integration: the "educational effectiveness" approach (Scheerens & Bosker, 1997) and the study of "academic optimism" as a latent concept (a good summary in contained in Hoy, 2012).

The political and institutional debate in favour or against the introduction of market mechanisms in the educational system is still open in Italy. Recently, some members of the Government and the Parliament proposed to start a deregulation process in the educational sector, towards a School Based Management approach; if it will happen, robust information about the relative performances of private and public schools will become crucial. The present contribution can be interpreted as a step towards this objective; and the main message is that "private school effect" is likely to be heterogeneous, and it requires broad information, numbers and statistics to be correctly evaluated across grades and different subgroups of students and schools.

5.3   School autonomy and accountability

Without the doubt the Italian school autonomy is incomplete, if not absent. In turn, accountability in the Italian educational system is something detached from reality. However, schools are different, also in the way through which they are led by their principals. There are, "hided" somewhere, people who try to maximize their power and to be accountable respect to the families and the government, though no one is asking that kind of behaviour. Indeed, principals find several bureaucratic obstacles.

The fourth chapter of the thesis aimed at discovering the diversity among schools' leaders. The inquiry has shown that some schools are not led at all

(chaotic case), someone are not led by the principal but by bureaucracy, and someone else try to do their best beyond the circumstances and regulations. This does not mean that entrepreneurial principal is against the law; it just means that he or she prefers to not give up and introduce innovations that can improve student's performance. Of course, the most important limitation of this study is that it was not possible to link this diversity with the different students' achievement of every school. In other words, it is not known whether the entrepreneurial headteachers are leading high performer schools. However, even in that case we could not be sure about the causal link between performance and archetype of principal. A headteacher can be a real leader, but if he or she has at his or her disposal only low quality teachers, it is hard to improve significantly student's performance. Likewise, considering a low socio-economic background of the students, the principal could result powerless. Thus, the focus is on the fact that despite of the centralization of the system, heterogeneity of patterns has risen. Other limitations deal with the number of principals involved, which does not allow to argue that this diversity occurs throughout the entire Italian educational system.

A policy implication can be drawn from the results of this inquiry. Because implementing school autonomy is difficult (Eck and Goodwin, 2010), the correct balance between administrative and teaching responsibilities is an open issue. More than ten years ago, Derouet (2000) noted the recruitment and training of head teachers (principals) as one of the conditions necessary to provide substance to school autonomy. This issue does not seem to have been overcome in the Italian context. Bush (2008) concludes an article in this way: "The best way to ensure the efficacy of leadership is to ensure that it is focused on classroom learning rather than being obsessed by budgets and HR practice" (p. 85). Our results challenge this idea and suggest that there is room to improve the managerial attitudes of school principals on the long path towards real autonomy for Italian schools.

5.4 From the "process" to the "results"

The suggestion deriving by this thesis can be summarized by the words of Hood (1995), when he claimed for "shifting the emphasis from process accountability towards a greater element of accountability in terms of results" (p. 94). The justification for the centralization of the educational system (as for other public services in Italy) is that the government has to guarantee that any student can be educated, beyond his or her family income; so the only way to guarantee equity is to guarantee equal procedures in the country as a whole. This operatively means that the Ministry of Education does: (i) recruit teachers and all the staff for every school; (ii) define which are the requirements to apply for become teacher; (iii) pays directly teachers' salaries; (iv) define curriculum and

so on. In poor words, the Ministry have to define all the procedures necessary to provide education. This system is in force since a century. The problem is that all this importance it has never given to the *results* of this process. Just five years ago an evaluation has started, which is providing very useful information and data. Thank to this evaluation is now clear that what it has been tried to avoid has happened anyway: social stratification (at least between North and South) and low performance (at least under the OECD average). This thesis showed a system – the Italian one – profoundly affected by the context: GDP per capita is the most relevant determinant of efficiency at regional level; student's background and the first generation of immigrant students are the factors explaining efficiency at school level. Moreover, by comparing two sub-systems (public and the private) the one with more autonomy appears to be the more efficient (given that it has not found a significant difference between public and private schools, but the latter costs less than the former). When looking at the schools' actors, i.e. principals, it emerged different patterns of behaviour where only a subgroup of them tries to maximise the outcomes. This means that the centralisation of the system, and so the focus on procedure, does not guarantee equal actors' behaviour, and neither equal (average) performance.

Thus, the contribution of this thesis consists in arguing that diversification process is not avoidable even in centralised systems. A set of indicators, which take into account all the diversity (such as in the analysis of adjusted efficiency), should be used in order to define school funding criteria and incentives/disincentives of the system. Otherwise the risk of wasting resources will become unsustainable in the short run. A concrete hypothesis concerns with standard cost. Every agency, in this case schools or regions in accordance to the policy-maker, should receive resources based on a formula. This way, any agency has to become accountable for its results. This was the choice of many countries, such as United Kingdom and Sweden. Through the formula policy-makers can pursue their objectives. For example, the English government established that at least 80% of the formula – constructed by each Local Education Authority – must depend on the number of pupils. In this case, the idea is to promote choice and competition. Whatever the objective, identifying a standard cost through a formula, is the best way to pursue it. Instead, in the Italian case, even though some formulae are formally adopted, the result is just following the historical distribution (CTFP, 2008). This formula should also be extended to private schools.

Moreover, what is a priority is to intervene on actors' motivation. The most used strategy around the world is decentralisation of power (Mitch, 2004). More specifically, many countries introduced school autonomy, in order to establish a more competitive system. Woessmann *et al.* (2009) show that the presence of school autonomy and national (and independent) evaluation system positively affects students' achievements. Then, the second suggestion rising from this

thesis is to "liberalise" Italian school sector so that a stimulus to actors can be given. Liberalising the school sector would mean: (i) attributing wide autonomy to schools, especially on staff matters and (ii) funding any type of schools according to a formula, which should takes into account enrolment but also contextual variables. This does not mean giving education to private sector but, as Le Grand (2003) argues, empowering individuals: to turn *pawns* into *queens*. Moreover, this change could definitively be the opportunity to harmonize the fragmented functions devolved to the different degrees of the governments: in Italy, the Ministry pays and recruits teachers, the provinces are the owner of buildings and the municipalities provide utilities. There are very few functions left to single schools. What should be up to the government, instead, is to evaluate what schools do and define the minimal level that schools have to guarantee. This is even more feasible since the evaluation process has already started by the INVALSI. Regarding all the functions and responsibilities (teachers' and no teaching staff's recruiting, salary management, building ownership and so on), they all should be devoted to the school board. This would make much easier for families to participate in the school activity, and also to complain when something is wrong in their opinion. Otherwise, as it can happen currently, headteachers just point at the government as an excuse.

Then again, moving from the "process" to the "results" is the synthetic suggestion that comes out from this work. Doing that is definitively hard, but it seems to be necessary.

References

Abadie, A., Imbens, G.W., (2006), Large Sample Properties of Matching Estimators for Average Treatment Effects, *Econometrica*, 74(1), 235-267.

