School Choice and Quality

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Abstract

The 1993 Survey of Household Income and Wealth, a representative survey of the Italian population covering 24,000 individuals, reports detailed information on children attendance of public and private schools and parents' self-assessment of the quality of public schools in the city of residence. The survey also provides detailed information on the household demographic structure, income and parent's education. The empirical analysis indicates that the quality of schools is one of the driving factors in the choice between private and public schools. The results are robust with respect to the particular quality indicator used and the presence of provincial fixed effects.

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1. Introduction

The choice between private and public provision and financing of education is receiving increasing attention. In spite of this debate, very little is known as to which variables guide parents' choice between private and public schools. Apart from the obvious role played by parents' resources, it is still unclear if parents' decisions are driven by quality considerations and quality comparisons between public and private schools. In the literature school quality is usually measured by the pupil-teachers ratio, class size, teachers' salaries and experience. However, these indicators are almost invariably aggregated by geographical areas, and are not available at the individual school level. This makes the task of estimating the genuine impact of quality on school choice difficult if not impossible, because the quality index might be correlated with other geographical variables.

In this paper we provide evidence on the effect of school quality on school choice using data drawn from the 1993 Survey of Household Income and Wealth, a large cross-section representative of the Italian resident population. The survey contains information on school attendance (private or public) and a subjective assessment of the quality of public schools. This information is then merged with provincial data on aggregate indicators of school quality (such as pupil-teachers ratio). We can therefore relate school choice not only to aggregate quality indicators, but also to indicators that vary at the individual level.

The OECD private enrolment rate in elementary and secondary schools is only 2.9 percent, reflecting a massive role of the government in the provision of education.[1] In the U.S., where the education system is more market oriented, the private enrolment rate is 10.9 percent. Italy's 5.5 percent of private enrolment rate is not as high as in the U.S. but ranks considerably above the OECD average.

Studying parents' decisions to invest in the education of their children is not easy in countries in which private schools receive direct or indirect government support. In this respect, Italy represents an interesting case study. Given the constitutional mandate that privately

[1] The OECD defines as private schools "privately managed institutions that receive less than 50 percent of funding from public sources." Data refer to 1999. Source: OECD (2002), Table C1.4.

managed schools cannot receive government support, parents who choose private schools must also pay tuition out-of-pocket.[2] Therefore parents must pay for quality if they believe that private schools offer a better education than public schools.

Italy features a centralized school system, setting national standards for both public and private schools.[3] Centralization should result in considerable school homogeneity, at least at the compulsory level where national standards are more rigid. So in principle the system should exhibit minimal variation in observable quality indicators, such as student-teacher ratios or average classroom size. However, given the considerable geographical variation in population density and fertility rates and the different financial involvement of local governments in the provision of buildings and facilities, there is ample heterogeneity of public schools across the country, resulting in different quality indicators across regions, provinces (smaller administrative units), and even within provinces. As we shall see, it is this variability that allows us to identify the effect of school quality on school choice.

Throughout the paper, we focus on elementary and secondary schools. We do not consider the enrolment decision at the pre-school level, because this decision it is intimately related to the labor market status of mothers. In the case of pre-school children, labor market participation depends also on the availability of pre-schools, creating two-way causation and endogeneity between school choice and labor market participation. For quite different reasons, we do not analyze the choice between private and public universities. The higher education system in Italy is mostly public, resulting in very few students in private institutions. Since the sample we use is representative of the population at large, it does not lend itself to the analysis of the choice between private and public universities.[4]

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[2] Since public schools are financed from the general income tax base regardless of attendance, in practice childless parents subsidize parents with children, and parents with children in private schools pay for both public and private education.

[3] Italian laws specify not only the length of compulsory education (age 6 to 14 until 1999, then raised to 16), but also the types of private and public schools that can operate, the maximum number of students in each class and the minimum number of teachers per class. For each type of school, the law provides guidelines on the subjects that must be taught, the course outlines, the evaluation and grading method, vacation periods and even entry and exit times from school. This reduces the dimensions along which private and public schools can differ, and also the difference within private schools.

[4] The choice of a university is usually not a parent's choice, but a student's choice within the limits of the budget allocated by parents. Since universities are not always available in the province of residence, there are other cost differences that affect students' choice besides tuition.

The paper is organized as follows. Section 2 reviews the economics of school choice. Section 3 describes the indicators that are most often adopted to measure school quality and Section 4 the variables that will be used in the empirical analysis. Section 5 describes the sample and Section 6 presents probit estimates for the choice between private and public schools. Section 7 concludes drawing policy implications, particularly on the importance of producing information about school quality and on the role of the government in affecting school choice.

2. The economics of school choice

The starting point of the economic literature on school choice is that private schools widen households' opportunity sets. The standard assumption of human capital investment models is that private (and more expensive) schools are of better quality than public schools (Stiglitz 1974; Glomm and Ravikumar 1992). Private schools allow parents to choose the amount and the quality of education that they believe appropriate, given their degree of altruism and the expected talent of their offspring. Parents who wish to invest in the human capital of their children beyond the level provided by public schools can opt out and choose private schools. In principle, with perfect capital markets parents' choice is unconstrained. But in the presence of borrowing constraints, parents are constrained and are not be able to choose private schools if their current resources do not exceeds a threshold level.

Private schools are also chosen for other reasons. Some parents may choose to send their children to private schools because these schools explicitly support common values, for instance religion (Sanders, 2001); others because private schools might have better facilities, such as libraries and laboratories, or lower transportation costs. Sometimes the quality of education or facilities is not even the main issue. Some people prefer private schools for status symbol (Fershtman, Murphy and Weiss, 1996), to improve their own social networks and those of their children, to shield their children from social problems, to avoid that their children mix with immigrants and children with handicaps, or just because they don't approve the open and more heterogeneous public school environment (Gradstein and Justman, 2001).

Empirically, it is difficult to identify which factors drive parents' choices. Some of the variables that might affect parents' choice are not observable (for instance, parents' perception of children's abilities and how they will perform in the labor market) or difficult to measure (for instance, intensity of religious beliefs). Other variables are easier to measure, at least in principle. In particular, the quality of education should be the main driving force of school choice if parents consider private education as an investment good. If instead parents base their decisions on other characteristics of private schools, quality should not be a major concern.

