Distance to School and Competition in the Chilean Schooling System

Meneses, Francisco and Urzua, Sergio and Paredes, Ricardo and Chumacero, Romulo

IFICC

2010

Distance to School and Competition in the Chilean Schooling System *

Rómulo Chumacero † Francisco Meneses ‡ Ricardo Paredes§

Universidad de Chile MINEDUC Universidad Católica

Sergio Urzúa¶

Northwestern University, IZA and NBER

June 6, 2010

Abstract

This paper analyze the demand for educational services in a context in which households and schools are heterogeneous. Distance from student's place of residence to schools is a key component of our model. School quality and household characteristics are also important ingredients.

Our empirical analysis uses rich and novel information from a large sample of students in Chile. We combine geo-referenced data with longitudinal information on student's performance. Our longitudinal data contains information for 95% of the Chilean students initially enrolled in 8th grade in 2004. For each student in our data, we observe her scores in two national tests (taken during eight and tenth grades, respectively), all her grades during high school, and her performance on the Chilean standardized test of college admission. We also observe her place of residence and the locations of the schools in which her enrolled.

Our results shed lights on the determinants of schooling choices. Our ultimate objective is to understand the impact of these choices on academic performance and and long-term outcomes.

JEL: I21, I22.

Keywords: Education, School Choice, Chile, Nested Logit.

*We thank Patricio Cereceda, from the SIMCE department of the Ministry of Education and we thank Cristian Aguirre from the firm Infomatic .

†Department of Economics and Central Bank of Chile. Address: Augustinas 1180, 3er Floor, Stgo. Chile. Email: rchumace@econ.uchile.cl

‡Ministerio de Educación de Chile and Pontificia Universidad Católica de Chile . Address: Alameda 1371, 4th floor, Stgo. Chile. Email: fjmenese@gmail.com

§Department of Industrial Engineering, Pontificia Universidad Católica de Chile. Address: Vicuña Mackenna 4860, Stgo. Chile. Email:rparedes@ing.puc.cl

¶Department of Economics and Institute for Policy Research, Northwestern University. Address: 2001 Sheridan Road Room 3225, Evanston, Il, 60208. Email: s-urzua@northwestern.edu.

1 Introduction

The extensive literature analyzing the Chilean educational system suggests that most children have limited access to high-quality schools. This conclusion is consistent with the increasing conflicts generated by students and teachers, that has produced a sequence of protests, strickes, and new law projects, some of them aimed at reforming the roots of the existing educational voucher system and in particular, to increase the role of public schools.

Not only a poor average education level is part of the diagnosis, but also an important gap. Comparing students' performances on standardized test scores suggests that students attending private schools have significantly higher scores than those enrolled in either voucher or public schools. Similarly, using appropriate (but not all possible) control variables, leads the conclusion that students enrolled in voucher schools out-perform students from public schools. The gap in results has been associated with a number of reasons, including lack of information on school quality, and hence, on competition. In particular, a number of analysts suggest that in the root of the poor quality observed, is the lack of competition among schools which in turn, is explained because poor families do not have or use quality information. This idea use to be supported by anecdotal information, and "declared preferences surveys," indicating that families do not know the results of standarized test and that a main aspect to decide the school for their children is distance.

The literature and evidence on how families decide the school for their children is scarce. In no country as in Chile this question is so relevant, due to the extension of the voucher system, which unlike elsewhere, it followed much more closely Friedman's (1955) idea. For Chile, Gomez, Chumacero and Paredes (2009) analyze family decisions using distance, among the relevant variables. The decision model, however, is focused on the nearest school, thus limiting the number of choices.

In this paper we also have the same motivation, that is, to find out the incentives leading families to choose school for their children. We expand the previous model to a more complete choice than "the nearest school available". In particular, the purpose of this paper is to analyze how families choose the school for their children under the hypothesis that they have a very imperfect knowledge of the school quality. In particular, we explore how consistent is the data with the popular knowledge that a number of selective and distinctive schools are much better that the rest.

To derive the model, we follow an empirical oriented literature aimed at estimating revealed substitution of characteristics, as in Tay (2003), Luft et al. (1990); Mc Fadden (1978) and White and Morrisey (1998). The relevance of substitution, where distance is a positive characteristic of the service, can directly be associated with the nature of competition, the relevance of geographic monopolies, and hence, naturally has been a concern in antitrust regulators (see, for instance, Elzinga and Hogarty, 1973 and 1978). To estimate the model, we construct a data set with the distance between homes and each school in the Greater Santiago Area.