Abdulkadiroglu, A., Angrist, J.D., Dynarski, S.M., Kane, T.J. and Pathak, P.A. (2011), Accountability and flexibility in public schools: evidence from Boston's Charters and Pilots, *Quarterly Journal of Economics*, 129, 699-748.

Adam, A., Delis, M., Kammas, P. (2011), "Public sector efficiency: levelling the playing field between OECD countries", *Public Choice*, 146 (1-2), 163:183.

Adamowski, S., Bowles Therriault, S. and Cavanna, A.P. (2007), *The Autonomy Gap*, Fordham Institute, Washington, D.C., US.

Afonso, A., Schuknecht, L., Tanzi, V. (2005), "Public sector efficiency: an international comparison", *Public Choice*, 123 (3-4), 321-347.

Agasisti, T., Bonomi, F., Sibiano, P. (2012a), "Do the managerial characteristics of schools influence their performance?", *International Journal of Educational Management*, 26(6), 593-609.

Agasisti, T., Bonomi, F., Sibiano, P. (2012b), *Schools' efficiency vs equity: evidence from a stochastic frontier approach with translog specification*, Politecnico di Milano - Department of Economics, Management and Industrial Engineering, mimeo.

Agasisti, T., Vittadini, G., (2012), Regional economic disparities as determinants of students' achievement in Italy, *Research in Applied Economics*, 4(1), 33-53.

Agasisti, T., (2011a), "Does competition affect schools' performance? Some evidence from Italy through OECD-PISA data", *European Journal of Education*, 46(4), 549-565.

Agasisti, T. (2011b), "The efficiency of Italian secondary schools and the potential role of competition: a data envelopment analysis using OECD-PISA 2006 data", *Education Economics*, 1: 1-25.

Agasisti, T., Catalano, G., Sibiano, P. (2011), *Can schools be autonomous in a non-autonomous system? A case study from Italy*, Paper presented at BELMAS Conference 2011, 8th-10th July, WyBoston Lakes, UK, available at http://www.kc-jones.co.uk/files/1311080598.pdf.

Agasisti, T., (2009), *School vouchers in Italy: theory, design, effects*, available online at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1482852.

Agasisti, T., (2008), *Educational vouchers in Italy: theory, design, effect*, Politecnico di Milano and Teachers College Columbia University, *mimeo*.

Ahlin, Å., (2003), *Does school competition matter? Effects of a Large-scale School Choice Reform on Student Performance*, Department of Economics, Uppsala University, WP2003:2 ,Uppsala.

Aiello, F. and Scoppa, V. (2000), "Uneven Regional Development in Italy: Explaining Differences in Productivity Levels", *Giornale degli Economisti e Annali di Economia*, 60: 1-30.

Allen, A. and Mintrom, M. (2009), "Responsibility and School Governance", *Educational Policy*, 24(3), 439-464.

Allen, R. (2007, "Allocating pupils to their nearest school: the consequences for ability and social stratification", *Urban studies*, 44(4), 751-770.

Ammermuller, A. (2004), *PISA: What Makes the Difference? Explaining the Gap in PISA Test Scores Between Finland and Germany*, Z.E.W. Discussion Paper n. 04-04.

Anand, P., Mizala, A. and Repetto, A. (2009), Using school scholarships to estimate the effect of private education on the academic achievement of low-income students in Chile, *Economics of Education Review*, 28: 370-381.

Angrist, J.D., Dynarski, S.M., Kane, T.J., Pathak, P.A. and Walters, C. R. (2010), Inputs and impacts in charter schools: KIPP Lynn, *American Economic Review*, 100: 239-243.

Angrist, J.D., Pathak, P.A. and Walters, C.R. (2011), *Explaining Charter School Effectiveness*, NBER Working Paper no. 17332, available at http://www.nber.org/papers/w17332.

Angrist, J.D., Pischke, J.S., (2009), *Mostly Harmless Econometrics: an empiricist's companion*, Princeton University Press: Princeton (USA).

Baker, B.D. (2005), "The emerging shape of educational adequacy: from theoretical assumptions to empirical evidence", *Journal of Education Finance*, 30(3), 259-287.

Banker, R.D., Janakiraman, S., Natarajan, R. (2004), "Analysis of trends in technical and allocative efficiency: An application to Texas public school districts", *European Journal of Operational Research*, 154(2), 477-491.

Barbetta, G., Turati, G. (2003), "Efficiency of junior high schools and the role of proprietary structure", *Annuals of Public and Cooperative Economics*, 74(4), 529-551.

Barbieri, G., Rossetti, C., Sestito, P. (2011), "The determinants of teachers mobility: evidence using Italian teachers' transfer applications", *Economics of Education Review*, 30(6), 1430-1444.

Barr, N. (1992), "Economic Theory and the Welfare State: a Survey and Interpretation", *Journal of Economic Literature*, 30: 741-803. DOI: 10.1177/1043463107077388.

Barro, R. and Sala-I-Martin, X. (2004), *Economic Growth,* 2, McGraw-Hill, New York.

Barrow, L. and Rouse, C.E. (2008), School vouchers: recent findings and unanswered questions, 3Q/2008, *Economic Perspectives*, available at http://ssrn.com/ abstract=1268316.

Barrow, M.H. (1991), "Measuring local education authority performance: A frontier approach", *Economics of Education Review*, 10(1), 19-27.

Bartlett, W. and Le Grand, J. (eds.) (1993), *Quasi-Markets and Social Policy*, MacMillan Press LTD, London.

Bates, J.M. (1997). "Measuring predetermined socioeconomic 'inputs' when assessing the efficiency of educational outputs", *Applied Economics*, 29 (1), 85-93.

Becker, G.S. (1964), *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*, National Bureau of Economic Research.

Beltrametti, L. (2004), *Vouchers, usi e abusi*, Il Mulino, Bologna.

Bertagna, G. (2009), *Dopo dieci anni: per un bilancio critico della cosiddetta «autonomia scolastica»*, FGA Working Paper n. 14, Fondazione Giovanni Agnelli, Turin, February 2009.

Bertola, G., Checchi, D. and Oppedisano, V. (2007), Private School Quality in Italy, *Giornale degli Economisti e Annali di Economia*, 66(3), 375-400.

Bertola, G., Checchi, D., (2004), "Sorting and private education in Italy", in Checchi, D., and Lucifora, C. (eds.), *Education, Training and Labour market outcomes in Europe*, Palgrave, London.

Bessent, A., Bessent, W., Kennington, J., Reagan, B. (1982), "An application of mathematical programming to assess productivity in the Houston independent school district", *Management Science*, 28(12), 1355-1367.

Biondi, G., Mosa, E. and Panzavolta, S. (2009), *Autonomia e innovazione: scenari possibili tra teoria e pratica*, FGA Working Paper n. 16, Fondazione Giovanni Agnelli, Turin, February 2009.

Birpi, F., Carmignani, A. and Giordano, R. (2011), *La qualità dei servizi pubblici in Italia*, Banca d'Italia, Questioni di Economia e Finanza (Occasional Papers), n. 84.

Bishop, J.H. (1999), "Are national exit examinations important for educational efficiency?", *Swedish Economic Policy Review*, 87(2), 260-264.