Most of the available empirical evidence refers to the US. In a sample of white parents, Lankford and Lee (1995) find that elementary and secondary private schooling decisions depend on household income and parent's education, racial composition of public schools, juvenile crime rate in the area of residence, and inner city location. Proxies for expenditures per student and tuition fees do not seem to affect parents' choice. Buddin, Cordes and Kirby (1998) study secondary school choice in a 1990 sample of California residents and find that parents' age, race, education and income affect the probability of choosing a private school. Working mothers are more likely to select private schools, signaling interactions between the choice of labor market participation and school choice. The coefficients of the indicators of tuition fees and of the quality of private and public schools (proxied by expenditure per students and teachers' salaries) are not statistically different from zero.[5] Thus quality considerations do not seem to have major impact on the choice of attending private schools, at least in US secondary schools.

Studies of the effectiveness of private education provide indirect evidence on the economics of school choice. Some papers suggest that there are potential benefits of attending private schools, but that these benefits are likely to be small, at least in the U.S.[6] In particular, students who attended a catholic school have slightly better labor market outcomes and performance in further education than students who attended public schools. Outcomes and performance of private school students also tend to be weakly related to students' background.

[5] Since specific information on school attendance is not available, Buddin, Cordes and Kirby (1998) proxy the quality of public and private schools by the corresponding aggregate indicators in the area of residence (SMSA). Long and Toma (1988) obtain similar results.

[6] See Evans and Schwab (1995), Neal (1997), and Altonji, Elder, and Taber (2000).

In contrast, Sander (2001) finds that US catholic schools increase the ability of catholic parents in promoting catholic values and beliefs, but have no impact on educational outcomes except for minorities. Using a sample of university students from a large Italian metropolitan area, Bertola and Checchi (2002) find that the academic performance of students that attended a private secondary school is actually *lower* than that of students who attended a public school. They explain that this result reflects differences in the composition of students between private and public schools, with lower ability students coming from richer families attending disproportionately private schools. Finally, some studies claim that quality indicators do not affect educational outcomes because resources are used inefficiently, see Hanushek (2002) for a survey.

Overall, the empirical evidence does not provide strong evidence in support of the hypothesis that parents choose private schools because they provide higher quality education. The finding of a low price elasticity of the demand for private education indicates that the perceived opportunity costs of ignoring quality are also relatively low. And the lack of evidence of large benefits in attending private schools questions the hypothesis that parents should invest in private education from a purely monetary point of view.

Existing studies, however, are mostly based on highly aggregate data (e.g., at the state or SMSA level). These variables are likely to be correlated with other unobserved determinants of school choice, such as family background, preferences and social networks. In this paper we study the impact of quality on school choice relying on a large sample of Italian households. The survey contains an assessment of school quality that varies at the individual level. We also supplement the survey data with objective measures of resources available to public and private schools, collected at the province level from administrative sources.

3. School quality

There are several approaches to measure school quality: outcome indicators, structure indicators, and subjective assessment of quality. Each of these indicators raises different econometric problems. Estimates based on outcome indicators are contaminated by the different

sample characteristics of students who attended public and private schools, and must be corrected for selection bias. Aggregate structure indicators do not allow distinguishing geographical effects from genuine quality. In cross-sectional studies, each of the indicators might be correlated with unobserved heterogeneity at the individual level.

Microeconomic surveys with *outcome indicators* based on student performance, such as standardized tests or labor market performance (conditional on enrolling in private or public schools) are not available in Italy.[7] Administrative sources provide detailed *structure indicators* for 92 provinces (administrative units comparable to U.S. counties): average students per class or per school, ratio of students to teachers, proportion of repeating students and proportion of students in double or triple shifts due to school congestion.

The student-teacher ratio is the only indicator available at the provincial level for both public and private schools. The indicator uncovers wide provincial differences. The student–teacher ratio in public compulsory schools (elementary and lower secondary) ranges from 6.9 in the province of Imperia (North-West of Italy) to 13.4 in the Sicilian province of Ragusa. Still in compulsory schools, the proportion of students in double or triple shifts due to school congestion is virtually zero in Northern and Central Italy, but as high as 6 percent in Naples and 14 percent in Caltanissetta (again in Sicily).[8] There is considerable variability in the student-teacher ratio even in upper secondary schools, where the ratio ranges from 7.7 to 10.2. But this indicator is harder to interpret, because aggregate statistics do not distinguish between different types of schools (generalist, technical, and vocational, all giving access to university), and might reflect compositional effects across provinces.

A third alternative to estimate quality is to rely on parents' *assessment of the quality of schools*. Quality indicators based on survey questions vary across individuals, allowing easier identification of quality on school choice even controlling for fixed effects. Furthermore, individual choice is based on quality perception, which might not necessarily bear a close relation

[7] Until 2001, the final exam at the end of upper secondary schools was the only national test graded by an external committee (replaced in 2002 by an internal committee). The test is open and grading is not uniform across committees. Since students in private and public schools have different characteristics and backgrounds, evaluation of student performance in college or in the labor market should be supplemented by microeconomic data on students as well as committee members.

[8] Data refer to 1993, the year of our microeconomic survey. More recent data exhibit similar patterns.

with measured quality. On the other hand, survey measures might be contaminated by individual characteristics and correlated with individual preferences for public schools.

4. The quality score in the Survey of Household Income and Wealth

The 1993 SHIW provides a unique opportunity to test the effect of school quality on the choice between public and private education. Conducted by the Bank of Italy, the survey collects data on a representative sample of 8,089 households and 24,013 individuals. Respondents provide information on parent's income, educational achievement and other demographic variables of the household.

The survey contains a special section on the perceived quality of public services (schools, health, transportation) and the use of alternative private services. In particular, survey respondents are asked to rate on a scale from 1 to 10 the quality of public schools in their area of residence (unfortunately, a similar question for private schools is not asked). We select all households with at least one child in school age (4,648 households) and merge individual information of school attendance, parent's education, labor market status of head and spouse, with household information on quality score and disposable income.[9]

Descriptive and regression analysis reveals that the quality score is a reliable and informative indicator of parents' attitudes towards education, as witnessed by the correlation of the quality score with aggregate indicators and regressions of quality on individual characteristics.

To examine the relation between aggregate indicators and the quality score, we aggregate the score by regions and plot it in Figure 1. The score exhibits substantial regional variation. On average, quality is considerably lower in the South (reaching a minimum in Campania) and peaks in two Northern regions, Trentino and Emilia. In Figure 2 we plot the regional student-teacher ratio for elementary, lower secondary and upper secondary public schools. The figure confirms

[9] Relating school choice to the quality score therefore requires assuming that the quality score of the head is the same as that of the spouse.

that also according to aggregate indicators public schools in the South feature lower quality than in the North.

