When Schools Are the Ones that Choose: The Effects of Screening in Chile*

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Objective. The voucher scheme introduced in Chile in 1981 allows for-profit private subsidized schools to choose their students. The objective of this article is to present evidence of this practice and examine its relationship with academic performance using information from the 2005 SIMCE test, in which parents were asked about the admission requirements for their children's schools. We present evidence indicating that student selection is a widespread practice among private subsidized schools. *Methods.* Using OLS and after controlling for a series of selection criteria and the segmentation effects that they produce, the evidence indicates that there are no differences in results between public and private subsidized education. *Results.* Our results show that a student attending a school that uses selection criteria obtains 7–9 percent higher results in standardized mathematics tests than a student from a school that does not use selection. *Conclusion.* The main conclusion of this study is that the basic belief behind the voucher system in Chile that competition will lead to better quality of all schools is not being met.

The international evidence convincingly demonstrates that education is a key factor for raising incomes, social mobility, and welfare. Arrow, Bowles, and Durlauf (2000) summarize a range of interdisciplinary articles that highlight the importance of education in reducing income inequality and fostering social mobility.

As a goal of obtaining better educational results, a voucher system was implemented in Chile in the early 1980s. The Chilean experience is the most significant international example of a competition- and incentive-based

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educational system. It is one of the few nationwide systems of this type in the world and has proper data for statistical analysis. Therefore, studying the Chilean case is crucial in evaluating the empirical results of competition in a sector traditionally organized around classic public-good mechanisms.[1]

School-choice proponents argue that many benefits will flow from empowering parents to choose the schools their children attend, including increasing the efficiency of schools. Choice proponents predict that public school choice will lead to intense competition in academic quality. They predict a higher equilibrium quality at all schools and less concentration of the top students in the higher-quality schools. Increased private school competitiveness may also affect public schools in several ways. The competition compels public schools to improve school quality, creating competitive pressure on schools that might be behaving as local monopolies (Hoxby, 1994, 2000). However, there are a series of critiques that question the functionality of school choice. First, the evidence suggests that parents do not necessarily choose schools on the basis of quality, which is a key element for strengthening (weakening) good (bad) schools (Elacqua, Schneider, and Buckley, 2006). In addition, parents do not have the necessary information to compare the quality of schools. Second, public schools are forced to accept all students, while private subsidized schools can select students in accordance with their educational objectives.

This article examines the effects of student selection practice and its impact on academic performance. One hypothesis developed in this article is that competition between schools will induce them to positively select their potential students.[2] The second hypothesis is that private subsidized schools will be more likely to adopt student selection mechanisms than will public schools. Indeed, if private subsidized schools are allowed to operate for profit, they will select students that are less expensive to educate, for example, better-skilled students and those from higher socioeconomic groups, in order to minimize costs. Therefore, if the objective of schools is to improve their absolute performance in standardized tests, they could foreseeably be expected to choose better-skilled students with higher social capital, since this would allow them to reduce costs and become more competitive (Epple and Romano, 1998). However, it may also be argued that these practices would not occur in a competitive environment, since private subsidized schools would have incentives to admit all students, thus maximizing their gains. The limited evidence found in Chile suggests that choosing

[1]For an analysis and discussion of the Chilean educational model, see McEwan (2001, 2003), Hsieh and Urquiola (2006), and Gauri (1999).

[2]We did not consider in the analysis information from private-paid schools for two reasons. First, all private-paid schools select students. Second, these schools differ substantively from both public and private subsidized schools in a series of aspects that go beyond administration, mainly in regard to financial structure. As a consequence, they belong to a different market structure and they are not competing for same students and resources.

students could be a significant phenomenon.[3] Finally, the third hypothesis is that after controlling for selection mechanisms, the gap in educational outcomes between public and private subsidized schools disappears.

We provide evidence on the use of student selection mechanisms applied by private subsidized schools in a competitive context. We also look at the effect of selection on academic results in standardized tests. The screening criteria are grouped into three categories: student ability, socioeconomic status, and religious selection (e.g., preference for a parochial school).[4]

The total impact of the screening is captured by the direct selection effect, while the indirect effect is measured through the benefit of attending a school where the socioeconomic profile of the students is higher than that of schools without selection.

This study uses individual information from the 2005 SIMCE for fourth grade primary students. The evidence indicates that the different selection methods are widely used by private subsidized schools, especially in schools with high socioeconomic profiles. As the theory suggests, student ability selection is the most frequently used, producing significant effects on subsequent academic outcomes. The results show that the public-private gap observed in earlier studies declines significantly after controlling for the selection criteria used. In addition, the results show that the impact of attending a private school with low socioeconomic levels is negative and statistically significant in all estimates. The results suggest that public schools are neither uniformly worse nor better than private schools; rather, public schools are relatively more effective for students from disadvantaged family backgrounds.[5] Thus, a basic belief of the voucher system in Chile that competition will lead to better quality of all schools is not being met.

In summary, we show some features of the Chilean educational design that have not been taken into account by other researchers and that alter the incentives faced by schools involved in expected market competition. Since parents choose schools mainly due to their proximity to either home or workplace and public schools must receive all students who apply,

[3] Parry (1996) provides preliminary evidence on the selection practices used in Chilean schools concerning admission exams, minimum grades, behavior reports, and parental interviews. The study includes a similar exercise to the one proposed here, but its results and interpretation are limited since the data are based on a small sample chosen by the author (only 48 observations). Information on the various selection practices come from interviews with school principals, which could bias the extent of the results. Our study uses a large sample with information provided by parents.