Björklund, A., Clark, M., Edin, P.A., Fredriksson, P., Krueger, A. (2005), *The market comes to education in Sweden: An evaluation of Sweden's surprising school reforms*, Russel Sage Foundation, New York.

Black, S., Machin, S. (2011), "Housing valuations of school performance", in Hanushek, E.A., Machin, S., Woessmann, L. (eds.), *Handbook of the Economics of Education*, Elsevier.

Blaug, M. (1976), "The empirical status of human capital theory: a slightly jaundiced survey", *Journal of Economic Literature*, 14: 827-55.

Blaug, M. (1970), *Economics of Education*, London: Penguin.

Boarini, R. (2009), *Towards better Schools and more Equal Opportunities for Learning in Italy*, OECD Economics Department Working Papers, n. 727, OECD.

Böhlmark A. e Lindahl M. (2008), *Does School Privatization Improve Educational Achievement?, Evidence from Sweden's Voucher Reform*, IZA Discussion Paper, n. 3691, Bonn.

Bolam, R. (1993), "School-based management, school improvement and school effectiveness. Overview and implications", in C. Dimmock (ed.), School-based management and school effectiveness, Routledge, London.

Bolick, C. (1994), "The Wisconsin Choice Plan", in Billingsley, K.L. (ed.), *Voices on Choice*, Pacific Research Institute for Public Policy, San Francisco, CA.

Bordignon, M. e Fontana, A. (2010), *Federalismo e istruzione. La scuola italiana nell'ambito del processo di decentramento istituzionale.* FGA Working Paper n. 34.

Borge, L.E., Naper, L.R. (2005), *Efficiency Potential and efficiency variation in Norwegian lower secondary schools*, CESifo Working Paper No.1624.

Bosker, R.J., (2011), The international evidence about the relative performance of public and private schools – theory and practice, Invited Lecture at the CRISP seminar "La qualità della scuola pubblica e privata in Italia", April 28th: Milan (Italy).

Bottani, N. (2000), *Autonomy and Decentralization: Between Hopes and Illusions – A comparative study of reforms in five European countries*, Paper presented at the AERA Annual Meeting, 24-28 April, New Orleans, available at: http://norberto.bottani.free.fr/spip/ IMG/pdf/2000_20AERA.pdf.

Bracci, E. (2009), "Autonomy, responsibility and accountability in the Italian school system", *Critical Perspective on Accounting*, 20(3), 293-312.

Bradford, D.F. e Shaviro, D. (1999), *The economics of vouchers*, NBER Working Paper no. w7092, Cambridge, Massachusetts.

Bradley, S., Johnes, G., Millington, J. (2001), "The effect of competition on the efficiency of secondary schools in England", *European Journal of Operational Research*, 135 (3), 545-568.

Bradley, S. e Taylor, J. (2007), *Diversity, choice and the quasi-market: an empirical analysis of secondary education policy in England*, Lancaster University Management School, Working Paper 2007/038, Lancaster.

Brasington, D.M. (2002), "Differences in the production of education across regions and urban and rural areas", *Regional Studies*, 36(2), 137-145.

Bratti, M., Checchi, D. and Filippin, A. (2007), *Da dove vengono le competenze degli studenti?*, Il Mulino, Bologna.

Brinson, D. and Rosch, J. (2010), "Charter school autonomy: a half-broken promise", Thomas Fordham Institute, Washington D.C., US.

Brookover, W., Beady, C., Flood, P., Schweitzer, J., Wisenbaker, J. (1979), *School social systems and student achievement: schools can make a difference*, Praeger, New York.

Brugnoli, A. and Fachin, S. (2001), "Testing economic geography: Italy, 1951-1991", *Economics Bulletin,* **18**: 1-7.

Brunello, G. e Checchi, D. (2005), *School vouchers Italian style*, IZA Discussion Paper, no. 1475, Bonn.

Brunello , G. and Checchi, D. (2004), "School quality and family background in Italy", *Economics of Education Review*, **24**: 563-577. DOI:10.1016/j.econedurev.2004.09.001.

Brunello, G. Rocco, L. (2008), "Educational Standards in Private and Public Schools", *The Economic Journal*, 118: 1866-1887.

Bryk, A.S., Lee, V.E., Holland, P.B. (1993), *Catholic Schools and the Common Good*, Harward University Press, Cambridge, Massachussets.

Bulman, R.C., Kirp, D.L. (1999), "The Shifting Politics of School Choice", in Sugarman, D.S., Kemerer, F.R. (eds.) (1999), *School Choice and Social Controversy. Politics, Policy, and Law*, Brookings Institution Press, Washington, D.C..

Buratti, C. (1995), "Autonomia scolastica e quasi-mercati dell'istruzione", *Politica Economica*, XI(1), 129-148.

Burgess, S., Greaves, E., Vignoles, A., Wilson, D. (2009), *Parental Choice of Primary School in England: What 'type' of schools do parents choose?*, CMPO Working Paper Series, n. 09/224, Bristol, UK.

Bush, T. (2008), "From Management to Leadership", *Educational Management Administration & Leadership*, 36(2), 271- 288.

Bush, T. (1994), "Accountability in education", in T. Bush & J. West-Burnham, *The principles of educational management* (pp. 309-325), London: Pearson Education.

Bush, T. and Gamage, D. (2001), "Models of self-governance in schools: Australia and the United Kingdom", *The International Journal of Educational Management*, 15(1), 39-44.

Caldwell, B.J. (2005), *School-based Management*, Education Policy Series, The International Institute for Educational Planning and The International Academy of Education, Paris and Brussels.

Caldwell, B.J. (1993), "The changing role of the school principal. A review of developments in Australia and New Zealand", in Dimmock (ed.) (1993), *School-based management and school effectiveness*, Routledge, London.

Caldwell, B.J. and Spinks, J.M. (1992), *Leading the self-managing school*, Falmer, Washington, DC.

Campodifiori, E., Figura, E., Papini, M., Ricci, R. (2010). *Un indicatore di status socio-economico-culturale degli allievi della quinta primaria in Italia* (An indicator for students' socio-economic background), INVALSI Working Paper no. 02/2010, INVALSI, http://www.invalsi.it/download/wp/wp02_Ricci.pdf, last download 12th April 2012.

Carbognin, M. (2010), "Riforme, progettazione organizzativa e manutenzione evolutiva nelle Pubblice Amministrazioni: quattro casi concreti, la gestione del cambiamento e il ruolo della dirigenza pubblica", *Studi Organizzativi*, 1: 153-158.

Carnoy, M., Amita Chudgar, F.A., Luschei, T.F. e Witte, J.F. (2007), *Vouchers and Public School Performance: A Case Study of the Milwaukee Parental Choice Program*, Economic Policy Institute, Washington, DC.

Chakrabarty, K. (2009), "Efficiency in public education - The role of socioeconomic variables", *Research in Applied Economics*, 1(1), 1-18.

Chakrabarti, K. (2008), "Can increasing private school participation and monetary loss in a voucher program affect public performance? Evidence from Milwaukee", *Journal of Public Economics*, 92(5-6), 1371-1393.

Chakrabarty, K., Poggio, J. (2008), "Efficiency and Equity in School Funding: a Case Study for Kansas", *International advances in Economic Research*, 14 (2), 228-241.