Figure 3 plots the aggregate student-teacher ratio against the quality score. The relation is negative and statistically different from zero, for both elementary and upper secondary schools, suggesting that, on average, subjective evaluations conform to objective data. Similar correlations between the quality score and various measures of school resources are reported in Table 1. The quality score is strongly correlated with all aggregate indicators, but especially with elementary schools indicators: availability of teachers (as measured by the student-teacher ratio), lack of proper buildings, proportion of students in extended shifts and proportion of full-time students.[10] Many of the indicators are strongly collinear and cannot be used simultaneously in regression analysis. For this reason in the empirical analysis we focus on the student-teacher ratio as a summary measure of school resources available to students.

As a further check on the reliability of the quality score indicator, we regress quality score on a full set of regional dummies and sex, age, education, marital status, and number of children of the respondent. The results (not reported for brevity) indicate that the coefficients of the regional dummies are the only coefficients that are statistically different from zero. The most natural interpretation of this experiment is that the quality score reflects genuine variability in quality rather than respondents' preferences or bias towards public schools.

Analysis of the quality score uncovers substantial variability in quality even within regions or provinces. Figure 4 reports, by region, the proportion of respondents who assign low (less or equal to 3) or excellent (above 7) scores. Even in top quality regions, such as Trentino, where the proportion assigning excellent scores is 20 percent, there is about 5 percent of the sample assigning very poor scores. On the other hand, in Campania, the lowest quality region, where almost one third of respondents assign very low scores, there are some people who rate public schools as excellent. Since the quality question refers to public schools in the respondent's neighborhood, the most natural explanation for the variability of the quality indicator within regions (or provinces) is that it reflects substantial inequality in quality within regions and

[10] Parents with higher education might have more informed opinions. However, the correlation coefficients reported in Table 1 are not affected when we split the sample by parents' educational attainment.

provinces. As we shall see, it is this within-province variability that allows us to identify the quality effect in the econometric analysis.

The 1993 SHW also contains an estimate of tuition costs for elementary and secondary school combined. Private schools cannot receive public funding, so in Italy all students attending schools managed by private entities must pay tuition.[11] In 1993 private tuition (which include meals, but not transportation and textbooks), was 2.25 million lire per year, equivalent to about 1500 Euro in 2002.[12] This information is missing for over one third of the sample attending private schools, so we do not attempt to use provincial averages to proxy for the cost gap of private schools.[13]

Unfortunately, the 1993 survey does not contain a comparable quality score for private schools. The available aggregate indicators suggest that, on average, public schools tend to outperform private schools. For instance, the student-teacher teacher ratio in public compulsory schools is 9.6, as opposed to 14.5 in private schools. National union contracts indicate that teachers' salaries in private schools are between 20 and 50 percent lower than in public schools, depending on seniority. If salaries reflect teachers' ability, productivity and experience, one should conclude that, on average, the quality of teaching in private schools is lower than in public schools. But aggregate indicators hide considerable variability in quality, as suggested by the quality score of public schools. The analysis of school choice must therefore be performed at the microeconomic level.

5. The sample

We select three groups of children: those in elementary schools (1218 children aged 6 to 10), in lower secondary schools (804 children aged 11 to 13) and upper secondary schools (1667

[11] In 2001 the local governments of Lombardy, Emilia and Puglie started to issue income-related vouchers to cover public or private school costs.

[12] The comparable cost of public schools was 190 Euro.

aged 14 to 18). We then match each child with information on his or her parents, including household disposable income, parental education, province of residence, and city size. Our analysis is therefore performed at the child, not at the parent level.

The microeconomic survey tends to underestimate private school attendance by about 2 percentage points, but the ranking of private enrolment rates correspond to the national aggregates: 5.1 percent in elementary schools, 2.2 percent in lower secondary and 5.4 in upper secondary.[14] A likely reason for under-reporting private school attendance is that private enrolment is strongly correlated with income, while the survey is meant to be representative of the population at large and does not fully reflect the behavior of high income groups.

Given the wide geographical variability in the quality of public schools, it is perhaps not surprising to find ample variability also in private school attendance across regions. However, the latter does not necessarily mirror the quality indicators. In fact, while the private enrolment rate in compulsory schools is 4.5 percent in the North, 5.2 percent in the Center and 2.7 percent in the South, the quality score is 7 in the North, 6.7 in the Center and 5.7 in the South. Of course one should not expect that the simple correlation between the quality score and the private enrolment rate is positive, because private school attendance is also correlated with income, and on average income is much lower in the South.

In Table 2 we report sample means for selected variables for children attending elementary, lower secondary and upper secondary schools. In each case, we distinguish between public and private schools. The table confirms that the proportion attending private schools is negatively correlated with the score, but positively correlated with household disposable income. The probability of choosing a private school increases with the educational attainment of both parents: the proportion of fathers and mothers with higher education choosing private schools is 57 and 65 percent, respectively, as opposed to 41 and 40 percent choosing public schools. Single parents, large households and residents in the South also tend to choose public schools. Two thirds of

[13] Also missing is information on the type of private school attended (confessional or lay private schools). Independent evidence shows that more than 50 percent of private schools are managed by organizations affiliated to the Catholic Church, especially secondary high schools and professional training.

[14] These numbers should be compared with the 1993 aggregate statistics: 7.6 percent in primary schools, 4.4 percent in lower secondary and 8.7 in upper secondary. Source: ISTAT (1995), *Statistiche della scuola materna ed elementare - anno scolastico 1992-93*; ISTAT (1995), *Statistiche della scuola media inferiore - anno scolastico 1992-93*; ISTAT (1994), *Statistiche delle scuole secondarie superiori - anno scolastico 1992-93*.

private enrolment is in medium or large cities. Household disposable income has a major impact on private enrolment rates: more than half of the students in private schools come from households in the top quartile of the income distribution, and only about 10 percent from below median income, regardless of the school attended (elementary, lower secondary, or upper secondary).

On average, parents who send their children to private schools do not rate the public school system of lower quality than parents with children in public schools (6.25 against 6.33 in elementary schools, 6.52 against 6.41 in lower secondary and 7.08 against 6.38 in upper secondary). But comparison between sample means does not take into account that quality is correlated with income and other geographical characteristics. For this we must turn to regression analysis.

6. Regressions results

Table 3 relates the probability of attending a private school (elementary and lower secondary school combined) to potential determinants of school choice. Our basic specification includes child's sex, mother's and father's age, a dummy indicating if mothers and fathers attended secondary school or beyond, a dummy for single parents, number of siblings, dummies for household income quartiles and two indicators of the quality of public schools, the quality score and the student-teacher ratio in the province of residence.

