“Primary school choice in Chile: a structural aproach”

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Alumno: Eduardo Antonio Cerda Nova

Profesor Guía:

Nicolás Grau

Juan Pablo Valenzuela

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Eduardo Cerda[*]

Advisors: Nicolas Grau[†], Juan Pablo Valenzuela[‡]

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*ecerdan@fen.uchile.cl

†ngrau@fen.uchile.cl

‡juvalenzuela@fen.uchile.cl

Abstract

This paper estimates a structural model of primary school choice in the metropolitan area *Gran Santiago*. It elaborates a static choice model based in Grau (2015) which separates preferences of families and restrictions of schools in the school choice process. The estimation of structural parameters allows to analyze the most important determinants of school election, and allows to perform different simulations based on fictional scenarios. The model contains two main functions: on the one hand, a Parent's Utility function that depends on variables as school fee, distance of the student to school, school quality and other school characteristics; and, on the other hand, an Admission Probability function which depends on the school selection mechanisms. The model presents high fit under different dimensions analyzed. On the basis of this good fit, four fictional scenarios are simulated: (i) no copayment, (ii) no selection, (iii) no copayment and no selection simultaneously, and (iv) no residential segregation. This four counterfactual are compared with respect to a baseline scenario, quantifying changes among type of school in terms of: enrollment distribution, families' characteristics, and distances traveled between school and home.

1 Introduction

In the last years educational protest had located education inside the most important issues in the public discussion and political agenda. In this context, the second government of Michelle Bachelet (2014-2018) positioned education as one of the main axis in the government's program, introducing a series of projects with structural reforms in this area. In may of 2015, the Congress approved the law 20.845 (*"Ley de Inclusión Escolar"*) that regulates the admission of the students, eliminates co-payment fee, and prohibits for profit in schools that receive public financial support[1]. The elimination of copayment and selection relaxes a restriction in the school choice process for families, which can induce changes in enrollment. The implementation of this reform is used as motivation for this study, which considers four fictional scenarios that include: (i) no copayment, (ii) no selection, (iii) no copayment and

[1]Law n° 20.845 had approved in may 19, 2015

no selection simultaneously, and (iv) no residential segregation.

Chile is a particular case of school provision due to the significant share of private sector. In 2018, primary enrollment of subsidized private (voucher-private) was 52.5%, and non-subsidized private (non voucher-private) was 9,3%[2]. Moreover, authors as Gallego and Hernando (2008), and Hsieh and Urquiola (2006) had manifested that Chilean school system is the most massive choice program in the world. The pre-reform system consists in a dynamic where, on the one hand, families choose the school that report higher utility according to their economic and social possibilities and, on the other hand, schools can select students through a series of mechanism that will be explained later. According to Carrasco (2014) in the Chilean school system, selection is an open practice for purposes of admission, it is highly sophisticated in their methods, and it predominates in subsidized private schools and schools of high socioeconomic level. Therefore, exist an interaction process where families have certain valuation for different attributes of the school, but it can put some restrictions to avoid certain students.

This study model school choice at the beginning of the school cycle (second grade). It elaborates an static choice model based in Grau (2015), where mathematical functions and resolution procedure is similar to this study[3]. The estimation of structural parameters allows to analyze the most important determinants of school election, and allows to perform simulations. It considers variables as school fee, distance of the student to school, school quality, and other variables considered relevant in previous literature ((Gallego & Hernando, 2008); (Chumacero, Gómez, & Paredes, 2011); (Arteaga, Paredes, & Paredes., 2014), and (Grau, 2015)).The model contains two main functions: on the one hand, a Parent's Utility function that depends on variables as school fee, distance of the student to school, school quality and school characteristics; and, on the other hand, an Admission Probability function which depends on the school selection mechanisms.

[2]Stadistics from Education Ministry of Chile. Data considers nationwide primary enrollment

[3]Grau (2015), on the other hand, develop a dynamic choice model

The model of this work uses data from second grade of primary in 2013, due to first grade doesn't have information about SIMCE and, therefore, it can't obtain a series of personal data about students and their families[4]. The final sample contains 20,749 students and 1,136 schools in the metropolitan area *Gran Santiago*.

Below are the main results. The model presents good fit under different dimensions analyzed. On the basis of this good fit, four fictional scenarios are simulated: (i) no copayment, (ii) no selection, (iii) no copayment and no selection simultaneously, and (iv) no residential segregation. Results shows that counterfactuals (i), (ii) and (iii) present an increase in the enrollment ratio of subsidized private schools and a decrease in the enrollment ratio of public schools and non-subsidized private schools. This result is intuitive because restrictions are eliminated in subsidized private schools, therefore, increases its availability. Likewise, counterfactual (iii) shows an increase in the average distances for all the dependencies, showing higher willingness of families to travel higher distances (respect to baseline scenario). In addition, this counterfactual is associated with an increase in the enrollment rate of the best performing schools in SIMCE.

The structure of the document is described below. The following section contains a review of the school choice literature, reviewing the theoretical support of school choice models, as well as studies made in Chile. Section 3 presents the main characteristics of the Chilean educational system, providing descriptive statistics and showing the reforms made in the last decades. Section 4 describes the data used in this work. It shows the sources of the information, the representativeness of the sample, and a brief descriptive statistic about the variables used in this study. Section 5 presents the mathematical structure of the model, in which each family decide among available primary schools before to entry to second grade. It presents the two main functions (Parent's Utility function and Admission Probability

[4] SIMCE is a standardized test applied in all schools nationwide, which evaluates learning process of the school curriculum

function), and then it shows the method of resolution of the model. Section 6 contains the results, where the it shows the model fit and later it simulates four fictional scenarios: (i) no copayment, (ii) no selection, (iii), simultaneously no copayment and no selection, and (iv) no residential segregation. Finally, Section 7 contains the conclusions of the study, which describes the potential implications of the implementation of *Ley de Inclusión Escolar* in *Gran Santiago*. Likewise, it shows the limitations of the study and the challenges that remain pending for future researchs.

2 Literature review

2.1 School choice

2.1.1 Theoretical background

School choice is one of the widely discussed topics in education[5]. An empirical model of how families choose schools should be based upon an appropriate theoretical model and data that correctly measure the factors hypothesized that affect school choice. To model the school choice mechanism the literature has used different approaches including: multinomial analysis, semi-structural models or structural models. Different approaches are based in the idea of a rational behavior where each family evaluate a set of school options and select the alternative that maximized its utility.

In Lankdorf, Lee, and et al. (1995) it defines a random utility model of school choice. They suppose U_{mj} as the utility of m household that would result if the j school alternative were selected ($j = 1, 2, 3..., J$). Assuming rationality, alternative i is chosen if and only if $U_{mi} > U_{mk}$ for all $i \neq k$. The function U_{mj} it defines as $U_{mj} = U(q_j, \epsilon_{mj})$ where q_j is a vector representation of relevant school characteristics and ϵ_{mj} is a random variable assumed to be normally distributed, which defines a multinomial probit model. This example represent the basic form of this kind of models.

[5]Friedman (1955) and Friedman (1962) initiates the school choice literature

On the other hand, can be defined a semi-structural choice model. Gallego and Hernando (2008) uses semi-structural estimates following the literature on horizontal differentiation in the attribute space developed by Berry, Levinsohn, and Pakes (1995) and Berry, Levinsohn, and Pakes (2004). This work model school choice as a discrete process in which parents choose schools based on its attributes, and it allows the choice to depend on an unobserved school effect, which is common to all students, and interactions between the set of observed school attributes and students characteristics. This allow to consider heterogeneity in preferences. The limitations of this study consist in it does not explicitly model potential direct effects of school choice on the supply of attributes, since doing so would require estimating the supply-side equations.

2.1.2 Chilean literature

Sapelli and Torche (2002) performed the first study that model the school choice in Chile, through multinomial analysis. Their empirical results confirm the significant effect of income level and parent's education in the school choice, where higher income levels and parents' educational attainment increase the probability of choose a subsidized private establishment. Later, Gallego and Hernando (2008), through a semi-structural approach, study the implications of school choice with a sample of 80,000 students in the Metropolitan area of Santiago. This work try to estimate the "value" of election (quantify how much gain the families in a school choice system in comparison to other counterfactuals). Their results suggest that a school choice system seems to be valuable to families, but exist a lot of heterogeneity in this value, and it is concentrated in the top 40% of income distribution. On the other hand, Elacqua and Martínez (2010) study school choice through surveys data at school level in Metropolitan area, to examine how changes in key aspects of voucher system affect parents' behavior and school decision. They find that changes in the voucher program have an important effect in the search behavior in parents, but decrease the aggregate satisfaction level. Despite, theoretically their satisfaction levels should increase with more available schools to evaluate, they realize worse evaluations of schools and obtain less satisfaction. Otherwise, Chumacero et al. (2011) estimate a school choice model and use data that permits estimate distances among students and their schools in a more precise way that Gallego and Hernando (2008). This work find that quality and distance are highly valued for families.

Arteaga et al. (2014) study the sources of school segregation in Chile through a semi-structural approach. This work model and estimate school choice in secondary education at the Metropilitan Region using a flexible structure (latent class logit) that permits differentiate preferences according to families characteristics, and to consider restrictions based on school availability and academic selection. Finally, using a series of counterfactuals, this study estimates that between 10% to 23% of whole segregation can attributed to copayment in subsidized schools, 8% to 13% to residential segregation, and 41% to 46% to variability of parents preferences. Unlike our study, Arteaga et al. (2014) studies school choice in secondary. Therefore, to compare both studies allows to analyze the differences in sources of segregation between primary and secondary school.

