Competition Pressures and Academic Performance in a Generalized Vouchers Context

Rómulo A. Chumacero

Juan Gallegos Mardones

Ricardo D. Paredes[1]

Abstract

The positive impact that competition has on performance in most industries, has been questioned in the "education industry." The idea that competition is limited, that parents don't choose schools for their children considering quality and that schools do not react to that choice is in the center of the debate. We analyze the prevailing methodology in the literature that relates competition and educational performance and the data used to estimate that impact. We propose the use of an idea that considers relevant substitutes for each school using various attributes which parents consider when choosing schools, and we estimate the effect of competition pressures on performance for Chile, were more than 90% of the students are covered by a voucher. The evidence supports the hypothesis that competition has a positive, significant and relevant educational impact on private and public schools.

Key words: Vouchers, Competition, Performance.

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[1] Chumacero, Department of Economics, Universidad de Chile, rchumace@econ.uchile.cl , Gallegos, School of Engineering, Pontificia Universidad Católica de Chile, and the Department of Business and Economic Sciences, Universidad Católica de la Santísima Concepción, jagalleg@uc.cl; Paredes (send correspondence), School of Engineering, Pontificia Universidad Católica de Chile, rparedes@ing.puc.cl
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1. Introduction

In the 1980s, Chile transformed its educational system, which was experiencing low academic performance, high dropout and repetition rates. This reform introduced mass decentralization, placing schools that had been managed by the State under the management of municipalities, and allowed private schools to receive a subsidy through vouchers, which were also introduced to finance public schools. The Chilean school voucher has been a topic of interest, mainly because it was introduced in a manner closely following Friedman´s (1962) proposal. It also is relevant since it covers 93% of student enrollment in 2011, making it the broadest reaching voucher system compared to other countries.

The capacity of a voucher system to improve learning depends on the ability parents have to choose schools based on quality and on the capacity schools have to respond on the incentives competition creates. That is, vouchers are associated with competition, a driving force to improve results.

Most prior studies have defined market scope and hence competition in a rather arbitrarily way. They use to associate competition to the number of private schools in a given geographic area, where the areas are defined following an administrative and political divisions criteria (i.e., counties). This proxy for competition will be poor when, as in the Chilean case, students have the freedom to choose their school independently of the neighborhood where they live. On the other hand, a quite common methodology used to estimate the impact of competition on results is through cross-sectional data. This method follows classic industrial organizational research on the relationship between competition and performance (e.g., Bain, 1956; Demsetz, 1973; Keppler, 2008; and Rosado, 2008). Cross sectional analysis is correct when, for instance, different barriers across industries exist in a given moment, and hence there are different competition levels among industries or among counties or areas within the country. The methodology however will be incorrect when competition does not differ in a given moment, as for instance, when the same potential entry is present in different "sub markets." If that were the case, firms would decide entry in the sub markets with higher potential profits, and hence, returns would be equal among them.

The 1980 reform and a change in the law in 1992 that allowed parents to complement the voucher provided by the Government generated a massive influx of new schools, which, unequivocally changed the competitive landscape and has driven a significant reduction in public education , to favor private subsidized schools (see Paredes and Pinto, 2009).

This change in the competitive environment that affected schools in a different way and the data available allow us to apply a methodology to measure the effect of (differentiated) competitive pressures on performance. In concrete, we propose a proxy to measure the change in competitive pressures affecting each school that recognize that substitution among different schools depends on a set of attributes that are identified and weighted depending on parents' decisions. The paper is organized into 4 sections, in addition to this introduction. The second section has an overview of the educational system in Chile, as well as a review of relevant literature. The third section describes the methodology and the results, and the fourth section concludes.