[4] These selection categories come from questions to parents in the 2005 SIMCE fourth grade test.

[5] This evidence replicates the results of earlier literature. Parry (1996), who used similar data in Chile, found that public schools with students with lower socioeconomic levels performed better than private schools with similar students. The private school advantage only appeared with schools having students with higher socioeconomic levels. This could also be considered evidence that public and private schools in Chile specialize in teaching children from different socioeconomic levels. The evidence presented on selection might support that argument.

subsidized schools are able to select the best students. As expected, our results show that selection practices are correlated with academic performance. Thus, when controlling for this type of selectivity, the public-private gap previously reported by other studies disappears. Although we do not have an econometric instrument to identify causality, we argue that since the evidence for Chile shows that school test scores do not mainly drive parents' decisions, it is not likely that schools with higher academic performance attract more students. Therefore, causality is expected to run from selection to results.

The Chilean Educational System

The Chilean educational system underwent significant modifications in the 1980s as a result of reforms implemented by the military government (which led the country in 1973–1990). The reforms included decentralizing the administration of educational establishments by transferring the administration of public schools from the Ministry of Education to Municipal Authorities.[6] The reforms also included a nationwide voucher system for both publicly and privately administered schools.[7] The reform introduced a uniform demand-side subsidy in which parents are free to choose among the schools in the market.

As a result, education in Chile shifted to three kinds of administrative alternatives: public establishments (PU) funded by the student subsidy provided by the state and under municipal administration; private subsidized establishments (PS) funded by the student subsidy and administered by the private sector; and private fee-paying establishments (PP) funded and administered by the private sector.[8] The reform led to a sharp redistribution of the educational system, giving a strong push to the private subsidized sector. In fact, although approximately 15 percent of school admissions were privately subsidized in 1981, by 2005 that figure had risen to 47 percent.

Private subsidized and municipal schools have the same funding program, but there are some differences. First, private subsidized schools have been able to charge tuition since 1993, which is known as the shared funding system. According to Ministry of Education data, in 2002, 90 percent of

[6]This is why these establishments became known as municipal schools. The reform also implied termination of the contracts between the Ministry of Education and the teachers, forcing the teachers to choose between becoming municipal employees or quitting and joining the private sector.

[7]As indicated by Gauri (1999), the political circumstances under which the voucher system was established are determinant in its implementation. Establishing such a system under a democratic government could have required long and profound discussions, and empirical evidence of its expected benefits.

[8]Prior to the reform, there were already private subsidized schools, mainly belonging to nonprofit religious institutions, with subsidies that were 50 percent of those given to public schools.

private subsidized schools received a co-payment from parents, limiting access to those schools for many families.

Unlike voucher schemes implemented in other countries, private schools in Chile can choose their students. In the Netherlands, Belgium, and Sweden, the private sector plays a significant role in education. However, those schools do not select students. For example, in Sweden, private schools must operate on a first-come, first-served basis, and cannot select students based on ability, income, or ethnicity. Thus the Swedish private schools are consistently found on average to have similar socioeconomic composition as public schools (Sandstrom and Bergstrom, 2005), unlike in Chile. In terms of impacts on learning, the evidence is mixed (Sandstrom and Bergstrom, 2005; Böhlmark and Lindahl, 2008).

On the other hand, in Chile, municipal schools are prohibited from choosing, except in cases where the demand for places exceeds availability. Lastly, private subsidized schools can exist as either for-profit or not-for-profit organizations.[9]

Theory and Evidence on the Impact of the Voucher System in Chile

Numerous studies have analyzed the impact of the voucher program in Chile. Many of these examine the public-private gap in academic results and the potential effects of competition on it. However, these studies do not take into account the screening practices conducted by schools.

Using the educational production function approach, McEwan and Carnoy (1998) studied the effects of competition on the Chilean educational system. They used the results of the SIMCE tests from 1988 to 1996. A measure of competition was defined as the percentage of private subsidized school admissions in each municipality. The results of the model with fixed effects per school show a negative effect of competition: municipalities with higher admission levels in private schools have public schools with lower SIMCE results. The authors argue that the negative relationship between competition and results in public schools is produced by the migration of the best students to private schools (sorting).

Meanwhile, Mizala and Romaguera (2000) estimate educational production functions using the 1996 SIMCE test data (fourth grade primary school). The SIMCE results of each establishment are regressed against a vector of socioeconomic variables (income brackets, vulnerability index), school variables (teacher experience, teacher/student ratio, number of schools, geographical area), and student characteristics (preschool attendance). The main findings of the article suggest that once they controlled the

[9]In 1981, most private subsidized schools belonged to religious institutions; however, after the reform most of the new schools were for-profit. For example, in 1988, 84 percent of new schools belonged to for-profit institutions (Hsieh and Urquiola, 2006).

variables described, there are small but statistically significant differences in the SIMCE results between public and private subsidized schools.

McEwan (2001, 2003) examines the change in the public-private gap when the socioeconomic level of families and peer effects are included. Additionally, these articles model parental school choice (municipal vs. private subsidized). By taking into account the geographical availability of different types of establishments, the author assumes that that variable is correlated to school choice, but not to student ability. Lastly, these articles place special emphasis on the results gaps associated with Catholic schools.