Finally, Grau (2015) develops a dynamic choice model in primary school. In this model, parents are heterogeneous and concern about different school characteristics as: school socioeconomic status, quality, religiosity, location, type of administration, fee, GPA standard. Their principal results are: (i) parents concern about quality but in a moderate degree, (ii) parents have an important misleading about school quality, (iii) if parents would have concern entirely in quality, they choose more frequently public schools, and (iii) admission restrictions play an important role, otherwise, parents would choose private schools more frequently.

3 Chilean educational system

Primary education in Chile is provided through mixed system where participates private and public sector in three types of establishments: public schools (owned and funded by the State); subsidized private schools; and non-subsidized private schools.

In 2018 nationwide enrollment in primary school was 1,988,777 students, which 38.2% attend to public schools, 52.5% to subsidized private, and 9.3% to non-subsidized private[6]. Then, subsidized sector, either public or subsidized private, concentrates the main share of student population. This sector is funded through fiscal contribution that it is materialized by per student subsidy (demand subsidy or *voucher*). The principal goal of this system, that determine school incomes to enrollment level, is stimulate competition among schools to attract and retain students. The idea is that competition among schools could promote better instruction quality and can encourage efficiency in resources administration.

Among defenders of voucher system is Milton Friedman, who argues that public school system is a monopoly in which establishments have guaranteed enrollment no matter their performance Friedman (1962). Therefore, schools have few incentives to provide quality education and allocate resources in a efficient way. This author argues that to allow particular schools compete for enrollment, would lead new schools in the market to offer a better education quality for the same price that public schools. Furthermore, other benefit of voucher system is that it allows freedom to choose a establishment that better represent the family values. Coleman (1990) says that to allow parents to choose among establishments based on communities that they belong, can increase diversity in education and strengthen notion of community, increasing the satisfaction level.

Despite theoretical support, empirical evidence shows mixed evidence about benefits of voucher system. If private schools are in fact more efficient, then school choice could raise students' achievement merely by facilitating their transfer to the private sector. Hsieh and Urquiola (2006) find no evidence that choice improved average educational outcomes as measured by test scores, repetition rates, and years of schooling in Chile. Another questionable issue of this system is that public schools are obligated to accept all students (unless they have capacity restriction), while subsidized private schools can select students in accordance

[6]Data from Ministry of Education

with their educational objectives. Contreras, Bustos, and Sepúlveda (2007) present evidence indicating that student selection is a widespread practice among private subsidized schools, because in order to maximize profits, this schools will have incentives to select students that are less expensive to educate (i.e. better-skilled students). After controlling for a series of selection criteria and segmentation effects, their results indicates that there are no differences in results between public and subsidized private schools. In this line, selection process enable a school improve its market position without improving the quality, because competition between schools is focused on attracting the best students and not on improving educational quality Bellei (2007).

Generalized voucher system starts in Chile with the educational reform of 1981, when it changes the funding way of subsidized establishments and it begins to depend on a flat voucher based on student attendance. In 1988 it is approved the copayment, which allows parents realize additional payment to complement fiscal contribution and it constitutes a new way of funding for subsidized particular schools. In 1989, copayment begins to be implemented and in 1993 it allows its generalization. As a result, a dynamic market was created, more than a thousand private schools entered to the market, and the private enrollment rate increased from 20% to 40% by 1988, surpassing the 50% mark in many urban areas Hsieh and Urquiola (2006).

The main reforms in Chilean educational system in the last years have been: (i) in 1997 began implementation of full school shift (*Jornada Escolar Completa*), increasing per student subsidy and increasing expenditure in infrastructure, (ii) in 2008 Preferential School Subsidy (SEP) was established, which allowed schools that voluntarily implemented this allocation to receive an additional subsidy for each of these priority students, with commitment of eliminate selection mechanisms as interviews or test, and eliminate co-payment fee to benefits students, (iii) in 2009 the legislation *Ley General de Educación* prohibit to select students between kindergarten and 6 grade in schools that receive public financial support, and (iv) In 2011 it is created *Sistema Nacional de Aseguramiento de la Calidad de la Educación Es-*

colar (SAC) which establishes the design of a new institutional framework in education that includes two new agencies: *Agencia de Calidad de la Educación* and *Superintendencia de Educación*

The system remained without significant changes until 2015, when it was approved the law *Ley de Inclusión Escolar* that will enter into validity in march 2016, and that regulates admission of students, eliminates co-payment, and prohibits lucre in establishments that receives public financial support. The holders must be constituted as non profit corporate until 2017, and must implement the new admission system that eliminates selection within four years, and finally must reduce co-payment gradually as the public subsidy grows.

Finally, regarding the segregation in the Chilean educational system, there are several studies that consider it high in international context. For example, Valenzuela, Bellei, and de los Ríos (2008) study magnitude and evolution of school segregation, analyzing its main factors, specifically basic characteristics of educational supply (share of private education, charge of fees). Their main results indicates that socioeconomic segregation in Chilean schools is high in international context, due to Chile presents the major level of segregation in students of high socioeconomic status that performed PISA test in 2000. Furthermore, this study indicates that school segregation is considerably higher in subsidized private schools compared to public schools, which is associated to high effectiveness in selection mechanisms of subsidized private schools. Finally, this study finds that communal school segregation is higher than residential segregation, and this variable is the most important source of segregation. On the other hand, Elacqua and Martínez (2010) find that co-payment schools enroll a smaller share of vulnerable students compared to public schools. Other study, Elacqua and Santos (2013), uses a database built from georeferenced information of students and schools in Metropolitan area (*Gran Santiago*). They find that schools are more segregated than neighborhoods and, therefore, interaction between families preferences and schools entry barriers (fees, and admission requirements) increase school segregation above the effect of residential segregation. The same result it is extended nationwide in Valenzuela, Bellei, and de los Ríos (2013).

4 Data and descriptive statistic

4.1 Data

The database is built from consolidation of bases from Ministry of Education. One of the main sources is the student georeferenced database in 2013, that has 39,526 georeferenced students of 78,771 total students of second grade in *Gran Santiago* (50.18% of total enrollment). This base is consolidated with other bases that has information about second grade students during 2013, as: SIMCE by student, SIMCE by establishment, "Survey for Parents and Guardians" of SIMCE[7], georeferenced schools database, and copayment base in 2013.

The final database contains 20,749 students and 1,136 schools, representing the 26.3% of total enrollment of second grade in *Gran Santiago*. The final database must have information about all relevant variables in the model, hence the most important source of data loss are students not georeferenced or students with no information in "Survey for Parents and Guardians" of SIMCE. As can be seen in Table 1, this sample is representative of population data under different dimensions[8].

4.2 Descriptive statistic

The final database has 20,749 students and 1,136 schools, from which 32.7% are public, 53.9% subsidized private, and 13.4% non-subsidized private (Table 2). School characteristics differ from type of establishment, where non-subsidized private schools has the highest share of full

[7]This database includes socioeconomic variables of the family (students and parents characteristics) and admission requirements to enroll, namely, variables of school selection

[8]This sample was randomized to be consistent with population distribution of enrollment by type of dependency of school

Table 1: Comparison of population and sample data (Gran Santiago)

	Population data		Sample			
	Mean Data	N1	Mean Sample	N2	Mean Diff.	P Score
School characteristics						
Public	0.2432	78771	0.2416	20749	0.0017	0.6150
Subsidized Private	0.6258	78771	0.6258	20749	-0.0001	0.9868
Non-Subsidized Private	0.1310	78771	0.1326	20749	-0.0016	0.5388
School socioeconomic group	3.1656	58928	3.1173	20749	0.0483	0.0000
SEP school	0.6432	78771	0.6804	20749	-0.0373	0.0000
Admission Requirement						
Preschool evaluation	0.4848	58943	0.4874	20749	-0.0026	0.5264
Birth Certificate	0.9144	58943	0.9273	20749	-0.0129	0.0000
Marriage Certificate	0.0633	58943	0.0681	20749	-0.0047	0.0178
Grade Certificate	0.3305	58943	0.3221	20749	0.0084	0.0269
Baptism Certificate	0.1148	58943	0.1319	20749	-0.0171	0.0000
Remuneration Certificate	0.0546	58943	0.0572	20749	-0.0026	0.1588
Interview	0.0546	58943	0.0572	20749	-0.0026	0.1588
Game session	0.1548	58943	0.1633	20749	-0.0085	0.0037
Admission Exam	0.4061	58943	0.4066	20749	-0.0006	0.8893
Phychological Report	0.1665	58943	0.1577	20749	0.0088	0.0031
Other	0.0514	58943	0.0485	20749	0.0029	0.1066
Family's characteristics						
Family income	656920	57919	622649	20749	34270.7	0.0000
SEP student	0.3776	78771	0.3911	20749	-0.0134	0.0004
Gender [Man=1]	0.5124	78771	0.5034	20749	0.0090	0.0216
Student's age	7.2702	78771	7.2353	20749	0.0349	0.0000
Parent's age	38.4442	58943	38.6239	20749	-0.1797	0.6682
Prekinder	0.9299	58145	0.9312	20670	-0.0013	0.5378
Kinder	0.9934	58247	0.9945	20749	-0.0011	0.1011

school shift (JEC), high average SIMCE score, and high monthly fee (Table 3). In Table 4 we can observe membership to different socioeconomic groups differs by type of establishment, where public schools concentrates mainly low and medium income groups, subsidized private schools to low, medium and high income groups, and non-subsidized private schools concentrate almost exclusively families of high income level. In Table 5, on the other hand, can be seen that families characteristics also differ by school type, where non-subsidized private school has richer families, older parents, and higher parents educational attainment.

