



CESifo / PEPG Conference on *Schooling and Human Capital Formation in the Global Economy*

CESifo Conference Centre, Munich
3 - 4 September 2004

School Choice and Quality

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July 2004

Abstract

The 1993 Survey of Household Income and Wealth, a large cross-section of the Italian population covering 24,000 individuals, reports detailed information on children's attendance of public and private schools and parents' assessments of the quality of public schools in the city of residence. The survey also provides detailed information on the household's demographic structure, income and parents' 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 fixed provincial effects.

We thank for comments seminar participants at IZA, York University, and Boston College. We acknowledge financial support from the Italian Ministry for Universities and Research (MIUR), the Italian National Research Council (CNR) and the European Community's Human Potential Programme under contract HPRN-CT-2002-00235 [AGE].

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1. Introduction

The question between private versus public provision and financing of education is receiving increasing attention. In spite of this debate, very little is known about the factors that 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 often measured by the pupil-teacher ratio, class size, teachers' salaries and experience. However, these indicators are almost invariably aggregated by geographical areas, and are not available for individual schools. This makes the task of estimating the actual impact of quality on choice of school difficult, because the quality index might be correlated with other geographical variables.

In this paper we provide evidence on the effect of quality on school choice using data drawn from the 1993 Survey of Household Income and Wealth, which covers a large cross-section representative of the Italian population. The survey contains information on school attendance (private or public) and a subjective assessment of the quality of public schools.¹ This information is then merged with provincial data on aggregate indicators of school quality (such as the pupil-teacher ratio). While the subjective quality score refers to many school characteristics – some of which unobservable – objective indicators measure school resources in each geographical area. Even though subjective measures may be more volatile and contaminated by measurement error, they refer to local public schools where the family expects to send its children; on the other hand, objective indicators do not vary across individuals in the same geographical region. By combining the two type of variables, we can therefore relate school choice not only to aggregate resources, but also to subjective indicators that vary at the individual level.

¹ The question is: “Based on your personal experience or on that of your family, can you give a mark ranging from 10 (best outcome) and 0 (worst outcome) to [followed by a list of 17 items, including]... the working of local schools (primary and secondary).”

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.

First of all, the private enrollment rate in elementary and secondary schools for the OECD countries is just 2.9 percent, reflecting the massive role of government in providing education.² In the United States, where the educational system is more market-oriented, the private enrollment rate is 10.9 percent. Italy's 5.5 percent rate is not as high as in the United States, but is considerably above the OECD average.

Second, given the constitutional mandate that privately managed schools cannot receive government support, parents who choose private schools must also pay tuition out-of-pocket.³ Accordingly, if they believe that private schools offer a better education than public schools, parents must pay for quality.

Finally, Italy features a centralized school system, setting national standards for both public and private schools.⁴ 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, in practice there is ample heterogeneity of schools, resulting in different quality indicators among regions, among provinces within the same region, 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.

² 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.

³ Since public schools are financed out of general tax revenues 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.

⁴ 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, course outlines, evaluation and grading methods, vacation periods and even school entry and exit times. This reduces the dimensions along which private and public schools can differ, and also the differences among private schools themselves.

Throughout the paper, we focus on elementary and secondary schools. We do not consider the enrollment decision at the pre-school level, because this depends chiefly on the labor market status of mothers, while labor market participation itself also depends on the availability of pre-schools, creating two-way causation and endogeneity (Del Boca, 2002). For quite different reasons, we do not analyze the choice between private and public universities. The higher education system in Italy is mostly public, and there are very few students in private institutions. Since public universities are not always available in the province of residence, and private universities exist only in Rome and Milano, the choice of attending a private university entails other cost differences that affect students' choice besides tuition. In addition, the choice of a university is usually not the parent's but the student's choice, within the limits of the budget allocated by parents. For both reasons we have decided not to analyze this choice.

This paper is organized as follows. Section 2 reviews the economics of school choice. Section 3 describes the most common indicators of 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 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 higher 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 the public school system can opt out and choose a private school. In principle, with perfect capital markets parents' choice is unconstrained. But given limited

borrowing capacity, parents are constrained. They cannot choose private schools if their current resources are below some threshold level.

There are also other reasons for choosing private schools. Some parents elect to send their children to private schools because they explicitly support certain values, such as religion (Sander, 2001)⁵; others because private schools have better sport facilities, or lower transportation costs. Sometimes the quality of education or facilities is not even the main issue. Some people consider private education a status symbol (Fershtman, Murphy and Weiss, 1996), a way of improving their own and their children's social networks, of shielding their children from social problems, avoiding contact with immigrants and children with handicaps, or simply because they do not approve of the open and more heterogeneous public school environment (Gradstein and Justman, 2001).

Empirically, it is hard to determine 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 belief). Others are easier to measure, at least in principle. In particular, the quality of education should be the main factor if parents consider private education as an investment good. If instead parents base their decisions on other characteristics, quality should not be a major concern.⁶

Most of the available empirical evidence refers to the United States. In a sample of white parents, Lankford and Lee (1995) find that the decision to enroll in private elementary and secondary schools depends on household income and parents' education, the racial composition of public schools, the juvenile crime rate in the area of residence, and inner city location. Proxies for schools' expenditure 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

⁵ By comparing a sample of voucher users in New York city with the eligible population, Howell (2004) finds that religious identity and practice is by and far the most significant variable affecting the permanence in the program.