Another important aspect to be considered in a theoretical discussion is peer effects. In the literature, common measures of peer-group characteristics include mean student ability or parental education in a particular school or classroom. Since the Coleman report (Coleman et al., 1966), a vast empirical literature in economics and sociology has tested this hypothesis (for reviews, see Jencks and Mayer, 1990; McEwan, 2003; Nechyba, McEwan, and Older-Aguillar, 1999). The variables used in the article to measure peer effects are the ones previously used in the literature on Chile. Thus, we would like to remain focused on selection practices rather than opening the discussion to other interesting topics that go beyond the objectives of this article.

After controlling for selection bias and peer effects, the evidence from the literature for Chile indicates that the gap between public and private subsidized schools is positive and small. However, as mentioned above, none of the earlier studies controlled for the selection criteria used by schools.

In general, international academic studies conclude that the socioeconomic characteristics of students are the main determinant of academic achievement. As may be expected, schools use selection practices to get the best students in order to improve their own results.

Epple and Romano (1998) show that schools will choose the highest ability students from the highest income families by stimulating parental behavior in a free choice system. This behavior is explained by less capable students implying higher educational costs. In other words, less capable students require greater resources than higher ability students to achieve the same results. Teachers must also spend more time with students with learning difficulties, thus negatively affecting the other students. Therefore, if the objective of private subsidized schools is to maximize gains, then student selection is an easy and economical method for attaining those goals and improving academic results.

Even though the design of the Chilean educational system offers the option of choice as a benefit in itself, the evidence suggests that competition tends to favor middle- and high-income families. Hsieh and Urquiola (2006) declare that a clear consequence of competition in Chile was to produce a large-scale segmentation of the educational system. According to the authors, private subsidized schools did not respond to the competitive pressures of the market model by raising their productivity, but rather by

choosing the best students. This may also explain why better results are not observed in public schools.

Finally, in a very recent paper, MacLeod and Urquiola (2009) develop a theoretical model to examine the effects of selection of students on competition, productivity of the schools, and overall market performance. The authors argue that if schools cannot select students based on their ability, then high productivity schools are encouraged to enter the free market system. On the other hand, when selection is allowed, competition leads to stratification by parental income, increased transmission of income inequality, and reduced student effort. In this model, the resulting equilibrium is characterized by a strict hierarchy of schools, with the highest ability students going to the most selective for-profit schools, and the lowest ability ones remaining in the nonselective public sector.

Adding to the evidence of segregation and selection discussion provided by the last two mentioned papers, the present article contributes evidence on the types and uses of school selection methods and their impact on results. In other words, this article complements the most recent literature by making an in-depth analysis of the mechanisms through which segregation occurs and its effects on academic results.

The Data

This article uses the database of standardized SIMCE tests given to fourth-grade primary students in 2005. The test is divided into mathematics, language, and science modules. The SIMCE test is given in all the educational establishments in the country. The academic results are complemented with information on the establishments and socioeconomic characteristics of the families. The latter information is gathered through a questionnaire for parents that includes questions on the student selection criteria used by schools. The sample used includes 160,819 students from municipal and private subsidized establishments from around the country.[10]

The 2005 SIMCE parental questionnaire included questions on the requirements or background information that was requested when applying to the school.[11] The screening criteria are grouped into three categories: student ability, socioeconomic status, and religious selection. Selection by ability indicates the cases in which students had to attend a game session or take an admissions exam. Socioeconomic selection indicates that parents had

[10]This study, like most of the previous literature for Chile, only included private subsidized and municipal schools mainly because private fee-paying schools (7 percent of the total students), which do not receive public funding, constitute a completely different market.

[11]The requirements or background information include: birth certificate, preschool grades, legal wedding certificate, former school grades, baptismal or religious wedding, attendance by the child at a game session, wage certificates, a written exam or admission exam by the child, and parental interview.

to present a certificate of income or attend a parental interview at the school. Finally, we include selection by religious reasons for when parents indicated that the school had requested a baptismal or church marriage certificate. Since it is self-reported, the responses within schools show differences. This occurs because most students were admitted four years ago and parents may not precisely remember the details. This is why we consider that a school used a given type of selection if more than 50 percent of the responses were affirmative for each selection category.[12]

The description and descriptive statistics of all the variables included in the study are presented in Tables 1 and 2. Private subsidized schools have higher parental income and years of schooling compared to municipal establishments. The average family income in those schools is Ch$323,796 (US$610), which is nearly twice that of municipal schools (Ch$174,990, US$330).

Mothers of students in private-sector establishments have 11.8 average years of schooling, while for fathers it is 11.9 years.[13] These figures are above the level for municipal schools. Meanwhile, the average size of households tends to remain stable throughout the different administrative alternatives, with an average of five household members.

In the mathematics and language scores of the SIMCE tests, the results of private subsidized schools exceed the results of municipal schools.

In addition, 50 percent of the sample is female, 51 percent attend private subsidized schools, and 10 percent of students attend rural schools. The average number of students per class in private subsidized schools is 35, while the corresponding figure for municipal schools is 31 students.

