Online Appendix

O-1 Provision of Preschool Services in Chile ³¹

Access to preschool education has increased in the last years but it is still below levels of developed countries. Accordingly to for Economic Co-operation and Development (2016), enrollment of 0-2 year-olds in formal care is 18% (below the average of 33% in OECD countries). This increases to 54% for 3 year-olds in 2015 (which is almost twice enrollment in 2005 but below the average of 71% across the OECD). In terms of provision, there are public and private providers. Free public providers are organized in two networks: Junji and Fundación Integra, which administer approximately 3,000 and 1,000 centers respectively, and are explicitly tasked with providing access to Pre-K educational services for students all over the country. 42% of the 3-4 year olds enrolled in preschools in 2016 attended Junji centers and 18% attended Integra centers. The reminder children attended private providers, some of them receiving public funding and others charging relatively high tuition fees.

The application process to public and private centers is decentralized and public providers give priorities to poor families (Aguirre, 2011). Several targeted public programs also support families in sending children to preschools. In addition, Junji was also in charge of (light) monitoring of private providers until 2016 (mainly related to inputs). Currently, there is an independent agency in charge of the monitoring of preschool providers. Expenditure per student was \$ 6,408 in 2015 and 15% of that comes from private funding (OECD, 2016).

O-1.1 Fundación Integra

Fundación Integra (Integra, here on) is the second largest public supplier of preschools in Chile. It serves more than 72,000 children throughout the country in its 1,000 tuition-free centers. Integra focuses on low-income neighborhoods in order to "[constitute] *a real support for families living in poverty, offering a safe space and an excellence educative program to their children from three months up to four years old*".

Working with Integra provides us with a unique setting to study school choice decisions by providing us with (i) an environment through which we can have access to families that are about to choose primary schools, being relatively confident that the results are not driven by self-selection into primary schools, and (ii) a cost-effective way to implement the intervention. Integra does not offer primary education, so students in the upper level of this program will necessarily have to choose a primary school to continue their education. In addition, working with them provides us with an exceptional opportunity to collect data and deliver interventions using the

³¹This subsection is partially based on for Economic Co-operation and Development (2016).

existing infrastructure of the program. Otherwise, finding families that are about to choose would be very costly to implement.

O-2 Sample Selection

With the aid of the Integra management team we decided to work in the three larger regions in the country, Valparaso, Biobo and Santiago, and we identified which municipalities and preschools within each one were useful to our research questions. We chose preschools located in urban areas (according to Integra's criteria) and that met our criteria for having an adequate level of school competition. To do so, we defined that all preschools in municipality *i* would participate if there were at least 10 schools within a 2 kilometer radius (around 1.2 miles) and the ratio (primary schools_{*i*}/preschools_{*i*}) \geq 2 for municipality *i*. In addition, we only considered schools in the three lower SES levels (according to the classification implemented by the Ministry of Education), which represent almost all the schools in the effective choice set among families of the first three income quintiles.

This left us with 143 preschools in the three regions mentioned above. Then we randomly assigned preschools to the treatment and control groups stratifying by region, grade and the number of schools within a 1.2 mile radius. We contacted each preschool to check whether they had any parents' meeting scheduled between August and December, 2010. If they had a scheduled meeting with parents, we asked if a person of our staff could go and apply the baseline survey during the meeting and apply the treatment (if the preschool was in that group).

Out of the 143 original preschools we selected, there were 10 for which we could not schedule a meeting. Among the main reasons were, a refusal by the principal, unavailability of dates and no parents attending the meeting. Table O-1 presents some differences in observable characteristics between schools included and not included in the experiment. The 10 preschools without meetings have a larger share of mothers with complete tertiary education, larger share of families in the second income quintile, and a lower proportion of indigent families. None of the parents in these schools were surveyed in the follow up, since no one was able to sign the informed consent. Thus for all practical reason our sample consist of the 133 preschools where we were able to attend the meeting.

In the 133 intervened preschools, a total of 1,832 parents signed the informed consent and answered the survey asking for contact information. The surveyed was applied before handing out any information and it included questions regarding the application process. We asked parents about whether they had decided to send their child to primary school in 2011, if they had already chosen a specific school, and whether they had already enrolled the child. Parents were also asked if they had any other children already enrolled in primary school, considering this could be an important determinant of school choice. Since our presence in the meeting was not announced,

	With Meeting	Without Meeting	Difference	t-test
Enrollment	40.21	46.50	-6.29	-1.02
Mean Attendance	27.99	32.40	-4.41	-0.77
Mother w. Complete Tertiary (%)	9.07	12.81	-3.74	-1.76*
Mother w. Complete Secondary (%)	47.74	45.36	2.38	0.70
Mother w. Incomplete Secondary (%)	34.72	34.89	-0.17	-0.05
Mother w. Complete Primary (%)	7.81	6.94	0.87	0.65
Q1 of Income (%)	58.35	53.89	4.47	1.22
Q2 of Income (%)	31.56	38.42	-6.86	-2.02**
Q3 of Income (%)	8.00	5.95	2.05	1.27
Indigent (%)	15.37	9.68	5.69	2.73***
Poor non-indigent (%)	40.67	42.10	-1.42	-0.41
Non-poor (%)	43.96	48.23	-4.27	-1.33
Number of Preschools	133	10	143	

Table O-1: Differences between preschools with and without meetings

Notes: Columns 1 and 2 present the average value for the respective variable for preschools treated (with meeting) and untreated (without meeting), Column 3 shows the difference between groups and column 4 the t-test of the null hypothesis of equality between averages, using standard errors clustered at the preschool level in parenthesis. * p-value<10% ** p-value<5% *** p-value<1%.

we would expect attendance to be similar across preschools, as we report in Table A2.

O-3 Selection on enrollment at baseline

The timing in the delivery of information interventions is a key aspect for their effectiveness. Ideally, our treatment should have been delivered before parents decided which school they wanted to send their children to. Unfortunately, we find that an important number of parents in our sample had already enrolled their children in a school at baseline. In most of our reduced form analysis, we distinguish between parents who have already enrolled their children and the ones that have not made their enrollment decision, with the idea that the second sample will give us the causal effects of the intervention when the treatment is delivered on time.

However, our results for the sub-sample of non-enrolled kids may not be generalizable if their parents are different to the ones of the kids that are already enrolled. In this section, we provide evidence that the likelihood of being enrolled in the baseline is mainly driven by the timing of the intervention and that both groups are not different in observable characteristics.

The meetings were conducted between August and December 2010, in a 16 weeks period. Figure O-1 shows the percentage of parents that reported to have chosen a school and already enrolled by the date of the meeting. Schools in which meetings were closer to the end of school year (December) had a higher share of enrolled parents. While in September a 20% of parents reported having already enrolled their kids, in November this number grew up to 65%.

Table A2 shows balance on observable for being enrolled at baseline. Both SES and birth characteristics are included. Enrolled parents seem to have more durable goods, but are not different in terms of mothers education, poverty status, house hold size or birth outcomes, except for being born at a hospital, for which they are marginally more likely.



Figure O-1: Timing and Probability of Matriculation

O-3.1 Treatment Design and Implementation

The intervention included two main components. The first was the provision of a Report Card designed for each preschool that included information about a subset of characteristics of the schools located in the same neighborhood³². The information provided in the Report Card included: (i) test scores, where to reduce the noise produce by a single observation, we averaged the results on Math and Reading (Spanish) over four years, between 2006 and 2009;(ii) a measure of the change in test scores between years, since a school in the median, but that has largely increased its test scores may be a better (o worst) match for some parents, than a school with the same median score, but that has largely worsened its results; (iii) the official tuition cost for parents, using data from the Ministry of Education³³; (iv) the type of the school (whether it is public or private) and (v) its location (i.e. address). We also provided parents a map with all schools included in the

³²As argued above, we excluded primary schools of higher SES, which generally charge higher fees and have more restrictive selection process, thus are not included in the effective choice set of parents in this context. We were also limited to include up to 30 schools due to space constraints. When a preschool had more than 30 schools within 2 Km. we randomly deleted some schools that were not in the extremes of the Report Card, in order to reduce the bias from presenting a selected part of information.

³³Note, however, that this is not a perfect measure of what parents actually pay, since there may be other costs, including materials or fees for parents' association. Schools could also offer discounts and scholarships to some students. Since we do not have data on those payments, we included the official co-payment since it is an objective measure and it is comparable across schools.

Report Card.

Figure O-2: Report Card - Front

Cartilla de Apoyo a la Elección de Establecimientos Escolares Ingreso a EnseñanzaBásica

Todos los padres en Chile tienen el derecho de elegir el establecimiento escolaren que estudian sus hijos. Esta cartilla, dirigida a padres y apoderados, ha sido diseñada para apoyar esta elección. En esta cartilla encontrará información de los colegios más

cercanos al jardín infantil donde asiste su hijo(a).

Para elegir un establecimiento escolar, es bueno fijarse en los resultados SIMCE de ese colegio, pues hablan de la calidad de la educación. También encontrará en esta cartilla información sobre los

Jardin Cardenal Caro

2010

INGRESO A ENSEÑANZA BÁSICA

costos de los colegios, la ubicación del colegio, y otras características.