The effect of competition on academic performance is one key but relative left aside aspect to explain the evolution of performance. Hoxby (1994 and 2002), and Ladd and Fiske (2001) study the relationship between competition and schools' academic results using data from a voucher "experiment" in Milwaukee, USA and New Zealand, respectively. The firs study finds that competition has a positive effect on the average results. The opposite is found in New Zealand. Maranto, Milliman and Stevens (2000) find that in Florida, the role of competition is reduced because low family income does not allow students to move to a private school. Bayer and McMillan (2005) find a significant positive relationship between competition and scores with data from an urban area in the USA. Braun-Munzinger (2005) reviews most of the evidence found so far.

The Chilean experience stands out because the reform that established the voucher system was country-wide and almost tree decades have passed since it was implemented, while in other countries, in general, small experiments have taken place in cities or small groups of schools. The main references to this literature are Gallego (2002), Hsieh and Urquiola (2003), Auguste and Valenzuela (2004). These papers use data for the whole country, using each county as an observation. Hsieh and Urquiola (2003) study the effect of the voucher system on schools' results. They construct a panel with data from 150 counties between 1982 and 1996, and measure the difference in schools' results before and after the 1981 reform. They compare the changes among rural and urban schools assuming that competition, measured by the entrance of the new voucher-funded private schools, was less intense in rural than in urban areas. They conclude that the voucher system has not improved school performance and that, in turn, it has produced sorting of the students. That is, the students of higher ability, higher family income, or who are set apart in some other dimension, have transferred from public schools to voucher-funded private schools.

Hsieh and Urquiola (2003) argue that the lack of effect of competition on schools performance

may be due to the way in which parents choose schools. They claim that parents may choose schools with good students, which would induce schools to improve their results only by attracting good students and not by raising the quality of the education offered. This in turn would reduce the scores of the schools that lose good students and the net effect would be zero.

Gallego (2002) tests the existence of a positive relationship between competition and school performance, and if this relationship is more important for private voucher schools than for public schools. Using cross-section regressions to explain SIMCE scores with a county-level competition index measured as the proportion of students in each county that attend private schools, and other socioeconomic variables, he finds support for both hypotheses.

Gallego (2002) states that competition is endogenous to test scores, and faces the endogeneity problem using total school enrollment per county as an instrument for the degree of competition. He also uses the degree of urbanicity in the schools' location as another possible instrument. He finds that without using instrumental variables he obtains a negative and significant effect of competition on schools' performance, which shows the importance of addressing endogeneity.

Auguste and Valenzuela (2004) study the impact of competition on schools' academic performance following Gallego (2002)'s methodology. They also find a positive effect of competition on schools' results and conclude that competition increases the sorting of students between public and private schools based on students' family income.

More recently, Benguria and Paredes (2008) use multilevel data, with observations for each student in Santiago, and taking into account the interaction between student level and school level data. The distance from each school to the closest similar one is taken as a measure of competition. They find a positive, though not robust relationship between competition and test scores is found.

Gallego and Hernando (2009) estimate a random utility model and find out that parents take into account schools' average scores, accesibility (in terms of closeness to home) and the fees charged by schools. Also, they find that parents with higher expectations about their pupil's skills place a greater value on the schools' test scores.

With evidence from the USA, Hastings, Kane and Staiger (2005) find out that parents value proximity and schools' average test scores, and that the importance given by parents to scores is increasing in family income and in student skills. Hastings and Weinstein (2007) conclude that information is a relevant variable when parents choose schools. In the context of the No-Child-

Left-Behind Act, they find that 16% of the students moved to a different school when their parents where informed about their under-performance.

The paper has 5 sections including this introduction. Section 2 describes the data. Section 3 develops a model of school choice and discusses its empirical implementation. Section 4 presents the main results. Section 5 concludes.

2 A New Data Set

The present research is done with a new data set, combining four different sources of information to construct a unique longitudinal data set of Chilean Students. We will use information from a national standardized test, the SIMCE. We will also use the College Selection Test (PSU in spanish), an optional test that is taken ant the end of the senior year of high school. We will merge this information with the official information of the Chilean Ministry of Education and with the geographic positions of the students and High Schools. We merge the information using the R.U.N. (similar to the social security numbers) of all students.

The SIMCE test is a national mandatory test, that evaluates all students in different grades. During the year 2004, 8th graders took the test and their parents answered a very complete questionnaire. From these answerers we will obtain a measure of the students ability and socioeconomic status. This test evaluates all of the Chilean students at that time. The test is developed by the Ministry of Education of Chile. In 2006, the same students were evaluated in 10th grade with the SIMCE test. Therefore, we can track the student's performance during the years.