Chalos, P. (1997), "An examination of budgetary inefficiency in education using data envelopment analysis", *Financial Accountability and Management*, 13(1), 55-69.

Charnes, A., Cooper, W.W., Rhodes, E. (1981), "Evaluating program and managerial efficiency: An application of data envelopment analysis to Program Follow Through", *Management Science*, 27(6), 668-697.

Charnes, A., Cooper, W.W., Rhodes, E. (1978), "Measuring the efficiency of decision making units", *European Journal of Operational Research*, 2(6), 429-444.

Chavis, B. (1994), "A Native American Perspective on Choice", in Billingsley, K.L. (ed.), *Voices on Choice*, Pacific Research Institute for Public Policy, San Francisco, CA.

Checchi, D. and Jappelli, T. (2004), School Choice and Quality, CEPR Discussion Paper No. 4748.

Cherchye, L., De Witte, K., Ooghe, E., Nicaise, I. (2010), "Equity and efficiency in private and public education: a nonparametric comparison", *European Journal of Operational Research*, 202(2), 1-22.

Chester, E., Finn, J.R. (1981), "Why Public and Private Schools Matter", *Harvard Educational Review*, 51(4), 510-514.

Chubb, J.E. and Moe, T.M. (1990), *Politics, Markets and America's schools*, Brookings Institution, Washington, DC.

Cocconi, M. (2003), *L'autonomia funzionale delle istituzioni scolastiche tra riforma del Titolo V, riordino del sistema formativo e coordinamento comunitario*, Paper presented at Questioni Giuridiche ed Organizzative per la Riforma della Scuola. Giornata di Studio in onore di Umberto Pototschnig, 14 May 2003, Trento, Italy.

Coleman, M. (1994), "Leadership in educational management", in Bush, T. & West-Burnham, J., *The principles of educational management,* (pp. 55-78), Pearson Education, London.

Coleman, J.S., Campbell, E., Hobson, C., McPartland, J., Mood, A., Weinfeld, F., York, R. (1966), *Equality of educational opportunity report*, Government Printing Office, Washington, D.C..

Coleman, J.S., Hoffer, T., Kilgore, S. (1982), *High school achievement: Public, Catholic and private schools compared*, Basic Books, New York.

Coons, J.E., Sugarman, S.D. (1971), "Family Choice in Education: A Model State System for Vouchers", *California Law Review*, 59(2), 321-438.

Cooper, W.W., Seiford, L.M. And Tone, K. (2006), *Introduction to data envelopment analysis and its uses*, Springer, New York.

Coulson, A.J., (2009), Comparing public, private and market schools: the international evidence, *Journal of School Choice*, 3(31), 31-54.

Cubbin, J., Zamani, H. (1996), "A comparison of performance indicators for training and enterprise councils in the UK", *Annuals of Public and Cooperative Economics*, 67(4), 603-632.

Cuhna, F., Heckman, J.J., Lochner, L., Masterov, D.V. (2006), "Interpreting the Evidence on Life Cycle Skill Formation", in E.A. Hanushek & F. Welsh, *Handbook of the Economics of Education*, 697-812, London: Elsevier.

Daniele, V. and Malanima, P. (2007), "Il prodotto delle Regioni e il divario Nord-Sud in Italia (1861-2004), *Politica Economica,* III-IV: 267-315.

Daraio, C. And Simar, L. (2007), *Advanced robust and nonparametric methods in efficiency analysis: Methodology and applications*, Springer, New York.

De Vaus, D. (2002), Surveys in social research, Routledge, London, UK.

De Witte, K., Moesen, W. (2010), "Sizing the government", *Public Choice*, 145(1-2), 39-55.

Dehejia, R.H. and Wahba, S. (2002), Propensity score-matching methods for nonexperimental causal studies, The Review of Economics and Statistics, 84(1), 151-161.

Deller, S.C., Rudnicki, E.R. (1993), "Production efficiency in elementary education: The case of Maine public schools", *Economics of Education Review*, 12(1), 45-57.

Denaux, Z.S. (2007), "Determinants of technical efficiency: urban and rural public schools in State of Georgia", *Southwestern Economic Research Review*, 36(1), 105-116.

Denaux, Z.S., Lipscomb, C.A., Plumly, L.W. (2011), "Assessing the technical efficiency of public high schools in the State of Georgia", *Review of Business Research*, 1, 1-12.

Derouet, J.L. (2000), "School autonomy in a society with multi-faceted political references: the search for new ways of coordinating action", Journal of Education Policy, 15(1), 61-69.

Di Giacomo, G., Pennisi, A. (2011), *Efficienza e autonomia scolastica nella suola primaria e secondaria di primo grado italiana*, Società Italiana di Economia Pubblica, Pavia, 19-20th September 2011, http://www.unipv.it/websiep/2011/201137.pdf, last download 12th April 2012.

Di Liberto, A. (2006), "Education and Italian regional development", *Economics of Education Review*, **27**: 94-107. DOI:10.1016/j.econedurev.2006.08.004 .

Di Pietro, G., Cutillo, A., (2006), Does attending a Catholic school make a difference? Evidence from Italy, Bulletin of Economic Research, 58(3), 193-234

Dimmock (ed.) (1993), *School-based management and school effectiveness*, Routdlege, London.

Dolton, P., Marcenaro-Gutierrez, O.D., (2010), *If you pay peanuts do you get monkeys? A cross country analysis of teacher pay and pupil performance,* Royal Holloway College.

Dronkers, J. and Robert, P. (2008), Differences in Scholastic Achievement of Public, Private Government-Dependent, and Private Independent Schools – A Cross-National Analysis, Educational Policy, 22(4), 541-577.

Dul, J. and Hak, T. (2008), *Case study methodology in business research*, Elsevier, Amsterdam.

Eck, J. and Goodwin, B. (2010), "Autonomy for School Leaders", *The School Administrator*, 67(1), 24-27.

Edmonds, R. (1979), "Effective schools for the urban poor", *Educational Leadership*, 37, 15-24.

Efron B., Tibshirani, R., (1993), *An introduction to the bootstrap*, Chapman & Hall, New York (US).

Epple, D. and Romano, R. (1998), Competition between private and public schools, vouchers and peer group effects, American Economic Review, 88, 33-62.

Escardibul, J.O. and Villarroya, A. (2009), "The Inequalities in School Choice in Spain in Accordance to PISA Data", *Journal of Education Policy,* **24**: 673-696.

Evans, W., Schwab, R., (1995), Finishing high school and starting college: do Catholic schools make a difference? *Quarterly Journal of Economics*, 110, 941-74.

Farrell, M.J. (1957), "The measurement of productive efficiency", *Journal of the Royal Statistical Society*, 120 (3), 253-290.

Figlio, D., Kenny, L. (2009), "Public sector performance measurement and stakeholder support", *Journal of Public Economy,* 93(9-10), 1069-1077.

Figlio, D., Kenny, L. (2007), "Individual teacher incentives and student performance", *Journal of Public Economy*, 91(5-6), 901-914.