⁶ Teske and Schneider (2001) survey several studies relative to the US experience reporting that greater parental choice induces more satisfaction and parental involvement. A common problem of these studies is that it is difficult to assess whether actual parents' behavior is consistent with their declarations: "...most of the studies are based on surveys of what parents *say* they want from the schools and very few are based on the actual choice behavior of parents" (p.613).

a private school. Working mothers are more likely to select private schools, signaling the interaction with the choice of labor market participation. 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.⁷ On the other hand, Figlio and Stone (2001), merging individual-level data with resource indicators at the school level, find that local violent crime rates, school district concentration, and student-teacher ratios in public schools affect school composition, especially in retaining those students most likely to opt out of public schools. Overall, this literature does not provide clear-cut evidence that educational quality affects private school attendance, at least for 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.⁸ 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.

Other studies obtain different results. Sander (2001) finds that US Catholic schools enhance the ability of parents in promoting Catholic values and beliefs but have no effect on educational outcomes except for minorities. Using a sample of university students from a large metropolitan area in Italy, Bertola and Checchi (2002) find that the academic performance of students who attended a private secondary school is actually *worse* than that of those who went to public school. They explain that this result reflects differences in the composition of the student body. That is, private schools are attended disproportionately by less capable students from richer families. Finally, some studies claim that quality indicators do not affect educational outcomes because resources are used inefficiently, see Hanushek (2002) for a survey.

Our reading of this literature is that there is no compelling empirical evidence for the hypothesis that parents choose private schools because they provide higher quality education. The

⁷ 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.

⁸ See, among others, Evans and Schwab (1995), Neal (1997), and Altonji, Elder, and Taber (2000).

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 substantial benefits from attending private schools weakens the hypothesis that parents should invest in private education from a purely monetary point of view.

These studies, however, are mostly based on highly aggregate data (e.g., at the state or SMSA level), where the variables of interest are likely to be correlated with other unobserved determinants of school choice, such as family background, preferences and social networks. In the present paper we study the impact of quality on school choice relying on a very 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 the resources available to public and to private schools, collected at the province level from administrative sources and from independent evidence available in recent survey of school parental choice.

3. School quality

Several different measures of school quality are possible: outcome indicators, resource indicators, and subjective assessments. Each raises a set of econometric problems. Estimates based on outcome indicators are contaminated by the different characteristics of public and private school students, and must be corrected for selection bias. Aggregate resource indicators do not allow one to distinguish geographical effects from genuine quality differences. 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 are not available in Italy.⁹ Administrative sources

⁹ Until 2001, the national final exam at the end of upper secondary school was the only national test graded by a commission external to the school (replaced in 2002 by an internal commission). The test consists of open questions (which are not as easily compared across students as in the case of multiple choice tests), however, and grading is not uniform across commissions. 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 commission members.

provide detailed *structure* or *resource indicators* for 92 provinces (comparable to US counties): average class or school size, student-teacher ratio, 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. Provincial differences are substantial. The ratio in compulsory public 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.¹⁰ Still in compulsory schools, the proportion of students in double or triple shifts due to school congestion is virtually nil in Northern and Central Italy, but as high as 6 percent in Naples and 14 percent in Caltanissetta (again in Sicily).¹¹ There is considerable variability in the student-teacher ratio even in upper secondary schools, with a range from 7.7 to 10.2. But this indicator is harder to interpret, because aggregate statistics do not distinguish between different types of schools (academic, technical, and vocational, all giving access to university), and might reflect compositional effects across provinces.

A third way to estimate the quality of schools is to rely on *parents' assessment*. Subjective quality indicators based on survey questions vary across individuals, allowing easier identification of the impact of quality on school choice even controlling for fixed effects. Furthermore, individual choice is based on perceived quality, which does not necessarily correspond to objectively measured quality. On the other hand, survey measures could be contaminated by individual characteristics and correlated with individual preferences for public schools and might suffer from cognitive dissonance, the *ex post* rationalization that confirms the choice. To take into account this potential criticism, in the empirical estimates we examine the reliability of subjective quality scores examining its association with aggregate school variables – e.g., student teacher ratio – and its relation to individual attributes.

¹⁰ While in the U.S. the typical student-teacher ratio ranges from 15 to 20, in Italian primary and secondary schools it ranges from 8 to 12, given that classes seldom exceed 25 students with 2 or 3 teachers.

¹¹ Data refer to 1993, the year of our microeconomic survey. More recent data exhibit similar patterns.

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 biannually by the Bank of Italy, that year the survey collected data on a representative sample of 8,089 households (24,013 individuals). Respondents provide information on parent's income, educational achievement and other demographic variables.