Table 2: Schools characteristics by school type

	N° of schools	% of tot schools	Enrollment	% of tot enrollment
Public	376	33.1%	5,028	24.23%
Subsidized private	611	53.8%	12,985	62.58%
Non-subsidized private	149	13.1%	2,736	13.19%
Total schools	1,136	100%	20,749	100%

Table 3: School characteristics by school type

	% Schools with JEC	SIMCE Score[a]	Monthly Fee
Public	51.86%	234.4	$0
Subsidized private	34.86%	249.9	$14,154[b]
Non-subsidized private	84.56%	284.3	$288,436[c]
Total average	46.92%	249.3	45,445

[a] SIMCE Score corresponds to lecture exam in second grade.

[b] If Subsidized private schools has no information sample mean are imputed

[c] Monthly Fee in Non-Subsidized private schools was obtained by school website or direct query to establishments (via email). Information about 96 of a total of 152 schools. If no information sample mean values are imputed.

Table 4: School socioeconomic group by school type

	Low	Middle low	Middle	Middle high	High
Public	14.36%	59.84%	22.07%	3.72%	0%
Subsidized private	3.93%	23.08%	50.08%	21.93%	0.98%
Non-subsidized private	0%	0%	0%	2.68%	97.32%
Total average	6.87%	32.22%	34.24%	13.38%	13.29%

Table 5: Families characteristics by school type

	Home income	Parents' age	Mother Educ. (years)	Father Educ. (years)
Public	$333,592	35.9	10.7	10.7
Subsidized P.	$461,698	36.0	11.9	11.9
Non-subsidized P.	$1,948,282	40.3	16.4	17.0
Total average	$626,678	36.6	12.2	12.3

4.2.1 Distances

All data in this section are based on the calculation of euclidean distances among students and schools, from geographical coordinates of homes and schools. According to Table 6, second grade students in average travel a distance of 2.19 km to attend to school. Non-subsidized private school students in average travel 3.54 km, while subsidized private schools students and public schools students in average travel 2.03 and 1.9 km, respectively. Table 7 shows that 50.5% of the students attend to schools located closer than 1 km from his home, 80.3% to schools located closer than 3 km, 89% closer than 5 km, and 95.9% closer than 10 km. On the other hand, Table 8 shows that 17.5% of students attend to their closest school, 34.8% to one of their three closest, 44.7% one of their five closest, and 57.2% one of their ten closest. Therefore, this descriptive statistic confirms the importance of the distance in the determination of actual school in primary students.

Table 6: Average distance by school type

	N° of students	Average distance (km)	Std Dev
Public	5,012	1.91	3.63
Subsidized P.	12,985	1.95	3.09
Non-Subsidized P.	2,752	3.52	3.55
Total average	20,749	2.15	3.33

Table 7: Descriptive statistic of distances

	N° of students	% of total
School closer than 1 km	10,499	50.60%
School closer than 3 km	16,747	80.71%
School closer than 5 km	18,592	89.60%
School closer than 10 km	19,955	96.17%
School closer than 15 km	20,435	98.49%
Total student-school distances	20,749	100%

Table 8: Descriptive statistic of distances

	N° of students	% of total	Average distance (km)
Closest school	3,627	17.48%	0.05
One of the 3 closest school	7,224	34.8%	0.14
One of the 5 closest school	9,275	44.70%	0.22
One of the 10 closest school	11,954	57.61%	0.35
Total student-school distances	20,749	100%	2.19

4.2.2 Admission requirements of schools

Admission requirements variables of schools are key in the model presented in this study due to it determines the probability of admission for different students. Table 9 shows that: preschool evaluation, birth certificate, marriage certificate, grades certificate, baptism certificate, remuneration certificate, parents' interview, game session, admission exam and psychological report are the main selection mechanisms that use the schools. Likewise, it table shows show that, in general terms, non-subsidized private schools have higher mechanisms of selection compared to public and subsidized private schools.

Table 9: Admission Requirements by school type

	Public	S. Private	Non-S. Private
Preschool evaluation	38.58%	49.08%	63.67%
Birth certificate	93.02%	92.68%	91.41%
Civil marriage certificate	1.53%	4.40%	28.40%
Grades certificate of previous school	34.59%	33.08%	20.80%
Baptism or church marriage certificate	0.34%	12.71%	40.94%
Remuneration certificate	1.87%	6.89%	8.85%
Parents' interview	19.17%	41.10%	87.61%
Game session	4.61%	12.47%	57.57%
Admission exam or test	17.88%	46.65%	55.48%
Psychological or behavioral report	12.89%	16.88%	14.80%
Other request	5.81%	4.77%	3.36%

5 Model

5.1 Why Structural Model?

To understand the school choice of families it is necessary to separate preferences and constraints. On the one hand, families rank schools according their preferences and, on the other hand, schools have the faculty to choose their students through selection mechanisms. To model this process and identify correctly the main parameters it is necessary to adopt a structural model, which also enable to simulate parents behavior in a scenario without constraints.

Some economists critic structural approach because they argued that rely on too many assumptions to be credible, while experimentalist approach provides an alternative that relies on fewer assumptions. Keane 2010 argues that this is a false dichotomy. The real distinction is that, in a structural approach, one's *a priori* assumptions about behavior must be laid out explicit, while in an experimentalist approach, key assumptions are left implicit.

This section presents the school choice model, in which each family $i \in \{1, 2, \ldots, I\}$ decide among available primary schools $j \in \{1, 2, \ldots, J\}$ before to entry to second grade. The parents' choice is restricted in two ways: (i) each family i has a specific choice set $\Lambda_i \subseteq \{1, 2, \ldots, J\}$, and (ii) each school $j \in \Lambda_i$ can accept or refuse the entry to the student i, based in a rule that will be explained later. It is assumed that options are ranked by its characteristics, whereby the model estimate preferences by attributes searching the set of parameters that best fit actual elections and non-elections.

5.2 Parents' Utility

The aggregate utility function of family i it defines as a function of consume of goods and utility that provides to parents i the attendance of their children to school j.

$$U_i = \beta_c log(C_i) + U_{ij}$$

Family i chooses school D_i, where $D_i \in \Lambda_i$. Parents utility i when student attend at school j it defines as:

$$U_{ij} = \beta_Y Y_j + \beta_Z Z_{ij} + \epsilon^u_{ij}$$

where , Y_j is a vector of school j characteristics, that includes: type of administration (public, subsidized private, or non-subsidized private), school socioeconomic level (in five categories), if school has full school shift (JEC), average SIMCE score of school in second grade, if is a religious school, average bullying of school, and average years of education of the mother of school. On the other hand, Z_{ij} is a vector of variables that are determined by the relation between student i and school j, and includes: distance in km between school j and student i, distance squared (it that can capture the possible nonlinear effect of distance in the utility), distance multiplied per capita income of the family (this variable can take account that students of richer families have the possibility of travel greater distances), and a variable that indicates the number of siblings per schools. The assumption is made that students who have the same geographical coordinates, both at home and in the school, would be siblings. Finally, ϵ_{ij}^{u} is an *iid* shock that it is assumed extreme value type I distributed.

5.3 Budget Constraint

Budget constraint it defines as:

$$Ing_i = C_i + Fee_j$$

where, Ing_i is monthly income of family i that must be higher or equal to fee of school j and consume of other goods of family i

5.4 Probability of Admittance

Parents have choices restricted due to schools has right of admittance. Then, it is defined a dummy variable AD_{ij}, unobservable for the econometrician, that equals one if student i it is admitted in school j, and zero otherwise.

$$AD_{ij} = \begin{cases} 1 \; if \; \varrho_{ij} - \epsilon_{ij}^{ad} \geq 0 \\ 0 \; if \; \varrho_{ij} - \epsilon_{ij}^{ad} < 0 \end{cases}$$

$$\varrho_{ij} = \varphi_1 + \varphi_2 Sel_j^{Pe} + \varphi_3 Sel_j^{Mc} + \varphi_4 Sel_j^{Gc} + \varphi_5 Sel_j^{Bpc} + \varphi_6 Sel_j^{Rm} + \varphi_7 Sel_j^{Int} + \varphi_8 Sel_j^{Gs} + \varphi_9 Sel_j^{Ex} + \varphi_{10} Sel_j^{Psy} + \varphi_{11} Sel_j^{Ot} + \varphi_{12} Inc_i Sel_j^{Int} + \varphi_{13} Inc_i Sel_j^{Rm} + \varphi_{14} M.Educ_i Sel_j^{Int} + \varphi_{15} F.Educ_i Sel_j^{Int} + \varphi_{16} Univ.M_i Sel_j^{Int} + \varphi_{17} Univ.F_i Sel_j^{Int} + \varphi_{18} Ab_i Sel_j^{Ex} + \varphi_{19} Fee1_j + \varphi_{20} Fee2_j + \varphi_{21} Fee3_j + \varphi_{22} Inc_i Fee1_j + \varphi_{23} Inc_i Fee2_j + \varphi_{24} Inc_i Fee3_j$$