Figlio, D. Loeb, S. (2011), "School Accountability", in Hanushek, E.A., Machin, S., Woessmann, L. (eds.), *Handbook of the Economics of Education*, Elsevier.

Figlio, D., Stone, J.A., (1997), *School choice and student performance: are private schools really better?*, Discussion paper 1141-97, Institute for Research on Poverty, University of Wisconsin-Madison.

Fink, A. (2003), The survey handbook, Sage, Thousand Oaks, CA.

Finningan, K.S. (2007), "Charter School Autonomy: The Mismatch between Theory and Practice", *Educational Policy*, 21(3), 503-526.

Fischer L. and Fischer M.G. (2009), "Quantitative survey of Italian head teachers", *Italian Journal of Sociology of Education*, 3(3), 47-75.

Fondazione Giovanni Agnelli (FGA) (2011), *Rapporto sulla scuola in Italia* (A Report on Italian Education, Bari (Italy): Laterza.

Fontana, A. e Petrina, F. (2001), *Valutazioni sull'efficacia della politica di contenimento del personale del comparto scuola attuata dal 1997 al 1999*, Ministero del Tesoro, Commissione Tecnica per la Spesa Pubblica (CTFP), Rome, March 2001.

Friedman M. (1962), *Capitalism and Freedom*, The University of Chicago Press, Chicago.

Friedman, M. (1955), "The role of Government in Education", in Solo, E.A. (ed.), *Economics and the Public Interest*, Rutgers University Press: New Brunswick, (USA).

Friedman, M. (1962), *Capitalism and Freedom*, The University of Chicago Press, Chicago.

Fuchs, T. and Woessmann, L. (2007), "What Accounts for International Differences in Student Performance? A Re-examination using PISA Data", *Empirical Economics*, 32(2-3), 433-464.

Gagliardi, L. and Percoco, M. (2011), "Regional disparities in Italy over the long run: the role of human capital and trade policy", *Région et Développement*, **33**, 81-105.

Gawlik, M.A. (2007a), "Beyond the Charter Schoolhouse Door: Teacher-Perceived Autonomy", *Education and Urban Society*, 39(4), 524-533.

Gawlik, M.A. (2007b), "Breaking Loose: Principal Autonomy in Charter and Public Schools", *Educational Policy*, 22(6), 783-804.

Gibbons, S. and Silva, O. (2011), Faith Primary Schools: Better Schools or Better Pupils?, *Journal of Labor Economics*, 29(3), 589-635.

Glenn, C.L. (2005), "What does school autonomy mean in practice?", *International Journal for Education Law and Policy*, 2, 5-14.

Goldhaber, D., (1996), Public and private high schools: is school choice an answer to the productivity problem?, *Economics of Education Review*, 15, 93-109.

Gottlieb, J. (2009), "Harmonizing No Child Left Behind's Restructuring Provision and State Charter School Laws: The Need for Autonomy, Flexibility, and Adequate Resources", Seton Hall Law Review, January 2009, South Orange N.J., US.

Gray, R., Owen, D. and Maunders, K. (1987), "External Reporting by UK Universities: an exploratory study of accounting change", *Financial Accountability & Management*, 6(1), 51-72.

Greeley, A.M. (1982), *Catholic high schools and minority students*, Transaction, Books, New Brunswick, New Jersey.

Greene, J., Loveles, T, MacLeod, W.B., Nechyba, T., Peterson, P., Rosenthal, M., Whitehurst, G. (2010), *Expanding choice in elementary and secondary education. A report on rethinking the federal role in education*, Washington DC: The Brookings Institution.

Greenwood, R. and Hinings, C.R. (1993), "Understanding Strategic Change: The Contribution of Archetypes", The Academy of Management Journal, 36(5), 1052-1081.

Hallinger, P., Murphy, J., Hausman, C. (1993), "Conceptualizing school restructuring – Principals' and teachers' perceptions", in C. Dimmock, *School-based management and school effectiveness* (pp. 22-39), London: Routledge.

Hansen, K., Vignoles, A. (2005) "The United Kingdom Education System in a Comparative Context", in Machin, S. and Vignoles, A. (eds.), *What's the good of education? The economics of education in the UK*, Princeton UP.

Hanushek, E.A. (1986), "The economics of schooling: production and efficiency in public schools", *Journal of Economic Literature*, 24(3), 1141-1177.

Hanushek, E.A., Woessmann, L. (2011), "The Economics of International Differences in Educational Achievement", in Hanushek, E.A., Machin, S., Woessmann, L. (eds.), *Handbook of the Economics of Education*, Elsevier.

Heckman, J., Navarro-Lozano, S., (2004), Using Matching, Instrumental Variables, and Control Functions to Estimate Economic Choice Models, The Review of Economics and Statistics, 86(1), 30-57.

Heyns, B.L. (1981), "Policy Implications of the Public and Private School Debates", *Harvard Educational Review,* 51(4), 519-525.

Hirsch, D. (1995), "School choice and the search for an educational market", *International Review of Education*, 41(3-4), 239-257.

Hood, C. (1995), "The 'new public management' in the 1980s: variations on a theme", *Accounting, Organizations and Society,* 20(2-3), 93-109.

Hood, C. (1987), "Public Administration", in Bogdanor, V. (ed), *Fbe Blackwell Encyclopaedia of Political Institutions*, Blackwell, Oxford, pp. 504-507.

Hood, C. and Jackson, M. (1991), *Administrative Argument,* London: Dartmouth

Hood, C.C. (1995), "The New Public Management in the 1980s: Variations on a Theme", *Accounting, Organizations and Society,* **20**: 93-109.

Hoxby, C., (ed.) (2003), School choice and school productivity: could school choice be a tide that lifts all boats?, in Hoxby, C. (ed.), The economics of school choice, 287-340, University of Chicago Press: Chicago (USA).

Hoxby, C.M. (1999), "The Productivity of Schools and Other Local Public Goods Producers", *Journal of Public Economics,* 74(1), 1-30.

Hoxby, C. (1998), *What Do America's 'Traditional' Forms of School Choice Teach Us about School Choice Reforms?*, Federal Reserve Bank of New York Economic Policy Review, 4(1), 47-59.

Hoy, W., (2012), School characteristics that make a difference for the achievement of all students: A 40-year odyssey, *Journal of Educational Administration*, 50(1), 76-97.

Jansen, H. (2010), "The Logic of Qualitative Survey Research and its Position in the Field of Social Research Methods", Forum: Qualitative Social Research, 11(2), art. 11.

Jenkins, Stephen P., Micklewright, John and Schnepf, Sylke V. (2008), "Social segregation in secondary schools: how does England compare with other countires?", *Oxford Review of Education*, 34(1), 21-37.

Jencks, C. (1970), *Education Vouchers: A Report on Financing Education by Payments to Parents*, Center for the Study of Public Policy, Cambridge, Massachusetts.

Jencks, C. (1985), "How much do high school students learn?", *Sociology of Education,* 58(2), 128-135.

Jeon, Y., Shields M.P. (2003), *The efficiency of Public Education In the Upper Peninsula of Michigan,* Midwest Economic Association, St.Louis, MO, March 2003, http://faculty.cba.cmich.edu/webs/shiel1mp/datafiles%5Cmichigan%20center%20of or%20the%20economics%20of%20education%5Cefficiency%20in%20up%20feb%202003%20abstract.pdf, last download 12th April 2012.