Ref	Nombre Colegio	Puntaje SIMCE*	Cambio SIMCE**	Precio Mensual Del Colegio***	*Valores promedio de básico de los años 200
1	Colegio Rosa Elvira Matte De Prieto	293	7,50	Entre 5.000 y 10.000	2009.
2	Colegio Polivalente Don Orione	286	13,75	Entre 10.000 y 20.000	2006-2007 v 2008-2009
3	Escuela Básica Sol De Chile	261	5,75	Entre 10.000 y 20.000	***Valores aproxima
4	Colegio Polivalente Saint Trinity	250	-8,00	Menos de 5.000	para el año 2009.
5	Escuela Básica Clara Estrella	250	-26,00	No Cobra Mensualidad	Nonatoratoratoratoratoratoratora
6	Colegio Kennedy	249	13,75	Entre 5.000 y 10.000	Puntajes
	Escuela Básica Santa Adela	247	-10,25	No Cobra Mensualidad	SOBRE el Promedio
8	Colegio Adventista Buenaventura	243	-7,50	Menos de 5.000	Nacional.
9	Centro Educacional Sagrado Corazón	243	-17,00	Menos de 5.000	Puntains
10	Colegio Saint Orland 2	239	1,25	No Cobra Mensualidad	BAJO el
11	Escuela Básica Karol Cardenal De Cracovia	238	0,00	No Cobra Mensualidad	Promedio Nacional
12	Escuela Alicia Ariztía De Silva	235	9,25	No Cobra Mensualidad	
13	Escuela Básica Parque Las Américas	23.5	6,00	No Cobra Mensualidad	El Promedio Nacional es de
14	Colegio Básica Hernán Olguín Maibee	233	-2,75	No Cobra Mensualidad	250 puntos
15	Escuela Básica Las Espigas	232	31,75	No Cobra Mensualidad	an an an an an an an an
16	Liceo Polivalente B 133	232	1,50	No Cobra Mensualidad	que aparece s/i son
17	Escuela Básica Raúl Sáez S.	231	-1,25	No Cobra Mensualidad	aquellos que no
18	Escuela Acapul co Din 582	227	7,25	No Cobra Mensualidad	información
19	Escuela Básica Bernardo O'Higgins	22.4	-19,75	No Cobra Mensualidad	disponible
20	Escuela Conquistando Futuro	219	-15,00	No Cobra Mensualidad	Terantoriantoriantoriantorianorian
21	Blue Star College	216	7,50	No Cobra Mensualidad	
22	Liceo Tte. 2 Francisco Mery Aguirre	215	-1,00	No Cobra Mensualidad	
23	Escuela Salomon Sack	215	8,00	No Cobra Mensualidad	
24	Escuela Básica Lo Valledor	212	24,25	No Cobra Mensualidad	
25	Escuela Republica De Las Filipinas	206	-18,25	No Cobra Mensualidad	
26	Escuela Especial Particular Despertar De	204	s/i	No Cobra Mensualidad	
27	Escuela Básica Saint Phillip Of Nery	202	-10,50	Menos de 5.000	
28	Escuela Básica Republica De Indonesia	200	-16,75	No Cobra Mensualidad	

56

stableci so a Enser	mientos Escolare	5	Jardin Cardenal Caro	20	Τ
Ref	NOMBRE COLEGIO	DIRECCION	Cursos	Dependencia*	Ali
1 Colegio i	Rosa Elvira Matte De Prieto	Buenaventura 3824	Párvulos a 4º Medio	PSUB	
2 Colegio i	Polivalente Don Orione	Av. Pedro Aguirre Cerda 7335	1º Básico a 4º Medio	PSUB	
3 Escuela I	Sásica Sol De Chile	León De La Barra N. 9211	Párvulos a 8º Básico	PSUB	
4 Colegio i	Polivalente Saint Trinity	9 De Enero N. 02699	Párvulosa 4º Medio	PSUB	
5 Escuela I	Sásica Clara Estrella	Valparaíso 6990	Párvulos a 8º Básico	MUN	
6 Colegio I	(enne dy	Maipú N. 9483	Párvulos a 8º Básico	PSUB	
7 Escuela I	Sásica Santa Adela	Los Profesoreis N. 7400	Párvulos a 8º Básico	MUN	
8 Colegio J	Adventista Buenaventura	Buenaventura N. 08928	Párvulosa 4º Medio	PSUB	
9 CentroE	ducacional Sagrado Corazón	Huasco Nº 7147	Párvulos a 4º Medio	PSUB	
10 Colegio S	aint Orland 2	Pasaje Saturno 03955	Párvulos a 8º Básico	PSUB	
11 Escuela i	Sásica Karol Cardenal De Cracovia	8 Norte N. 08922	Párvulos a 8º Básico	PSUB	
12 Escuela J	Nicia Arista De Silva	México N. 02444 Pob. Santa Olga	Párvulos a 8º Básico	MUN	
13 Escuela i	Sásica Parque Las Américas	Lo Ovalle N. 3915	Párvulos a 8º Básico	MUN	
14 Colegio I	Sásica Hernán Olguín Maibee	Avenida Central N. 8108	Párvulos a 8º Básico	MUN	
15 Escuela I	Sási ca Las Espigas	19 Sur N. 03820	Párvulos a 6º Básico	PSUB	
16 Liceo Pol	ivalente B 133	Inés De Suarez N 6970	Párvulos a 4º Medio	MUN	
17 Escuela I	Sásica Raúl Sáez S.	Veracruz N. 5243	Párvulos a 8º Básico	MUN	
18 Escuela J	Acapulco Dn 582	Acapulco N. 7661	Párvulos a 8º Básico	MUN	
19 Escuela I	asica Bernardo O'Higgins	Pio XI N. 7148	Párvulos a 8º Básico	MUN	
20 Escuela (Conquistando Futuro	La Habana N. 7451	Párvulos a 8º Básico	MUN	
21 Blue Star	College	Monterrey N. 7519	Párvulos a 8º Básico	MUN	
22 Lice o Tte	2 Francisco Mery Aguirre	Avenida Centenario N. 02854	Parvulos a 4º Medio	MUN	
23 Escuela S	alomon Sack	Avenida Las Torres N. 7850	Párvulos a 8º Básico	MUN	
24 Escuela i	Sásica Lo Valledor	Arturo Alessandri N. 6378	Párvulos a 8º Básico	MUN	
25 Escuela i	Republica De Las Filipinas	Júpiter N. 7746	Párvulos a 8º Básico	MUN	
26 Escuela i	ispecial Particular Despertar De	Calle Jalisco N. 02407	1º a 4º Básico	PSUB	
27 Escuela i	Sasica Saint Phillip Of Nerv	Astaburua za N. 9350	Párvulos a 8º Básico	PSUB	
28 Escuela I	Sisica Republica De Indonesia	Ortiz De Zarate N. 03373	Pápyulos a 8º Básico	MUN	

Figure O-3: Report Card - Back



Jardín Cardenal Caro

In order to send a signal about relatively "good" and "bad" schools, establishments that are above the nationwide mean test score (roughly 250 points) where signaled in green and schools that lied below the nationwide mean test scores where signaled in red. Figures O-2, O-3 and O-4 present an example of the Report Card and a map. This aspect mirrors policy maker preferences for the type of intervention that was planned and the hope is this design feature will addresses the potential asymmetry of information parents may have regarding the quality of schools. The underlying hypothesis is that parents do care about the quality of the education their children receive, though are not aware of which schools are those that provide such high-quality education.

A second component of the policy is a video where we prepared with testimonies of: (i) a mother that had decided to change her son that attended second grade to a better school, with higher test scores, in order to give him a better education, (ii) a current college student ending his degree, who went to a relatively good high school in a poor neighborhood, and (iii) a young girl who also came from a poor background but, in part due to her relatively good high school, was able to study a vocational career and now holds a job in a bank.

What these three testimonies share in common is that their characters belong to a low socioeconomic status. The objective was to show people that they can access good schools and higher educational levels and that this is not restricted to high-income families. The choice of these role models is in line with Nguyen (2008) results on the provision of information by people from similar background as the intervened group.

The video also provided some information about rates of return of tertiary education in Chile³⁴, and argued that there is a relation between the primary school results and the chances of enrollment in college or vocational tertiary school, although it didn't argue any causal effect, only the observed correlation (in a similar way than Jensen (2010)).

This aspect aimed to complement the potential lack of information regarding good schools with information on the benefits of providing the child with high-quality education. The hypothesis is that even if parents were aware of which are the high-quality schools in their neighborhood, they might not be conscious of the potential benefits of a good education, thus their schooling decisions reflect other determinants rather than quality, such as distance, or parents simply enrolling their children in the same school they once attended.

O-3.2 Additional Statistics On RCT Design, Implementation and Results

Figure O-5 shows the distributions of treatment and control schools and students in the map of the city of Santiago. It is important to mention that the Pre-K schools were selected so that the report card provided would not overlap with any other Pre-K schools in the study.

³⁴Specifically the video showed that on average, a person with college degree earns around three times what the average person only with high school does.





Note: This figure shows a map of Santiago. Treatment and control preschools are indicated on the map with larger, bold circles. Student homes are indicated with smaller circles. The color differentiates treatment and control.