The survey contains a section on the perceived quality of public services (schools, health, transportation) and the use of alternative private services. In particular, survey respondents (the household head or the person responsible for the financial matters of the household) are asked to rate 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 school-age child (4,648 households) and then match individual information on school attendance, parents' education, and labor market status of head and spouse, with the household's quality score and disposable income.¹²

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 region and plot it in Figure 1. There is substantial regional variation. On average, quality is considerably lower in the South (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 that also according to aggregate indicators public schools in the South are lower in quality. Figure 3 plots the aggregate student-teacher ratio against the quality rating. The relation is negative and statistically different from zero, for both elementary and upper secondary schools, suggesting that subjective evaluations tend to conform to objective data. Similar correlations between quality score and various measures of school resources are reported in Table 1. The quality rating is

strongly correlated with all aggregate indicators, but especially with those for elementary schools: availability of teachers (the student-teacher ratio), facilities, proportion of students in extended shifts and proportion of full-day students whose schedule extends beyond lunchtime (the standard schedule calls for six mornings a week).¹³ 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, we regress it on a full set of dummies for region, sex, age, education, marital status, and number of children. The results are not reported for brevity, but only the regional dummies have coefficients statistically different from zero. The most natural interpretation of this experiment is that the quality score reflects genuine variations in quality and not respondents' preferences for or bias against public schools.

Quality scores vary substantially even within regions or provinces. Figure 4 reports, by region, the proportion of respondents whose rating is poor (3 or less) or excellent (above 7). Even in top quality regions, such as Trentino, where 20 percent give excellent scores, about 5 percent of the sample assigns very poor scores. On the other hand, even in Campania, the lowest quality region, where almost a third give very low scores, some people rate locally available public schools as excellent. Since the question asked refers to public schools in the respondent's neighborhood, the most natural explanation for the variability of the indicator within regions (or provinces) is that it reflects substantial inequality between different local schools. As we shall see, it is this intra-province variability that allows us to identify the quality effect.

The 1993 SHIW also contains an estimate of tuition costs for elementary and secondary school combined. At the time, Italian private schools received no public funding, so all students had to pay tuition.¹⁴ In 1993 private tuition (including meals, but not transportation and

¹² Relating school choice to the quality score thus requires the assumption that the quality score of the head is the same as that of the spouse.

¹³ 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.

¹⁴ In 2001 the local governments of Lombardy, Emilia, Veneto and Puglia started to issue income-related vouchers to cover public or private school costs.

textbooks), came to 2.25 million lire per year, equivalent to about Euro 1,500 at 2002 prices.¹⁵ However this information is lacking for more than a third of the sample attending private schools, so we do not use provincial averages to proxy for the cost gap.¹⁶

5. The sample

We select three groups of children by type of institutions attended: elementary school (1218 children aged 6 to 10), lower secondary school (804 children aged 11 to 13) and upper secondary school (1667 aged 14 to 18). We then match each child with information on his or her household, including disposable income, parents' education, province of residence, and city size. Our analysis, that is to say, is conducted at the child rather than parent level.

The survey tends to underestimate private school attendance by about 2 percentage points, but the ranking of private enrolment rates corresponds to the national aggregates: 5.1 percent in elementary schools, 2.2 percent in lower secondary and 5.4 in upper secondary.¹⁷ A likely reason for the under-estimation of private school attendance is that this 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 great geographical variability in the quality of public schools, it is perhaps not surprising to find ample intra-regional differences also in private school attendance. However, these differences do not necessarily mirror the quality indicators. In fact, private enrollment rates in compulsory schools are 4.5 percent in the North, 5.2 percent in the Center and 2.7 percent in the South, while the average index of quality score is 7 in the North, 6.7 in the Center and 5.7 in the South. Of course one would not expect the simple correlation between the quality score and

¹⁵ The comparable cost of public schools was Euro 190.

¹⁶ Also lacking 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 academic and vocational schools.

¹⁷ 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*.

the private enrollment rate to be positive; the income factor is important, and incomes are much lower in the South.

In Table 2 we report sample means for selected variables for children in elementary, lower secondary, and upper secondary schools, distinguishing between public and private. The table confirms that the proportion attending private schools correlates negatively with parents' perception of quality, and positively with income. The probability of choosing a private school increases with the educational attainment of both parents: the proportion of university-educated fathers and mothers choosing private schools is 57 and 65 percent, respectively. Single parents, large households and residents in the South also tend to choose public schools. Two thirds of private enrollment is in medium-sized or large cities. Disposable income has a major impact on private enrollment rates: more than half of the students in private schools at all levels (elementary, lower secondary, or upper secondary) come from households in the top quartile of the income distribution and only about 10 percent from the bottom two quartiles.

On average, parents who send their children to private schools do not rate the public school system as lower in quality than do 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 of sample means does not take account of quality's correlation with income and other geographical characteristics. For this we must turn to regression analysis.