The second data set is the Registry of Students From Chile (RECH), that has got the high School grades off all the students graduating from High School in 2008. This information is from the Ministry of Education of Chile.

The third data set is the College Selection Test from 2009 (PSU in spanish), a voluntary test, that is a requisition for entering most of the Universities and for obtaining most of the scholarships. This test is taken by roughly 83% of students that finish high school, therefore, we do not have information for all the students that graduated from High School. This test is administered, published and developed by the Department of Evaluation, Measurement and Education Registry of the University of Chile. This data set contains information provided by the student regarding

socioeconomic characteristics.

The fourth source of information contains the addresses associated with the place of residences of the individuals in the PSU 2009 data file. Using GIS technology,[1] we obtain geographic coordinates for a large sub-sample of those addresses. We combine this information with the geographical location of schools to compute distance between students' residences and schools. To our knowledge, this is the first paper computing distances at this level in Chile.

With respect to our sample size, the total number of individuals with valid information in PSU 2009 is 278,275. The sample reduces to 110,811 after restricting it to individuals with address in Greater Santiago. Out of those, 29,188 are males with valid information in SIMCE 2006 (when they were attending tenth grade). For 21,866 of them we are able to geographically locate their place of residence (as reported in PSU 2009). Finally, after restricting the sample to those observations in Greater Santiago (20,650),[2] those with valid information from the parents' SIMCE 2006 survey (15,955) and to those enrolled in the same school in 2006 and 2008 we obtain 10,007 observations.[3]

Table 1 presents the description of the variables utilized in this study as well as the associated sources of information. Table 2 presents the summary statistics from our sample of schools. We present the information by school category (Big ten/Other). Table 3 on the other hand, presents the summary statistics from our sample of students. As for schools, the information is presented by school category.

Figures 1 and 2 present a graphical analysis of the intuition behind our empirical approach.

3 Our Approach

Consider the following regression model for individual's i test score attending school j T_{ij}

$$T_{ij} = \alpha_0 + \alpha_1 V_j + \alpha_2 X_i + \alpha_3 Z_j + e_{ij}$$

where D_j is equal to 1 if school j is voucher and 0 otherwise, X_i is a vector of student-specific controls, and Z_j is a vector of school-specific controls. This regression model has motived the

[1] The geographic positioning was dome by the firm Infomatic .

[2] We exclude the cities of Buin, Colina, Curavavi, Isla de Maipo, Lampa, Melipilla, Padre Hurtado, Paine, Peñaflor, Pirque, Talagante, Til-Til and Calera de Tango. These are considered Santiago's suburbs.

[3] 19 observations are lost in the regression, finalizing with 9,988 students

empirical studies studying the chilean educational system. The empirical literature has focused on the sign and magnitude of α_1 which has been interpreted as the effect of vouchers or competition. Our approach is different. We model the process used by parents when deciding where to enroll their children. In this context, we consider the standard approach too simplistic. In that literature the endogenous selection process of schools is kept silent. In this paper we deal with it.

In this paper we extends the literature by modeling the complex decision process of choosing a school. We point out that whether or not a student is observed attending a particular school is a result of a complex process involving family characteristics, characteristics of the school attended and of those alternative schools considered during the decision process.[4]

Let Ω_i denote the set of schools considered by household when deciding where to enroll child i. We assume families decide first between school categories. Specifically, we assume the existence of two different groups of schools. Schools known by their reputation for being high-quality (famous) and schools that are nearby the household. Thus, we assume $\Omega_i = \left\{\Omega_i^q \cup \Omega_i^d\right\}$ where Ω_i^q and Ω_i^d represent the set of "famous" and nearby schools, respectively. The dimensionality of each of the set of schools is arbitrary but exogenous and finite.

Let $U_{ij(k)}$ be utility in the event of attending school j of category k (with $k = \{q, d\}$). We assume

$$U_{ij(k)} = \alpha + \beta_k X_i + \gamma Z_{ij(k)} + \epsilon_{ij(k)}$$

where X_i is a vector of student-specific controls (e.g., mother's or father's education), $Z_{ij(k)}$ is a vector of school- and student-specific controls (distance from student i's place of residence to school j in category k), and ϵ_{ijk} is an error term. We model the schooling decision using a discrete choice approach. Specifically, if we denote by $D_{ij(k)}$ a dummy variable indicating whether or not student i attends school j of category k, we assume:

$$D_{ij(k)} = 1 \text{ if and only if } U_{ij(k)} = \max_{l(r)\in\left\{\Omega_i^q \cup \Omega_i^d\right\}} \{U_{il(r)}\} \text{ with } r = \{q, d\}$$

Formally, we allow for individual- and alternative-specific regressors when modeling the decision model.