Jepson, C., (2003), The effectiveness of Catholic schooling, *Journal of Human Resources*, 38(4), 928-41.

Johnson, A.L., Ruggiero, J. (2011), "Nonparametric measurement of productivity and efficiency in education", *Annals of Operations Research*, 1, 1-14.

Jurges, H., Schneider, K. (2004), "International differences in student achievement: an economic perspective", *German Economic Review*, 5(3), 357-380.

Kang, C. (2007), "Classroom peer effects and academic achievement: quasi randomization evidence from South Korea", *Journal of Urban Economics*, 61 (3), 458-495.

Kim, D.Y., Zabel, J.E., Stiefel, L., Schwartz, A.E. (2006), "School Efficiency and Student Subgroups: Is a Good School for Everyone?", *Peabody Journal of Education*, 81 (4), 95-117.

Kolderie, T. (1992), "Chartering diversity", Equity and Choice, 9 (1), 28-31.

Kyle, M.J. (ed.) (1985), *Reaching for Excellence: An Effective Schools Sourcebook,* National Institute of Education, Washington.

Ladd, H. (2001), "School-based educational accountability systems: the promise and the pitfalls", *National Tax Journal,* 54(2), 385-400.

Lakoff, S. (1990), "Autonomy and liberal democracy", *The Review of Politics*, 52(3), 378-396.

Laffont, J. and Martimort, D. (2002), The Theory of Incentives: The Principal-Agent Model, Princeton University Press, Princeton, US.

Lavy, V. (2007), "Using performance-based pay to imporve the quality of teachers", *Future Child,* 17(1), 87-109.

Le Grand J. (2003), Motivation, agency and public policy, Oxford University Press, New York.

Lechner, M., (2002), Program Heterogeneity and Propensity Score Matching: An Application to the Evaluation of Active Labor Market Policies, The Review of Economics and Statistics, 84(2), 205-220.

Lee, J.W., Barro, R.J. (2001), "Schooling quality in a cross-section of countries", *Economica,* 68 (272), 465-488.

Levačić, Rosalind (2008), "Financing Schools: Evolving Patterns of Autonomy and Control", *Educational Management Administration Leadership,* 36(2), 221-234.

Levin, H.M. (1968), "The Failure of the Public Schools and the Free Market Remedy", *Urban Review,* 32, 32-37.

Lockheed, M.E., Hanushek, E.A. (1994), *Concepts of educational efficiency and effectiveness,* Human Resources Development and Operations Policy (HRO) Working Papers, HROWP 24, March.

Machin, S. and Vignoles, A. (2005), *What's the good of education? The Economics of Education in the UK,* Princeton University Press, New Jersey, U.S..

Maffezzoli, M. (2006), "Convergence Across Italian Regions and the Role of Technological Catch-Up", *The B.E. Journal of Macroeconomics,* **6** (Topics), Article 15.

Malinvaud, E. (1994), *Is the european Welfare State Unsustainable?,* in Baldassarri, M., Paganetto, L. and Phelps, E.S. (eds.) (1995), *Equità efficienza e crescita. Il futuro del welfare state,* SIPI, Roma.

Mancebon, M.J., Calero, J., Choi, A., Pérez, D. (2010), *The efficiency of public and Publicly-Subsidized High schools in Spain. Evidence from PISA 2006,* Munich Personal RePEc Archive, No.21165.

Mante, B., O'Brien, G. (2002), "Efficiency measurement of Australian public sector organisations - The case of state secondary schools in Victoria", *Journal of Educational Administration,* 40 (3), 274-296.

Maragos, E.K., Despotis, D.K. (2004), *Evaluating school performance over time in the frame of Regional Socio-Economic Specificities,* University of Pireus, March 2007, http://dsslab.cs.unipi.gr/Publications/CORFU2.pdf, last download 12th April 2012.

Maroy, C. (2008), *The New Regulation Forms of Educational Systems in Europe: Towards a Post-bureaucratic Regime,* in *Governance and Performance of Education Systems,* Soguel, N.C. and Jaccard, P. (eds.), Springer, Dordrecht.

Marrocu, M., Paci, R. and Pala, R. (2000), *Estimation of total factor productivity for Regions and sectors in Italy. A panel cointegration approach,* Contributi di Ricerca CRENoS, n. 00/16.

McCarty, T.A., Yaisawarng, S. (1993), "Technical efficiency in New Jersey school districts", in: H.O. Fried, C.A. Lovell, S.S. Schmidt, *The measurement of Productive Efficiency: Techniques and Applications* (pp. 271-287), New York: Oxford University Press.

McEwan, P. (2011), "The Effectiveness of Public, Catholic, and Non-Religious Private Schools in Chile's Voucher System", *Education Economics,* 9(2), 105-128.

Mincer, J. (1970), "The distribution of labor incomes: a survey with special referene to the human capital approach", *Journal of Economic Literature,* 8(1), 1-26.

Ministry of Education, University and Research (MIUR) (2008). *La scuola in cifre* (Numbers about Education), MIUR: Rome (Italy).

Ministry of Education, University and Research (MIUR) (2009). *La scuola in cifre* (Numbers about Education), MIUR: Rome (Italy).

Ministry of Education, University and Research (MIUR) (2011). *La scuola in cifre* (Numbers about Education), MIUR: Rome (Italy).

Mitch, D. (2004), *School finance*, in *International Handbook on the Economics of Education*, Johnes G. and Johnes J. (eds.), Edward Elgar Publishing Limited, Cheltenham.

Mizala, A., Romaguera, P., Farren, D. (2002), "The technical efficiency of schools in Chile", *Applied Economics*, 34 (12), 1533-1552.

Mohrman, S.A., Wohlstetter, P. and Associates (1994) (eds.), School-based management: Organizing for high performance, Jossey-Bass, San Francisco.

Montanaro, P. (2008), *I divari territoriali nella preparazione degli studenti italiani: evidenze dalle indagini nazionali e internazionali*, Banca d'Italia, Questioni di Economia e Finanza (Occasional Papers), n. 14.

Muniz, M.A. (2002), "Separating managerial inefficiency and external conditions in data envelopment analysis", *European Journal of Operational Research*, 143 (3), 625-643.

Murnane, R.J., Willet, J.B. (2011), Methods matter: improving causal inference in educational and social science research, Oxford University Press: New York (USA).

National Commission on Excellence in Education (NCEE), *A Nation at Risk*, Washington, D.C..

National Governors' Association (NGA), *Time for Results: The Governors' 1991 Report on Education*, Washington.

National Institute of School System Evaluation (INVALSI) (2011), *Servizio Nazionale di Valutazione 2010-11. Le rilevazioni degli apprendimenti A.S. 2010-11*, INVALSI, Rome, http://www.invalsi.it/esamidistato1011/documenti/ Rapporto_SNV%202010-11_e_Prova_nazionale_2011.pdf, last download 12th April 2012.