6. Regression results

Table 3 relates the probability of private school attendance (elementary and lower secondary school combined) to various potential determinants of school choice. Our basic specification includes child's sex, dummies for parents' education, for single parents, number of siblings, income quartiles and two indicators of the quality of public schools (the parents' rating and the provincial student-teacher ratio).¹⁸

¹⁸ Standard errors are robust to heteroskedasticity. We also check for the presence of cluster effects coming from the fact that some children belong to the same households. The results are qualitatively similar, and are available on

The results confirm that household disposable income and the quality of public schools are strong determinants of enrollment in private schools. The probability that a child with parents in the fourth income quartile will attend private school is between 7 and 10 percentage points higher than that of a child with parents in the first quartile. Both subjective and objective quality indicators affect the schooling decision. The coefficient of the quality score is negative and statistically different from zero at the 1 percent level. The coefficient of the student-teacher ratio is positive and statistically significant. Considering the estimates of the first column, an increase of one standard deviation of the quality score lowers private enrollment by 6.2 percent, whereas a standard deviation increase in the number of students per teacher raises it by 9 percent.¹⁹ Overall, private enrollment rates are higher where the aggregate student-teacher ratio in public schools is relatively high and their quality score relatively low.²⁰

In principle, also the quality of private schools should affect the enrolment decision. We therefore add to the basic probit specification the student-teacher ratio in private schools in each province, our only available quality indicator. The coefficient of this indicator is small in absolute value and not statistically different from zero, and the variable has accordingly been dropped from the basic specification.

The estimates uncover other interesting results. The negative coefficient of “Number of siblings” could be taken as evidence that liquidity considerations affect parental choice. However, the coefficient could be biased, because fertility choice might depend on unobservable characteristics. Contrary to other results in the literature (Lankford and Lee, 1995; Buddin,

request. Results using a continuous income variable are similar; we prefer using income quartiles dummies to model the non-linear relation between household resources and school choice.

¹⁹ For primary schools we can supplement the evidence in Table 3 using two other indicators of school quality: the fraction of students under daily shifts for lack of space (using the specification in column 1 of Table 3 the coefficient is 0.67), and the fraction of students in unfit buildings (a coefficient 0.42 and a standard error of 0.16); both are statistically different from zero at the 1 percent level. The effect of the two structure indicators of school quality are in line with our interpretation that a worsening of public school standards raises the probability of private enrolment. Unfortunately the indicators are non available for secondary schools.

²⁰ Using aggregate provincial data we regress the private enrollment 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 1.64), showing that aggregate indicators alone do not explain educational choices.

Cordes and Kirby, 1998), we find that parents' educational attainment does not affect the choice of private schools.²¹

The second probit of Table 3 adds parents' age, dummies for city size, for households where at least one adult member does not work ("housewife") and for residence 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 the North increases private school attendance. Living in a city increases the probability of private enrollment by 8 percentage points. This reflects not only the greater availability of private schools, but also the higher juvenile crime rate, which presumably induces some parents to shield their children from exposure to social problems.

The possible interaction between women's labor force participation and school choice is of great interest not only for the economics of school choice but also for household's allocation of time and employment opportunities. Since many private schools have extended schedules of activities, the presence of a housewife should lower the probability of choosing private school; and the coefficient of this variable is indeed negative and statistically different from zero at the 10 percent level, lending support to the hypothesis that some parents choose private education as a substitute for child care, not for better education.²² However, we hesitate to attribute causal significance, given that labor market participation itself may depend on the availability of private schools (Del Boca, 2002).

The results of the first two probits are open to the objection that the effect of quality on school choice could be spurious. The many possible omitted significant factors include religion, political orientation, local labor market conditions, and crime rates. We attempt to control for all these factors by introducing a full set of provincial dummies in the third column of Table 3. This entails dropping the provincial student-teacher ratio. The results are qualitatively unchanged. The probability of attending private school decreases with the quality score for public schools: an increase in the quality score of one standard deviation lowers the private enrollment rate by 6.1

²¹ Given the correlation between father's and mothers' education, the lack of significance of the two coefficients might reflect multicollinearity. We therefore replace the two variables with the average education of the spouses. In this case the parents' education coefficient in the specification of Table 3 is positive and statistically different from zero.

²² We also include hours worked by parents. The coefficient of this variable is not statistically different from zero.

percent. Although the inclusion of provincial fixed effects is the best way forward with the available data, it represents only a partial solution to the problem of omitted variables, since possible omitted factors might vary substantially within provinces. For instance, more religious parents may be more likely to choose private schools and to assess public school quality more critically simply because they prefer a religious education.

A related point is the potential endogeneity of the quality score indicator due to the fact that parents who have chosen private schools might tend to give a lower rate to public schools.²³ Consider again the case of religious beliefs, an unobservable variable we cannot control for. If churchgoers have a negative attitude towards state entities, they will systematically provide a lower score for public schools and, at the same time but for independent reasons, may prefer private (religious) schools, and the estimated coefficient of the quality score will be biased.²⁴

A weak exogeneity test of the quality score variable can be constructed in two steps. In the first step we regress the quality indicator on the instruments and the exogenous variables. In the second step we use the residuals from the first stage regression as an additional explanatory variable in the school choice equation. Smith and Blundell (1986) show that the weak exogeneity test is asymptotically equivalent to testing the null hypothesis that the coefficient of the residuals of the first stage regression in the school choice equation is not statistically different from zero. We use as instruments father's and mother's education interacted with dummies for city size. The weak exogeneity test does not reject the hypothesis that the quality score is weakly exogenous at the 5 percent significance level for each of the equations in Table 3 (the test is reported in the last line of the table).