Methodology

The methodology used to examine the impact of selection on academic performance follows the production function approach. The dependent variable corresponds to the 2005 mathematics and language SIMCE scores. Two groups of variables are included that explain academic performance. The first group, student and household characteristics, includes: student gender, parental schooling, and household income and size. The second group of variables includes establishment and teacher characteristics, such as: geographical area, number of students per class, fourth-grade primary school admissions size, age, experience, and gender and postgraduate qualifications of the teacher.

[12]The 50 percent mark may seem arbitrary, but the results do not vary significantly when the rule indicating when a school uses student selection is modified. We estimate the models using 50 percent, 75 percent, and the average response as classificatory thresholds. The results are available upon request.

[13]In Chile, secondary schooling lasts 12 years.

TABLE 1

Variable Description

Variable	Description
SIMCE Score	
Math	SIMCE math scores
Language	SIMCE language scores
Student Variables	
Gender	1 = female, 0 = male
Household Variables	
Mother schooling	Mother years of schooling
Father schooling	Father years of schooling
Household income	Household income in Chilean pesos divided by 10,000
Household size	Number of people living in student's family
Peer Effects	
Average schooling of mothers	Schooling average of all of the school's mothers
Average schooling of fathers	Schooling average of all of the school's fathers
Average household income	Average household income of the school
School Variables	
Private subsidized (PS)	Dummy variable; 1 if student attends private subsidized school, 0 if municipal school
School's SES	Dummy variable; 1 if student attends low socioeconomic status school, 0 if not
PS*SES	School's SES and the interaction of this with private subsidized
Rural	Dummy variable; 1 if student lives in rural zone, 0 if urban zone
Class size	Number of students per class
School size	Number of students in school's 4th grade
Fee	Average fee paid to school by parents
Teacher age	4th-grade teacher's age
Teacher experience	4th-grade teacher's experience
Teacher gender	1 = female, 0 = male
Teacher studies	Dummy variable; 1 if teacher has postgraduate studies, 0 if not
Screening Criteria	
Student ability selection	1 if student undertook admission tests such as game sessions or written exams, 0 if not
Socioeconomic selection	1 if parent was asked to present wage income certificate or required to attend an interview, 0 if not
Religious selection	1 if school required baptismal or religious marriage certificate, 0 if not
Regional dummies	
D1 to D12	Dummy variable equals 1 for each of the 12 country regions, 0 for metropolitan region (RM)
Competition	Density of school supply in the municipality.

TABLE 2

Descriptive Statistics

	Total		Public		Private Subsidized	
Variable	Mean	*SD*	Mean	*SD*	Mean	*SD*
SIMCE Scores 2005						
Math	248.11	53.95	237.51	53.18	258.48	52.67
Language	256.10	52.21	245.34	51.31	266.61	50.92
Student Variables						
Gender	0.49	0.50	0.49	0.50	0.51	0.50
Household Variables						
Mother schooling	10.79	3.28	9.74	3.23	11.81	2.99
Father schooling	10.85	3.44	9.79	3.38	11.89	3.16
Household income (US$610)	25,0210	252,306	174,990	162,397	323,796	298,638
Household size	4.99	1.66	5.14	1.75	4.84	1.56
Peer Effects						
Average schooling of mothers	10.70	1.96	9.63	1.53	11.76	1.75
Average schooling of fathers	10.78	2.03	9.70	1.63	11.84	1.82
Average household income	246,546	158,417	171,662	77,301	319,805	181,518
School Variables						
School's SES	0.33	0.47	0.54	0.50	0.13	0.34
Rural	0.10	0.30	0.16	0.37	0.04	0.20
Class size	32.83	9.09	30.99	9.31	34.62	8.49
School size	78.57	60.95	72.78	43.99	84.25	73.43
Fee	7,531	10,974	1,492	984	13,438	12,913
Teacher Variables						
Teacher age	46.10	10.49	49.91	9.10	42.38	10.41
Teacher experience	20.45	11.99	24.91	10.97	16.08	11.31
Teacher gender	0.85	0.36	0.86	0.34	0.84	0.37
Teacher studies	0.40	0.49	0.41	0.49	0.39	0.49
Screening Criteria						
Student ability selection (S1)	0.27	0.44	0.05	0.22	0.48	0.50
Socioeconomic selection (S2)	0.13	0.34	0.01	0.09	0.26	0.44
Religious selection (S3)	0.10	0.29	0.00	0.00	0.19	0.39

NOTES: Own calculations based on SIMCE 2005 data set. Variable's average shown and standard deviation presented in parentheses.

The main variables of interest for this study are the administrative management of the school and the student selection criteria used by the school. We define a dichotomous variable that takes the value 1 if the student attended a private subsidized school and 0 otherwise. Meanwhile, the selection indicators used correspond to: ability, socioeconomic status, and selection for religious reasons. A dummy variable is defined for each of these

selection criteria, which takes the value 1 if the school applies selection criteria and 0 otherwise. Finally, a group of variables was included to capture the peer characteristics of students. These used mothers' schooling, fathers' schooling, and average household income in the school. The impact of selection on academic performance will be estimated through the following general model, summarized in the following specification:

$$SIMCE_{ij} = \alpha + \beta_1 PS_{ij} + \beta_2 SES_j + \beta_3 PS_i^* SES_j + \beta_4 S_j + \beta_5 P_j + \beta_6 X_i + \beta_7 E_j + \beta_8 C_j + \varepsilon_i \quad (1)$$