National Institute of School System Evaluation (INVALSI) (2010), *Servizio Nazionale di Valutazione A.S. 2009/10. Rilevazione degli apprendimenti. Prime analisi. Parte I-II,* INVALSI, Rome, http://www.invalsi.it/download/rapporti /snv2010/Rapporto_SNV_09_10.pdf, last download 12th April 2012.

National Institute of School System Evaluation (INVALSI) (2009), *La prova nazionale al termine del I ciclo. A.S. 2008/09*, INVALSI, Rome, http://www.invalsi.it/download/rapporto/Rapporto_PN_ver_11.5.pdf, last download 12th April 2012.

National Institute of Statistics (ISTAT), *Annuario Statistico 2010*, ISTAT, Roma.

Neal, D., (1997), The effects of Catholic secondary schooling on educational achievement, Journal of Labor Economics, 15, 98-123.

Nechyba, T.J. (2003), "Centralization, Fiscal Federalism, and Private School Attendance", International Economic Review, 44(1), 179-204.

Nguyen, A.N., Taylor, J., (2003), "Post-high school choices: new evidence from a multinomial logit model", *Journal of Population Economics*, 16(2), 287-306.

Nguyen, A.N., Taylor, J., Bradley, S. (2006), "The estimated effect of Catholic schooling on educational outcomes using propensity score matching", *Bulletin of Economic Research*, 58(4), 285-307.

Noden, P. (2000), "Rediscovering the Impact of Marketisation: Dimensions of Scial Segregation in England's Secondary Schools, 1994-99", *British Journal of sociology of Education*, 21, 371-390.

Noulas, A.G., Ketkar, K.W. (1998), "Efficient utilization of resources in public schools: a case study of New Jersey", *Applied Economics*, 30 (10), 1299-1306.

OECD, (2011), Private schools: who benefits? PISA in Focus, 2011/7, August, OECD: Paris (France).

OECD PISA (2009), *PISA 2009 Results: What Students Know and Can Do - Student Performance in Reading, Mathematics and Science*, OECD, Paris.

OECD PISA (2009), PISA 2009 Results: What Students Know and Can Do - Student Performance in Reading, Mathematics and Science, OECD, Paris.

Paci, R. and Saba, A. (1997), *The empirics of Regional economic growth in Italy (1951-1994)*, CRENos Working Paper, n. 97/01.

Paletta, A. and Vidoni, D. (2006), "Italian School Managers: a complex identity", ISEA, 34(1), 46-70.

Parsons, E., Chalkley, B., and Jones, A. (2000), "School Catchments and Pupil Movements: a case study in parental choice", *Educational Studies*, 26(1) 33-48.

Pascal, C. (1989), "Democratised primary school government: conflicts and dichotomies", in Glatter, R. (ed.), Educational Institutions and their Environments, Open University Press, Milton Keynes.

Peacock, A.T. and Wiseman, J. (1964). Education for Democrats. London: Institute of Economic Affairs Hobart Paper 25.

Pigliaru, F. (2009), *Persistent Regional gaps and the role of scial capital: Hints from the Italian Mezzogiorno's case*, IAREG Working Paper, n. Wp5/4.

Poggi, A (2010), *L'accordo Stato-Regioni in materia di istruzione e le prospettive del federalismo fiscale per la scuola*, FGA Working Paper, n. 33.

Poggi, A. (2004), *Un altro pezzo del "mosaico": una sentenza importante per la definizione del contenuto della competenza legislativa concorrente in materia di istruzione*, Federalismi.it, n. 3.

Portela, M.C., Camanho, A.S. (2007), *Performance assessment of Portuguese secondary schools: The society and educational authorities perspectives*, Working Papers in Economics, No. 07/2007, Universidade Catolica Portuguese, Porto, Portugal,

Purkey, S.C. and Smith, M.S. (1983), "Effective schools: a review", *The Elementary School Journal*, 83(4), 427-452.

Pusey, M. (1991), *Economic Rationalism in Canbewa*, Cambridge University Press, Cambridge.

Quintano, C., Castellano, R. and Longobardi, S. (2009), "L'influenza dei fattori socio-economici sulle competenze degli studenti italiani. Un'analisi multilevel dei dati PISA 2006", *Rivista di Economia e Statistica del territorio*, **2**: 109-149.

Rainey, D.V., Murova, O. (2004), "Factors influencing education achievement", *Applied Economics*, 36 (21), 2397-2404.

Rassouli-Currier, S. (2007), "Assessing the efficiency of Oklahoma public schools: a data envelopment analysis", *Southern Economic Review*, 34, 131-143.

Ray, S.C. (1991), "Resource-Use Efficiency in Public Schools: A Study of Connecticut Data", *Management Science*, 37 (12), 1620-1628.

Regione Lombardia – Istruzione, Formazione e Lavoro (2010), *Sette anni di Istruzione, Formazione e Lavoro*, Guerini Associati, Milano.

Ribolzi, L. (2000), *Il sistema ingessato. Autonomia, scelta e qualità nella scuola italiana*, Editrice La Scuola, Brescia.

Rosenholtz, S.J. (1985), "Effective schools: interpreting the evidence", *American Journal of Education,* 93, 359-388.

Rothstein, R., Jacobson, R., Wilder, T. (2008), *Grading Education: Getting Accountability Right,* Teachers College Press.

Rosenbaum, B., Rubin, D., (1983), "The central role of the propensity score in observational studies for causal effects", *Biometrika*, 70(1), 41-55.

Rosenbaum, P., (1995), *Observational Studies*, Springer, New York (US).

Rouse, C.E., (1998), "Private school vouchers and student achievement: an evaluation of the Milwaukee parental choice program", *Quarterly Journal of Economics*, 113(2), 553-602.

Ruggiero, J. (1996), "On the measurement of technical efficiency in the public sector", *European Journal of Operational Research*, 90 (3), 553-565.

Ruggiero, J., Vitaliano, D.F. (1999) "Assessing the efficiency of Public schools using data envelopment analysis and frontier regression", *Contemporary Economic Policy*, 17 (3), 321-331.

Rutter, M., Maughan, B., Mortimore, P. Outson, J., Smith, A. (1979), *Fifteen thousand hours: secondary schools and their effects on children*, Harvard University Press, Cambridge, Massachusetts.

Sander, W., Cohen-Zada, D., (2010), The economics of Catholic schools, in Brewer, D.J., McEwan, P.J. (eds.), The Economics of Education, 317-322, Elsevier Academic Press: San Diego (USA).

Sandström, F.M. e Bergström F., (2002), *School Vouchers in Practice: Competition Won't Hurt You!,* The Research Institute of Industrial Economics, Working Paper, n. 578, Stokholm.

Scheerens, J. (2000), "Improving school effectiveness", International Institute of Educational Planning, no. 68, Paris.

Scheerens, J. (1991), "Process indicators of school functioning: a selection based on the research literature on school effectiveness", Studies in Educational Evaluation, 17(2), 371-403.

Scheerens, J. (1990), "School Effectiveness Research and the Development of Process Indicators of School Functioning", School Effectiveness and School Improvement, 1(1), 61-80.

Scheerens, J. & Bosker, R., (1997), The foundations of educational effectiveness, Elsevier Science Press: Oxford (UK).