To illustrate the results further, Figure 5 plots the predicted probability of attending private school for selected values of the regressors: a child living in a large Northern city from an average household (in terms of parental age, parental education and number of siblings) in the top income quartile. The figure shows that a one-point increase in the quality score reduces the

²³ Causality between school quality and school choice could go the other direction. If peer group effects are important and there is cream skimming, then in areas in which more people go to private schools, public schools will be worse. However, in the Italian case, existing evidence points to a different self-selection in (upper secondary) private schools, which gather less brilliant children from richer families (Bertola and Checchi 2002).

²⁴ Under the null hypothesis of exogeneity, the test statistic is distributed as a chi-squared with 1 degree of freedoms.

probability by about half a percentage point. Since the enrollment rate in this selected sample is 8.7 percent, lowering the quality score from 8 to 2 doubles the probability of private enrollment.

Table 4 reports separate probit estimates for elementary and lower secondary schools. For each sample, we report the basic specification, the specification with regional, city size and “housewife” dummies and the specification with provincial dummies. Although the sample for these regressions is considerably smaller, the general pattern is similar to that of Table 3. The enrollment 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 “housewife” is negative, as in Table 3, but not statistically different from zero except in the specification with provincial dummies for lower secondary schools.

These probits do not capture potentially important motivations for three groups of parents: those who wish to enroll their children in elementary schools earlier than the standard age, those with children with handicaps or serious diseases and those who are strongly Roman 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 also take younger children. So one motivation for choosing private schools is to anticipate the legal school age. The survey includes 225 five-year olds, 52.8 percent of whom 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 officially certified handicaps receive special attention in public schools and are entitled to an individual, full-time teacher. Since private schools have no such program, parents of children with handicaps really have 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 the 1995 data on health status with the 1993 information on school choice and find that out of 50 children with health problems only 1 attended private school.

The 1993 survey does not measure the intensity of religious belief or provide information data on the type of private school attended. To check whether Catholic parents are more likely to select Catholic schools, we rely on regional indicators of the intensity of religious belief available in a 1996 Survey: the proportion of individuals going to church every day, several times a week, once a week, or several times a month.²⁵ We add this variable to the set of regressors and estimate the probit for school choice omitting provincial dummies. We find that 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 upper secondary schools. With respect to compulsory school, there are some noteworthy differences. Girls are more likely to attend private school, possibly reflecting differential parental protectiveness. Private enrollment is correlated with income, but the coefficients are imprecisely estimated. At this higher, non-compulsory school level, father's education has a positive impact on private school attendance. The coefficient of the quality score is not statistically different from zero. On the other hand, the provincial student-teacher ratio has a much greater impact than in compulsory schools (of course, the ratio is dropped when we introduce fixed provincial effects).

The result that school quality matters is also corroborated by independent evidence available in a different survey of Italian households (multiple answers are possible). Table 6 shows that 38.9 percent of parents who choose to register their children in private schools do so for the "quality of teaching" and 40.8 percent for the "service offered." Only 13.7 percent report as "cultural or ideological reasons" (in agreement with the lack of significance of the intensity of religious belief in the school choice equation), and less than 25 percent for location ("school available nearby" or "vicinity"). These numbers suggest that school quality considerations are a chief concern of parents choosing private schools, reinforcing the econometric evidence.

²⁵ The *Multiscopo* survey was carried out by ISTAT, the National Statistical Institute. Italy's 20 regions are divided into 95 provinces. So regional indicators are collinear with provincial dummies. The proxy for Catholic beliefs attains the lowest values in the central and highest in the northern regions. In Liguria, Emilia, and Tuscany only 40 percent of the sample goes to church at least a few times a month; in Trentino and Veneto, about 65 percent do.

7. Policy implications

Under the Constitution privately managed schools cannot receive State financial support: accordingly, the Italian school system is a clear case in which parents who choose private schools must also pay tuition out-of-pocket. The regression analysis conducted here suggests that the quality of public schools (as perceived by parents or as 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 larger family size and, in elementary and lower secondary schools, the presence of a housewife reduce the probability of private enrollment. The results are robust with respect to the presence of provincial effects and the potential endogeneity of the subjective quality score indicator.

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 improve parents' information about school characteristics and students' performance in later schooling and in the labor market. In this respect, standardized national tests would be extremely valuable. It is unfortunate that Italy's only national test – for the academic secondary school diploma – is not standardized. Evaluation is by commissions made up mostly of examiners internal to the student's own school. Information on teachers' competence, experience and background and on school facilities and resources would also help parents in making their choice. Given the ample variability in school quality even within relatively small districts, this information should be available and comparable for all the schools in every district.

The second implication is that the amount of funding of public schools has a great impact on the private enrollment rate because changes in the level of spending for education affects public school quality. Cuts in public expenditures on education tend to reduce the quality of public schools, thereby heightening the demand for private education. Current proposals aim to reduce the number of public school teachers by about 40,000, raising the student-teacher ratio in compulsory schools by almost one point. According to our estimate of the coefficient of the

student-teacher ratio (the second regression of Table 3), this implies an increase of 10 percent in private enrollments.

The positive correlation with working mothers indicates that private schools are also chosen for other features, regardless of educational quality. Singling out different reasons for investing in education is important. If private schools improve educational achievement and labor market performance, there could be a rationale for subsidizing private institutions through tax exemption or educational vouchers. However, if private education serves mainly as a substitute for other services (such as child care) or is chosen to develop social networks, ideology and religion, the externality argument provides no support for public intervention. At the moment the data do not allow us to discriminate fully between these hypothesis; we consider the issue important for future research.