	Mean	(0.118)	(0.159) (0.036)	(0.025)	(0.029)	(0.033) (0.025)		1	(0.029)		0.0294)	egression vining the me of the
olled 36)	Control (6)	4.829	4.477 0 366	0.807	0.209	0.431 0.822		1	0.414		0.414 (oups in a 1 ean. Comb
Non-Enr (N=1,0	ce T-C	(0.158)	(0.182)	(0.031)	(0.034)	(0.040) (0.032)		1	(0.037)		(0.0367)	d control gr group me rolled or r
	Differen (5)	0.146	-0.023 -0.035	0.037	-0.025	-0.059 0.022		1	-0.015		-0.0146	eatment and the contro hey were ei
	Mean	(0.144)	(0.231)	(0.029)	(0.038)	(0.046) (0.032)		1 0	(0.039)		(0.0389)	ween the tre d errors for whether t
6) (6	Control] (4)	4.852	4.694 0 311	0.857	0.194	0.378 0.816		1	0.420***		0.420***	ference bety nd standary ormation or
Enroll (N=60	e T-C	(0.172)	(0.259) (0.058)	(0.047)	(0.046)	(0.057) (0.039)		1 0	(150.0)		(0.0512)	r for the dif oefficient a ve have info
	Difference (3)	0.060	0.221 0.116**	-0.035	-0.017	-0.038 0.041		1 0	-0.008		-0.00778	andard erro resent the c for which v
	Mean	(0.101)	(0.160)	(0.021)	(0.026)	(0.032) (0.022)		(0.038)	(0.024)		(0.033)	cient and start 4 and 6 p
mple 832)	Control (2)	4.837	4.558 0 345	0.826	0.203	$0.411 \\ 0.820$		0.375	0.416		0.759	the coeffic Columns 2 re 1,612 ob
Full Sa (N=1,	nce T-C 1)	(0.126)	(0.179) (0.039)	(0.027)	(0.031)	(0.039) (0.028)		(0.048)	(0.032)		(0.042)	d 5 present it status. (sys, there a
	Differe (eristics 0.114	0.069	0.010	-0.022	-0.051 0.029	ool choice	0.002	-0.012	e 2011	-0.015	ns 1, 3 and treatmer up surve
		Panel A: SES charact. Household size	Durable goods Owns Dwelling	Mother head of hh	Mother NHS	Mother HS Mother HE	Panel B: Baseline schu	Already enrolled	Another child	Panel C: School choic	Will apply on 2011	Notes: Columr each variable on seline and follow

Table O-2: Treatment Balance at the Family Level



Figure O-6: Treatment Effects on Distance by Bandwidth

	VA 1	(1P)	VA 2	(2P)	VA 3	: (1E)		VA 4 (2E)
Danol A. Full Countly	(1)	(2)	(3)	(4)	(5)	(9)	(2)	(8)
Tunet A: Fuit Sumple Treatment	0.027 (0.029)	0.023 (0.027)	0.025 (0.028)	0.022 (0.026)	0.027 (0.029)	0.023 (0.027)	0.027 (0.027)	0.024 (0.026)
N obs.	1744	1744	1744	1744	1752	1752	1752	1752
Panel B: Enrolled sample Treatment	-0.034 (0.051)	-0.050 (0.051)	-0.035 (0.050)	-0.052 (0.050)	-0.033 (0.051)	-0.049 (0.051)	-0.032 (0.050)	-0.048 (0.050)
N obs.	590	590	590	590	590	590	590	590
Panel C: Not enrolled sample Treatment	e 0.067* (0.036)	0.064* (0.036)	0.068* (0.036)	0.066* (0.035)	0.071** (0.035)	0.068* (0.035)	0.072** (0.035)	0.069** (0.035)
N obs.	956	956	956	956	962	962	962	962
Randomization controls	×		×		×		×	
Expanded controls		×		×		×		×
Note: Randomization c 25, 50 and 75.). Expan	controls in ded cont	nclude mark rols includ€	tet characte Mother's	ristics of sc education,	chools (nun , householc	nber and te 1 informati	st scores mean, s ion (size, durabl	tandard deviation and percei le goods, owned house), bas
school choice informati	ion.)

Table O-3: Effect of Treatment on Value Added Chosen

	Lang	- 2nd	Avera	ge - 4th	Lang	g - 4th	Math	1 - 4th
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Full Sample								
Treatment	-0.008	-0.028	0.103*	0.085	0.046	0.021	0.149**	0.137**
	(0.052)	(0.059)	(0.058)	(0.058)	(0.066)	(0.068)	(0.062)	(0.060)
N obs.	1392	1218	1267	1112	1242	1093	1240	1090
Panel B: Enrolled sample								
Treatment	-0.076	-0.110	-0.080	-0.115	-0.102	-0.140	-0.012	-0.036
	(0.110)	(0.109)	(0.103)	(0.107)	(0.120)	(0.126)	(0.111)	(0.115)
N obs.	492	484	450	443	448	441	438	432
Panel C: Not enrolled samp	le							
Treatment	0.068	0.050	0.232***	0.214***	0.173*	0.136	0.254***	0.257***
	(0.072)	(0.073)	(0.083)	(0.078)	(0.099)	(0.092)	(0.079)	(0.076)
N obs.	761	734	695	669	677	652	682	658
Randomization controls	×		×		×		×	
Expanded controls		×		×		×		×

Table O-4: Effect of Treatment on Student Test Scores

Note: Randomization controls include market characteristics of schools (number and test scores mean, standard deviation and percentiles 25, 50 and 75.). Expanded controls include Mother's education, household information (size, durable goods, owned house), baseline school choice information.



Figure O-7: Markdown distribution in the Map - Santiago



Figure O-8: Distribution of Teachers College Entrance Exam Scores



Figure O-9: School Expendatures on Teacher Salaries and VA

Figure O-10: Teachers College Entrance Exam Scores and VA





Figure O-11: Comparing Measures of Value Added

O-4 Estimation Specifics

In the first step, we implement the estimation of the parameters (θ_1 , θ_2) by using the MPEC approach. This method exploits the sparsity structure of the Jacobian of the market share equations, as the unobserved qualities affect the demand of other products in the market but not the demand for products in other markets. The method includes the unobserved qualities as additional parameters to be estimated. The optimization problem that we solve is:

$$(\theta_1^*, \theta_2^*, \xi) = \operatorname{argmin}_{\theta_1, \theta_2} \begin{bmatrix} g_2 \\ g_3 \end{bmatrix}' \begin{bmatrix} W_{MM} & 0 \\ 0 & W_{IV-D} \end{bmatrix} \begin{bmatrix} g_2 \\ g_3 \end{bmatrix}$$
(31)

Subject to the following constraints:

$$(M(\delta, \theta_2) - \bar{M}) - g_2 = 0$$
 Micro moments from school choice decision (i)

$$\begin{bmatrix} \omega(\theta_2) \end{bmatrix}' \cdot IV - g_3 = 0$$
 IV moments (ii)

$$\delta - s^{-1}(\bar{S}, \theta_2) = 0$$
 Inner loop (iii)

$$\xi(\theta_2) - \delta(\theta_2) - f(\theta_1) = 0$$
 Demand disturbance (iv)

$$\xi^{norm} = 0$$
 Normalization restrictions (vi)

Where $f(\theta_1) = \sum_r \eta_k^r x_{jt}^r$.

In the second step, we estimate φ under the following optimization problem:

$$\varphi^* = \operatorname{argmin}_{\varphi} g_4(\theta)' W_{RCT} g_4(\theta)$$
(32)

Subject to the following constraints:

$$\hat{\beta}^{\text{RCT}} - \hat{\beta}^{sim} - g_3 = 0$$
 RCT moments (i)

In the third step, we estimate supply side parameters (θ_3). To do so, we need to get an expression for $\Delta \omega_{jt}$

When we rearrange the first order condition for quality we can get an expression for the unobserved component that affects the marginal cost of rising quality :

$$\omega_{jt} = \underbrace{\frac{v + p_{jt} - \sum_{l} \gamma^{l} w_{jt}^{l}}{\left[q_{jt}^{*} + s_{jt}(\mathbf{q}, \mathbf{p}, \boldsymbol{\xi}) \left[\frac{\partial s_{jt}(\mathbf{q}, \mathbf{p}, \boldsymbol{\xi})}{\partial q_{jt}}\right]^{-1}\right]}_{A_{jt}} - \gamma^{q}$$
(33)

Where $\omega_{jt} = \overline{\omega_j} + \Delta \omega_{jt}$. We use two strategies to identify the supply parameters. First, we exploit the panel nature of our data to estimate the fixed unobservable that impacts the marginal cost of quality $\overline{\omega_j}$.

To do so, lets name the first term at the right side of Equation 33 A_{jt} . For a given set of parameters γ_l , we can calculate the expression A_{jt} for every school-year combination and take the mean. we also redifine A_{jt} as $A_{jt} = \overline{\omega_j} + \Delta \omega_{jt} + \gamma^q$.

$$\overline{A}_j = \frac{\sum_{t=1}^T \overline{\omega_j} + \Delta \omega_{jt} + \gamma^q}{N_T} = \overline{\omega}_j + \gamma^q$$

We can rearrange the expression in Equation 33 and substract \overline{A}_i at both sides:

$$\omega_{it} + \gamma^q - \overline{\omega}_i + \gamma^q = A_{it} - \overline{A_i}$$

$$\Delta \omega_{jt} = A_{jt} - A_j$$

our optimization problem for the third step will be:

$$\theta_3^* = \operatorname{argmin}_{\theta_3} g_5(\theta)' W_{IV-S} g_5(\theta)$$
(34)

Subject to the following constraints:

$$w(\hat{\theta}_2) - h(\theta_3, s(\hat{\theta}_2), \nabla s(\theta_2)^{-1}) = 0$$
 Cost disturbance (v)

O-5 Calculating Standard Errors

The standard errors of the estimated parameters in each step of the estimation procedure are obtained from the variance-covariance matrix for the GMM estimator proposed by Hansen (1982). We will discuss how we calculate the standard error for a generic case (the parameters θ and moments **M**), and then we discuss the case of each set of parameters more specifically. Each one of our GMM estimators is the result of an optimization problem in which the objective function has a quadratic form:

$$\min_{\theta} Q_{obj} = \mathbf{M}' W_m \mathbf{M}$$

For which the gradient is:

$$\frac{\partial Q_{obj}}{\partial \theta} = 2 \cdot \mathbf{J}'_M W_m \mathbf{M}$$

Where \mathbf{J}_M is the Jacobian.