Where $SIMCE_{ij}$ is the outcome variable for student i who attends school j; PS_{ij} is a dummy variable that takes the value 1 if the student attends a private subsidized school j; SES_j is a dummy variable that takes the value 1 if the student attends a low socioeconomic status school j; PS_{ij}^* SES_j is the interaction between a school's socioeconomic status level and the dummy that indicates if student i attends a low socioeconomic status school j; S_j is the vector of selection criteria of school j; P_j is the vector of peer characteristic of students in school j; X_i is the vector of individual control variables for student i; E_j is the vector of school characteristics of school j; and C_j is the vector of school competition for school j.[14]

As shown in the literature, the variable that defines the type of administration is endogenous. Indeed, the decision to send a child to a private subsidized or municipal school is correlated to the geographical availability of various kinds of schools with parents' resources and preferences. In that case, the OLS estimates would be biased. To solve this potential problem, the literature has used instrumental variables estimators (IV). We estimated an IV model using the instruments previously used in the literature, and the results remain stable with respect to the main question examined in this article: the effects of screening on Chilean schools. For that reason, we are not presenting these estimates in this article, but they are available upon request.[15]

Do schools obtain higher results because they choose the best students or are they able to choose because they have better results? Although we do not have an econometric instrument to identify causality, we argue that since the evidence for Chile shows that school test scores do not mainly drive parents' decisions, it is not likely that schools with higher academic performance attract more students. We argue that the most likely story is that the effect runs from selection to results and not the other way around. However, estimates of β_1 must be taken as upper bounds of the unbiased effect. Still, the parameters (correlates) between selection and performance are informative and further research is needed.

[14]The vector of school competition is the number of schools per km^2 at municipality level.

[15] McEwan (2001, 2003) used the density of school supply in the municipality as a like instrument. This variable is assumed to be correlated to the decision by parents to send their child to a private school, but not correlated to academic performance. In addition, it is questionable whether the IV methodology really adds value to our analysis given our model contains school screening criteria.

Results

This section examines the effects of student selection by schools on the public-private gap and their impact on the academic performance of students. To do this, we first present evidence indicating that student selection is a widespread practice among private subsidized schools. In a second stage, we replicate the results of the earlier literature and present the results of the estimates when the student selection criteria are controlled for. Finally, we quantify the effects of selection through their direct effects (selection parameters) and indirect effects (peer effects) based on the results obtained.

Student Selection in Chile

The analysis of the 2005 SIMCE data reveals that schools in Chile extensively use selection mechanisms to choose the most advantaged students.

Table 3 contains the descriptive statistics of the selection criteria disaggregated by type of selection and possible combinations. The data indicate that over 31 percent of students underwent some selection process when they were admitted into their present schools at the time of the SIMCE test. This proportion practically doubles in the case of private subsidized schools. Table 3 also reports the combinations of selection methods. Only 1 percent of all students underwent all the selection criteria.

With regard to student selection by private subsidized schools, 48 percent of students were chosen by ability, 26 percent for socioeconomic reasons, and 20 percent for religion or values. Remember that municipal schools use virtually no selection criteria.

Table 4 presents the disaggregated descriptive statistics of the selection criteria by SES decile.[16] The results show the significant degree of homogeneity in the selection of students. Students with better SES characteristics are more likely to have undergone some kind of selection process.

The pattern of increasing selection as socioeconomic level rises applies to both private subsidized and municipal schools. For instance, on average, 66 percent of the students from the highest decile were chosen by some of the screening criteria. As expected, while the trend is similar, the degree of selection varies significantly among types of schools.

Table 4 shows that 74 percent of students from the 10th decile in private subsidized schools were subject to some selection process, while only 24 percent of students from the first decile from the same kind of schools were subject to any screening. In those schools, 63 percent and 46 percent of students were selected by ability and socioeconomic level, respectively. Private subsidized schools favor the selection of students with better abilities

[16]The socioeconomic status index (SES) was constructed by the principal components technique using total household income, both parents' schooling, and household size.

TABLE 3

Student Screening (Percentages)

Screening Criteria	Total	Public School	Private Subsidized School
Student ability selection (S1)	27	5	48
Socioeconomic selection (S2)	13	1	26
Religious selection (S3)	10	0	19
(S1) & (S2)	10	0	20
(S1) & (S3)	8	0	15
(S2) & (S3)	6	0	13
(S1) & (S2) & (S3)	6	0	11
Some selection	31	6	56
Obs.	160,819	79,527	81,292

TABLE 4

Private and Public Student Screening (Percentages)

Decile SES	1	2	3	4	5	6	7	8	9	10	Total
Total											
Student ability selection (S1)	6	9	13	18	22	27	32	39	47	57	27
Socioeconomic selection (S2)	2	3	5	7	9	11	14	18	27	39	13
Religious selection (S3)	1	2	3	5	7	9	11	14	18	24	10
Some selection	7	11	15	21	25	30	36	44	55	66	31
Public School											
Student ability selection (S1)	1	2	3	4	5	6	7	10	14	23	5
Socioeconomic selection (S2)	0	0	0	0	0	1	1	1	2	5	1
Religious selection (S3)	0	0	0	0	0	0	0	0	0	0	0
Some selection	2	2	3	4	5	6	8	11	15	24	6
Private Subsidized School											
Student ability selection (S1)	19	27	35	39	42	47	50	54	58	63	48
Socioeconomic selection (S2)	8	11	14	17	19	22	24	27	35	46	26
Religious selection (S3)	6	8	10	13	15	17	20	22	24	29	19
Some selection	24	32	40	45	49	53	57	62	68	74	56

NOTE: Author calculations based on SIMCE 2005 data set.

and family backgrounds. Meanwhile, municipal schools display a similar pattern at a lower scale. Selection in the 10th decile totals 24 percent, mainly due to ability-based screening (23 percent).