References

- Altonji, Joseph G., Todd E. Elder, and Christopher R. Taber (2000), "Selection on observed and unobserved variables: assessing the effectiveness of catholic schools," NBER Working Paper n. 7831
- Bertola, Giuseppe, and Daniele Checchi (2002), "Sorting and private education in Italy," CEPR Discussion Paper n. 3198.
- Buddin, Richard J., Joseph J. Cordes, and Sheila Nataraj Kirby (1998), "School choice in California: who chooses private schools?," *Journal of Urban Economics* 44, 110-34.
- Del Boca, Daniela (2002), "The effect of child care and part time opportunities on participation and fertility decisions in Italy," IZA Discussion Paper n. 427.
- Evans, William N., and Robert M. Schwab (1995), "Finishing high school and starting college: do catholic schools make a difference?," *Quarterly Journal of Economics* 110, 941-74.
- Fershtman, Chaim, Kevin Murphy and Yoram Weiss (1996), "Social status, education, and growth," *Journal of Political Economy* 104, 108-32.
- Figlio, David N. and Joe A. Stone (2001), "Can public policy affect private school cream skimming?," *Journal of Urban Economics* 49, 240-66.
- Glomm, Gerhard, and B. Ravikumar B. (1992), "Public versus private investment in human capital: endogenous growth and income inequality," *Journal of Political Economy* 100, 818-34.
- Gradstein, Mark, and Moshe Justman (2001), "Public education and the melting pot," CEPR Discussion Paper n. 2924.
- Hanushek, Eric A. (2002), "Publicly provided education," NBER Working Paper n. 8799.
- Howell, William G. (2004), "Dynamic selection effects in a means-tested, urban school voucher program," *Journal of Policy Analysis and Management* 22(3), 225-50.
- Lankford, Hamilton R., E. S. Lee, and James H. Wyckoff (1995), "An analysis of elementary and secondary school choice," *Journal of Urban Economics* 38, 236-51.
- Levin, Henry M. (1999), "The public-private nexus in education," *American Behavioral Scientist* 43, 124-37.
- Long, James E., and Eugenia F. Toma (1988), "The determinants of private school attendance," *The Review of Economics and Statistics* 70, 351-57.

Neal, Derek (1997), "The effects of catholic secondary schooling on educational achievement," *Journal of Labor Economics* 15, 98-123.

OECD (2002), *Education at a glance*. OECD: Paris.

Smith, Richard J., and Richard Blundell (1986), "An exogeneity test for a simultaneous equation Tobit model with an application to labor supply," *Econometrica* 54, 679-686.

Stiglitz, Joseph (1974), "The demand for education in public and private school system," *Journal of Public Economics* 3, 349-85.

Sander, William (2001), "The effect of Catholic schools on religiosity, education and competition," National Center for the Study of Privatization in Education Occasional Paper n. 32 (<http://www.tc.columbia.edu/ncspe>).

Teske, Paul, and Mark Schneider (2001), "What research can tell policymakers about school choice," *Journal of Policy Analysis and Management* 20, 609-631.

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

<i>Variable</i>	<i>Elementary</i>		<i>Lower Secondary</i>		<i>Upper Secondary</i>	
	<i>Private</i>	<i>Public</i>	<i>Private</i>	<i>Public</i>	<i>Private</i>	<i>Public</i>
Female	39.7	47.5	38.9	44.4	58.9	47.7
Father's education (lower secondary diploma or better)	57.9	41.2	48.4	39.4	64.5	38.4
Mother's education (lower secondary diploma or better)	65.1	39.9	54.5	31.2	54.1	29.5
Father's age	38.6 (7.20)	37.6 (10.9)	45.8 (5.22)	39.0 (14.5)	47.6 (8.95)	43.3 (14.6)
Mother's age	35.2 (5.63)	35.7 (7.31)	41.5 (8.51)	39.5 (8.24)	41.5 (9.57)	43.0 (8.20)
Single parent	3.0	6.5	2.4	10.5	4.9	10.1
Number of children	1.84 (0.68)	2.25 (0.91)	1.49 (0.68)	2.39 (0.91)	1.87 (0.60)	2.38 (0.95)
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 (scale 1 to 10)	6.25 (2.37)	6.33 (2.06)	6.52 (1.98)	6.41 (2.03)	7.08 (1.84)	6.38 (1.81)
Student-teacher ratio in public schools	10.17 (1.54)	10.02 (1.54)	7.82 (0.63)	7.87 (0.75)	9.21 (0.36)	9.12 (0.57)
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 enrollment: compulsory education

The table reports probit regressions for private enrollment in elementary and lower secondary school. Father's and mother's education are defined as lower secondary diploma or better. For each regression we report the marginal effect and the *t*-statistic of the original probit coefficient in parentheses.