The variance-covariance matrix for a GMM estimator is calculated using the estimator proposed by Hansen (1982):

$$\operatorname{cov}(\theta) = (\mathbf{J}'_M W_m \mathbf{J}_M)^{-1} \mathbf{J}'_M W_m \mathbf{V} W'_m \mathbf{J}_M (\mathbf{J}'_M W_m \mathbf{J}_M)^{-1}$$

Where *V* is the vector for the variance of the moments. For estimating the demand and supply parameters, this variance corresponds to simulation error in our calculations of the models predictions. This element is estimated by simulating the sample moment at the estimate of θ for many independent sets of N_v simulation draws and calculating the variance across the calculated moment vectors. In the case of the parameters that we estimate from the experiment moments, we need to take into account the fact that the variance in our moments is not only affected by simulation error but also by sampling error in the OLS estimator for the treatment effects. As discussed by Berry et al. (2004) the simulation and sampling errors are independent of each other. The RCT moments in Equation 26 take the difference between the estimated treatment effects and our models predictions for it. Then, the variance of the moment conditions can be expressed as the sum of the variances due to sampling and simulation errors. The second one can be estimated as we already mentioned. The variance due to sampling error can be consistently estimated by calculating the variance of the moment conditions at the estimate of the parameter values holding the simulation draws constant.

O-6 Revenues and Expenses Analysis

In this section, we describe the composition of revenues and expenses of schools in Chile. Public resources come mainly from the voucher system, the principal source of income for public schools, and not less relevant for private voucher schools. Vouchers are significant economic resources that the state, through the Ministry of Education, gives to public and private education, in order to support its financing. These resources have different functions and assignation reasons, and they can be delivered based on school enrollment or school's characteristics. The voucher system is one of the main items in the public education budget (representing between 50% and 60% of it). On the other hand, these revenues are spent on different resources and educational projects, which must be reported annually in the schools' public accounts.

First, we will review the different types of vouchers and assignations that become revenues for schools, analyzing their composition and distribution. Second, we will study how these resources are used and what for, analyzing how is the spending behavior of schools.

O-6.1 Revenues

Schools' revenues can be obtained from different sources. On the one hand, there are incomes reported by school owners in their annual public accountability report. However, these entries are less detailed and, as will be explained in the expenses sub-section, categories vary over the years.

On the other hand, the other source of information about school revenues are the records published by the Ministry of Education about all vouchers delivered to each school. In these databases, each school has associated the amounts it receives for each voucher and assignation monthly, considering discounts according to the conditions of the school. This information allows us to have more detailed data about income sources and to do comparative statistics about the composition of total revenue.

After a description of the school, student, and teacher vouchers, we will analyze per capita school revenue for schools considered in schooling markets.

Vouchers Description

Since 1980, with the educational reform which conceives the different types of school (public, private voucher and private), and the DFL No. 2 that established the diverse transfers delivered to schools, there have been various vouchers created along the years. Table O-5 summarizes the entry of the vouchers that we will describe in the next subsection between 1990 and 2017.

Vouchers	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
General Voucher	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Educational Integration Program	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Zona assignation	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Boarding School Voucher	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Rural Voucher	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Educational Reinforcement Voucher		×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Voucher for Student Retention				×	×	×	×	×	×	×	×	×	×	×	×	×
Preferential Voucher (SEP)							×	×	×	×	×	×	×	×	×	×
Extended Preferential Voucher															×	×
SEP Concentration Voucher								×	×	×	×	×	×	×	×	×
Difficult Conditions		×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Difficult Conditions to teaching assistants															×	×
Special Additional Voucher (SAE)		×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Education Assistants Voucher			×	×	×	×	×	×	×	×	×	×	×	×	×	×
Excellence Performance Voucher (SNED)			×	×	×	×	×	×	×	×	×	×	×	×	×	×
Pedagogical Excellence assignation (AEP)				×	×	×	×	×	×	×	×	×	×	×	×	×
Assignation Individual Performance (AVDI)				×	×	×	×	×	×	×	×	×	×	×	×	×
Assignation for Collective Performance (ADECO)				×	×	×	×	×	×	×	×	×	×	×	×	×
Professional Acknowledgment Bonus						x	×	×	×	×	×	×	×	×	×	×

Note: This table summarizes the entry of the different voucher described in this document along the years.

Vouchers for Schools and Students

The schools' transfers from public resources are made up of a base voucher, increases and discounts to that voucher, other minor subsidies, and assignations or bonuses. Most of the subsidies or vouchers are calculated using a factor expressed in a unit of account called USE (*School Voucher Unit* in Spanish, School Voucher Unit), which varies its value according to changes in CPI and other economic parameters. From here on, we will talk about total revenue referring to the total transfers received by schools from public resources. In these descriptions, we do not consider the top-off fees (co-payment) that private voucher schools can charge to families, but it will be analyzed later.

This section will describe the vouchers that are reported annually for all schools. There may be other transfers to schools not detailed in this report, but they are marginal contributions to total revenue.

In the first place, the **general/base voucher** or **educational voucher**³⁵ is the core of the public financing system for schools (public or private voucher). Created in 1980, it consists of a monthly payment to the owner of the establishment per student attended. This amount may differ depending on the level or grade of the student, the school day he attends (full or half day) and the educational modality that the school imparts.

There are three major levels in the Chilean educational system: preschool, primary, and secondary education. Preschool education can start is composed of the 1st and the 2nd transition levels (students between four and five years old). Primary education accounts for levels 1 to 8 (6 to 14 years old), while secondary education has another four levels. The general voucher is different for the following categories (depending on the school-day length): (1) preschool students; (2) 1st grade, and 2nd-grade primary students; (3) 3rd to 6th-grade primary students; (4) 7th and 8th-grade primary students; and (5) 1st to 4th-grade secondary students. However, they can have the same voucher established within them³⁶.

The voucher can also differ between different education modalities. In secondary school, there are two types: technical education and professional education. There are also other modalities like Differential Special Education and Adult Education.

Finally, schools can have different school day lengths. Before 1997, schools could have a fullschool-day (FSD) regime, or multiple (often 2) shifts for enrolling and teaching students, daytime and evening school day. In 1997, Law No. 19.532 established the FSD mandatory for most of the

³⁵Article 9 DFL No. 2/98 and its modifications.

³⁶The general voucher for preschool education was only for no full-school-day (FSD) schools until October 2012, when Law No. 20,637 established an increase in the general voucher and the expansion of it for preschool students in FSD schools, among other modifications. After that, the general voucher for preschool students is the same as the one for 1st and 2nd-grade primary students in FSD schools.

subsidized schools (public and private) for third primary grade and above. The implementation was gradual because of infrastructure and resources-related constraints, and some schools were not included because of their education modalities.

Table O-6 shows the values of the general voucher in 2012, measured in dollars of the same year, for some of the different modalities, levels, and school day lengths.

	FSD	No FSD
Preschool (1st and 2nd transitional levels)	-	80
Primary (1st and 6th grade)	110	80
Primary (7th and 8th grade)	110	87
Secondary Professional (Scientist-Humanist)	131	97
Secondary Technical (Agricultural and Maritime)	177	144
Secondary Technical (Industrial)	139	112
Secondary Technical (Commercial)	131	101

Table O-6: General Voucher 2012, monthly values

Note: This table summarize the different monthly values of the general voucher for some levels and modalities of education in 2012. Values are expressed on 2012 dollars and they are the official published values before November 2012, when Law No. 20,637 comes into force. There are other modalities, as Differential Special Education and Adult Education, that have different values for the base voucher.

There are assignations or other vouchers that add-up to the general voucher. The first one is the **increment for the Educational Integration Program** or **PIE increment**³⁷- in Spanish *Programa de Integracin Escolar*, that increases the base voucher for students with transitory or permanent Special Educational Needs (NEE in Spanish). The voucher is increased only if the student joins educational levels that develop school integration projects approved by the Ministry of Education.

The second one is the **geographic zone assignation** or the **area assignation**, established in the 11th article of DFL No. 2. It consist of a percentage increase applied to the voucher, depending on where the establishment is located, and it is intended to compensate teachers and other school workers³⁸. The percentage can go from 0% to 140%, and is higher in areas that the cost of living could be expensive because of mobilization or connection issues³⁹. Table O-7 shows the percentage of schools in each range of the zone assignation for 2012, disaggregated by region. The ranges represent the percentage of the general voucher that is added to its full value. We can see that in the most central regions, such as the Metropolitan Region (13th), where the capital Santiago is located, the area assignation is zero; while if we observe more remote regions, such as the southern

³⁷Article 9 DFL No. 2

³⁸This voucher can be classified as a Teacher Voucher as well, but we consider it as a school voucher because it depends on school geographic conditions.

³⁹The percentage of increase can be: 0, 10, 15, 20, 25, 30, 35, 40, 50, 55, 60, 70, 80, 90, 95, 105

part of the country (regions 11th and 12th) or the northern ones (15th and 1st), we can see much higher values for this assignation.