The results confirm that income and the quality of public schools are strong determinants of the probability of enrolling in private schools. In particular, the probability that a child with parents in the fourth income quartile attends a private school is 7.8 percentage points higher than that of a child with parents in the first quartile. Both subjective and objective quality indicators affect schooling decisions. The coefficient of the quality score is negative and statistically different from zero at the 1 percent level. The marginal effect of raising the quality score by one point is to reduce the private enrolment rate by 0.5 percentage points. The coefficient of the student-teacher ratio is positive and statistically significant. Raising the ratio reduces the quality of public schools relative to private schools, and therefore increases the probability of private

enrolment by almost one percentage point for each point-increase in the student-teacher ratio. Overall, the estimates suggest that private enrolment rates are higher in provinces where the aggregate student-teacher ratio in public schools is relatively high and the quality score of public schools is relatively low.[15]

In principle, indicators of the quality of private schools should affect positively the decision to enroll in private schools. We therefore add to the basic specification the student-teacher ratio in private schools in each province, the only available indicator of private schools quality. The coefficient is small in absolute value and not statistically different from zero, and the variable is therefore dropped from the basic specification.

The estimates uncover other interesting results. The negative coefficient of the variable "Number of siblings" is evidence that liquidity consideration affect parental choice. Parents' education does not affect the choice between public and private schools, contrary to other results in the literature (Lankford and Lee, 1995; Buddin, Cordes and Kirby, 1998).

The second regression of Table 3 adds to the basic specifications parents' age, dummies for city size, a dummy for households where at least one relative does not work (the variable "housewife") and dummies for resident in the Center and in the South (the North is the reference dummy). We find that older parents are less likely to send children to private schools, while living in large cities or in Northern regions of the country increases private school attendance. Living in a city increases the probability of private enrolment by 8 percentage points. This reflects not only the wider availability of private schools in large cities, but also the higher juvenile crime rate in metropolitan areas, which might induce some parents to shield their children from exposure to social problems.

The potential interaction between women labor force participation and school choice is of great interest not only for the economics of school choice, but also for the allocation of time within the household and the employment opportunities of women. Since private schools often have extended schedules of activities, the presence of a housewife in the household should tend to reduce the probability of choosing a private school. In fact, the coefficient is negative and statistically different from zero at the 10 percent level, lending some support to the idea that some

[15] Using aggregate provincial data we regress the private enrolment rate on the student-teacher ratio, regional dummies and average income in the province. The coefficient of the student-teacher ratio is 0.01 (with a t-statistic of

parents choose private education as a substitute for child care and not because private schools offer better education opportunities.[16] However, we are hesitant to give to the coefficient a causal interpretation, given that the choice of participating in the labor market is itself potentially driven by the availability of private schools (Del Boca, 2001).

The results of the first two regressions might be criticized because the effect of quality on the choice of private schools might be spurious. Among the many possible omitted factors, religion, political orientations, quality of private schools, local labor market conditions, and crime rates might play a role. We attempt to control for all these factors by introducing a full set of provincial dummies in the third column of Table 3. This of course entails dropping the provincial student-teacher ratio. The results are qualitatively unchanged. In particular, the probability that a child attends a private school decreases with the quality score.

To illustrate further the results, we plot in Figure 5 the predicted probability of attending a private school for selected values of the regressors: a child living in a large Northern city with parents in the top income quartile. Each point increase in the quality score reduces the probability by about half of a percentage point. Since the enrolment rate in this selected sample is 8.7 percent, reducing the quality score from 8 to 2 doubles the probability of private enrolment.

In Table 4 we report separate probit estimates for the probability of enrolling in elementary (children of age 6 to 10) and lower secondary schools (age 11 to 13). For each sample, we report the basic specification, the specification with regional dummies, city size dummies and the dummy for the presence of a housewife, and the specification with provincial dummies.

Although the sample size of these regressions is considerably reduced, the general pattern of the estimates is similar to that of Table 3. The enrolment rate is strongly correlated with parents' income and city size. The coefficient of the quality score is negative and of the same order of magnitude in all specifications, although in the sample of children attending lower secondary schools it is less precisely estimated than in the other regressions. The coefficient of the presence of a housewife is negative, as in Table 3, but it is not statistically different from zero except in the specification with provincial dummies for lower secondary schools.

1.64), showing that aggregate indicators alone do not explain educational choices.

[16] We also include hours worked by parents. The coefficient of this variable is not statistically different from zero.

The regressions presented do not capture two potentially important reasons for choosing a private school affecting three groups of parents: those who wish to anticipate the legal age at which their children can enroll in an elementary school, those with children with handicap or serious disease and those who choose private schools because they are catholic.

While public schools can enroll only children at least 5 years and 6 months old in September of each year, private schools are more flexible, and accept in first grade also younger children. So one motivation for choosing private schools is to anticipate the legal school age. In the survey there are 225 children 5 years old, and 52.8 percent of these attend first grade, resulting in a sample of 1,332 children in elementary school. As a robustness check, we therefore estimate the probit on this extended sample. The results are unchanged and, for brevity, they are not reported.

Children with handicap receive special attention in public schools, and are entitled to an individual, full-time teacher, provided the local health authorities certify the handicap. Since private schools do not feature this program, parents of children with handicap have really no choice. We cannot test formally for this effect because the 1993 SHIW does not report information on health. Some information is available in the 1995 survey, where 5 percent of children are reported with handicap, chronic disease or very poor health. Using the panel section of the 1993-95 surveys, we merge 1995 data on health status with 1993 information on school choice and find that out of 50 children with health problems only 1 attends a private school.

The 1993 SHIW does not contain a measure of the intensity of religious beliefs at the individual level or information on the type of private school attended. To check if catholic parents are more likely to select catholic schools, we rely on regional indicators of the intensity of catholic beliefs available in a 1996 Survey: the proportion of individual going to church every day, few times per week, once per week, or few times per month.[17] We add this variable to the set of regressors and estimate the probit for school choice omitting provincial dummies. We find that

[17] The survey (*Multiscopo*) was carried out by ISTAT, the National Statistical Agency. In Italy there are 95 provinces and 20 regions, and each region includes one or more provinces. So regional indicators are collinear with provincial dummies. The proxy for Catholic beliefs attains the lowest and the highest values in central and northern regions. In Liguria, Emilia, and Tuscany only 40 percent of the sample goes to church few times per month or more often; in Trentino and Veneto, about 65 percent does.

the coefficient of the proxy for catholic beliefs is positive, but not statistically different from zero, while the coefficients of the other variables are unaffected.