[4] In other words, we specify the information set of the households when deciding where to enroll their children.

3.1 Empirical Counterpart and Implementation

The structure of our decision model is similar to the one utilized in a nested logit regression with two levels. The upper level defines the school category whereas the lower level defines the set of schools within each category. This model allows for within category correlation of the ϵ_{ijk}s.

We estimate the model using our sample of students from SIMCE 2006 and PSU 2009. Given the characteristics of this sample, we focus on the decision of selection a high school.

We utilize a list of ten high schools of high reputation to define Ω^q. These schools are: Liceo Salesiano, Liceo Lastarria, Liceo Dario Salas, Liceo Barros Borgoño, Liceo de Aplicacion, Liceo Amunategui, Liceo Barros Arana, Colegio Don Bosco, Instituto Nacional Jose Miguel Carrera and Colegio San Ignacio. We denote this group as the Big Ten Schools. For each household on the other hand, Ω^d is defined as the 150 closest schools.[5]

4 Results

We estimate the household's preferences for each of the schools in our sample.

Table 4 presents the controls (variables) utilized in estimation. It also indicates the decision level in which each variable is considered.

Table 5 presents the results from the nested logit model. For the upper level model (enrolled in one of the Big Ten schools) we observe that the number of books in the household, father's and mothers education and family income have all increase the likelihood of choosing an elite voucher school. On the other hand, absent father, number of family members and local competition have negative effects. It is particularly interesting that if a student lives in an area surrounded by a large fraction of voucher schools, the probability of attending to an elite school goes down.

For the lower level model (enrolled in one of the 150 nearest schools), we observe that single sex and new schools, and high average SIMCE score in mathematics affect are positive attributes (increasing the demand for schools). At the same time, distance from place of residence to the school, voucher schools and annual tuition are negative attributes (reducing the demand for schools).

Our results suggest that students would travel one extra kilometer for seven more points of both

[5]It is worth mentioning that with our definition of Ω^q and Ω^d we cover more than 92% of the students in the data. That is, less than eight percent of the sample does not attend one of the Big Ten Schools or a school among the 150 closest schools.

SIMCE scores. Alternatively, our results indicate that that students would be indifferent between traveling one extra kilometer and paying 100.000 pesos more per year in school tuition.

5 Conclusions

This paper analyzes the demand for educational services in a context in which households and schools are heterogeneous. Our empirical analysis uses rich and novel information from a large sample of students in Chile. We combine geo-referenced data with longitudinal information on student's performance. To our knowledge this is the first study combining student-specific data on academic achievement, distance from place of residence to school, and localOur results shed lights on the determinants of schooling choices.

We found that parent's education, a high number of books in the house, and income increase the probability of attending one of the elite (or Big Ten school) in Gran Santiago. When analyzing the demand for the nearest 150 schools (excluding the elite schools), we obtain that students/families value more schools with higher SIMCE scores, of a single gender, located close to the place of residence, and with lower tuition.

Our preliminary results show that students would travel one extra kilometer for seven additional points in the SIMCE test scores. We also estimate that the one extra kilometer of distance between the place of residence and schools is valued in 100,000 pesos per year. availability of schools.

6 References

Auguste, S. and Valenzuela, J. (2004). "Do students benefit from school competition? Evidence from Chile". (Doctoral Dissertation, University of Michigan).

Benguria, F. and R. Paredes (2008)."Competition and School Performance: The Case of the Chilean Vouchers," Working Paper, Department of Industrial Engineering, Universidad Catlica de Chile.

Braun-Munzinger, C. (2005). "Education Vouchers: An International Comparison", Centre for Civil Society Working Paper, CCS: New Delhi.

Bayer, P. and McMillan, R. (2005). "Choice and Competition in Local Education Markets," NBER Working Papers 11802, National Bureau of Economic Research.

Elzinga, K.G., and Hogarty, T. F. (1973). "The problem of Geographic Market Delineation in Antimergers Suits", Antitrust Bulletin, vol. 18, pp. 45-81.

Elzinga, K.G., and Hogarty, T. F. (1978). "The problem of Geographic Market Delineation Revisited: The Case of Coal", Antitrust Bulletin, vol. 23, pp. 1-18

Friedman, M. (1955). "The Role of Government in Education".