Region	0%	10-30%	35-70%	80-105%	115-140%
1	0	0	87	13	0
2	0	52	46	2	0
3	0	80	20	0	0
4	0	100	0	0	0
5	99	1	0	0	0
6	100	0	0	0	0
7	86	13	1	0	0
8	0	99	1	0	0
9	0	95	5	0	0
10	0	57	40	3	0
11	0	0	0	65	35
12	0	0	64	35	1
13	100	0	0	0	0
14	0	100	0	0	0
15	0	0	87	13	0

Table O-7: Percentage of schools in each range of the Zone Assignation in 2012

Note: This table summarizes the percentage of schools in each range of the zone assignation, by region in 2012. The percentage of increase can be: 0, 10, 15, 20, 25, 30, 35, 40, 50, 55, 60, 70, 80, 90, 95, 105. Remote regions have higher percentages for zone assignation because it compensates for the cost of living due to mobilization and connection issues. The 13th, 6th, and 5th regions are the ones with the lowest percentages because they are the central regions (the capital Santiago is located in the 13th region), while the southern (11th and 12th regions) and the northern regions(15th and 1st), are the ones with the highest percentages.

The third voucher that add-up to the base voucher is the **Boarding School Voucher**. This subsidy goes to schools that serve as boarding schools to finance expenses for housing and feeding students, and expenses for maintenance and operation of the establishment. It also allows scholarly attention to students with access problems, either by mobilization or distance.

As mentioned above, private voucher schools can charge top-off fees and enrollment charges to families for entering the school. There are certain conditions under which students do not pay charges, like being a priority student (more details in the description of SEP voucher). Schools who charge top-off fees are called schools with *financiamiento compartido* or shared-funding⁴⁰, and it has consequences in the general voucher that they receive. Schools that have shared-funding have a discount over the general voucher, based on the price that they charge (as shown in Table

⁴⁰The shared-funding or co-payment was first announced in Law No. 18,768 (46th Article), in 1988, as a new regime only for school owners of private voucher schools. Later in 1993, Law No. 19,247 (9th Article) made more attractive this form of funding, increasing the co-payment limit and reducing the discount to the general voucher that was linked to the top-off fees charged.

O-8). The discount is known as **Shared-Funding Discount**.

0		11 1 1 1 1	0/ 6 1:
Group	Average amount cha	irged by shared-funding	% of discount
-	in U.S.E.	in 2012 USD	in general voucher
Ι	Less or equal to 0.5	Less or equal to 19.6	0 %
II	Over 0.5 USE to 1	Over 19.6 USD to 39.2	10 %
III	Over 1 USE to 2	Over 39.2 USD to 78.5	20 %
IV	Over 2 USE to 4	Over 78.5 USD to 157.0	35 %

Table O-8: Groups of voucher discount for schools with shared-funding

Note: This table shows the groups for school voucher discount by shared funding amount charged established in Law No. 19,247 (1993). Values are in U.S.E. (*Unidad de Subvencion Educacional*, or Educational Voucher Unit) and in the equivalent amount on USD for 2012. With the Inlcusion Law in 2015, the maximum amount charged for shared funding in that year was frozen in its nominal value, so that it decreases with the devaluation of the currency, while the decrease in resources is compensated with a nominal increase of the average school voucher and the application of new types of targeted vouchers for middle and low income families.

The Rurality Increment and the Contribution for Rural Floor are transfers that seek to compensate for the higher cost of educating children in rural areas. These vouchers are unified in the **Voucher for Rurality** and it varies according to the number of children attending the school. Also, it includes urban schools that are in *comunas* that do not exceed 5,000 inhabitants and with a population density of no more than two inhabitants per square kilometer. The zone assignation does not multiply the voucher for rurality.

There are some vouchers related to the support of students development by the school, like the **Voucher for Student Retention** and the **Educational Reinforcement Voucher**. Both vouchers aim to improve incentives from schools to enhance the educational achievements of students. The objective of the Voucher for Student Retention is to promote the incorporation, continuity, and end of the twelve years of schooling of students from 7th grade (primary) to 4th grade (secondary). This voucher applies for public and private voucher schools, and for students that belong to families participating in the *Chile Solidario* program⁴¹. On the other hand, the Educational Reinforcement Voucher is a transfer for schools that perform reinforcement courses to support low-performance students and help them improve, preferably considering students in higher social risk.

In 2008, Law No. 20,248 established the **Preferential School Voucher** or *Subvencin Escolar Preferencial* (SEP). This voucher was the most important voucher that add-on resources to the general voucher because it raises the transfers per kid in 50% for low-income students, changing the voucher structure from a flat voucher to a targeted voucher. It is intended to increase fund-ing to low-income families to improve their school choice and the students' performance. The voucher goes to *priority students*, who are students that: (1) belong to the *Chile Solidario* program;

⁴¹*Chile Solidario* is a public system of social protection focused on families from extreme poverty levels, aimed to promote their inclusion to social networks and to improve their living conditions (established in Law No. 19,949, 2004).

(2) they are in the bottom 30% of the income distribution (measured by the score of the Social Protection Record⁴²); (3) they are affiliated to the lower-income segment in the public health insurance system; or (4) they present vulnerable socioeconomic conditions (related to the education of the mother and the rurality and poverty of their *comuna* of residence). In the first year, the classification of students as priority students was from 4th grade and below. Every year, another level was included in the classification (and more resources were delivered to schools), to follow-up the same cohort of students, until 2016 where the policy covered all levels.

One side of the SEP policy is to raise educational vouchers to vulnerable students to increase schools' incentives to enroll them. The other side is that vulnerable students can choose more and better schools because they are exempt from paying any tuition or top-off fees. These conditions rule for schools that sign an agreement with the Ministry of Education to accept priority students without financial charges or selection of any type, in exchange for receiving more resources. A more detailed and deep explanation in ().

There are two more vouchers related to the SEP policy. The first one is the **SEP Concentration Voucher**, which accounts for additional resources for schools with a higher concentration of priority students. The value of the voucher increases as the percentage of priority students in the school grows, starting from 15% upwards, defining four concentration segments: between 15 and 30%, between 30 and 45%, between 45 and 60%, and 60% upwards. The second SEP-related voucher is the voucher for **Preferent Students**. It began in 2016 and it is an extension of the SEP voucher for students that are not priority students, but whose families are in the bottom 80% of the income distribution. This additional subsidy is half the value of the original SEP voucher.

Table O-9 shows the annual values of the regular voucher and SEP vouchers. Values are calculated using the official monthly value reported by the Ministry each year and multiplied for twelve months. These vouchers are paid based on the enrollment of the school according to the different types of students.

Finally, there are other vouchers directed to schools and students not detailed in this report, like the **school maintenance support voucher**, established in 1998 in the DFL No. 2 and the **contribution for free schooling**, established in 2015 with the Inclusion Law (Law No. 20,845).

Vouchers for Teachers

There are contributions and vouchers delivered directly to compensate teachers and education workers, either for work conditions or for their performance. Within the compensations for working conditions, we have in the first place the **Assignation of Performance under Difficult**

⁴²The Social Protection Record is an instrument built by the Ministry of Social Development to identify vulnerable families, for them to apply to financial or social benefits given by the State. It was replaced in 2016 for a social support system called Social Household Registry (*Registro Social de Hogares*)

Year	Regular Voucher	SEP	Preferent SEP	SEP Concentration
2005	974	-	-	-
2006	997	-	-	-
2007	973	-	-	-
2008	974	-	-	-
2010	1,110	564	-	102
2011	1,238	629	-	113
2012	1,314	798	-	142
2013	1,384	813	-	145
2014	1,390	816	-	146
2015	1,411	829	-	148
2016	1,430	1,008	504	150
2017	1,498	1,017	508	151

Table O-9: Vouchers Value per Student

Note: This table shows the annual values in 2012 dollars of the general voucher and SEP-related vouchers. The values correspond to the subsidies that would receive a 1st-grade student that attends a school with a high concentration of priority students (more than 60%). Values are calculated using the official monthly value reported by the Ministre of Education each year, and it is multiplied for twelve months. These vouchers are paid based on the average enrollment of the school for the past three months. For months that are not accounted in the scholar year, the voucher considers the three nearest "active" months before the month paid.

Conditions. This assignment is aimed at teachers who work in schools classified as "difficult performance" due to their geographical location, marginality, extreme poverty, or other similar characteristics. The benefit corresponds to a percentage of up to 30 % of the Minimum National Basic Remuneration (MNBR)⁴³. As of 2016, the schools receive an additional Assignation of Performance for Difficult Conditions associated with the **Assistant Education Personnel**, in addition to that corresponding to the teachers. However, Law No. 20,903 was published in the same year, creating a new System of Professional Development for Teachers, which built a new structure of remunerations for teachers and other education workers, modifying the existing assignations. In particular, one of the vouchers that the law derogates is the Assignment for Difficult Conditions.

Within wage compensations for teachers due working conditions, the **Special Additional Voucher** (SAE in Spanish) is an important contribution in this item. This voucher accounts for three different assignments: the Proportional Bonus (*Bono Proporcional*), the Complementary Form (*Planilla Complementaria*) and the Extraordinary Bonus (*Bono Extraordinario*).