2. Background

2.1 The Chilean Educational System

Until the early 1980s, nearly 80% of the country's schools were run by the State. The Ministry of Education was in charge of funding and running Chile's schools, supervising and developing curricula, and investing in and building public school infrastructure. The system had high dropout and repetition rates, and was viewed as delivering a poor-quality education owing to its excessively bureaucratic nature, insufficient coverage and failure to provide schools with proper incentives.[2] This gave rise to a far-ranging reform of the education system based on the work done by Friedman (1955). Chile was one of the first countries in the world to introduce a reform of this type, or at least a reform of this scale and nature. State-run schools were handed over to the country's municipalities and were financed with subsidies that did not differentiate between students attending municipal schools and those attending non-fee private voucher schools (Mizala and Romaguera 1998). This reform was in the line of several structural reforms in Chile in the late 1970s, including market and choice elements (Castañeda, 1991; Cox, 2005). Thus, the reform gave rise to three types of schools: (i) municipal, State-funded schools (with funding provided by per-student subsidies); ii) privately run, State-funded subsidized schools (with funding provided by per-student subsidies); and (iii) privately run schools funded by tuition payments.

Since the reform, the system has gone through numerous modifications, in response to an analysis to improve quality levels and equality (Cox and Lemaitre, 1999). One such change was the Program for Educational Quality and Equality (MECE), which incorporated a

[2] Hanushek (1998) suggests, for example, that in 1970 the test scores for Chile's students were 50% lower than the those of students in France and the United States and 20% lower than those of students in Japan and were only 10% higher than students in India and the Islamic Republic of Iran. Barro (1999) reported that Chile's scores were 50% lower than what they would be expected to be given its level of development.

systematic intervention of processes and conditions used in education, with an emphasis on the segment of students and schools that were falling furthest behind. In 1995 the results for the standardized SIMCE tests were published for each institution. This standardized test measures the achievement of educational objectives and is taken by all students in 4th grade and 8th grade, with the exception of students who studied in multi-grade classrooms. Tests for 10th graders were incorporated in 1998. The publication of these results was done so parents would have information regarding schools´ performance, a key element in making proper decisions.

In 1993 a provision was introduced to supplement State funding. Under this statute, some of the subsidized schools were allowed to charge parents for a portion of the tuition, and subsidized private schools and some public schools were authorized to receive donations or grants, which would be deducted from the State subsidy. This led to a steep rise in private school enrolment that has cast some doubt over the sustainability of the municipal school system (Table 1). These policies succeeded in bringing about a steep reduction in dropout rates and a steady increase in enrolment rates. The scores on the System for Measuring the Quality of Education (SIMCE) tests, however, indicate that the quality of education remains quite limited and that striking differences between the performance of students in different socio-economic sectors continue to pose a major challenge.[3]

[3] Chilean students scored substantially higher on PISA 2006 , especially in language (OECD, 2008).

Table 1 Number of schools by type.

Year	Total	Municipal	Private Subsidized	Private Paid
1990	9,811	6,359	2,694	758
1991	9,801	6,346	2,678	777
1992	9,802	6,364	2,651	787
1993	9,831	6,347	2,653	831
1994	9,810	6,313	2,637	860
1995	10,296	6,448	2,790	1,058
1996	10,515	6,527	2,883	1,105
1997	10,318	6,411	2,857	1,050
1998	10,631	6,407	3,065	1,159
1999	10,712	6,367	3,170	1,175
2000	10,610	6,325	3,217	1,068
2001	10,799	6,309	3,459	1,031
2002	10,879	6,248	3,640	991
2003	11,223	6,209	4,084	930
2004	11,296	6,160	4,274	862
2005	11,561	6,168	4,630	763
2006	11,671	6,041	4,897	733
2007	11,763	5,979	5,054	730
2008	11,905	5,917	5,262	726
2009	12,116	5,899	5,536	681

Source: MINEDUC.

The conceptual and empirical foundations underlying this discussion about the consequences of the reform clearly extend beyond the specific case of Chile. Hanushek (2003) suggests that, in recent years, the cost of public education has risen sharply without attaining the expected results. Chubb (2001) contends that, if education were privatized, schools would have powerful incentives for cutting costs and that this would push them to innovate and become more efficient. Others argue that this type of system would prompt private schools to cut costs in ways (e.g., recruiting less qualified teachers at lower salaries) that would lower the quality of the education that they provide. In addition, this system could lead to discriminatory practices whereby schools would give preference to students that would be less costly for them (Levin, 2002). In Hoxby's view (2001), this kind of situation arises because, in a flat-rate subsidization

system, subsidized private schools have no incentive to take on students who are in more vulnerable situations, since they will require a larger investment in order to achieve better scores.