In Table 5 we extend the analysis to students in upper secondary schools. With respect to compulsory school, there are some noteworthy features. Being a female increases the probability of attending a private school, possibly capturing different parents' protective attitudes with respect to girls. Going to a private school is correlated with income, but the coefficients are generally imprecisely estimated. Differently from compulsory schools, father's education has a positive impact on private attendance. The coefficient of the quality score is not statistically different from zero. One the other hand, the provincial student-teacher ratio has a much larger impact than in compulsory schools (of course, the ratio is dropped when we introduce fixed provincial effects).

7. Conclusions and policy implications

Given the constitutional law that does not allow privately managed schools to receive government support, the Italian school system provides a clear case in which parents who choose private schools must also pay tuition out-of-pocket. The regression analysis suggests that the quality of public schools (perceived by parents or measured by provincial indicators of school resources) is an important determinant of the choice between private and public schools, even controlling for provincial fixed effects. We also find that private school attendance at the compulsory level is strongly correlated with parents' income, while number of siblings and, in elementary and lower secondary schools, presence of a housewife in the household reduce the probability of private enrolment.

The effect of quality on school choice has some interesting policy implications. First of all, since parents make decisions on the basis of their perception of school quality, it would be important to raise parents' information about school characteristics and students' performance in continuing education and in the labor markets. In this respect, standardized national tests would be extremely valuable. It is unfortunate that Italy's only national test – after completion of upper secondary school – is not a standardized national test, the evaluation being left to committees

formed mainly by internal examiners. Information about teachers' competence, experience and background and about school structures and resources would also help parents in making their choice. Given the ample variability in school quality even in relatively small districts, this information should be available and comparable across schools in each district.

The second implication is that public resources spent on public schools have great impact on the private enrolment rate because the government can affect quality by changing the level of spending for public education. Government plans to cut public expenditures on education tend to reduce the quality of public schools, thereby raising the demand for private education. Current proposals aim at reducing the number of schoolteachers by about 40,000, thereby increasing the student-teacher ratio in compulsory schools by almost one point. According to the estimated coefficient of the student-teacher ratio in the second regression of Table 3, this implies an increase in private enrolment of 10 percent with respect to its current level.

The positive correlation with mothers' working status indicates that private schools are chosen also because they offer additional features, regardless of quality. Singling out different reasons for investing in education is important. If private schools raise educational achievement and labor market performance, there could be a rationale for subsidizing private institutions through tax exemption or educational vouchers. If instead private education is mainly a substitute for other services (such as child care) or is chosen to develop social networks, ideology and religion, the externality argument does not lend support to public intervention. At the moment the data do not allow us to discriminate fully between these hypothesis, and we consider the issue important for future research.

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Table 1

Correlation matrix among quality indicators of public schools

The correlation matrix is estimated on the basis of aggregate indicators of school quality and 92 provincial averages of the quality score available in the 1993 SHIW. Note: p-values are reported in italics.

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1. Quality score	1.000							
2. Student/teacher ratio in elementary schools	-0.4694* *0.0000*	1.0000						
3. Student/teacher ratio in lower secondary schools	-0.1069 *0.3105*	0.6819* *0.0000*	1.0000					
4. Student/teacher ratio in upper secondary schools	-0.2489* *0.0167*	0.5440* *0.0000*	0.5329* *0.0000*	1.0000				
5. Proportion of elementary school students in full-day schedules	0.2360* *0.0235*	-0.4960* *0.0000*	-0.2848* *0.0059*	-0.1386 *0.1877*	1.0000			
6. Proportion of elementary school students in buildings unfit for school use	-0.6521* *0.0000*	0.5188* *0.0000*	0.1952 *0.0623*	0.1989 *0.0573*	-0.4017* *0.0001*	1.0000		
7. Proportion of elementary school students in second or third shift	-0.5476* *0.0000*	0.4111* *0.0000*	0.2685* *0.0097*	0.3114* *0.0025*	-0.2502* *0.0162*	0.3445* *0.0008*	1.0000	
8. Proportion of upper secondary school students in second or third shift	-0.1446 *0.1691*	0.1968 *0.0601*	0.1573 *0.1344*	0.2309* *0.0268*	-0.0801 *0.4481*	0.0298 *0.7781*	0.1961 *0.0610*	1.0000

Table 2
Sample statistics

Except for number of children, father's and mother's age, quality score and student-teacher ratio, values are expressed in percent. Sample means are computed using population weights. The total number of observations does not equal the total sample size because there are children not attending the school level corresponding to their age (5 in the age group 6-10, 2 in the age group 11-13, and 227 in the age group 15-18, beyond compulsory school level).

Variable	*Elementary*		*Lower Secondary*		*Upper Secondary*	
	Private	*Public*	*Private*	*Public*	*Private*	*Public*
Female	39.7	47.5	38.9	44.4	58.9	47.7
Father's education (beyond compulsory)	57.9	41.2	48.4	39.4	64.5	38.4
Mother's education (beyond compulsory)	65.1	39.9	54.5	31.2	54.1	29.5
Father's age	38.6	37.6	45.8	39.0	47.6	43.3
Mother's age	35.2	35.7	41.5	39.5	41.5	43.0
Single parent	3.0	6.5	2.4	10.5	4.9	10.1
Number of children	1.84	2.25	1.49	2.39	1.87	2.38
Housewife (at least one person at home)	36.1	50.1	43.2	50.4	39.8	49.4
I income quartile	7.26	18.69	6.31	21.76	2.24	16.66
II income quartile	5.36	33.27	9.46	30.01	28.73	25.55
III income quartile	34.54	24.90	32.28	23.57	21.41	27.93
IV income quartile	52.85	23.14	51.94	24.66	47.62	29.86
Quality score	6.25	6.33	6.52	6.41	7.08	6.38
Student-teacher ratio in public schools	10.17	10.02	7.82	7.87	9.21	9.12
Resident in the North	39.8	37.9	61.3	37.0	44.5	35.3
Resident in the Center	25.6	18.0	19.0	16.6	28.2	20.9
Resident in the South	34.6	44.1	19.7	46.4	27.3	43.8
City size<20,000	18.3	49.5	5.3	51.0	43.6	43.9
20,000<City size<40,000	9.8	14.4	18.4	13.7	8.5	15.5
40,000<City size<500,000	41.0	25.6	40.9	26.6	15.4	25.7
City size>500,000	30.8	10.5	35.4	8.8	32.5	14.9
Observations	70	1143	24	778	57	1383

Table 3
Probit regressions for private enrolment: compulsory education

The table reports probit regressions for private enrolment in elementary and lower secondary schools. For each regression we report the marginal effect and the *t*-statistic in parentheses.