Law 19,410 (1995) established the SAE, which was an amount given to school owners based on the enrollment of the school (adding-up to the base voucher) for compensating teachers' wages

⁴³The Minimum National Basic Remuneration is the minimum monthly income for teachers, understood as the product of the minimum value of the chronological hour set by law for each level of the educational system, multiplied by the number of weekly chronological hours for which the education professional has been hired.

through these three different bonuses⁴⁴. The 8th article established the permanent right of teachers of public and private voucher schools to receive an increment proportional to their designated working hours (the proportional bonus); while the 9th article states the permanent right of receiving an amount that complements the remuneration when it is below the MNBR (the complementary form). Finally, the 10th article determines that if there are resources left from these two transfers, it will be another bonus for teachers (the extraordinary bonus). These three bonuses remained until 2016 when they were derogated by Law No. 20,903, leaving only the complementary form. In 2012, the value of the monthly SAE voucher was 3.5 US dollars (US dollars of 2012) per student in average for primary education students.

In the same line of increases in remuneration, Law No. 19,464 (1996) established a contribution to wages of the education assistants staff, called **Education Assistants Voucher**. This voucher is proportional to the working hours of the assistants, and its value is determined every January for the rest of the respective year.

There are other cases in which wage compensations are delivered due to the position that the teachers fulfill in the school. In this category, we have the **Assignation for Collective Performance** or ADECO established in Law No. 19,933, which benefits education workers who fulfill teaching-directive and technical-pedagogical functions in public or private voucher schools⁴⁵. For rural schools, there is another compensation called **Bonification to Teacher in Charge**, which is an income that goes directly to the teacher who is in charge of rural subsidized schools when there is not a director, and that additionally does teaching tasks.

As we mentioned before, vouchers for compensating teachers can be attributed because of working conditions or because of teachers performance. These latest vouchers are not recorded as regular income for schools because they can change annually, but they can be a relevant contribution to total revenues every year.

In its 16th article, Law No. 19,410 creates the National System of Performance Evaluation or SNED (for *Sistema Nacional de Evaluacin de Desempeo* in Spanish), which is applied since 1996 to identify best-performance schools within public and private voucher schools from the same region. Schools are evaluated in six fields: effectiveness, overcoming, initiative, school conditions improvement, opportunities equality and integration of the school community ⁴⁶. The best-evaluated schools become creditors of the **Excellence Performance Voucher** (*Subvencin por Desem*-

⁴⁴Law 19,410 only established this voucher regime for 1995 and 1996, so later in 1995, Law No. 19,429 determined an annual increase of the SAE, setting it as a permanent transfer. Law No. 19,598 (1999) and Law No. 20,247 (2008) made modifications in the same direction. The first one stated that the value of SAE must be expressed in U.S.E., meaning that it will increase proportionally with other vouchers; and the second one officially incorporated SAE to the permanent voucher system

⁴⁵The school must have more than 250 students enrolled in March each year

⁴⁶The first two fields are measured based on standardized test scores of the school. The rest of the fields have their own measures.

peo de Excelencia) for two years, which is an economic benefit for teachers aimed at the improvement of the education quality. Schools have to use 90% of these resources directly in compensating teachers, while the rest can be spent in other fields defined by each school. In 2008, Law No. 20,244 expands the voucher for Excellence Performance to education assistants.

In 2004, Law No. 19,961 established a system of evaluation for teachers who fulfill classroom teaching functions in public schools⁴⁷. The Center for Improvement, Experimentation and Pedagogical Research (CPEIP in Spanish), an institution belonging to the Ministry of Education, is in charge of the technical coordination for the correct implementation of evaluation processes. The evaluation is composed of four instruments: a portfolio, an auto-evaluation, an interview with another teacher, and reference reports.

The portfolio aims to evaluate different fields of the teaching practice, inside and outside the classroom. It is composed of reflection activities about the teaching vocation and a recorded class, to evaluate the class structure and the teacher behavior with students (participation promotion, feedback, support to students). The auto-evaluation, the interview with another teacher (which finishes in a pair-evaluation), and the reference reports written by the director or other high administrators, aim to evaluate the teaching practice and performance of the teacher on its own development and within the school community.

Teachers can be qualified as outstanding, competent, basic, and unsatisfactory. These results not only imply quality and professional development signaling for the teacher but can also mean wage increases for the well-qualified teachers. Outstanding and competent teachers can apply to the **Variable Assignation for Individual Performance** (AVDI), a transfer of resources that seeks to strengthen the quality of education and recognize the merits of teachers. However, it was derogated by Law No. 20,903 in 2016.

Another voucher that was created to enhance quality education and to recognize teachers of excellence, but was also derogated by Law No. 20,903, was de **Assignation for Pedagogical Excellence** or AEP. This voucher was delivered to schools to compensate teachers that were accredited as teachers of excellence through the evaluation of a knowledge test and a portfolio, similar to the AVDI.

Finally, to recognize teachers' education level, there is a monthly remuneration benefit to teachers who accredit having a professional degree and a major diploma. The amount of this contribution, called **Professional Acknowledgment Bonus**, is determined for a 30-hour working day (proportionally paid for teachers who work less than 30 hours) and is distributed 75% for the professional degree and 25% for the major diploma.

Some other vouchers addressed to teachers not detailed in this document are the compen-

⁴⁷The evaluation is compulsory for teachers in public schools. In 2017, private voucher schools requested access to participate in the evaluation system in 2018.

satory bonus, the assignation for professional development, and the assignation for teaching in schools with a high concentration of priority students. The last two assignations were established with Law No. 20,903, and they replace the AVDI and the AEP for the first one, and the Assignation of Performance under Difficult Conditions for the second one.

Revenue Analysis

The composition of total school revenue shown in Figures O-12 and O-13 for schools in markets reveal that the highest contribution is the educational or general voucher⁴⁸. The second highest contribution of resources for schools is the increasing share coming from the SEP voucher since 2008. This pattern is similar between public and private voucher schools. Note that private schools can receive more resources from top-off fees.



Figure O-12: Schools Revenue Composition: Public Schools

Note: This figure shows per capita annual revenue from the different vouchers for public schools. Other vouchers consider all the vouchers described in the previous section except for general voucher and SEP-related vouchers. This figure shows average values for urban schools, and it does not account for the area assignation, assuming schools located in centralized urban areas (as the capital city, Santiago). The figure shows that the highest contribution is made from the general voucher, while the second highest contribution is the SEP voucher.

⁴⁸For rural schools, not considered in the analysis of schooling markets, both the general voucher and the rural voucher mean a great source of resources as we would expect. Also, they received a significant share of their total revenue from the area assignation, the bonus for teacher in charge, and the assignation for difficult conditions, vouchers targeted to rural and/or vulnerable schools.



Figure O-13: Schools Revenue Composition: Private Voucher Schools

Note: This figure shows per capita annual revenue from the different vouchers for private schools. Other vouchers consider all the vouchers described in the previous section except for general voucher and SEP-related vouchers. This figure shows average values for urban schools, and it does not account for the area assignation, assuming schools located in centralized urban areas (as the capital city, Santiago). The figure shows that the highest contribution is made from the general voucher, while the second highest contribution is the SEP voucher.

The analysis of aggregate revenue we effectuate in this report is based on per capita revenue of schools, measured as total annual income for the general voucher and other regular vouchers over the average enrollment by year. The total revenue includes the general voucher, the PIE increment, the area assignation, the boarding school voucher, the rurality voucher, the assignation of performance under difficult conditions, the special additional voucher, the education assistants voucher, and the bonification to teacher in charge⁴⁹. For private voucher schools, the total revenue also includes contributions and discount related to shared-funding and the price that they can charge to families (top-off fees).

We also consider two different measures for total school revenue. The first one is the one described above, the annual sum of all the vouchers and other incomes received by the schools every month. The second one is the annual median of monthly revenue per school, multiplied by 12. This measure can solve minor problems due to deviations for outliers months or schools that report less than 12 months of income. However, as those cases represent less than 2% of the sample and the analysis remains very similar, we are showing figures for the first measure.

Figure O-14 shows per-capita (per-student) revenue between 2005 and 2017, differentiating by socioeconomic context of the school. This socioeconomic context or status is defined by quintiles of the percentage of 1st-grade students eligible for the SEP voucher less than or at 1 km away from the school. The first quintile corresponds to 20% of the schools with the lowest proportion

⁴⁹The rurality voucher and the bonification to teacher in charge are less relevant in schools considered for the analysis, because rural schools are not contemplated in the studied schooling markets.

of eligible children less than 1km away, and it is classified as "High SES". The fifth quintile then is classified as "Low SES". Eligible students in 2007 are identified as eligible students in 2008 who attended second grade, assuming they would maintain their eligibility status the previous year. For 2005 to 2007, the share of eligible students defining the socioeconomic status of the school is fixed.

We can see that per-capita revenue has been growing across the years, being higher for Low SES public schools relative to other public schools. For private schools, it is higher for High SES schools at the beginning, but then the gap between High and Low SES becomes smaller until it fully reverts near 2015. In the figures we can see three major jumps on schools revenue: the implementation of the SEP policy in 2008; then its reforms throughout 2011 (noticed in 2012) that increased the value and the usage flexibility of the subsidy; and in 2015 with the Inclusion Law, which not only increased transfers to schools but also created a new category to receive resources from the SEP policy. These jumps are more markedly for public schools.