Schuetz, G., Ursprung, H.W., Woessmann, L. (2008), "Education policy and equality of opportunity", *Kyklos*, 61(2), 279-308.

Schultz, T. (1961), "Investment in human capital", in American Economic Review, 51:1-17.

Sengupta, J.K., Sfeir, R.E. (1988) "Efficiency measurement by data envelopment analysis with econometric applications", *Applied Economics*, 20 (3), 285-293.

Simar, L. And Wilson, P.W. (1998), "Sensitivity analysis of efficiency scores: How to bootstrap in nonparametric frontier models", *Management Science*, **44**: 49-60.

Simar, L., Wilson, P. (2000) "A general methodology for bootstrapping in non-parametric frontier models", *Journal of Applied Statistics*, 27 (6), 779-802.

Simar, L., Wilson, P. (2007) "Estimation and inference in two-stage, semi-parametric models of production processes", *Journal of Econometrics*, 136 (1), 31-64.

Simkins, T. (2004), "School Finance and Equity in England: an Analysis of Strategies and Consequences", *Educational Management Administration Leadership*, 32(4), 369-386.

Smith, J., Todd, P., (2005), "Does matching overcome Ladonde's critique of nonexperimental estimators?", *Journal of Econometrics*, 125, 305–353.

Smith, P., Maystone, D. (1987) "Measuring efficiency in the public sector", *Journal of Management Science*, 15 (3), 181-189.

Sockett, H. (1980), Accountability in the English educational system, Hodder and Stouughton, London.

Somers, M.A., McEwan, P.J. and Willms, J.D. (2004), "How Effective Are Private Schools in Latin America?", *Comparative Education Review*, 48(1), 48-69.

Staiger, D., Stock, J.H. (1997), "Instrumental Variables Regression with Weak Instruments", *Econometrica*, 65(3), 557-586.

Stiefel, L., Rubenstein, R., Schwartz, A.M. (1999), "Using adjusted performance measure for evaluating resource use", *Public budgeting & Finance*, 19 (3), 67-87.

Stock, J.H., Wright, J.H., Yogo, M., (2002), A Survey of Weak Instruments and Weak Identification in Generalized Method of Moments, Journal of Business & *Economic Statistics*, 20(4), 518-529.

Thanassoulis, E., Dunstan, P. (1994) "Guiding schools to improved performance using data envelopment analysis: an illustration with data from a local education authority", *Journal of the Operational Research Society*, 45 (11), 1247-1262.

Tiebout, C. (1956), "A pure theory of Local Expenditures", *The Journal of Political Economy*, 64(5), 416-424.

Toma, E.F. (2005), "Private schools in a global world: 2004 presidential address", *Southern Economic Journal*, 71(4), 693-704.

Turati, G., Montolio, D., Piacenza, M., (2011), Fiscal decentralisation, private school funding, and students' achievement. A tale from two Roman Catholic countries, IEB Working Papers, n. 2011/44.

Tyagi, P., Yadav, S.P., Singh, S.P. (2009) *Efficiency analysis of schools using DEA: A case study of Uttar Pradesh state in India*, International Data Envelopment Analysis Society, Philadelphia, USA, 10-11th July, 2009.

Vaizey, J. (1958), *The costs of education*, Allen & Unwin, London.

Vanderberghe, V. and Robin, S. (2004), "Evaluating the effectiveness of private education across countries: a comparison of methods", *Labour Economics*, 11, 487-506.

Vergari, S. (2007), "The politics of charter schools", *Educational Policy*, 21(1), 15-39.

Vergari, S. (2007), "The politics of charter schools", *Educational Policy*, 21:15-39.

Violini, L. (2007), *Considerazioni sul buono scuola quale espressione di una politica dell'istruzione innovativa e sussidiaria*, in Violini, L, Lauro, C., Maccarini, M. e Capone, D. (2007), *Politiche sussidiarie nel settore dell'istruzione: il caso del buono scuola in Lombardia*, Giuffrè Editore, Milano, pp. 17-23.

Viteritti, A. (2009), "A Cinderella or a Princes?", *Italian Journal of Sociology of Education*, 3(3), 10-32.

Walberg, H.J. (ed.) (1988), *We Can Rescue Our Children: The Cure for Chicago's Public School Crisis – with Lessons for the Rest of America*, Heartland Institute, Chicago.

West, E.G. (1992), "Autonomy in school provision: Meanings and implications – Review essay", *Economics of Education Review*, 11(4), 417-425.

West, A., Pennell, H. (1997), "Educational Reform and School Choice in England and Wales", *Education Economics*, 5, 285-305.

West, M.R., Woessmann, L. (2010), "Every Catholic child in a Catholic school: Historical resistance to state schooling, contemporary private competition, and student achievement across countries", *Economic Journal*, 120(546), F229-F255.

Whitty, G. (1997), "Creating Quasi-Markets in Education: A Review of Recent Research on Parental Choice and School Autonomy in Three Countries", *Review of Research in Education*, 22(1), 3-47.

Wiseman, J. (1959), "The economics of education", *Scottish Journal of Political Economy*, 6(1), 48-58.

Witte, J. (1992), "Public Subsidies for Private Schools: What We Know and How to Proceed", *Educational Policy*, 6(2), 206-227.

Woessmann, L. (2005), "The effect heterogeneity of central examinations: evidence from TIMSS, TIMSS-Repeat and PISA", *Education Economics*, 13(2), 143-169.

Woessmann, L. (2004), *How Equal Are Educational Opportunities? Family Background and Student Achievement in Europe and the United States*, I.Z.A. Discussion Paper n. 1284.

Woessmann, L. (2003), "Schooling Resources, Educational Institutions and Student Performance: the International Evidence", *Oxford Bulletin of Economics and Statistics*, 65(2), 117-170.

Woessmann, L. (2002), *Schooling and the Quality of Human Capital*, Springer.

Woessmann, L. (2001), "Why Students in Some Countries Do Better: International Evidence on the Importance of Education Policy", *Education Matters*, 1(2), 67-74.

Woessmann, L., Luedemann, E., Schuetz, G. and West, M.R. (2009), School Accountability, Autonomy and Choice around the world, Edward Elgar Publishing Limited, Cheltenham.

Wohlstetter, P. and Griffin, N. (1998), *Creating and sustaining learning communities: Early lessons form charter schools*, University of Pennsylvania, Consortium for Policy Research in Education, Philadelphia.

Wohlstetter, P., Wenning, R., and Briggs, K. (1995), "Charter Schools in the United States: the Question of Autonomy", *Educational Policy*, 9(4), 331-358.

Wolf, A. (2002), *Does education matter?*, Penguin Group, UK, London.

World Bank (2008), *What is School-Based Management?*, World Bank, Washington, DC.

Worthington, A. (2001), "An Empirical Survey of Frontier Efficiency Measurement Techniques in Education", *Education Economics*, 9(3), 245-268.

Zimmer, R., Buddin, E., (2010), "The economics of charter schools", in Brewer, D.J., McEwan, P.J. (eds.), *The Economics of Education*, 329-335, Elsevier Academic Press: San Diego (USA).