<i>Variable</i>			
Female	-0.007 (-1.13)	-0.005 (-0.87)	-0.009 (-1.19)
Father's education	0.002 (0.29)	0.003 (0.44)	-0.000 (-0.05)
Mother's education	0.011 (1.25)	0.007 (0.94)	0.009 (0.89)
Single parent	0.011 (0.66)	-0.008 (-0.58)	-0.008 (-0.44)
Number of siblings	-0.019 (-3.85)	-0.014 (-3.37)	-0.023 (-4.03)
II Income quartile	0.009 (0.67)	0.011 (0.86)	0.021 (1.19)
III Income quartile	0.046 (2.76)	0.041 (2.75)	0.076 (3.35)
IV Income quartile	0.070 (3.58)	0.055 (3.18)	0.101 (3.66)
Quality score	-0.005 (-2.61)	-0.004 (-2.63)	-0.006 (-2.86)
Student-teacher ratio	0.007 (2.36)	0.007 (2.20)	
Attending primary school	0.017 (2.36)	0.013 (2.08)	0.016 (1.94)
Father's age		-0.000 (-0.87)	-0.000 (-0.70)
Mother's age		-0.000 (-1.34)	-0.000 (-1.38)
Housewife		-0.011 (-1.64)	-0.020 (-2.13)
Resident in the Center		-0.019 (-2.65)	-0.021 (-0.83)
Resident in the South		-0.015 (-1.67)	-0.011 (-0.27)
20,000<City size<40,000		0.033 (2.14)	0.121 (3.40)
40,000<City size<500,000		0.034 (3.23)	0.076 (4.30)
City size>500,000		0.079 (3.27)	0.108 (2.67)
Province dummies	<i>NO</i>	<i>NO</i>	<i>YES</i>
Pseudo R ²	0.103	0.142	0.224
Number of observations	1948	1948	1948
Smith-Blundell exogeneity test: χ^2 (1); (<i>p</i> -value)	8.24 (0.00)	0.71 (0.78)	0.23 (0.62)

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

The table reports probit regressions for enrollment in private elementary and lower secondary school. Father's and mother's education are defined as lower secondary diploma or better. For each regression we report the marginal effect and the *t*-statistic of the original probit coefficient in parentheses.

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

The table reports probit regressions for private enrollment in upper secondary school. Father's and mother's education are defined as lower secondary diploma or better. For each regression we report the marginal effect and the *t*-statistic of the original probit coefficient in parentheses.

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

Table 6
Parents of students less than 18 years old registered in private schools
per type of school and reason of parents' choice – Italy 1998

The table reports the answer to reasons for choosing private schools in a sample of 20,153 households interviewed in June 1998. Source: ISTAT, 2000, *Indagine multiscopo sulle famiglie. Famiglia, soggetti sociali e condizione dell'infanzia*.

	<i>Primary</i>	<i>Lower secondary</i>	<i>Upper secondary</i>	<i>Total</i>
No specific reason	11.3	11.6	6.1	9.8
Only school available nearby	7.6	4.8	27.4	12.7
Vicinity	14.8	12.8	11.7	13.5
Services offered	48.9	41.5	26.1	40.8
Cultural (ideological) reasons	14.0	13.4	13.5	13.7
Quality of teaching	36.8	43.4	39.4	38.9
Other reasons	12.5	9.5	5.8	9.9