Regarding the consequences of the Chilean reforms, there is a consensus that the reform increased coverage and reduced repetition rates. However, most analysts also find a low quality of education and that the results and the intellectual ability is strongly stratified and that the level of education is unsatisfactory by international standards (see, Hayneman, 1990 and 2004; Brunner, 2005; Garcia and Paredes, 2010).

The TIMMS-R (Third International Study of de Sciences and Mathematics) for instance, shows that Chilean eighth grade students in 1999 ranked 35 among 38 countries both in mathematics and in science, while in the year 2003 they ranked 40 among 45 in mathematics, and 37 among an equal total number in science. Chile's low ranking persists even with respect to countries with a lower per capita GDP and investment in education, such as Jordan and Malaysia. Furthermore, the TIMMS-R 2003 shows that the gap in quality between the low and high income sectors increased between 1990 and 2003 from 120 to 142 points in a scale having a mean of 500 and a standard deviation of 100. Tokman (2004), on the basis of other international tests (PISA, IALS, Kimko and TIMMS), arrives at similar conclusions.

Besides learning, the literature states a main concern regarding segregation. Hsieh and Urquiola (2003) argue that the reform spurred an exodus of middle-class students from municipal schools to private subsidized ones, which left the municipal schools with a much greater proportion of students from vulnerable sectors and therefore drove down their average scores. Tokman (2005) and Valenzuela, Bellei and de los Ríos (2008) suggest that allowing parents to pay in a State voucher context explains Chile's high tisegregation shown in the PISA2006 report. Using Simce scores, the same concern is present in Mizala and Torche (2011).

Behind some criticism to the Chilean reform, it prevails the idea that the competition model induced by extensive vouchers has not been effective, as reflected in the high segmentation in schools (Carnoy, 1997). Gallego (2002) develops a model to estimate the effect of competition in municipal and subsidized private schools. He finds a positive correlation between competition and performance, particularly in subsidized

private schools, and interprets this as being a consequence of the existence of stronger incentives for a rapid response to potential competition. However, Hsieh and Urquiola (2006) contents those findings arguing that, after the reform, the private subsidized schools' better showing was primarily due to the fact that they had selected out the best students.

2.2 Competition and Performance

The introduction of competition through a voucher system could induce schools to improve performance (Hoxby, 2002). Competition among schools is expected to increase social welfare when families can choose and school budgets depend on family decisions. Pioneering research on the relationship between competition and academic performance was done by Borland and Howsen (1992) as well as Couch, Williams and Shugart (1993). Using cross section, Borland and Howsen (1992) measured the level of competition by the relative participation of private schools in the State of Kentucky, USA, finding a positive relationship between this and academic performance. Likewise, Couch, Williams and Shugart (1993) measured competition as the percentage of students who attend private schools and they found a positive and significant relationship between the competition provided by these private schools and academic performance of public schools in 100 counties in the State of North Carolina,USA.

Hoxby (1994, 2001) used a Tiebout (1956) type model which included choices based on the proximity between school and the family residence, also using cross-sectional data. The model assumed that public schools have access to parental information regarding resource productivity. So, including private schools (which are assumed to operate with greater productivity) provided information regarding academic productivity, and limited the agency problem. Results suggest that the greater the competition provided by private schools, the greater the efficiency of public schools, raising performance levels, teacher salaries and high school graduation rates.