where, Sel_j^{Pe} is a variable that represent the average of parents that indicate that school j required a preschool evaluation; Sel_j^{Bc} is the equivalent for birth certificate, Sel_j^{Mc} for marriage certificate, Sel_j^{Gc} for grade certificate; Sel_j^{Bpc} for baptism certificate, Sel_j^{Rm} for remuneration certificate; Sel_j^{Int} for interview with parents, Sel_j^{Gs} for game session, Sel_j^{Ex} for admission exam, Sel_j^{Psy} psychological report, Sel^{Ot} is the average of parents that indicate that school j select students by other mechanism. Variable Ab_i indicates estimated ability level of student i, Inc_i is the monthly per capita income of the family i, $M.Educ_i$ is mother's years of education, $F.Educ_i$ is father's years of education, $Univ.M_i$ is a dummy variable that indicates university mother, $Univ.F_i$ is a dummy variable that indicates university father, and $Fee1_j$, $Fee2_j$, and $Fee3_j$ are dummies variables that indicates school fee higher than \$50.000, \$100.000, and \$200.000, respectively. The interactive variables $Sel_j^{Rm}Inc_i$ and $Sel_j^{Int}Inc_i$ considers the heterogeneous effect that can have remuneration certificate and interview as requirements of school j, depending on the income level of the family i. The interactive variables: $M.Educ_iSel_j^{Int}$, $F.Educ_iSel_j^{Int}$, $Univ.M_iSel_j^{Int}$ and $Univ.F_iSel_j^{Int}$ considers heterogeneous effect of interview depending on the education of the parents. On the other hand, Inc_iFee1_j, Inc_iFee2_j, and Inc_iFee3_j are three dummies variables that considers heterogeneous effect of school fee depending on income of the family. Finally, $Sel_j^{Ex}Ab_i$ take into account the heterogeneous effect of exam in the school j for different levels of ability of the student i.

It assumes that ϵ_{ij}^{ad} is iid and has logistic distribution. Then, the probability of admission is described by:

$$Pr(AD_{ij} = 1) = \frac{exp(\varrho_{ij})}{1 + exp(\varrho_{ij})}$$

It assumes that ϵ_{ij}^{ad} is realized before parents take the decision D_i. Moreover, it assumes that, for each student, always exist at least one public school that admit him. In particular,

$$h \in argmax_{j \in \Lambda_i}(\varrho_{ij}) => AD_{ih} = 1$$

Finally, it assumes that the student have a probability equals to one to be accepted in the school if he has other siblings within the same school.

5.5 Students' Ability

In this section it tries to "clean" the ability of students from schools' fixed effect and pair effect of classmates. The intrinsic ability level Ab_i of student i it estimates from the following specification:

$$S_{igj} = \beta_0 + \beta_1 \bar{S}_{-ig} + \beta_2 X_i + \beta_3 \bar{X}_{-ig} + \beta_4 Z_g + \beta_5 Y_j + \epsilon_{igj}$$

where, S_{igj} is SIMCE score in second grade of student i, grade g, and school j $\bar{S}_{-ig}$ is the average SIMCE score of grade g (no considering student i), X_i is a vector of characteristics of student i (parents' education, parents' involvement in school, parents' age socioeconomic status), $\bar{X}_{-ig}$ is a vector of average characteristics of families in grade g, Z_g is a variable that indicates class size, Y_j is a vector of characteristics of school j (type of dependency, full school shift (JEC), school socioeconomic group, monthly fee), and ϵ_{igj} is a random residual. This specification considers a pair effect *linear-in-means*.

Finally, estimated ability Ab_i it is defined as the actual SIMCE score minus estimated SIMCE score.

$$Ab_{igj} = S_{igj} - \hat{S}_{igj}$$

5.6 Parents' Choice Set

Choice set it is defined as the set of schools that parents i can effectively consider and compare to take the decision. In principle, any school in the country can be chosen, but actually parents discard some school of their choice set based on different criteria. One factor considered fundamental for parents is home-school distance.

In order to limit the specific choice set for family, this model uses distance criteria, in the line of Wouters (2015). Then, the available choice set for family i contains only schools that are located within a range of 15 km from their home.

5.7 Model Resolution

To consider the school's right of admittance, utility function is redefined as:

$$\bar{U}_i = \tilde{U}_i(\epsilon_{ij}^{ad}) + \epsilon_{ij}^{u}$$

where,

$$\tilde{U}_i(\epsilon_{ij}^{ad}) = \begin{cases} \beta_c log(C_i) + \beta_Y Y_j + \beta_Z Z_{ij} \; if \; AD = 1 \\ -\infty \; if \; AD = 0 \end{cases}$$

Families choose the school that maximizes their utility function. Under the assumption that ϵ_{ij}^{u} follows a standard type I extreme value distribution, the probability that family i chooses school j (probability of $U_{ij} \geq U_{iq} \; \forall \; q \neq j$) is the following expression:

$$P_{ij} = Pr(D_i = j \mid \epsilon_{ij}^{ad}) = P_{ij} = \frac{exp(\beta_c log(C_i) + \beta_Y Y_j + \beta_Z Z_{ij}) AD_{ij}(\epsilon_{ij}^{ad})}{\sum_{q \in \Lambda_i} exp(\beta_c log(C_i) + \beta_Y Y_j + \beta_Z Z_{ij}) AD_{iq}(\epsilon_{ij}^{ad})}$$

P_{ij} can not be calculated in loglikelihood function, because ϵ_{ij}^{ad} in not observed. Then, it uses **Simulated maximum likelihood method** to estimate this probability.

$$P_{ij} \approx \tilde{P}_{ij} = \int \frac{exp(\beta_c log(C_i) + \beta_Y Y_j + \beta_Z Z_{ij}) AD_{ij}(\epsilon_{ij}^{ad})}{\sum_{q \in \Lambda_i} exp(\beta_c log(C_i) + \beta_Y Y_j + \beta_Z Z_{ij}) AD_{iq}(\epsilon_{ij}^{ad})} d\epsilon_{ij}^{ad}$$

Finally, approximate loglikelihood function is:

$$\tilde{L} = \sum_{i=1}^{I} ln(\tilde{P}_{ij})$$

6 Results

6.1 Ability Estimation

Table 10 shows the regression by OLS of SIMCE score of the student over several variables explained above. Later, it is calculated the intrinsic ability of the student i, as the actual SIMCE score minus estimated SIMCE score. Figure 1 shows the histogram of the estimated ability.

Table 10: Ability Estimation

	m1	m2	m3	m4
Variables	SIMCE score	SIMCE score	SIMCE score	SIMCE score
SIMCE (grade average)	0.732***	0.518***	0.499***	0.471***
	(0.0116)	(0.0140)	(0.0159)	(0.0163)
Father education		1.218***	1.178***	1.112***
		(0.143)	(0.145)	(0.145)
Mother education		1.628***	1.551***	1.450***
		(0.153)	(0.155)	(0.155)
Parents' involvement		1.864***	1.726***	1.609***
		(0.440)	(0.440)	(0.440)
Parents' age		0.149***	0.149***	0.148***
		(0.0353)	(0.0355)	(0.0354)
Family income		3.85e-06***	4.92e-06***	5.30e-06***
		(7.56e-07)	(1.08e-06)	(1.09e-06)
Father education (grade average)			0.0855	-0.489
			(0.423)	(0.441)
Mother education (grade average)			0.615	-0.274
			(0.433)	(0.455)
Parents' involvement (grade average)			4.337***	3.252**
			(1.281)	(1.290)
Family income (grade average)			-3.56e-06**	-1.61e-07
			(1.61e-06)	(2.43e-06)
Subsidized Private				2.066**
				(0.842)
Non-Subsidized Private school				0.828
				(3.223)
Full school shift				0.651
				(0.675)
Socioeconomic group (school)				3.443***
				(0.782)
Monthly Fee				-8.56e-06
				(9.59e-06)
Class Size				0.182***
				(0.0457)
Constant	68.61***	75.79***	63.66***	73.77***
	(2.996)	(3.720)	(4.603)	(5.178)
Observations	20,749	20,340	20,340	20,340
R-squared	0.161	0.195	0.196	0.198

Standard errors in parentheses

$***p < 0.01$, $**p < 0.05$, $*p < 0.1$

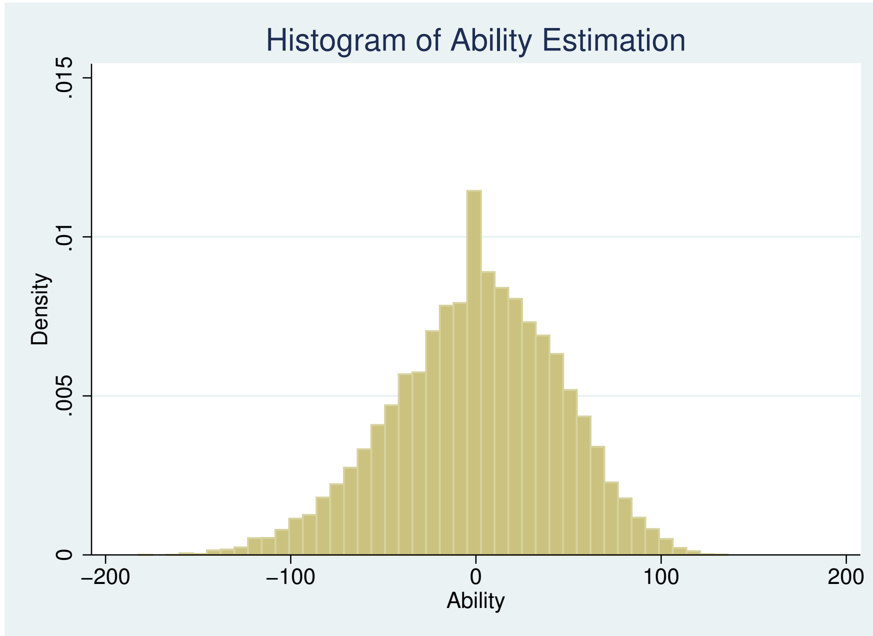

Figure 1: Ability Estimation

6.2 Optimal Parameters

The optimal parameters of the estimation by simulated maximum likelihood are shown in Tables 11 and 12. These tables contain the optimal parameters of the utility function and the admission probability function. Almost all the cases the signs of parameters are consistent with intuition.