Variable			
Female	-0.007	-0.005	-0.009
	(-1.05)	(-0.83)	(-1.17)
Father's education	0.003	0.004	0.000
	(0.35)	(0.53)	(0.07)
Mother's education	0.014	0.009	0.011
	(1.47)	(1.12)	(1.08)
Single parent	0.009	-0.013	-0.015
	(0.56)	(-1.04)	(-0.92)
Number of siblings	-0.020	-0.014	-0.023
	(-3.82)	(-3.26)	(-3.96)
II Income quartile	0.009	0.011	0.022
	(0.64)	(0.89)	(1.21)
III Income quartile	0.046	0.043	0.078
	(2.71)	(2.79)	(3.37)
IV Income quartile	0.068	0.058	0.105
	(3.47)	(3.24)	(3.70)
Quality score	-0.005	-0.004	-0.007
	(-2.68)	(-2.65)	(-2.82)
Student-teacher ratio	0.008	0.007	
	(2.35)	(2.20)	
Father's age		-0.000	-0.000
		(-1.33)	(-1-16)
Moher's age		-0.000	-0.001
		(-1.82)	(-1.87)
Housewife		-0.011	-0.020
		(-1.61)	(-2.13)
Resident in the Centre		-0.019	0.067
		(-2.57)	(1.03)
Resident in the South		-0.015	-0.005
		(-1.63)	(-0.14)
20,000<City size<40,000		0.031	0.118
		(2.00)	(3.35)
40,000<City size<500,000		0.034	0.075
		(3.15)	(4.27)
City size>500,000		0.079	0.110
		(3.25)	(2.70)
Province dummies	*NO*	*NO*	*YES*
Pseudo R square	0.095	0.137	0.220
Number of observations	1948	1948	1948

Table 4
Probit regressions for private enrolment: elementary and lower secondary

The table reports probit regressions for enrolment in private elementary and lower secondary schools. For each regression we report the marginal effect and the *t*-statistic in parentheses.

Variable	*Elementary school*			*Lower secondary school*		
Female	-0.001	0.000	0.000	-0.014	-0.011	-0.032
	(-0.16)	(0.04)	(0.04)	(-1.78)	(-1.70)	(-1.57)
Father's education	0.005	0.004	0.002	-0.002	0.000	-0.004
	(0.38)	(0.40)	(0.15)	(-0.26)	(0.09)	(-0.20)
Mother's education	0.016	0.014	0.013	0.007	0.001	0.017
	(1.18)	(1.28)	(0.83)	(0.72)	(0.21)	(0.58)
Single parent	0.029	-0.015	-0.022	-0.007	-0.006	-0.002
	(1.04)	(-0.87)	(-0.97)	(-0.51)	(-0.57)	(-0.05)
Number of siblings	-0.021	-0.014	-0.027	-0.016	-0.009	-0.030
	(-2.93)	(-2.47)	(-3.07)	(-2.72)	(-2.14)	(-2.23)
II Income quartile	-0.002	0.004	0.016	0.029	0.019	0.060
	(-0.11)	(0.27)	(0.63)	(1.37)	(1.22)	(1.11)
III Income quartile	0.054	0.056	0.149	0.037	0.017	0.029
	(2.30)	(2.60)	(3.67)	(1.70)	(1.21)	(0.63)
IV Income quartile	0.087	0.083	0.174	0.046	0.019	0.046
	(3.12)	(3.25)	(3.78)	(1.85)	(1.19)	(0.84)
Quality score	-0.006	-0.005	-0.009	-0.002	-0.002	-0.011
	(-2.26)	(-2.36)	(-2.87)	(-1.27)	(-1.26)	(-1.79)
Student-teacher ratio	0.008	0.007		0.006	0.007	
	(2.41)	(2.04)		(1.41)	(1.58)	
Father's age		-0.001	-0.002		0.000	0.002
		(-2.36)	(-2.59)		(1.90)	(2.38)
Moher's age		-0.001	-0.002		-0.000	-0.000
		(-1.71)	(-2.25)		(-0.38)	(-0.25)
Housewife		-0.007	-0.023		-0.010	-0.054
		(-0.86)	(-1.51)		(-1.58)	(-2.23)
Resident in the Centre		-0.025	-0.027		-0.010	-0.023
		(-2.53)	(-0.95)		(-1.35)	(-0.57)
Resident in the South		-0.019	-0.005		-0.012	0.203
		(-1.40)	(0.10)		(-1.46)	(2.16)
20,000<City size<40,000		0.026	0.238		0.035	0.125
		(1.28)	(2.96)		(1.88)	(1.87)
40,000<City size<500,000		0.043	0.147		0.017	0.072
		(3.02)	(3.92)		(1.42)	(1.90)
City size>500,000		0.085	0.242		0.042	0.066
		(2.77)	(2.68)		(1.54)	(1.06)
Province dummies	*NO*	*NO*	*YES*	*NO*	*NO*	*YES*
Pseudo R square	0.108	0.161	0.279	0.102	0.152	0.216
Number of observations	1172	1172	1172	776	776	776

Table 5
Probit regressions for private enrolment: upper secondary

The table reports probit regressions for private enrolment in upper secondary schools. For each regression we report the marginal effect and the *t*-statistic in parentheses.

Variable			
Female	0.020	0.017	0.030
	(2.67)	(2.44)	(2.12)
Father's education	0.016	0.017	0.038
	(1.84)	(1.96)	(2.32)
Mother's education	0.011	0.011	0.009
	(1.23)	(1.24)	(0.55)
Single parent	-0.010	-0.015	-0.038
	(-0.89)	(-1.18)	(-1.45)
Number of siblings	-0.021	-0.019	-0.039
	(-4.44)	(-4.38)	(-4.21)
II Income quartile	0.020	0.017	0.027
	(1.17)	(1.05)	(0.95)
III Income quartile	0.007	0.006	0.017
	(0.45)	(0.42)	(0.63)
IV Income quartile	0.023	0.023	0.065
	(1.28)	(1.23)	(1.83)
Quality score	-0.000	-0.000	0.001
	(-0.04)	(-0.03)	(0.37)
Student-teacher ratio	0.019	0.018	
	(3.17)	(2.40)	
Father's age		-0.000	-0.001
		(-0.32)	(-0.92)
Moher's age		-0.000	-0.002
		(-1.98)	(-2.80)
Housewife		0.007	0.025
		(0.92)	(1.58)
Resident in the Centre		-0.011	0.042
		(-1.27)	(0.93)
Resident in the South		-0.011	0.103
		(-1.27)	(2.04)
20,000<City size<40,000		0.009	0.028
		(0.80)	(0.94)
40,000<City size<500,000		0.000	-0.006
		(0.09)	(-0.31)
City size>500,000		0.014	0.006
		(0.95)	(0.25)
Province dummies	*NO*	*NO*	*YES*
Pseudo R square	0.113	0.132	0.196
Number of observations	1351	1351	1351