Epple y Romano (1998) developed a theoretical computational model which included schools financed by taxes – competitive, free public schools- as well as private schools financed with a voucher system, including students with varying abilities and incomes. Their results showed that the performance of these schools are explained by the students´ socioeconomic factors; they also demonstrated that the voucher system drives private sector growth and sorting, which benefits the most qualified students as compared to those with lower grades. Epple and

Romano (2002) then studied a voucher system designed to increase competition, without creating student sorting. To achieve this, they corrected their prior model, varying the voucher based on students´ abilities. The results of this model indicated that a voucher system that recognizes student characteristics can reach higher levels of efficiency, increasing quality of results and equality in private and public schools.

Toma (1996) evaluated the effect of private school enrollment and the financing system in five countries. She finds that the public effort to promote private enrollment does not reduce the public school performance and that the government restrictions on decision making reduced the private school performance. Sander (1999), also using a cross-sectional analysis evaluated how competition by private schools affect mathematical performance in public primary and secondary education in Illinois, USA. They use as a proxy for competition the percentage of students enrolled in private schools and they dealt with the endogeneity of this variable by using the density of the Catholic population per neighborhood as an instrument. They conclude that competition provided by private schools has no direct effect on the performance of public schools.

Ladd and Fiske (2001) evaluated the effects of the 1991 reform which provided complete freedom of school choice and created competitive conditions between primary schools in New Zealand in 1996. They concluded that greater competition, measured as the percentage of private schools, negatively affected students´ learning, learning styles, relationships with parents and relationships with the principals.

Bayer and McMillan (2005) also focused on the impact of free choice on public school performance using information from the 1990 Census for the San Francisco Bay area. They developed a more direct measure of competition faced by each of the schools, associated with the effect of a reduction in quality in the school demand. The authors use as an instrument the price of homes in the area where the schools were located. The results showed that competition is closely and positively related to academic performance of the schools.

Braun-Munzinger (2005) conducted a review of 21 voucher programs in 14 countries and identified factors which impact the quality of education through competition between schools. They found that including the greatest number of schools and publishing the results of the school´s tests contributed to the proper operation of a voucher program. The factors which get in the way of the success of the voucher system are the existence of barriers to entry, unequal financing of public and private schools as well as a low rate of participation of private schools. Böhlmark and Lindhal (2008) evaluated the effects of free choice and competition on the results of private and public schools in Sweden. They defined competition as the number of

students in a neighborhood who are enrolled in private schools. They found that an increase in participation of private schools improved the results of public schools in the short term.

Gibbons, Machin and Silva (2008) evaluated if the greater availability of schools and competition between primary schools in England improved academic results. They proxied competition by the Herfindhal index in each zip code area. Initially, they did not find any significant relationship between choice, competition and academic performance, which they attributed to the endogenous relationship between breadth of choice and competition. Then they controlled for endogeneity, using as an instrument the maximum distance travelled for the student, defined by reveled preferences in different transport modes. They found that in the whole sample, competition had a small impact on performance. However, when the population is restricted to the population of Voluntary Aided schools (schools with more administrative freedom), the results show a positive and significant impact on academic performance.

The Chilean experience offers an exceptional case to evaluate the relationship between competition and performance. First, Chile has the most massive voucher system in the world, covering over 90% of the students, that besides tuitions applied to some schools, have limited restrictions to choose one school or another. Second, Chile has had a relatively long tradition in evaluating results mainly through the SIMCE , an standardized test was introduced in 1988 and measures math, language and science learning for 4th, 8th and 10th grades. For the Chilean case, McEwan and Carnoy (1998) using cross-sectional data analyzed the impact of competition on the academic performance of fourth graders from 1988 to 1996. Competition was proxied by the percentage of enrollment in subsidized schools in each neighborhood. The results showed that competition had a negative impact on public schools, and that the effect is greater in neighborhoods with a higher participation of private subsidized schools. The authors propose that this relationship is caused by the migration of the best students to subsidized private schools.

Hsieh and Urquiola (2003) studied the effects of competition on academic performance in math and language arts in 150 municipalities from 1982 to 1996, defining competition as the participation of private schools in each municipality. They found that when competition increased, the SIMCE results of the public schools fell, but the years of schooling increased. Gallego (2002) made a similar estimation using SIMCE results and cross-sectional data from 1994 to 1997. He also proxied competition as the percentage of private enrollment per municipality, and concluded that competition improved school results in the case of private subsidized schools.