Table 11 shows that utility function parameters are as expected: (i) Non-subsidized private school parameter is positive, (ii) higher school socioeconomic levels are associated with higher magnitudes of parameters, (iii) parameters of school characteristics as JEC, SIMCE score, and religious school are positive, (iv) parameter associated to bullying is negative, (v) distance and distance squared parameters are negative, (vi) parameter of distance multiplied income is positive, which is consistent with the idea that richer families can travel higher distances, and finally (vi) parameter of number of siblings in the school is positive.

Likewise, Table 12 shows that in terms of the admission probability function, parameters also are as expected: (i) all parameters associated with school admission requirement are negative, (ii) parameters of remuneration certificate multiplied income and interview multiplied income are positive which is consistent with the intuition that richer families have higher probability of admission in schools that present this requirements, (iii) parameters associated to interactive variable between interview and parents education are positive, (iv) parameter of admission exam multiplied ability is positive as expected, (v) parameters associated to dummies variables of school fee are negative, and finally (vi) parameters of school fee multiplied income are positive which is consistent with the idea that richer families have higher probability of admission in school with school fee.

Table 11: Parameters of Utility Function

Variable	Parameter	Coeff
Log(C_i)	β_c	3.02
Dummy. [Subsidized P. school = 1]	β_{Y1}	-0.2
Dummy. [Non-Subsidized P. school = 1]	β_{Y2}	2.68
Dummy. [NSE 2 School= 1]	β_{Y3}	0.047
Dummy. [NSE 3 School= 1]	β_{Y4}	0.68
Dummy. [NSE 4 School= 1]	β_{Y5}	1.28
Dummy. [NSE 5 School= 1]	β_{Y6}	1.85
Dummy. [JEC = 1]	β_{Y7}	0.003
SIMCE Score (school average)	β_{Y8}	0.018
Dummy. [Religious school = 1]	β_{Y9}	0.06
Bullying (school average)	β_{Y10}	-0.17
Mother Education (school average)	β_{Y11}	0.089
Distance (km) Home-School	β_{Z1}	-2.56
Distance (km) Squared	β_{Z2}	-3.5e(-08)
Distance (km)*Per capita income	β_{Z3}	1.2e(-07)
N Siblings in the school	β_{Z4}	8.9

Table 12: Parameters of Admission Probability Function

Variable	Parameter	Coeff
Constant	φ_1	-0.9
Preschool evaluation	φ_2	-0.13
Marriage Certificate	φ_3	-0.48
Grade Certificate	φ_4	-0.56
Baptism Certificate	φ_5	-0.24
Remuneration Certificate	φ_6	-1.29
Interview	φ_7	-0.8
Game Session	φ_8	-2.8
Admission Exman	φ_9	-0.37
Psycological report	φ_{10}	-0.6
Other Requirement	φ_{11}	-0.98
Remuneration C.*Per capita Income	φ_{12}	4e(-06)
Interview*Per capita Income	φ_{13}	9e(-07)
Interview*Mother education (years)	φ_{14}	0.301
Interview*Father education (years)	φ_{15}	0.505
Interview*Dummy[Univ.Mother=1]	φ_{16}	1.32
Interview*Dummy[Univ.Father=1]	φ_{17}	1.14
Exam*Ability	φ_{18}	0.0126
Dummy. [If School Fee≥$50.000=1]	φ_{19}	-6.19
Dummy. [If School Fee≥$100.000=1]	φ_{20}	-5.08
Dummy. [If School Fee≥$200.000=1]	φ_{21}	-6.1
Dummy. [If School Fee≥$50.000=1]*Per capita Income	φ_{22}	8.2e(-07)
Dummy. [If School Fee≥$100.000=1]*Per capita Income	φ_{23}	7.1e(-07)
Dummy. [If School Fee≥$200.000=1]*Per capita Income	φ_{24}	5.3e(-07)

6.3 Model Fit

In this section it presents a series of graphs that shows the fit of the model under different dimensions (See Figures 2 to 11). The comparison between the data and the simulation shows that the model has a good fit in terms of the dimensions: student fraction by school type, average family income by school type, distances, among others.

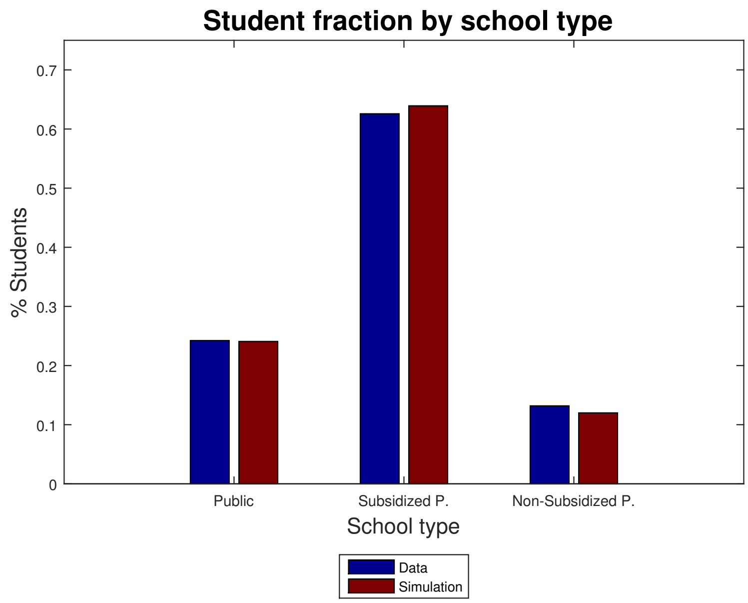

Figure 2: Student fraction

6.4 Utility (Preferences)

This section presents the utility, which represents the preferences of families in this model. Figure 12 shows that the average of total utility is slightly superior in subsidized private schools compared with public schools, but it has a negative value for non-subsidized private schools. A possible explanation is that an average family has an income too low in relation to the monthly fee of non-subsidized private school, then they must sacrifice a lot of consumption of other goods, which provides a very low utility (or even negative) of enrolling the student to this type of school.