Measuring the Effects of Selection on Performance

Our empirical analysis on the subject is carried out at the national level based on information from the SIMCE data and OLS estimation methods. Table 5 shows these estimates. It can be seen in Column 1 that after controlling for socioeconomic characteristics of the student, the school, and peer

effects, results indicate that a child who attends a private subsidized school obtains 3.54 additional points in mathematics than a child in a municipal school.[17]

Regressions 2–5 in Table 5 estimate Equation (1), showing the impact of school selection on student academic performance. Columns 2–4 show the estimates after controlling for each type of selection separately, while Columns 5 controls for the three selection criteria simultaneously.

The first interesting result is the effect on the public-private gap when these additional controls are included. The estimates indicate that after controlling for school, household, peer, and individual characteristics, the impact of attending a private subsidized school declines. Indeed, after controlling for all the selection criteria, the parameter associated with the public-private gap remains positive but declines significantly. These results indicate that the positive, small, and statistically significant gap reported in earlier studies is mainly explained by the selection criteria of private subsidized schools, rather than by educational advantages of those schools.

A second important result is the effects associated with a school's SES and the interaction of this with the public-private gap. These results show that the impact of attending a private school with low socioeconomic level is negative and statistically significant in all estimates. This evidence indicates that public schools with low student socioeconomic level perform better than private schools with the same kind of students.[18]

On the other hand, the parameter estimated for parents' fee is positive but is statistically insignificant when the selection criteria are included.

The results show that after controlling for school, individual, and household characteristics, the parameters associated with the various types of selection are positive and statistically significant in all estimates. These results suggest that students who underwent some selection process obtain better results than those who did not.

Meanwhile, after controlling for the three selection criteria simultaneously, the results show that selection by ability (S1) has the greatest coefficient on academic performance, with over 6.5 additional points over the sample average.[19] The impact of selection by ability represents 12 percent of the standard unconditional deviation of the mathematics SIMCE scores. Selection by socioeconomic level (S2) has the lowest effect,

[17]These results are consistent with previous evidence in Chile. See McEwan (2001) and Mizala and Romaguera (2000). The complete set of controls of this equation is available upon request.

[18]As mentioned before, some public schools also use selection—at higher socioeconomic levels nearly a quarter of them do (Table 4). In addition, in Chile, schools can also expel students for behavior issues. This sort of ''negative selection'' is not controlled for in the model.

[19]We note the issue of multicollinearity in the model. Many explanatory variables are correlated. However, the variables with higher correlation are the peer effects; when these variables are dropped from the model, there is a little variation in the results related to the screening criteria variables. These results are available upon request.

TABLE 5

OLS Estimates—Math Scores

	1	2	3	4	5
Private subsidized school (PS)	3.54	1.54	3.12	2.72	1.2
	(0.41)**	(0.42)**	(0.42)**	(0.42)**	(0.43)**
Parent fee (average of school)	0.49	0.20	0.26	0.52	0.19
	(0.22)*	(0.22)	(0.23)	(0.22)*	(0.23)
SES	−0.03	−0.42	−0.26	−0.47	−0.64
	(0.49)	(0.49)	(0.49)	(0.49)	(0.49)
SES*PS	−4.72	−3.65	−4.47	−4.11	−3.39
	(0.68)**	(0.68)**	(0.68)**	(0.68)**	(0.68)**
Screening Criteria					
Student ability selection (S1)		6.98			6.5
		(0.35)**			(0.36)**
		[0.13]			[0.12]
Socieconomic selection (S2)			3.3		0.58
			(0.42)**		(0.46)
			[0.06]		[0.01]
Religious selection (S3)				4.29	2.09
				(0.44)**	(0.49)**
				[0.08]	[0.04]
Controls					
Peer effects					
Average schooling of mothers	yes	yes	yes	yes	yes
Average schooling of fathers	yes	yes	yes	yes	yes
Average household income	yes	yes	yes	yes	yes
Competition	yes	yes	yes	yes	yes
Individual and household controls	Yes	yes	yes	yes	yes
School's controls	Yes	yes	yes	yes	yes
Regional controls	Yes	yes	yes	yes	yes
R^2	0.16	0.16	0.16	0.16	0.16
Wald test (Prob > *F*)					

NOTES: Huber/White standard errors in parentheses (*significant at 5 percent and **significant 1 percent). Estimated coefficient over SIMCE score standard deviation in brackets (%). The last row reports the *p* value of the joint hypothesis Wald test that all the selection practices have no effect. Estimations done using 160,819 observations.

representing less than 1 additional point and is not statistically significant. Selection for religious reasons (S3) has the second highest parameter, contributing more than 2 additional points. Therefore, if a school uses the three selection methods indicated above, its students obtain about 10 additional points on average compared to students from schools with no selection. This is almost 20 percent of the standard unconditional deviation of the mathematics SIMCE scores.[20]

[20]Even though this result is significant, only 1 percent of students are selected with all four criteria.