Auguste and Valenzuela (2003) evaluated the impact of competition on academic results using SIMCE scores for the year 2000. They explicitly assumed that municipalities represent independent markets. The competition proxy is, once again, enrollment in subsidized schools by municipality. They found that higher competition has a positive but small effect on the SIMCE, though an increased inequality of the results and that the segmentation observed within municipalities negatively impacted public schools.

3. Methodology.

3.1 Incomplete Analogy between Industrial Organization and Education

There is wide agreement that firm's profitability is negatively correlated with different proxies of competition, particularly, market concentration indicators. Whilst the interpretation that associates competition with concentration received important criticism, such as Demsetz (1973), who suggests that the relationship concentration profitability is spurious when size is not controlled for, the Structure-Conduct-Performance paradigm has had a large impact and tends to be specifically applied by antitrust organizations in different countries (i.e., Brozen, 1971; Weiss, 1974; Gilbert, 1984). In fact, that paradigm is implicit in some of the research on the relationship competition and performance in the area of education. A number of analysts have followed the basic industrial organization type of model to determine the effect that competition on educational performance.

The typical model applied in the industrial organization field is as in (1)

(1) $$Return_{i,j} = \alpha_o + \beta_1 Competition_{i,j} + \beta_2 X_{i,j} + u_{i,j}$$

where the dependent variable, return of firm i in the industry j is for instance measured as the quotient between profits and the company assets, competition is empirically associated with the industry concentration, X summarizes other controls, and "*uij"* is an error term not related to the competition variable. Model (1) typically is estimated with cross-sectional data and assumes a variance in the level of competition between industries at one moment in time. That estimation makes sense when in a given moment of time the industries face different barriers to entry or another similar consideration which affects each market or industry differently. A main problem with this approach for the Chilean case is that the reform allowed entry with no different restrictions by area, county or region. Consequently, after a period of entry, it is expected that no differences in return should prevail among counties or areas. More precisely,

there are at least two problems to directly estimate model (1) with Chilean data. First, information about school profitability is not available and furthermore, we are more interested in learning than in financial return. This is however, a small technicality, since the implicit idea behind equation (1) is that a competitive process results in dropping prices to attract customers, with the subsequent reduction of profitability. The variable associated with "customer attraction" for the ideal voucher system would be the school quality. Even though it is possible to think that schools compete to attract students by providing other services, the objective of the voucher system is competition driven by quality. Thus, the analogy between the variables of financial profitability and educational performance is clear when we think that to maximize the financial benefit, each school must promote quality and that has a cost. It is to be expected that competition will reduce the economic benefit by causing schools to incur greater costs to provide greater quality. In summary, it is plausible that financial profitability is negatively related to educational performance and therefore equation (1) can be estimated by replacing profitability with performance (obviously the sign assumed for $\beta_1$should be positive, and not negative as when it is used for profitability).

The second problem is that this methodology requires changes in the monopolistic power and competition through counties or areas in a given moment of time. As suggested above, this is unlikely in the Chilean case after the massive entry of schools. The reform allowed and encouraged an important influx of schools independently of the sector or area. Prior to this change, there may have been variances in the level of competition between different areas of the country and within the same city, and these could be associated with the number of schools or concentration indexes. Non economic criteria were used to determine the number and size of schools, and could have created an unbalanced social situation by setting up new schools in different areas of the country. However, the restrictions for new schools were lifted, and this propelled the creation of new schools which had no regional or local patterns. So attributing the number of schools or the concentration of those to a given area seems, after the reform, irrelevant. It could be expected that schools would open to fill spots where they filled a social or private need, which would have the effect of creating uneven profitability across the country. As is to be expected, once the period of liberalization allowing the entry of new schools had past, the equilibrium does not allow us to detect differences between monopolistic power because there it is not possible to measure the necessary variability to determine the impact. Any difference in profitability, ceteris paribus, would have been arbitrary, unrelated to the entry of the schools. Even if there wasn't complete equilibrium, the relationship between competition and number of schools in a given area is not relevant.