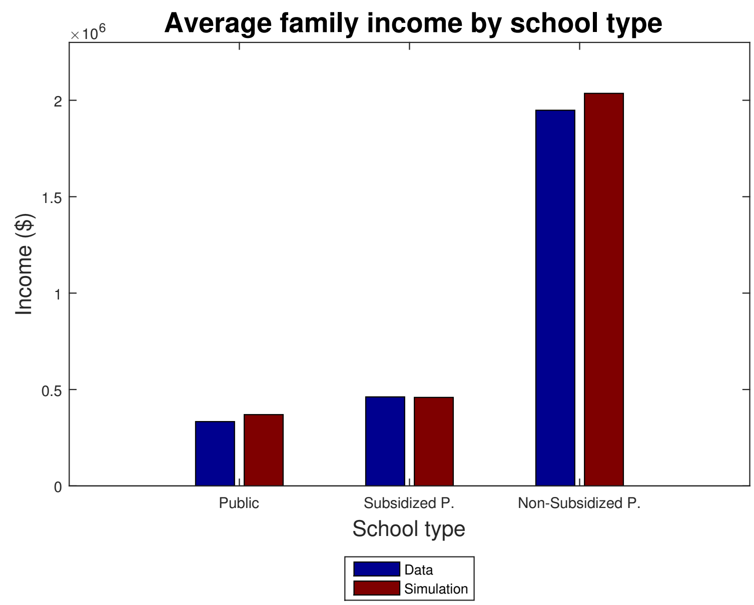

Figure 3: Average family income

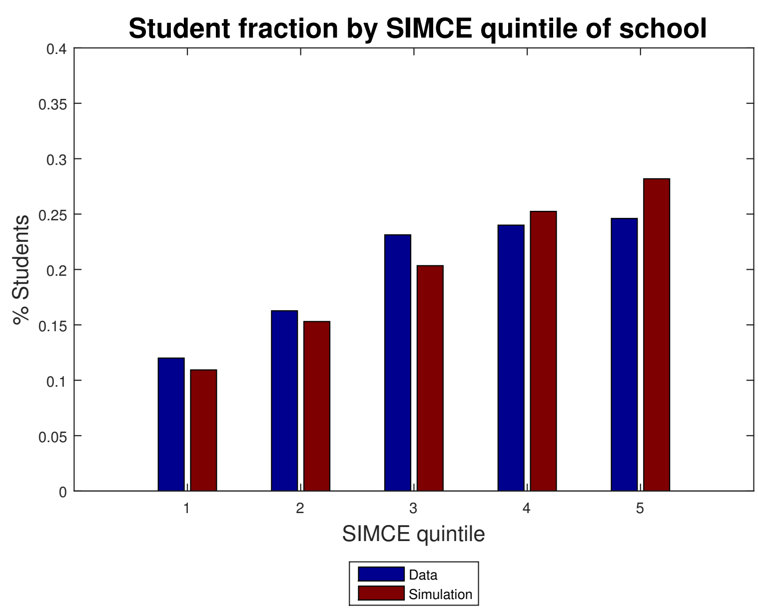

Figure 4: Average family income

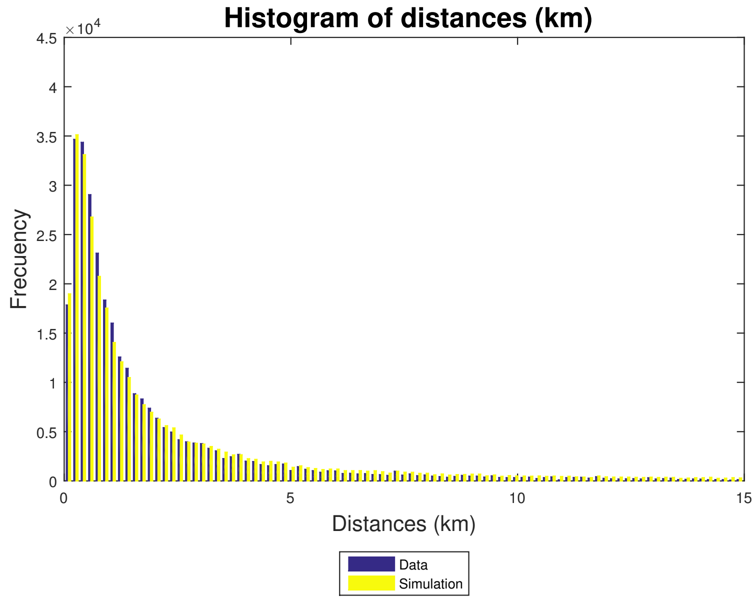

Figure 5: Histogram of distances

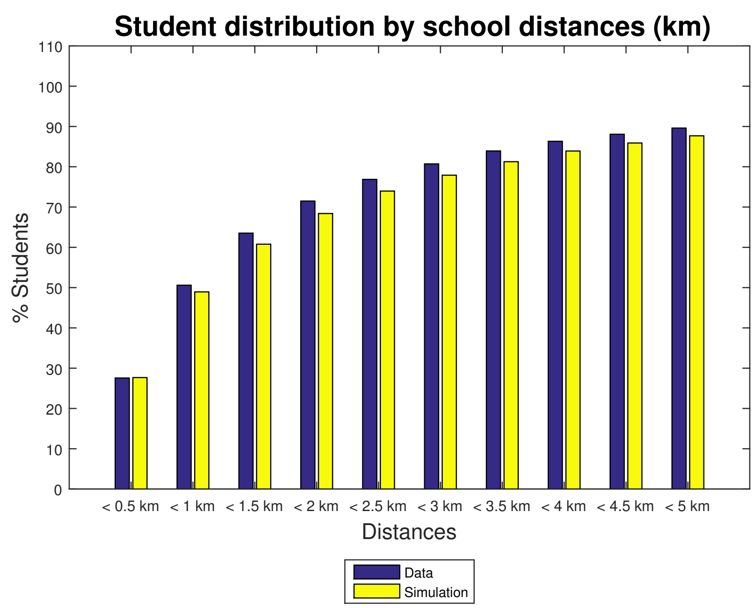

Figure 6: Student distribution

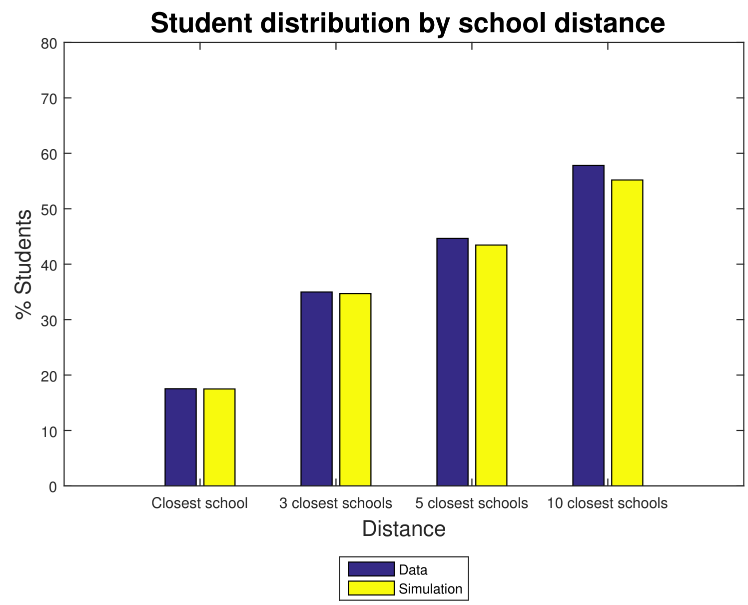

Figure 7: Student distribution

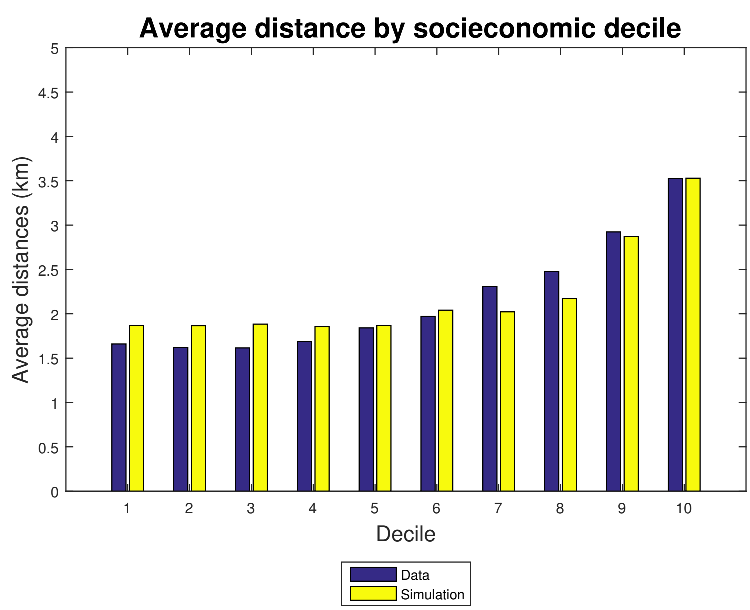

Figure 8: Average distances

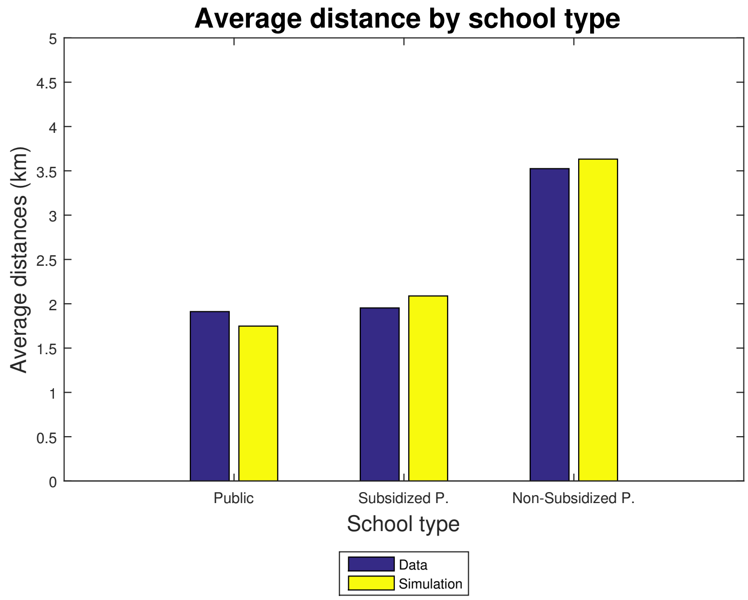

Figure 9: Average distances

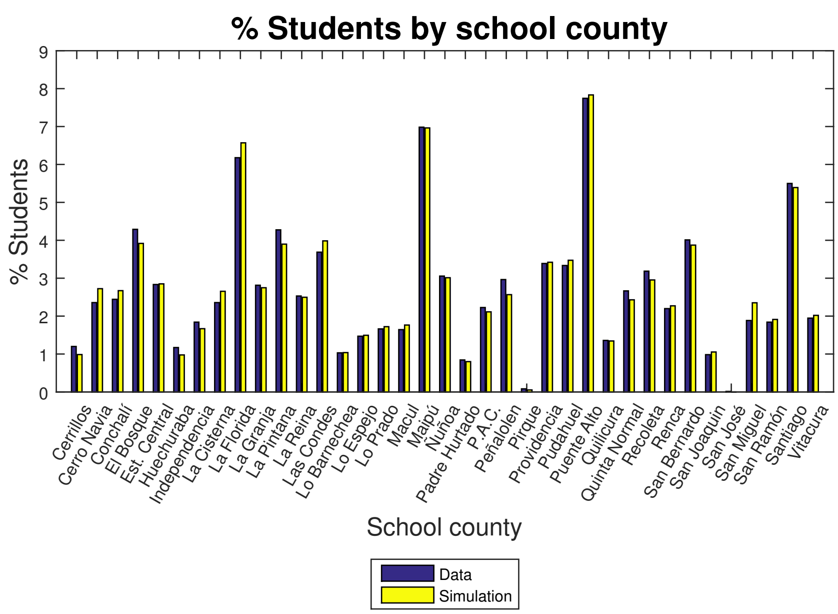

Figure 10: Students by county

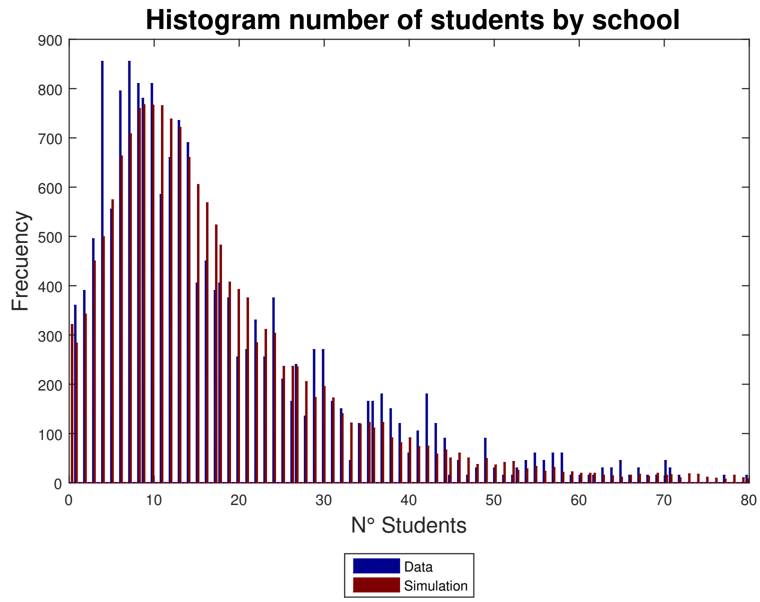

Figure 11: Histogram of students

6.5 Available Schools (Restrictions)

Figure 13 shows that available schools by students are consistent with intuition, namely, families of higher socioeconomic decile has more available schools. The difference between the proportion of available schools is quite pronounced between the first and the tenth decile, going from 18.2% to 53.8%, respectively. It make sense, because Table 12 shows that parameters associated with family income as interactive variable have a positive relation with the probability of students to be accepted in the school. Likewise, in Figure 14 can be seen that non-subsidized private schools accept fewer students which is also consistent with intuition, since these schools have higher admission requirements (certificates, interviews, exams, etc.).

6.6 Counterfactuals Experiments

This paper simulates four fictional scenarios which are explained below.

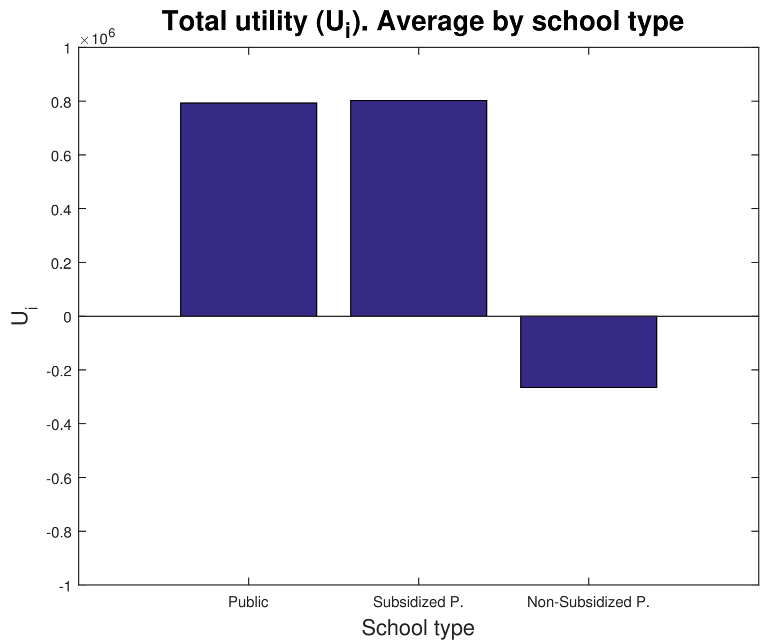

Figure 12: Total Utility U_i

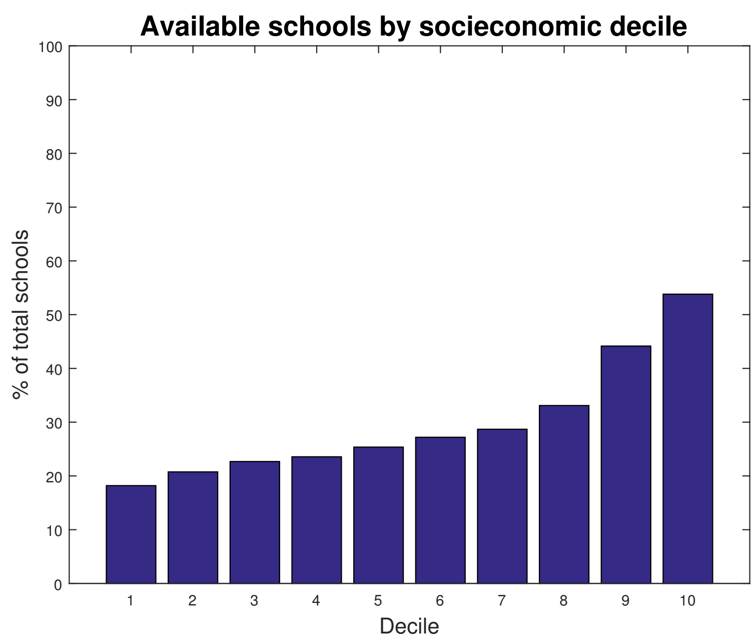

Figure 13: Available schools

Counterfactual 1: No copayment in subsidized private schools.

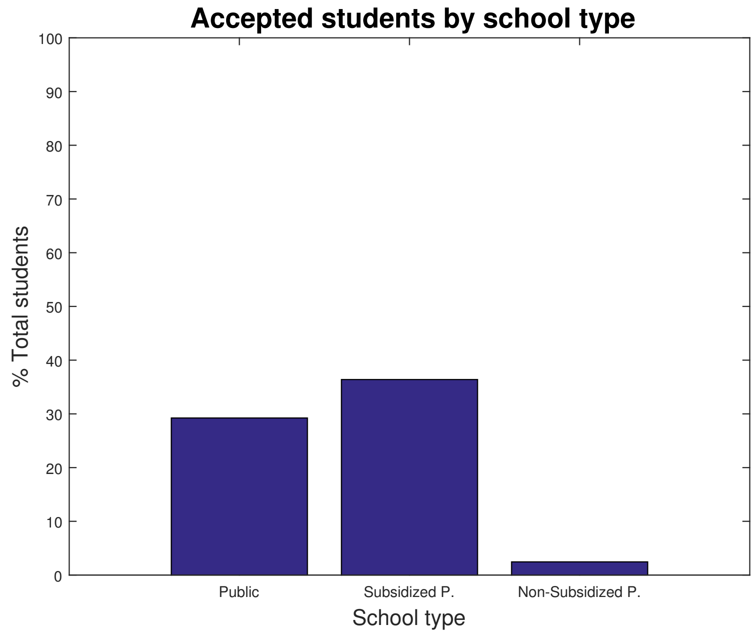

Figure 14: Accepted students

Counterfactual 2: No selection in public and subsidized private schools. For the same school, all students have the same probability to be accepted.

Counterfactual 3: Counterfactual (1) and Counterfatual (2) simultaneusly, namely, no copayment and no selection in public and subsidized private schools.

Counterfactual 4: No residential segregation. This simulation considers that the households of the families are located in a random way within the map.

Table 13. Changes in enrollment distribution by school type