A Discussion on Causality

We found a positive coefficient of the screening criteria variables. However, it is difficult to establish causality. Do schools obtain higher results because they choose the best students or are they able to choose because they have better results? Given that we do not have experimental data, it is very difficult to measure an exogenous variation in order to identify causality between selection and results. In spite of that, we can try to explain the most likely story.

There are two hypotheses to explain why some schools have the ability to choose. First, assume schools that have attributes different from academic performance that are appreciated by parents (i.e., proximity to home or work, etc.). If demand is high, schools allowed to choose will select better students, thus lowering costs and, possibly, improving their academic performance. In the second hypothesis, schools with a good academic track record, a feature prized by parents, have a greater demand. As a result, these schools that already have a good performance, by being able to select among applicants, will further strengthen their results. Although we would like to observe this last hypothesis, the evidence shows that the most likely story is the first one.

We mainly believe this to be the case because the evidence suggests that parents do not necessarily choose schools on the basis of quality, which is a key element for strengthening good schools. Indeed, Elacqua, Schneider, and Buckley (2006) show that the main reasons behind school choice by families is the proximity to the student's home or parent's workplace. In addition, according to the authors, parents do not have the necessary information to compare the quality of schools.

At the same time, most of the public schools are forced to accept all students, while private subsidized schools can select students in accordance with their educational objectives and are allowed to operate for profit. As such, in order to minimize costs, private subsidized schools have incentives to select students that are less expensive to educate: better-skilled students and those from higher socioeconomic groups. Therefore, if the objective of schools is to improve their absolute performance in standardized tests, they could foreseeably be expected to choose better-skilled students with higher social capital, since this would allow costs to be reduced while increasing competitiveness (Epple and Romano, 1998). It may also be argued that these practices would not occur in a competitive environment, since private subsidized schools would have incentives to admit all students as that would be the way to maximize financial gains. However, the evidence presented in this article suggests that choosing students is a significant phenomenon.

Quantifying the Effects: Direct and Indirect Effects of Student Selection

As has already been explained, schools use screening criteria to choose students with the best characteristics who are, consequently, cheaper to

educate. We will call this the direct effect of student selection. However, the use of selection mechanisms has a second effect in terms of academic performance: it improves peer characteristics. We will call this the indirect effect. It is important to note that the earlier specifications control for peer effects. However, the effect indicated here differs from the peer effect since it considers the benefits associated with peer selection more than their direct contribution.

$$E.S = \underbrace{\alpha}_{Direct\ effect} + \underbrace{\beta(X_s^p - X_{ns}^p)}_{Indirect\ effect} \quad (2)$$

where $E.S$ is the total effect of selection. The vector α corresponds to the estimated coefficients of each of the selection methods. The indirect effects, captured by vector β, are calculated based on the impact on academic performance of the difference between the school peer variables that selected X_s^p and those that did not choose X_{ns}^p. The latter seeks to measure how much an average student benefits from attending a school with good students, after controlling for peer contribution, independently from his or her conditions.

The coefficients estimated by OLS presented in Column 5 of Table 5 are used to calculate Equation (2). All the selection coefficients are statistically significant except for the case of socioeconomic selection. The variables associated with peer effects show a positive and significant impact on academic results. The high impact of the average schooling of mothers is noteworthy. In fact, it is six times higher than the effect of fathers' education on individual performance.

A summary of the quantification of the effects of selection on results is presented in Table 6. In each of the cases considered, the direct effect is the coefficient associated with the selection criteria.

TABLE 6

Direct and Indirect Effects of Screening on SIMCE Math Scores (Percentages)

Screening Criteria	Direct Effect	Indirect Effect	Total Effect
Student ability selection (S1)	2.8	4.3	7.0
Socioeconomic selection (S2)	0.0	5.2	5.2
Religious selection (S3)	0.9	4.8	5.7
(S1) & (S2)	2.8	5.5	8.3
(S1) & (S3)	3.6	5.1	8.7
(S2)& (S3)	0.9	5.2	6.1
(S1) & (S2) & (S3)	3.6	5.4	9.1

NOTES: Results are relative to the average score of 239, 6 points above children attaining schools without any selection practices. The direct effects correspond to the coefficient estimated by Equation 5 in Table 5. The indirect effects are calculated as the difference in the peer variables (average schooling of mothers and fathers and household average income) multiplied by the estimated coefficients.

The results of Table 6 indicate that a student who attends a school that selects by ability (S1) obtains (simply by having passed that selection criteria) a score 2.8 percent above students who attend a school without selection. The indirect effect of attending a school with a better level of peers adds 4.3 percent in the case of selection by ability. As such, a student who attends a school that selects by ability obtains (on average) a SIMCE score in mathematics 7 percent above that of a student in a school that does not select. The table also shows the direct and indirect effects of schools that combine different selection methods. As may be expected, the best results are obtained by students in schools that select: 9.1 percent higher than students from schools that do not select.

Conclusions

The provision of education through the introduction of competition and incentive mechanisms (demand-side subsidies or vouchers) has been widely debated in the literature. Chile has one of the few nationwide incentive mechanism systems and provides appropriate data to examine this model. The Chilean system provides a direct common subsidy to educational establishments from the government for each student admitted to a public or private subsidized school. This market design, proposed by Friedman (1962), is expected to prove that through competition average school productivity will rise. Thus, competition may enhance learning, but is dependent on the details of the market design.