Figure O-14: Per Capita Revenue by SES Group

Note: This figure shows the per capita annual revenue for public and private schools, differentiated by socioeconomic group. It shows that schools' incomes have been increasing over time and that Low SES public schools receive more resources (from public transfers as vouchers) relative to other SES groups within public schools. On the other hand, High SES private schools receive more resources (from public transfers as vouchers and for top-off fees charged to families) relative to other SES groups within private schools.

Figure O-15 shows per capita revenue that schools receive from SEP vouchers. Income from the SEP policy has continuously grown for both public and private schools, and it is always higher the lower is the socioeconomic status of the school. This trend arises because Low SES schools concentrate more vulnerable students, increasing not only the individual SEP voucher but the

concentration voucher as well.



Figure O-15: Per Capita SEP Income by SES Group

Note: This figure shows the per capita annual revenue for public and private schools due to the SEP policy, differentiated by socioeconomic group. It shows that income from the SEP voucher has been increasing over time, and it is always higher the lower is the socioeconomic status of the school.

If we differentiate per capita revenue for private schools between those that have SEP vouchers and those that do not, as shown in Figure O-16, we can see that it is higher for Low SES private schools within SEP private schools. This fact is directly related to what is mentioned in the previous figure, given that the schools of Low SES concentrate more vulnerable students. For non-SEP private schools, the situation is the opposite, High SES schools always have more percapita revenue within SES groups across the years, because of higher prices. Figure O-17 shows the importance of SEP income over total revenue for SEP private schools, and it can be noted the growing trend of the share of SEP resources, specifically for Low SES schools. Figure O-18 shows the heterogeneity of the distribution of SEP importance through its percentiles 25, 50, and 75, within public and private schools in 2012.



Figure O-16: Per Capita Revenue by SES Group and SEP status (Private Schools)

Note: This figure shows the per capita annual revenue for private schools, differentiated by the socioeconomic group and the SEP status. It shows the inverse relation between SES Group and per capita revenue when we analyze SEP/non-SEP private schools.



Figure O-17: SEP Importance over Total Revenue: SEP Private Schools

Note: This figure shows the percentage of SEP income over total revenue for SEP private schools. It shows a growing trend of the share of SEP resources over total resources, being higher for the lower SES groups.



Figure O-18: SEP Importance over Total Revenue in 2012

Note: This figure shows the percentage of SEP income over total revenue for SEP private schools and public schools, by SES groups in 2012. It shows percentiles 25, 50, and 75 of SEP importance for SEP schools in each case.

To check the previous point, we can see in Figure O-19 the evolution of the prices charged by private schools, differentiated by SEP and non-SEP schools. SEP private schools have maintained their average price charged since the application of the SEP Law, with a small downward trend for Low and Medium-Low SES schools. This situation arises because they can not charge priority students, so the average price decreases to a higher number of priority students. On the other hand, non-SEP private schools have increased their prices since 2008.



Figure O-19: Private Schools' Prices by SES Group and SEP status

Note: This figure shows the evolution of prices for private schools, differentiated by SES Group and SEP status. It shows how prices for SEP private schools have remained flat with slight downward trends, while prices for non-SEP private schools have increased.

Marginal revenue from students

For further analysis and estimation, we use values reported in Table O-9 to obtain the marginal revenue that every school in the markets receive for the different types of 1st-grade students. First, we assume that every school has full-school-day. This assumption is close to reality since the fraction of students who attended a full-day school grew from 20% in 1997 to 90% in 2014 (Alfaro et al., 2015). Then, we computed the share of priority students in each school by year, to assign the SEP concentration voucher⁵⁰. Finally, we compute three different values: the marginal transfers from a regular student, the marginal school revenue from a regular student, and the marginal school revenue from a priority student. The first one is different from the second one because the first one accounts for public transfers (i.e., vouchers), while the second one accounts for vouchers and price charged to the student if the school charges top-off fees. In many cases, when the school does not charge top-of-fees, the marginal transfer and the marginal revenue for regular students are the same.

The marginal transfers account for the general voucher, adding the area assignation and the discount for shared-funding if the school charges top-of-fees. Then, as stated above, the marginal

⁵⁰The values of the Concentration Voucher are different for the four groups previously defined. Table 3 only reports the highest values for the 4th group, with 60% or more priority students.

revenue from regular students accounts for the marginal transfers and the price, if it is larger than zero. Finally, the marginal revenue from a priority student accounts for the transfers of a regular student, the SEP voucher, and the SEP concentration voucher, which depends on the share of priority students in each school every year.

O-6.2 Expenses

The accountability of public resources is a relevant issue in educational policy because it is necessary for ensuring the proper use and efficiency of public resources. The SEP Law (Law No. 20,248) in 2008 establishes in the letter (a) of its 7th article that the school owners must report to the Ministry of Education regarding the use of all the resources received under the SEP policy. Given that, both revenues and expenses were only reported if they used SEP resources and if they went to the Educational Improvement Plan actions.

In 2009, article No. 46 of Decree with Force of Law (DFL) No. 2 of the Ministry of Education stated that all school owners who receive public resources have to account publicly for the use of resources and they will be subject to the audit and supervision of the Superintendency of Education. However, there were not common records reporting expenses as administrative data, apart from the SEP-expenses reports.

In August 2011, Law 20.529 created a new system for quality education guarantee, called the "National System for Quality Assuring of Pre-School, Primary and Secondary Education". This system aims to ensure quality and equity on education through policies, evaluations, and support and supervision mechanisms over schools and other agents in the educational system. In the 54th article of this law, it is established that all school owners who receive public resources must annually account for the use of all the resources they receive, both public and private, and not only for SEP-related expenses. These accountability records must follow the procedures and setup established by the Superintendency of Education, through the National System for Quality Assuring.

In September 2013, Decree No. 469 approved the rules that established the characteristics, modalities, and conditions for the shared mechanism of public accountability of the use of resources. This mechanism has to be followed by all school owners of public or private voucher schools⁵¹.

The accountability processes for the years 2013 and 2014 had some discrepancies that were perceived in the administrative data. In the first place, in 2014, the Superintendency of Education notified the existence of about 1300 schools that had not sent their reports on the use of resources of the general subsidy in 2012. These cases were allowed to render accounts for 2012 in the 2013

⁵¹Decree 469 will be modified later in 2016 by Decree 575, adding more details in the descriptions of central concepts and giving more time to schools to send the reports.

process (which took place in 2014). Then, that same year, the Superintendency established a new revenue and expense report format that had much more detailed entries. For example, in the case of expenses, it goes from having six categories, to having eighteen.

All these changes caused the administrative expenditure records for 2012 and 2013 to be inconsistent with the other years. The data of expenses that we receive from the Superintendency are balanced and consistent between 2008 and 2011 for exclusive SEP-related expenses, and between 2014 and 2017 for aggregate expenses. However, about 90% of the schools that register expenses in 2012 only have SEP expenses, 4% only report according to the new detailed expense format, and 6% report both. For 2013, 1% reported only SEP expenses, 30% reported only under the new detailed norm, and the remaining 69% reported both. Also, the total number of schools that reported expenses in 2012 was 8,189, while in 2013 they were 11,531, suggesting

Considering the context, we will do two separate analyses: (1) General expenses between 2014 and 2017, and (2) SEP-related expenses between 2008 and 2012, considering the 90% mentioned above. The principal analysis will describe the use of general resources, and we will link the schools' behavior with the use of SEP resources. Even though the 69% who report both types of expenses in 2013 could be considered in the 2014-2017 analysis, there could be some selection bias if the difference between the records is due to the engagement of the school owner (reporting or not within the established date), and from 2014 onward other spending categories are defined that do not coincide with the detailed format of 2012-2013. Since the 2014 process, the Superintendency of Education publishes manuals for accountability records each year.

Expenses Description

General Expenses

In this subsection, we will describe the detailed categories where general expenses are classified. For the analysis, some related expenses will be grouped into more general categories.

The first class of expenses is Remuneration Expenses, and they account for wages and compensations for teachers, assistants, and other educational workers. Items considered in these records are the base wages, payment for extra hours, and some other compensations and vouchers as the ones described in the subsection of Teacher Vouchers, in the Vouchers Description Section (SNED, AVDI, AEP, among others).

Then, we have expenses assigned to the payment for bonuses established in the Readjustment Law of the Public Sector (which is set every December); pension contributions to workers; other transfers due to indemnities; and other remuneration adjustments.

All of these expenses that are related to teachers' and workers' payments will be grouped into **Labor Expenditures** for the upcoming analysis.

The **Technical Advisory and Training** expenses are directed to invest in advisory services, consultancies, and training for the school workers. The resources are used to qualify teachers and assistants, and to improve their pedagogical and technical abilities.

Learning Resources expenses are dedicated to acquiring resources for the correct development of the students' learning process. Some examples are laboratory implements, sports implements, musical and artistic instruments, audiovisual resources and educational softwares, books, and educational and cultural events. Pedagogical Support Equipment expenses, on the other hand, accounts for the acquisition of needed equipment to develop the students' learning process. Some examples are photography equipment, interactive boards, computers and notebooks, televisions, DVD players and projectors, printers, scanners, and speakers.

There is a category of expenses named Expenditures on Student Welfare, that record all resources used for the students' basic needs, like meals, clothing, transfers for public shuttle, and school supplies, among others.

For the analysis, we will add up Learning Resources, Pedagogical Support Equipment, and Student Welfare Expenditures into an only group for Learning and Development Resources.

The **Operational Expenses** are the expenditures aimed at ensuring the proper functioning of the establishment. In this context, they include expenses for rent of school transport, operation of transportation, office supplies, computer inputs for administrative areas, and expenses related to specific activities of the school (events and field trips).