Gallego, F. (2002). "Competencia y Resultados Educativos: Teoría a y Evidencia para Chile," Documentos de Trabajo 217, Instituto de Economa. Pontificia Universidad Catlica de Chile.

Gallego, F. and A. Hernando (2009). "School Choice in Chile: Looking at the Demand Side," Documentos de Trabajo 356, Instituto de Economa. Pontificia Universidad Catlica de Chile.

Gomez, D., R. Chumacero, and R. Paredes (2009). I would walk 500 miles: Vouchers and school choice in Chile, presented at the Latin America Econometrica Society, Rio, Brazil, 2008.

Hastings, J., Kane,S. Thomas J. and Staiger, D. (2005)." Parental Preferences and School Competition: Evidence from a Public School Choice Program ". Yale Economic Applications and Policy Discussion Paper No. 10.

Hastings, J. and Weinstein, J.(2007)" No Child Left Behind: Estimating the Impact on Choices and Student Outcomes". NBER Working Paper No. W13009.

Hsieh. C. and Urquiola, M. (2003). "When Schools Compete, How Do They Compete? An Assessment of Chile's Nationwide School Voucher Program," NBER Working Papers 10008, National Bureau of Economic Research.

Hoxby, C.(1994). "Does Competition Among Public Schools Benefit Students and Taxpayers?," NBER Working Papers 4979, National Bureau of Economic Research.

Hoxby, C.(2002). "School Choice and School Productivity (or Could School Choice be a Tide that Lifts All Boats?)," NBER Working Papers 8873, National Bureau of Economic Research.

Ladd, H.F. and Fiske, E.B. (2001)" The uneven playing field of school choice: Evidence from New Zealand", Journal of Policy Analysis and Management 20, 43-63.

Luft, H.S., Garnick, D.W., Mark, D.H., and Peltzman, D.J. (1990): "Does Quality Influence Choice of Hospital?" JAMA, Vol. 263, pp. 2899-2906

Maranto, R., Milliman, S. and Stevens, S. (2000)."Does Private School Competition Harm Public Schools?," Political Research Quarterly 53: 1 (March), 177-92.

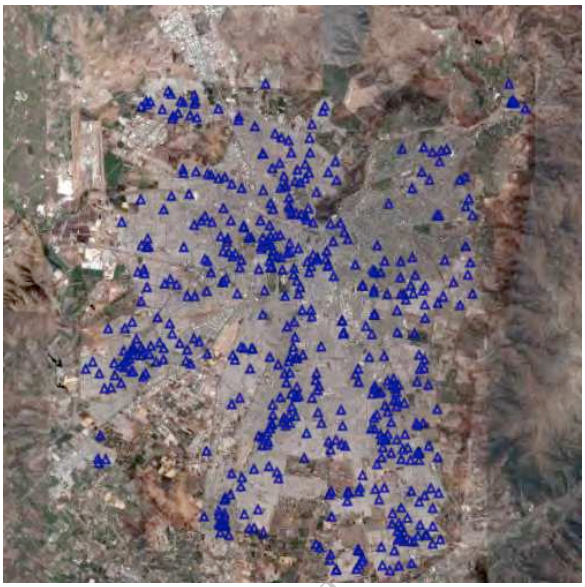
Mc Fadden, D. (1978): "Modeling the Choice of Residential Location."In A. Karlqvist, L. Lundqvist, F. Snickars, and J.

Tay, Abigail (2003): "Assessing competition in hospital care markets: the importance of accounting for quality differentiation", Rand Hournal of Economics, Vol. 34, No 4, Winter; pp. 786-814. Weibull, eds., Spatial Interaction Theory and Planning Models. Amsterdam: North-Holland.

White, W.D. and Morrisey, M.A. (1998): "Are Patients Traveling Further?" International Journal of the Economics of Business, Vol. 5, pp. 203-221.