When the market design is not adequate, the free market may not be able to assure an efficient provision of a complex good such as education. This article provides some evidence along those lines. The Chilean voucher system was structured in a way that led schools to compete on selection of students rather than on productivity in skill generation. There are at least two characteristics of the Chilean educational design that call into question the functionality of this market. First, the evidence suggests that parents do not necessarily choose schools on the basis of quality, which is a key element for strengthening good schools. Second, most public schools are obligated to accept all students, while private subsidized schools can select students in accordance with their educational objectives. Furthermore, private subsidized schools are allowed to operate for profit. As such, in order to minimize costs, private subsidized schools will logically select students who are less expensive to educate. The process of selection also improves the peer average characteristics (indirect effect).

This study provides evidence on the topic of student selection mechanisms in Chile, mainly applied by private subsidized schools in a competitive context. As the theory suggests, student ability selection is the most frequently used, and produces the greatest effects on subsequent academic results. The results indicate that after controlling for family and school

characteristics and student selection criteria, the public-private gap shown in earlier studies declines significantly. Since parents reveal that they do not choose schools by academic quality, causality is likely to run from selection to results, not the other way around.

Thus, holding everything else constant, a student attending a school that uses selection criteria obtains 7–10 percent higher standardized mathematics test results than a student from a school that does not use selection.

Thus, a basic belief of the voucher system in Chile that competition will lead to better quality of all schools is not being met. This evidence should not be considered as proof of the failure of the voucher system, but should be taken into account when trying to improve the system's design, regulation, and functionality. Further research should be conducted to understand why some schools have excess demand, and how this market reacts to the existence of rents that could be appropriated by entrance of new establishments.

REFERENCES

Arrow, Kenneth, Samuel Bowles, and Steven Durlauf. 2000. *Meritocracy and Economic Inequality*. Princeton, NJ: Princeton University Press.

Böhlmark, Anders, and Mikael Lindahl. 2008. *Does School Privatization Improve Educational Achievement? Evidence from Sweden's Voucher Reform*. IZA Discussion Papers 3691. Institute for the Study of Labor (IZA).

Coleman, James S., Ernest Q. Campbell, Carol J. Hobson, James McPartland, Alexander M. Mood, Frederic D. Weinfeld, and Robert L. York. 1966. *Equality of Educational Opportunity*. Washington, DC: U.S. Government Printing Office.

Elacqua, Gregory, Mark Schneider, and Jack Buckley. 2006. "School Choice in Chile: Is it Class or the Classroom?" *Journal of Policy Analysis and Management* 25(3):577–601.

Epple, D., and R. Romano. 1998. "Competition Between Private and Public Schools, Vouchers and Peer Group Effects." *American Economic Review* 88:33–63.

Friedman, M. 1992. *Capitalism and Freedman*. Chicago, IL: University of Chicago Press.

Gauri, V. 1999. *School Choice in Chile: Two Decades of Educational Reform*. Pittsburgh, PA: University of Pittsburgh Press.

Hoxby, Caroline M. 1994. *Do Private Schools Provide Competition for Public Schools?* NBER Working Paper 4978.

———. 2000. "Does Competition Among Public Schools Benefit Students and Taxpayers?" *American Economic Review* 90(5):1209–38.

Hsieh, Chang-Tei, and Miguel Urquiola. 2006. "The Effect, of Generalized School Choice on Achievement and Stratification: Evidence from Chile's Voucher Program." *Journal of Public Economics* 90(8–9):1477–1503.

Jencks, C., and E. Mayer. 1990. "The Social Consequences of Growing Up in a Poor Neighborhood." Pp. 111–86 in L. J. L. MeGeary and M. G. H. McGeary, eds., *Inner-City Poverty in the United States*. Washington, DC: National Academy Press.

MacLeod, W. B., and M. Urquiola. 2009. *Anti-Lemons: School Reputation and Educational Quality*. NBER Working Paper 15112.

McEwan, Patrick. 2001. "The Effectiveness of Public, Catholic, and Non-Religious Private Schools in Chile's Voucher System." *Education Economics* 9:103–28.

———. 2003. "Peer Effects on Student Achievement: Evidence from Chile." *Economics of Education Review* 22:131–41.

McEwan, Patrick, and Marti Carnoy. 1998. *Choice Between Private and Public Schools in a Voucher System: Evidence from Chile*. Mimeo. Stanford, CA: Stanford University.

Mizala, Alejandra, and Pilar Romaguera. 2000. "School Performance and Choice: The Chilean Experience." *Journal of Human Resources* 35(2):392–417.

Nechyba, Thomas, Patrick, McEwan, and Dina Older-Aquilar. 1999. "The Impact of Family and Community Resources on Student Outcomes." Manuscript. Durham, NC: Duke University.

Parry, Taryn Rounds. 1996. "Will Pursuit of Higher Quality Sacrifice Equal Opportunity in Education? An Analysis of the Education Voucher System in Santiago." *Social Science Quarterly* 77:821–41.

Sandstrom, F. Mikael, and Fredick Bergstrom. 2005. "School Vouchers in Practice: Competition Won't Hurt You." *Journal of Public Economics* 89:351–80.