Figure 1. Quality score of public schools, by regions

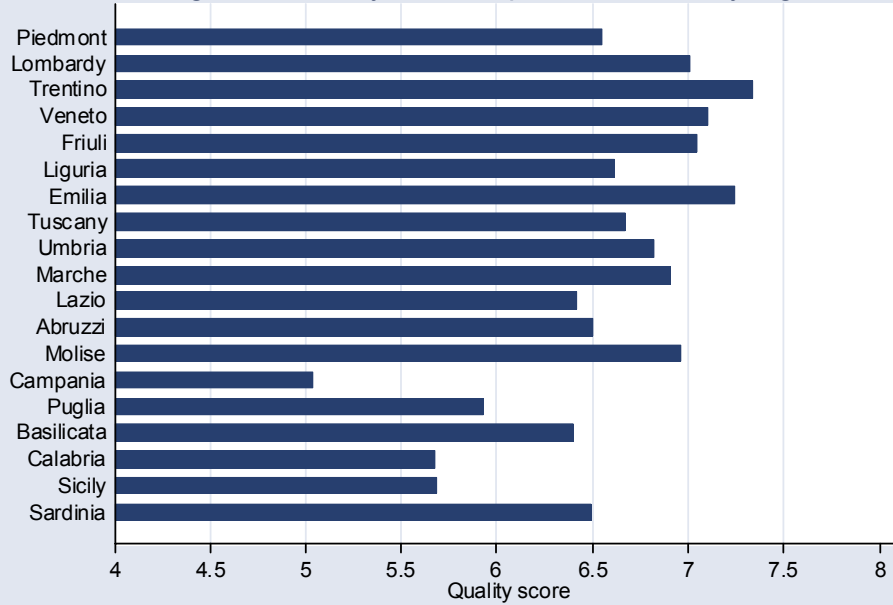


Figure 2. Student-teacher ratio, by regions

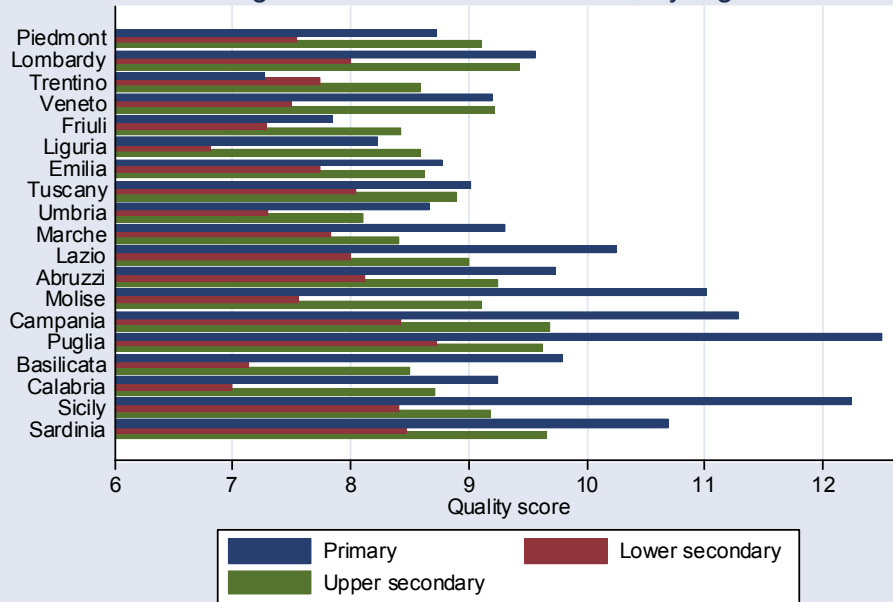


Figure 3. The subjective quality score and the student-teacher ratio

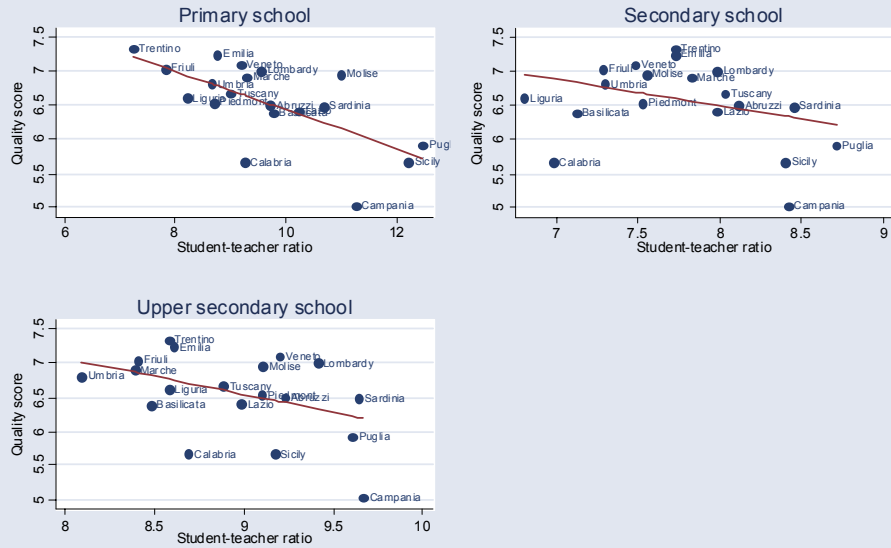


Figure 4. Proportion finding very low or very high quality of public schools, by region

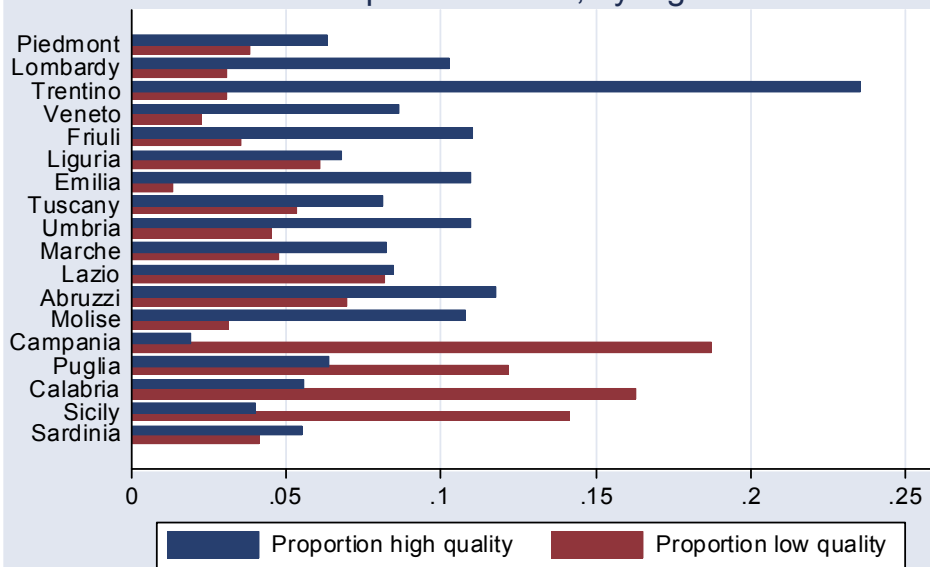


Figure 5. The effect of the quality score on the probability of private enrollment