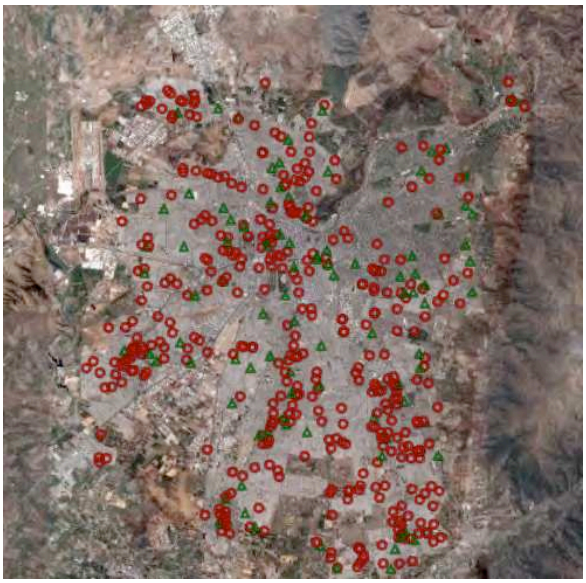
Figure 1: Geographical Location of Secondary Schools in 2006
Greater Santiago[a]

(A) All Schools



(B) Big Ten Schools[b]
by Type (Voucher or Public)[c]

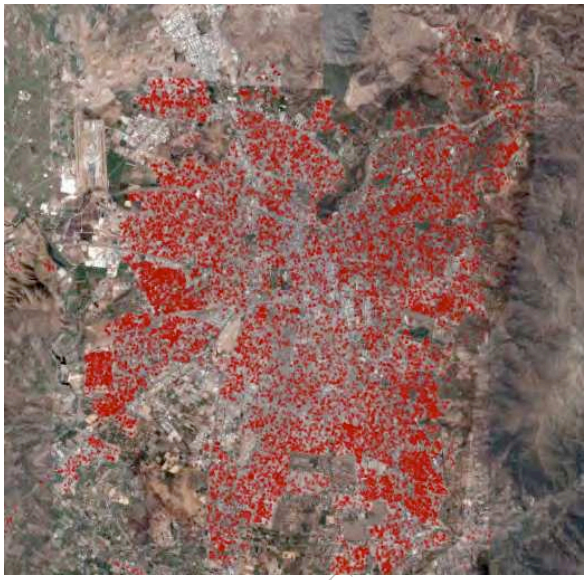
(C) Other Schools
by Type (Voucher or Public)[c]



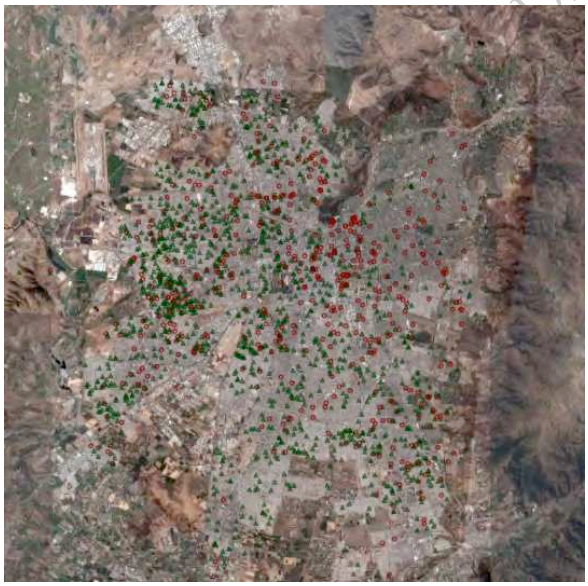
Note: Authors' calculation using information from PSU2009 and SIMCE2006. Each panel depicts the geographical location of secondary schools in 2006. Panel A presents all the schools in our data. Panels B and C use the sample of schools utilized in this study which excludes private schools. (a): We exclude the cities of Buin, Colina, Curavavi, Isla de Maipo, Lampa, Melipilla, Padre Hurtado, Paine, Peñaflor, Pirque, Talagante, Til-Til and Calera de Tango. These are considered Santiago's suburbs. (b) The Big Ten Schools are: Liceo Salesiano, Liceo Lastarria, Liceo Dario Salas, Liceo Barros Borgoño, Liceo de Aplicacion, Liceo Amunategui, Liceo Barros Arana, Colegio Don Bosco, Instituto Nacional Jose Miguel Carrera and Colegio San Ignacio. (c) A red circle indicates a voucher secondary school (private subsidized) whereas a green triangle identifies a public school.