Figure 1
Quality score of public schools, by region

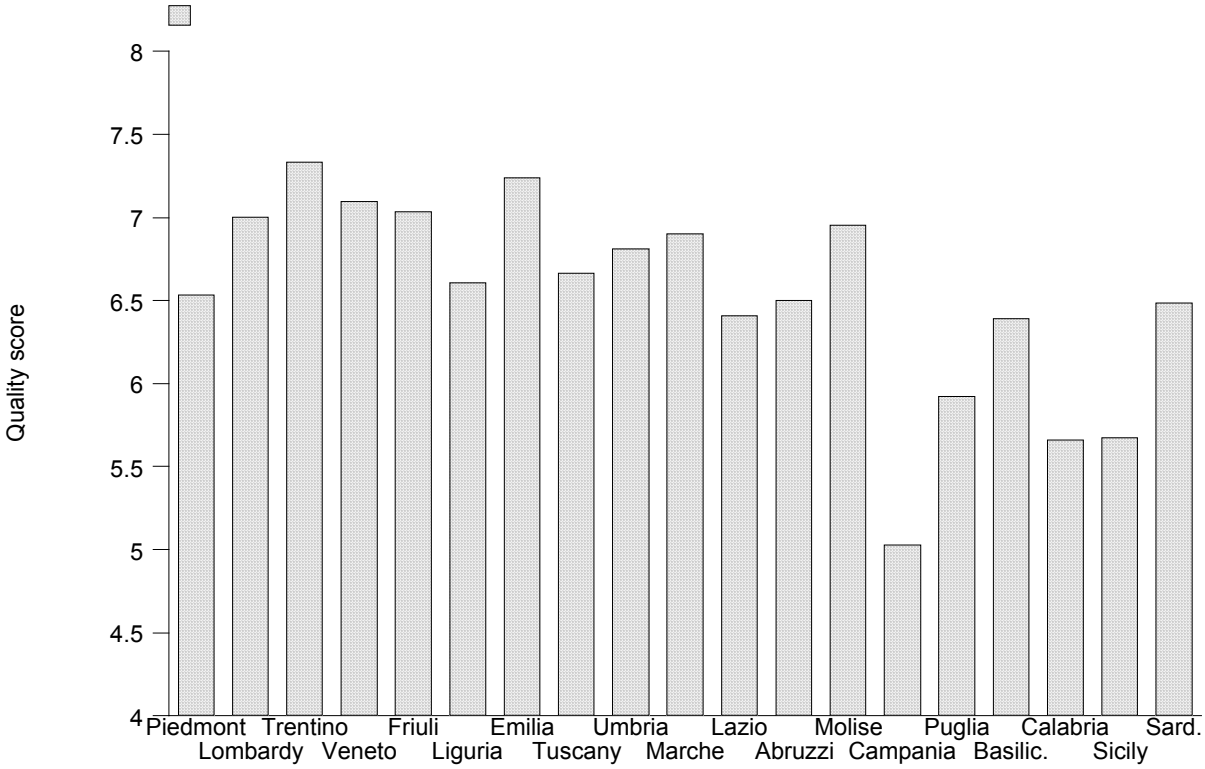

Figure 2
Student-teacher ratio, by region

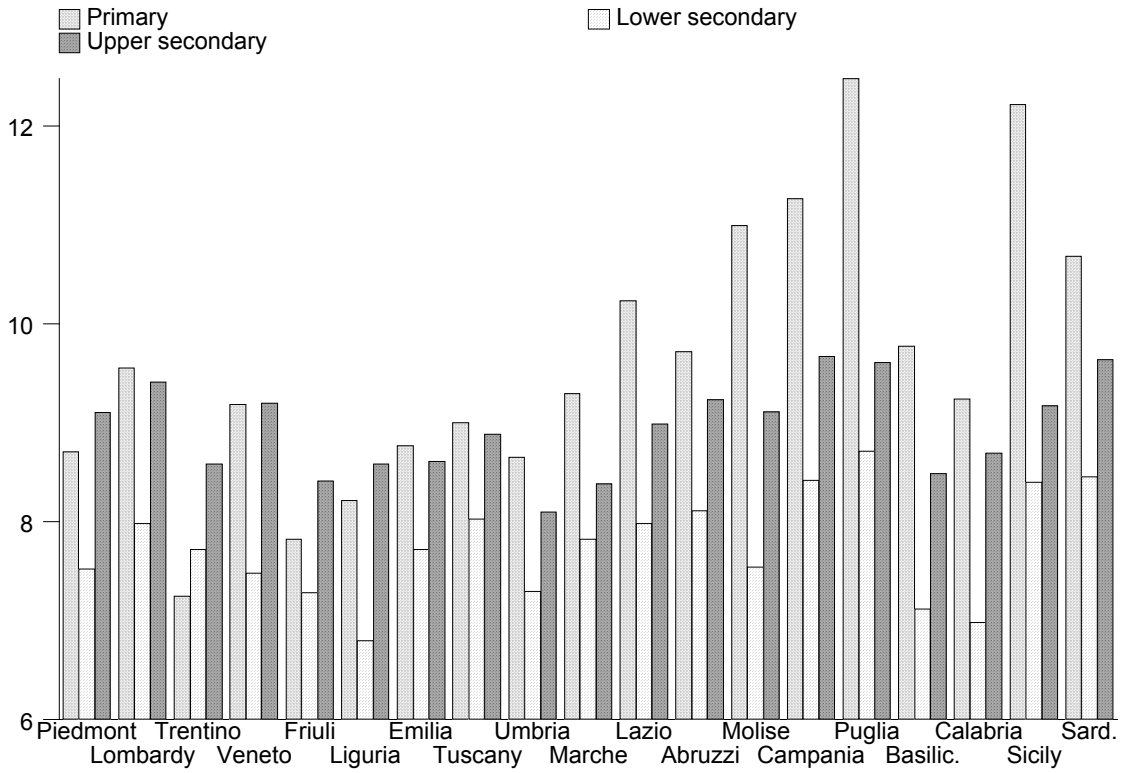

Figure 3
The correlation between the quality score and the student-teacher ratio