	Public	Subsidized P.	Non-Subsidized P.
Baseline Scenario	24.1%	63.9%	12.0%
Counterfactual (1). No copayment	23.1%	68.1%	8.8%
Counterfactual (2). No selection	23.9%	67.7%	8.3%
Counterfactual (3). Simultaneously (1) y (2)	21.7%	70.1%	8.3%
Counterfactual (4). No residential segregation	24.7%	65.9%	9.3%

Tables 13, 14, 15 and 16 presents the changes between counterfactuals respect to a base-

Table 14. Changes in Average Income by school type

	Public	Subsidized P.	Non-Subsidized P.
Baseline Scenario	$369,788	$459,023	$2,035,870
Counterfactual (1). No copayment	$461,926	$499,447	$2,045,447
Counterfactual (2). No selection	$497,039	$498,918	$2,035,228
Counterfactual (3). Simultaneously (1) y (2)	$513,700	$495,020	$2,036,136
Counterfactual (4). No residential segregation	$427,791	$506,330	$2,013,436

line scenario, for different dimensions. Counterfactual (1) simulates no copayment scenario and, as expected, increase the share of subsidized private school enrollment in 5.1 percentage points respect to baseline scenario (from 63.9% to 69%). Likewise, decrease the share of enrollment in public and non-subsidized private school in 1.8 and 3.3 percentage points, respectively. This results indicates that, in a non-copayment contex, most of the movement in enrollment between type of schools is explained by the migration of students from private schools to subsidized private schools. Respect to income dimension (Table 14), the counterfactual (1) produces an increase in average income for all dependencies. This situation could indicate that lower income families from private schools migrate to subsidized private schools, which implies that the average income increases in both groups. On the other hand, respect to distance, Table 15 shows that average distance presents a decrease in public and private schools and an increase in subsidized schools. This make sense, because in a non-copayment context, the subsidized private schools become more attractive respect to the baseline scenario, which implies that families are willing to move higher distances for schools with this dependency. Finally, Table 16 shows an increase in the enrollment ratio of the fourth and fifth quintile schools of results in SIMCE. The previous result is intuitive since families move towards schools with better academic results in this standardized test.