Figure 2: Geographical Location of Students Attending 10th Grade in 2006 Greater Santiago[a]

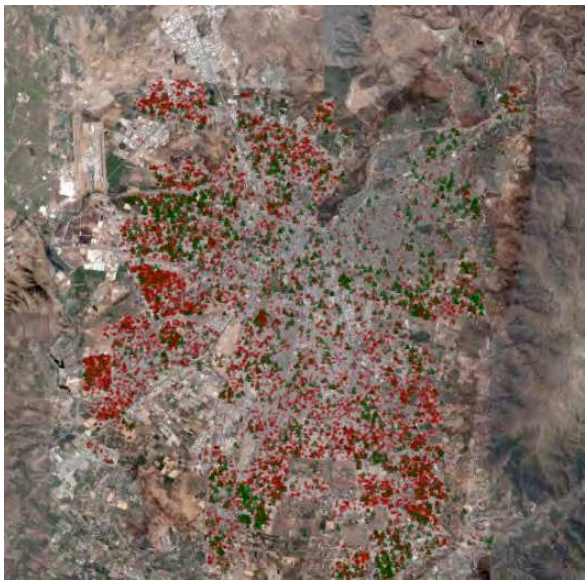
(A) All Students (All Schools)



(B) Sample of Students Attending Any of The Big Ten School[b] by Type (Voucher or Public)[c]



(C) Sample of Students Attending Any of the 150 Closest Schools by Type (Voucher or Public)[c]



Note: Authors' calculation using information from PSU2009 and SIMCE2006. Each panel depicts the geographical location of home addresses (as reported in PSU2009) of students attending 10th grade in 2006. Panel A presents all the students in our data. Panels B and C use the sample of students utilized in this study which excludes those attending private schools. (a): We exclude the cities of Buin, Colina, Curavavi, Isla de Maipo, Lampa, Melipilla, Padre Hurtado, Paine, Peñaflor, Pirque, Talagante, Til-Til and Calera de Tango. These are considered Santiago's suburbs. (b) The Big Ten Schools are: Liceo Salesiano, Liceo Lastarria, Liceo Dario Salas, Liceo Barros Borgoño, Liceo de Aplicacion, Liceo Amunategui, Liceo Barros Arana, Colegio Don Bosco, Instituto Nacional Jose Miguel Carrera and Colegio San Ignacio. (c) A red circle indicates a student attending a voucher secondary school (private subsidized) whereas a green triangle identifies the place of residence of a student attending a public school.

Table 1: List of Variables, Sources of Information and Description of Variables

Variable	Sources	Description
Student-Specific Variables		
Number of Books	SIMCE 2006	Dummy: 1 if in the household are more than 100 books, 0 otherwise
Father's Education	SIMCE 2006	Father's years of Education
Mother's Education	SIMCE 2006	Mother's years of Education
No Father	SIMCE 2006	Dummy: 1 if the student does not have father, 0 otherwise
Family Income	SIMCE 2006	Monthly Family Income in 2006
Number of Family Members	SIMCE 2006	Number of Family Members living in the Household
Competition	SIMCE 2006 and PSU 2009	Fraction of Voucher schools in the neighborhood (radium of 7.5 Kilometers)
School-Specific Variables		
Simce 2003	SIMCE 2003	Average Simce Score in 2003 (including math and language scores)
New School	SIMCE 2003 and PSU 2009	Dummy: 1 if school is new (school founded between 2003 and 2006), 0 otherwise
Annual Tuition	MINEDUC	School's per-student Annual Tuition in 2004
Single Gender	SIMCE 2006	Dummy: 1 if School is Single Gender School (only boys), 0 otherwise
Voucher School	SIMCE 2006	Dummy: 1 if school is voucher, and 0 otherwise (public)
Big Ten School	SIMCE 2006	Dummy: 1 if school belongs to the big ten schools, 0 otherwise
School and Student-Specific Variables		
Distance	SIMCE 2006 and PSU 2009	Distance (kms) between student' place of residence and any secondary school
Ranking	SIMCE 2006 and PSU 2009	Ranking based on Distance between student' place of residence and alternative schools. Ranking indicates the position of the chosen school within school category.

Note: Most of the information from SIMCE 2006 comes from the questionnaires for parents. The Big Ten Schools are: Liceo Salesiano, Liceo Lastarria, Liceo Dario Salas, Liceo Barros Borgoño, Liceo de Aplicación, Liceo Amunategui, Liceo Barros Arana, Colegio Don Bosco, Instituto Nacional José Miguel Carrera and Colegio San Ignacio.