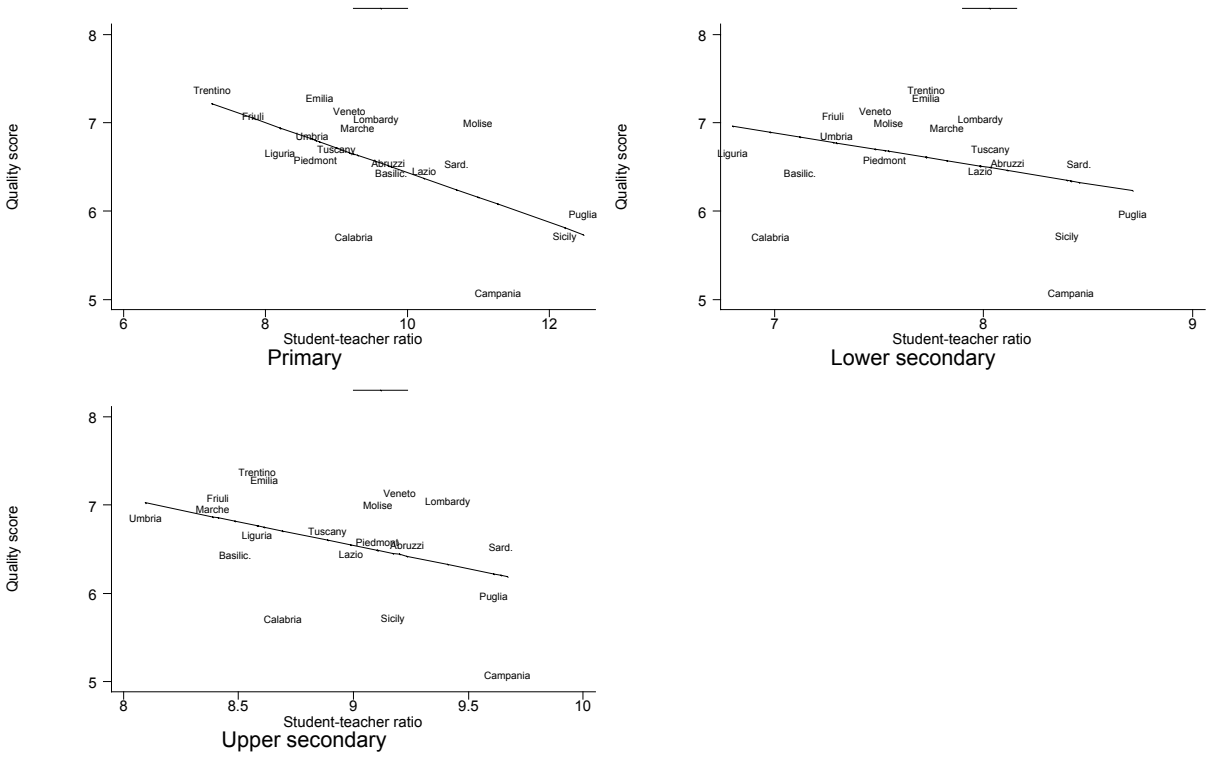

Figure 4
Proportion reporting low or high quality of public schools, by region

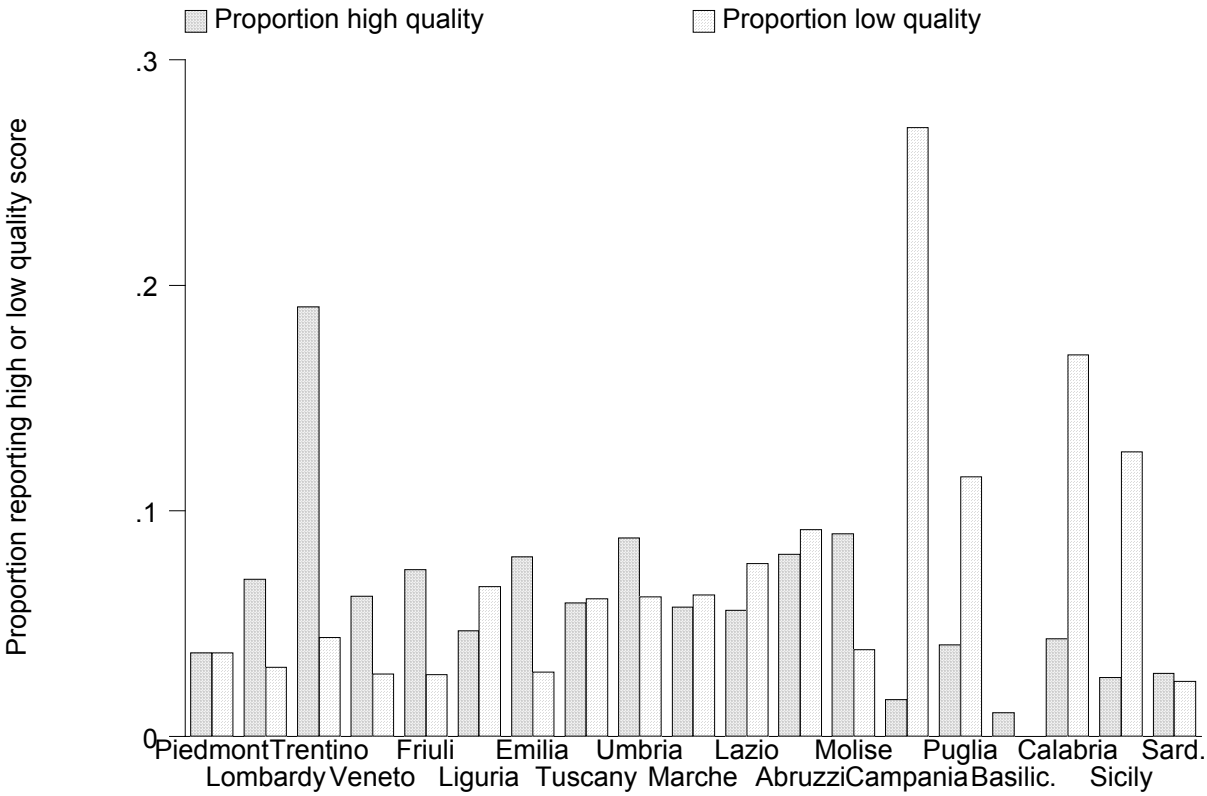

Figure 5
The effect of the quality score on the probability of private enrolment