The approach to face this problem comes from the fact that competitive pressures for each school, after the entry of other schools, should have changed. The reform allowed the entry that presumably was more intense in areas where there was a larger deficit or less competition or where competition was less intense. Thus, to test the basic hypothesis that competition increases learning we consider two different periods (prior and post entry). Thus, we can follow model (1) to test the effect of competition on learning performance through model (2:

$$(2) \qquad \Delta Perf_{i,t} = \alpha_0 + \beta_1 \Delta Comp_{i,t} + \beta_2 (\Delta Comp * ST)_{i,t} + \beta_3 Perf_{i,0} + \beta_4 \Delta Control_{i,t} + \varepsilon_{i,t}$$

where the dependent variable is the change in the performance of incumbent *school* $_i$ in the period *t;* $\Delta Comp_{i,t}$ is the change in the competitive pressures faced by *school* $_i$ in the period t , $Perf_{i,0}$is the initial SIMCE score of *school* $_i$, and ST is the school type, so $\Delta Comp * ST$, an interactive variable that captures the effect of competition for the different types of schools.[4] Equation (2) also considers controls for the change in sociodemographic characteristics ($\Delta Control_{i,t}$). We also consider as an instrument of the change in competition, the enrollment in the base year.

3.2 Market Scope and Competition.

One of the critical aspects to have a good competition proxy is the definition of market scope. Overall, the literature uses an empirical approach to define it by considering a threshold for the cross elasticities between goods. For example, to determine if cola drinks are part of the same market as other sodas, the value for cross elasticity will tell, if they exceeds a limit, that they do belong to the same market. In the case of education, two schools will be sharing the same market if the entry of a new school affects parents' choice of another incumbent.

Since school choice is a multidimensional , it will be wrong to define the market or the competitive pressures based only in one characteristic, like for instance, distance among schools. Substitution among schools depends on all the factors parents consider relevant to choose them, including infrastructure, academic performance, distance, and tuition costs . To define the factors parents consider and the weight given to each of them, we follow the choice model developed by Chumacero, Gomez and Paredes (2011).

[4] Following Barro and Sala-i-Martin (1992), we considered the Simce in the base year as a way to test convergence of results between schools over time.

Let $i = 1, \ldots, I$ index the individuals (students) in the sample and Let $j = 1, \ldots, J$ index the possible choices (schools). Denote by x_i the vector of characteristics of the student and its household that do not depend on the school, by y_i the vector of characteristics of the school that do not depend on the student, and by $z_{i,j}$ the vector of attributes of the school that are specific to each student. Then define $u_{i,j}$ as the (indirect) utility of child i attending school j, so that:

$$u_{i,j} = u(x_i, y_j, z_{i,j}) + \varepsilon_{i,j} \qquad (3)$$

where $u(.)$ corresponds to a systematic component and $\varepsilon_{i,j}$ is a (random) non-systematic component. Given (3), agent i chooses school h if $u_{i,h} \geq u_{i,j} \ \forall_j \neq h$.

Let $d_{i,j}$ denote the distance between household i and school j. Let d_{ni} be the distance between household i and the nearest school and u_{ni} the value of the utility function in (3) associated with choosing that school. On the other hand, let u_{mi} be the value of the utility function associated to the choice of the school that maximizes (3). Note that the school that minimizes $d_{i,j}$ and the one that maximizes $u_{i,j}$ may be different for each student i. Clearly, when the nearest school maximizes (3), u_{mi} and u_{ni} will coincide.

Let

$$v_i = \begin{cases} 1 & \text{if} \quad u_{mi} = u_{ni} \\ 0 & \text{if} \quad u_{mi} > u_{ni} \end{cases} \qquad (4)$$

that is, v_i is the (observed) variable that takes the value of 1 when the student attends the school nearest to the household and 0 otherwise.