On the other hand, counterfactual (2) simulates no selection in public and subsidized private schools, which is approaching as the same probability of admission for different students who apply to a same school. Counterfactual (2) produces a decrease of 0.2 percentage points in the share of enrollment in public schools, an increase of 3.8 percentage points in subsidized private schools, and a decrease of 3.7 percentage points in non-subsidized private schools (Table 13). A possible explanation of the movements could be related to the lower income families that come from private school (in baseline scenario) and that have low probability of admission in the subsidized schools, who in a non-selection context (or equality in the probability of admission), have the possibility of entering an school of these dependency. Because the monthly fee is much cheaper is subsidized schools (compared to private schools) the context of non-selection makes them a more attractive option. The changes linked to the average income could also support previous intuitions, since the average income increases in in non-subsidized private and subsidized private schools (Table 14). Respect to distance dimension (Tabla 15), we have an increase in each of the dependencies. This indicates that, in a non-selection context, people have a greater willingness to move higher distances than in the baseline scenario. Finally, Table 16 shows an increase in the proportion of students enrolled in schools in the fourth quintile of SIMCE results, which indicates that families move towards schools with better academic results compared to the baseline scenario.

The counterfactual (3) combines the two situations presented above, namely, simultaneously simulates non-co-payment and non-selection in subsidized private schools. In general terms, the counterfactual (3) reinforces the movements described in counterfactuals (1) and (2) regarding the dimensions: share of enrollment, average income, distances, and SIMCE quintile. Table 13 shows that exists a decrease of 3.2 percentage points in the enrollment share of public schools, an increase of 7 percentage points in subsidized schools and an decrease of 3.9 percentage points in non-subsidized private schools. Table 14 shows that the movements in average income have the same direction as that observed in the counterfactual (2), therefore, the same intuition could be established to explain the movements. Regarding the distance dimension, we have an increase in the average distances for all the dependencies, showing a greater willingness to move higher distances with respect to the baseline scenario (Table 15). Finally, Table 16 shows that families migrate to better performing schools in SIMCE test.

Finally, the counterfactual (4) simulates the non-residential segregation scene, which is approaching as the random location of the families within the map. Table 13 shows that there is an increase of 0.6 percentage points in the share of enrollment in public establishments compared to the baseline scenario, an increase of 2 percentage points in the subsidized private schools and a decrease of 2.7 percentage points in non-subsidized private schools. Most of the movement between types of dependence is explained by the migration of families from non-subsidized private to subsidized private schools. One possible explanation is that the families that come from non-subsidized private schools usually have high income, so, they would be the only group that has the possibility to choose the location of their home based on the proximity with non-subsidized private schools. In a random location context it is likely that the home will be located at higher distances respect to the school of baseline scenario, so that high-income families could migrate from non-subsidized private to subsidized private schools. This intuition is consistent with the income dimension (Table 14), since observe a decrease in the average income of non-subsidized private schools and an increase in public and subsidized private schools. Regarding the distance (Table 15), we observe an increase for all dependencies, being much more pronounced in non-subsidized private schools where it goes from 3.63 average km to 7.46 average km, which indicates the high disposition of these families to travel to a school of this dependency. Finally, table 16 shows that in a context of no residential segregation there is an increase in the enrollment of high-performance schools in SIMCE test.

As a general summary, we can say that most of the results are consistent with intuition, mainly the decrease in the share of enrollment in public schools and the increase in subsidized private schools in the first three counterfactuals. This result is expected, because restrictions are eliminated in subsidized private schools, which makes them more attractive with respect to the baseline scenario. The economic cost of public schools and subsidized private schools is within a similar range (very low cost), therefore, a movement between these dependencies is understandable because they are comparable. However, the results also show a reduction in the share of enrollment in non-subsidized private schools, which is not very intuitive due to the high cost of these schools, that is, it makes little sense that people pay a high monthly fee in the baseline scenario and later in the counterfactual (no copayment and no selection) change to subsidized private schools. On the other hand, it is consistent with the intuition that decreases the share of enrollment for non subsidized private schools in a residential non-segregation scenario. In short, most of the results of the model are expected, however, the estimate in future research should be refined. The model can be sophisticated in many dimensions, for example, by considering the capacity constraint of schools in counterfactuals.

Table 15. Changes in Average Distance by school type

	Public	Subsidized P.	Non-Subsidized P.	Total Dist.
Baseline Scenario	1.75	2.01	3.63	2.19
Counterfactual (1). No copayment	1.74	2.24	3.17	2.21
Counterfactual (2). No selection	1.96	2.26	4.20	2.35
Counterfactual (3). Simultaneously (1) y (2)	1.90	2.34	4.18	2.40
Counterfactual (4). No residential segregation	3.28	3.22	7.46	3.63

Table 16. Changes in enrollment by school SIMCE quintile

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Baseline Scenario	10.9%	15.3%	20.3%	25.2%	28.2%
Counterfactual (1). No copayment	9.8%	14.3%	19.0%	27.6%	29.3%
Counterfactual (2). No selection	9.7%	14.8%	19.5%	28.6%	27.2%
Counterfactual (3). Simultaneously (1) y (2)	9.0%	13.8%	18.2%	29.3%	29.3%
Counterfactual (4). No residential segregation	8.5%	13.3%	18.3%	28.0%	31.9%

7 Conclusions

This paper estimates a structural model of primary school choice in the metropolitan area *Gran Santiago*. It elaborates a static choice model based in Grau (2015) which separates preferences of families and restrictions of schools in the school choice process. The model contains two main functions: on the one hand, a Parent's Utility function that depends on variables as school fee, distance of the student to school, school quality and school characteristics; and, on the other hand, an Admission Probability function which depends on the school selection mechanisms.

The estimation of structural parameters allows to analyze the most important determinants of school election, and allows to perform different simulations based on fictional scenarios. The model presents good fit under different dimensions analyzed. On the basis of this good fit, four fictional scenarios are simulated: (i) no copayment, (ii) no selection, (iii) no copayment and no selection simultaneously, and (iv) no residential segregation.

The results shows that counterfactuals of non-copayment, non-selection, and the combination of the previous two, as expected, present an increase in the enrollment ratio of subsidized private schools and a decrease in the enrollment ratio of public schools and non-subsidized private schools. These results would indicate that a non-copayment and non-selection situation would be associated with a decrease of 3.2 percentage points in the enrollment share of public schools, an increase of 7 percentage points in subsidized schools and an decrease of 3.9 percentage points in non-subsidized private schools. It also shows that the this scenario would be associated with an increase in the average distances for all the dependencies, showing a greater willingness to move higher distances. In addition, the scenario of non-copayment and non-selection is associated with an increase in the enrollment rate of the best performing schools in SIMCE.

On the other hand, the counterfactual that simulates no residential segregation shows that practically all the movement between types of dependence is explained by the migration of families from non-subsidized private to subsidized private schools. One possible explanation is that the families that come from non-subsidized private schools usually have high income, so, they would be the only group that has the possibility to choose the location of their home based on the proximity with non-subsidized private schools. In a random location context it is likely that the home will be located at higher distances respect to the baseline scenario, so that high-income families could migrate from non-subsidized private to subsidized private schools.

Finally, regarding the limitations of the study, we have to mention that the model does not consider: (i) the existence of endogeneity between the decision of location of the home and the closeness of the school, (ii) endogeneity of the monthly payment of the school and SIMCE score (see Gallego Hernando, 2008), (iii) we do not allow the characteristics of the school to change with the counterfactuals (for example, socioeconomic composition of the school, etc.), (iv) potential changes in attributes of the schools are not considered (dependency changes, among others).

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8 Figures and Tables

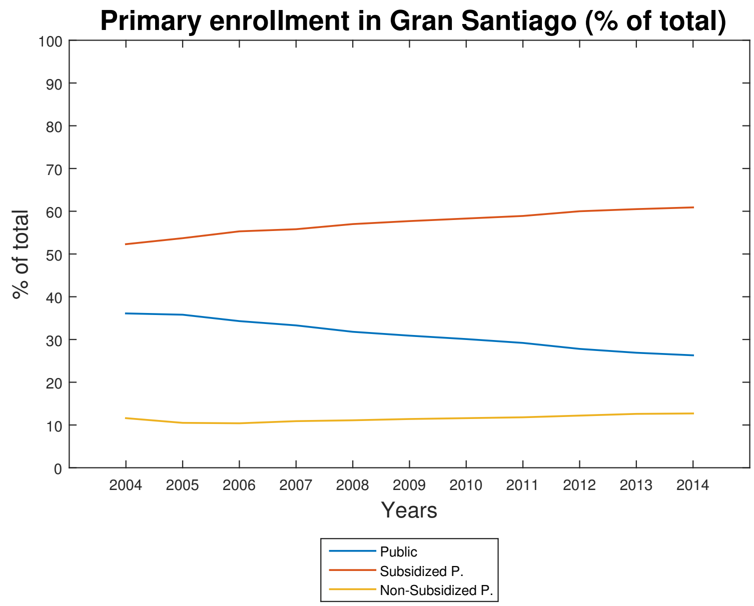

Figure 15: Primary Enrollment in Gran Santiago