Table 2: Descriptive Statistics
Sample of Schools

Variable	School Category							
	Big Ten Schools				**Others**			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Single Gender	.8	.421	0	1	.045	.208	0	1
Simce 2003: Mathematics	312.3	37.0	238	370	239.7	50.4	219	338
Simce 2003: Language	296.6	21.2	257	326	248.5	44.8	223	313
New School	0	0	0	0	.0193	.139	0	1
Voucher	.3	.483	0	1	.807	.394	0	1
Annual Tuition (1,000 of 2004 pesos)	82.8	166.3	0	488.0	122.6	139.3	0	618
Number of Schools	10				504			

Note: The Big Ten Schools are: Liceo Salesiono, Liceo Lastarria, Liceo Dario Salas, Liceo Barros Borgoño, Liceo de Aplicacion, Liceo Amunategui, Liceo Barros Arana, Colegio Don Bosco, Instituto Nacional Jose Miguel Carrera and Colegio San Ignacio.

Table 3: Descriptive Statistics
Sample of Students

Variable	School Category							
	Big Ten Schools				**Others**			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Single Gender	.923	.265	0	1	.094	.291	0	1
Simce 2003: Mathematics	329.45	33.34	238	370	251.68	43.41 219	338	
Simce 2003: Language	303.96	18.64	257	326	256.7	35.51	223	313
New School	0	0	0	0	.013	.115	0	1
Voucher	.105	.307	0	1	.808	.393	0	1
Number of Books	.261	.439	0	1	.131	.337	0	1
Father's Education	12.82	3.04	0	17	11.23	3.53	0	17
Mother's Education	12.72	2.55	0	17	11.25	3.038	0	17
No Father	.013	.114	0	1	.027	.163	0	1
Family Income	541.79	366.19	9.49	1800	380.39	312.61	2.45	1800
Number of Family Members	4.656	1.34	2	11	4.83	1.58	2	11
Competition	.795	.053	.55	1	.811	.061	.52	1
Distance	8.59	4.74	.140	40.00	2.69	2.38	.0002	32.39
Ranking based based on Distance	4.61	2.96	1	10	25.11	32.40	1	150
Number of Students	1,504				8,503			

Note: The Big Ten Schools are: Liceo Salesiono, Liceo Lastarria, Liceo Dario Salas, Liceo Barros Borgoño, Liceo de Aplicacion, Liceo Amunategui, Liceo Barros Arana, Colegio Don Bosco, Instituto Nacional Jose Miguel Carrera and Colegio San Ignacio.

Table 4: Variables by Decision Level

Variable	Upper Level Selection of School Category	Lower Level Selection of School
Number of Books	Y	N
Father's Education	Y	N
Mother's Education	Y	N
No Father	Y	N
Family Income	Y	N
Number of Family Members	Y	N
Competition	Y	N
Simce 2003	N	Y
New School	N	Y
Annual Tuition	N	Y
Single Gender	N	Y
Voucher School	N	Y
Distance	N	Y

Note: The Big Ten Schools are: Liceo Salesiano, Liceo Lastarria, Liceo Dario Salas, Liceo Barros Borgoño, Liceo de Aplicación, Liceo Amunategui, Liceo Barros Arana, Colegio Don Bosco, Instituto Nacional José Miguel Carrera and Colegio San Ignacio.

Table 5: Results from Nested Logit Regression

Variable	Coefficient
Lower Level (School-Specific): Selecting School	
Single Gender	.132
	(.0130)
Simce 2003: Language	-.014
	(0.002)
Simce 2003: Mathematics	0.028
	(0.002)
New School	.144
	(.034)
Distance	-.099
	(.008)
Voucher	-.062
	(.007)
Annual Tuition	-.0001
	(.00002)
Upper Level (Student-Specific): Selecting School Category[a]	
Number of Books	.528
	(.073)
Father's Education	.061
	(.014)
Mother's Education	.071
	(.013)
No Father	-.023
	(.291)
Number of Family Members	-.144
	(.020)
Family Income	.0003
	(.0001)
Competition	-3.083
	(.2689)
Number of Observations	1,598,080
Number of Cases (Students)	9,988

Note: The associated estimated τ are 0.174 (0.013) and 0.30 (0.026) for the 150 closest schools and big ten schools, respectively. The likelihood ratio test for IIA (conditional logit) indicate the rejection of the IIA hypothesis. The p-value is 0.0000. The Big Ten Schools are: Liceo Salesiono, Liceo Lastarria, Liceo Dario Salas, Liceo Barros Borgoño, Liceo de Aplicacion, Liceo Amunategui, Liceo Barros Arana, Colegio Don Bosco, Instituto Nacional Jose Miguel Carrera and Colegio San Ignacio. Standard errors are presented in parenthesis. (a) The estimates are obtained using the set of 150 closest schools as baseline. In this context, a positive (negative) sign would be an indication that the variable has a positive (negative) effect on the probability of enrolling in a Big Ten School.