Evaluating (4) instead of (3) is convenient as now we can focus on modeling the determinants of choosing the nearest school using binary response models. The model considered is:

$$\Pr(v_i = 1 | w_i) = F(\beta' w_i)$$

where F is a postulated distribution function (say the standard normal), w_i is a vector of determinants, and β a vector of parameters to the estimated.[5] Once obtained the parameters

[5] As considered in Ferreyra (2007), the choice of school and of residence may be jointly determined. Whilst we have no data to control for the choice of residence, this may not be a prevalent problem in Chile because the vast majority of beneficiaries of the voucher program

associated to each of the characteristics parents consider in choosing a school, we can have a proxy for the increase in the competitive pressure each school faced in the period

The parameters obtained from the school choice model allow to compare the indirect utility for each family associates with choosing each school. We define as a proxy for the "increase in the competitive pressure" between two periods, to the proportion of students from each incumbent school had preferred a new school had it been available. Thus, by comparing the indirect utility associated with the incumbent and a new school, we define a dichotomous variable S_i for each student attending the incumbent schools where Si = 1 if $U_{ij}^{chosen} \leq U_{ij}^{new}$, 0 otherwise. Getting Si for each student in the incumbent schools, the proxy of the increased competitive pressure for each incumbent school is the proportion of the students in an incumbent school that would have been better off in a different school had this been available (5).

(5) $C_{ik} = \sum S_j / n$

3.3 The Data.

The Chilean National Socioeconomic Survey (CASEN) database used by Chumacero, Gómez, and Paredes (2011) has statistical representation at a municipal level, which is insufficient to create a competition pressure variable at school level. The SIMCE database detailed the academic performance for each student and school, monthly tuition and the socio-demographic characteristics of the parents of each student, such as gender, family income, education of the father and mother, but does not have information on the home address, needed to compute distance to school. To get distance, we used the College Entrance Exam (PSU) 2009 database provided by The Department of Educational Evaluation, Measurement and Registration of the Universidad de Chile (DEMRE) , which included the student´s address when he/she took the test at the end of 12th grade. This database was combined with the SIMCE tests, which had information regarding the school, the students and their families. We assumed that the student lived in the same location in 2004, as he/she lived in 2009, so we could have a proxy for the distance between home and school in 2004. Then, we re-estimated the school choice model, to create the competition pressure metric.

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are from middle income and low income households. They tend to use publicly financed housing programs in which the location of the household is "exogenous" to them.

3.4 Results.

Table 2 shows the results from a Probit estimation for the school choice model, that is, the parameters associated with the different attributes which are valued by families when selecting their school. The results are consistent with economic theory and empirical evidence obtained in Gómez, Chumacero and Paredes (2011) in terms that families marginally prefer a closer school in the case of female students, but that probability declines with increased family income and increased level of education of the mother. When there are more schools which are close to the family home, the probability of choosing the closest school declines. As would be expected, families are more likely to choose the closest school when its quality is greater or it is closer. Thus, a trade-off between quality, distance travelled by students and the tuition paid is obtained. From the parameters of table 2, we computed the increased competitive pressure variable as suggested above.

The estimation of model (2) differentiated the grade when the SIMCE test was taken. This is necessary due the uneven entry pattern of new schools and the different decisions which are made by parents depending on the age of the child.[6] The estimated derived from this model using 2SLS, are presented in table 3.

The results consistently show that greater competitive pressure significantly increase the performance of private pay schools and private subsidized schools for the 4^{th} and 8^{th} grades, and no significant effect is observed for the 10^{th} grade. The results suggest the effect is also positive for public schools, but significatively smaller (join significance test for the coefficients). Finally, the results show a convergence path over time, shown by a negative impact of the initial SIMCE coefficient.

More relevant, the size of the effect of the competitive pressure variable is quite high. Thus, for example, let's consider the differentiated impact on 4^{th} year student performance for two otherwise identical schools. School 1 and 2 had an increase in the competitive pressure they face by 20 and 30, respectively. If both schools were private, that would imply a difference in their performance by 10.4 points. In the case both schools were municipal, the differentiated effect would be 3.9 points. Considering that the standard deviation of the SIMCE test is 50, and that the results have been almost unchanged over the last 10 years, these magnitudes are huge.

[6] As an example in 2008, there were 8,829 schools teaching 4th and 8th grade, and 3,675 schools teaching high school.

Table 2. School Choice (Probit estimates)

	Public schools		Private Subsidized Schools		Private Pay Schools	
Variable	Estimated Value	Std Error	Estimated Value	Std Error	Estimated Value	Std Error
Constant	1.33311 (**)	0.1733	-1.67217(**)	0.1324	1.75619(**)	0.4981
Female student	0.03291	0.0346	0.0037	0.0208	0.12514(**)	0.0414
Mother´s yrs. of education	-0.01050	0.0054	-0.00813(*)	0.0036	-0.02668(*)	0.0114
Log income	-0.04528	0.0249	0.00663	0.0156	-0.04145	0.0453
Tuition for selected school	-0.01979(**)	0.0035	-0.00452(**)	0.0006	-0.00793	0.0023
Tuition for closest school	0.00197	0.0031	-0.00368(**)	0.0005	-0.00627(**)	0.0020
Quality of selected school	-0.01879(**)	0.0007	-0.00149(**)	0.0004	-0.00423(**)	0.0010
Quality of closest school	0.01452(**)	0.0008	0.00631(**)	0.0004	0.00655(**)	0.0008
Distance to closest school	-0.15412(**)	0.0176	-0.24804(**)	0.0199	-0.06921(**)	0.0222
Number of schools	-0.08291(**)	0.0104	-0.01935(**)	0.0018	-0.03017(**)	0.0031
Statistically significant with a 99% (*) and 95% (**) level of confidence.						
Observations	9143		25328		6229	
Percentage correctly predicted	76.0691		87.3855		86.4184	
Pseudo R-squared	0.2367		0.0371		0.0576	

Table 3. Effect of competitive pressures on Academic Performance (2SLS).

	10th grade	8th grade	4th grade
Variables	Coefficient	Coefficient	Coefficient
Constants	-72.7229*	-118.7656**	-162.5068**
	(36.3945)	(18.7403)	(9.2809)
Change in competitive pressure (range 0 – 100)	0.7502	2.5540**	1.0459**
	(0.4448)	(0.2392)	(0.0743)
Change in competitive pressure * School Type	-0.0269	-0.7825**	-0.6605
	(0.0229)	(0.0686)	(0.0468)
Initial SIMCE score of school	0.0301*	-0.2304**	-0.8491**
	(0.0258)	(0.0264)	(0.0478)
Income variation	0.0005	0.0369**	-0.0028
	(0.0078)	(0.0055)	(0.0018)
Tuition variation	0.0532	-0.0023	0.5520**
	(0.0673)	(0.0587)	(0.0616)
Variation of mother´s education	3.1124*	2.7053**	1.8055*
	(1.4108)	(0.8382)	(0.8154)
Variation of father´s education.	1.8253	5.0632**	0.3610
	(1.4257)	(0.8521)	(0.8132)
Desviaciones estándar entre paréntesis. *p < 0.05, **p < 0.01.			
Observaciones	599	526	554
F(7, 592)	1.81	20.71	52.34
Prob > F	0.0835	0	0
R- Squared	0.0209	0.2427	0.4345

5. Conclusions

The lack of consensus in the area of education regarding the effect of greater competition on learning or performance, contrasts with the results for other industries. Using a methodology that introduces the idea and measures competitive pressures, we found that competitive pressures does improve significantly and in a relevant way the academic performance of 4^{th} and 8^{th} year students. Secondly, we found that the increase in the competitive pressure positively affects all schools, regardless of the type of administration. It is true that in the case of municipal schools the effect is less important, but still there is an effect which is positive and relevant. Our findings contend some previous ideas, in the sense that higher competition among schools does not have a significant effect on student performance, or even if it has an effect, this is limited to the private schools.

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