Expenditures on services are split into two types: Basic Services and General Services. Basic Services satisfy the primary needs for running the school, like water, electricity, gas, internet, mail, telephone, and heating. General Services, on the other hand, correspond to services that require the hiring of workers (or enterprises), such as cleaning, gardening, and security. These two types of expenditures are analyzed as **Services Expenses**.

We have five categories in school expenses records related to investment in school infrastructure. First, we have the lease of real estates, such as the educational place or possible administration offices; and the lease of movable property, such as furniture and machinery. Then, we have the expenses in construction and maintenance of the infrastructure, which considers both the heavy construction and the lighter installations; and the expenditures in maintenance and repair of movable property. Finally, the expenses in the acquisition of movable and immovable property are also considered, for those schools that decide to buy them. These five categories are considered as **Infrastructure Expenses** for further analysis.

Finally, schools have to account for **Expenses for Contingencies**, and they run them with petty cash that has a fixed amount of money to operate with cash available to schools' dependencies or officials, in case it is needed. Also, schools have to record payments for **Fines and Interests** that the school owner must pay for non-compliance and infractions of the regulations. Note that it

does not include fines issued by the Superintendency of Education, because these are deducted from the voucher settlement.

We add into a ninth category all **other expenses** reported by schools that do not fit in the categories previously defined. These expenses are adjustments for rectification, centralized resources, late reports for Law N0. 20,550 (See SEP expenses subsection) and withdrawals.

SEP Expenses

The SEP-related expenses are classified in similar categories that the general ones, but they have more restrictions and have to be exclusively related to the actions of the Educational Improvement Plan (EIP). In this subsection, we describe the nine different categories used in the accountability report for SEP expenditures.

First, we have **Operational Expenses** on goods and services. This entry accounts for all resources directed to daily use material, regular consumption goods, several services, leases, and minor expenses related exclusively to the EIP. The expenses of the regular operation of the establishment cannot be imputed to the SEP.

Staff or Labor expenses are the resources destined to the remunerations of the educational workers for their work in exclusive relation with the execution of the EIP. In 2011, Law No. 20,550 modified the SEP Law in multiple fields, but in particular, it extended the permitted expenses in staff, mostly to hire more teachers and education assistants and to extend the working hours of the available personnel. More details in the SEP Policy section ().

Another group of expenses is the one for **Technical Advisory and Training** directed to invest in advisory services, consultancies, and training in pedagogical or administrative matters for the school workers, within the framework of the EIP. Entities who provide these services have an essential influence on school development and its preparation for setting goals at the EIP, so they must be supervised by the Superintendency of Education. They can be natural or legal agents, and they have to register in the ATE Registry (External Technical Advisory in Spanish) to be accountable for schools.

The EIP establishes different actions in each learning environment that requires resources both for its implementation and for its development. In this context, we have two groups of defined expenses: expenses in **Pedagogical Support Equipment** and expenses in **Learning Resources**. Pedagogical Support Equipment expenses account for the acquisition of goods and equipment to carry out the actions on the EIP; while Learning Resources are those resources allocated to the consumable and non-consumable material to develop pedagogical activities of support and reinforcement of the students, within the framework of the EIP. Examples of these two groups of expenses are presented in the General Expenses subsection. There are two other groups of expenses defined by special situations: **Contingencies Expenditures** and **Centralized Resources**. Expenses for contingencies can exceed the 5% of SEP resources and they have to be within the context of the SEP policy, by solving problems with SEP rules or expenses linked with the EIP. When school owners have more than one school in the SEP policy, they can allocate up to 10% of SEP resources to Central Administration. These resources must be spent on technical, pedagogical, and administrative financial support tasks that involve the preparation and implementation of each EIP.

Another change introduced by **Law No. 20,550** in 2011 was that, for schools that have entered into the SEP policy between 2008 and October of 2011 and have not reached the minimum percentage of SEP spending required, can benefit from exceptional requirements and conditions in the first renewal of the SEP agreement.

The minimum percentage of spending for SEP resources was 70%. As mentioned in the 7th bis article and the transitory 15th article of Law No. 20,248, the requirements for the first renewal of the agreement in this extraordinary situation are: (a) to have asked the Ministry of Education for an agreement renewal at least sixty days before its expiration; (b) to have accounted for all SEP resources in the previous years; and (c) to have spent at least 50% of these resources in EIP's actions. Additionally, it can be exceptionally considered for the third requirement expenses for up to 15% of total voucher incomes spent in actions out of the EIP. As we will see in the spending analysis, expenses for Law No. 20,550 were only reported for 2012 because it was an extraordinary situation.

Finally, the last expenses reported by schools in the SEP policy context are expenses due to **Law No. 20,452** published in July 2010. This law approved extraordinary conditions for the use of voucher resources for infrastructure repair and construction, and equipment replacement needed after the earthquake that took place on February 27, 2010.

Spending Analysis

In this subsection, we analyze the spending behavior of schools considered in markets, examining the use of general resources between 2014 and 2017.

Table O-10 shows the spending behavior of schools within the nine categories described before. It is clear to see that Labor expenditures are the main subject of spending for both the private voucher and public schools. Figure O-20 shows the distribution of the share of labor expenses between public and private schools⁵². As we can see, private schools have a wider distribution in this expense subject, but public schools spend more on average. This situation can be justified because labor expenses account for bonuses for the public sector and other costs that public schools

⁵²The figure consider all years between 2014 to 2017. The figures for each year show similar results.

are more likely to spend in.

Figures O-21 and O-22 show the distribution of the share of operational expenses and learning resources expenses, respectively. For operational expenses, private voucher schools spend more than public schools, most probably because the latter depends on municipalities where operational costs can be centralized. For expenses on learning and development resources, schools' behavior is similar between private voucher and public schools, showing that both types of schools dedicate an equal share of their resources to provide students with school supplies and equipment for a proper learning environment.

	20)14	20)15	20)16	20)17
Expense Type	Р	PV	Р	PV	Р	PV	Р	PV
Labor	80	74	81	74	80	74	81	73
Technical Advisory and Training	2	1	1	1	1	1	1	1
Learning and Development Resources	4	4	4	4	5	4	5	5
Operational	4	6	4	7	4	7	3	6
Services	3	4	2	4	2	4	2	4
Infrastructure	1	9	0	8	1	8	1	8
Contingencies	0	0	0	0	0	0	0	0
Fines and Interests	0	0	0	0	0	0	0	0
Other Expenses	7	2	7	3	7	2	8	2

Table O-10: Spending 2014 - 2017 Percentage of Total Spending

Note: This table presents schools' types of spending as a percentage of total spending between 2014 and 2017, self-reported data. This data includes SEP spending, but it isn't differentiated between General and SEP sources. 'P' columns are for public schools, and 'PV' columns for private voucher schools. Labor Expenses account for remuneration expenses, bonuses for the public sector, pension contributions, indemnities, and other remuneration adjustments. Learning and Development Resources account for learning resources expenses, student welfare expenditures, and pedagogical support equipment expenses. Services expenses account for Basic and General Services expenses. Other expenses consider adjustments for rectification, centralized resources, late reports for Law N0. 20,500 and withdrawals.

Figure O-20: Share of Labor Spending over General Expenses



Note: This figure shows the distribution between public and private voucher schools of the percentage of labor spending over general spending. Labor spending accounts for remuneration expenses, bonuses for the public sector, pension contributions, indemnities, and other remuneration adjustments.





Note: This figure shows the distribution between public and private voucher schools of the percentage of operational spending over general spending.

Figure O-22: Share of Learning and Development Resources Spending over General Expenses



Note: This figure shows the distribution between public and private voucher schools of the percentage of learning resources spending over general spending. Learning and Development spending accounts for learning resources expenses, student welfare expenditures, and pedagogical support equipment expenses.

Analysis of SEP Expenses

In this subsection, we show the spending behavior of schools considered in markets respecting SEP expenses, for 2008 to 2012. Table O-11 shows the spending behavior of schools within the nine categories described in the description subsection.

	2008		2009		2010		2011		2012	
Expense Type	Р	PV								
Operational	31	24	15	18	15	18	15	17	12	16
Labor	36	35	35	39	41	46	45	49	43	50
Technical Advisory and Training	13	6	10	8	10	6	13	9	9	7
Pedagogical Support Equipment	11	19	17	17	10	12	7	9	6	8
Learning Resources	8	15	13	16	14	14	12	13	10	13
Contingencies	0	1	1	1	1	1	1	1	1	1
Centralized Resources	0	0	8	1	8	1	8	1	6	1
Law N. 20.550	0	0	0	0	0	0	0	0	13	4
Law N. 20.452	0	0	0	0	0	1	0	1	0	0

 Table O-11: SEP Spending 2008 - 2012 Percentage of Total SEP Expenditures

Note: This table presents schools' types of SEP spending as a percentage of total SEP expenditures between 2008 and 2012. 'P' columns are for public schools, and 'PV' columns for private voucher schools.

Once again, as we saw for general expenses, labor-related expenses are the main subject of spending for all types of school. Considering that rules for SEP expenditures were more rigid than for general resources, and only since 2012 with the reform of 2011 (Law No. 20,550) schools have fewer restrictions to hire and to extend teachers' working hours, it is expectable that the share of Labor expenditures on total SEP expenditure is lower than the same percentage in general spending.



Figure O-23: Share of Labor Spending over SEP Expenditure

Note: This figure shows the distribution between public and private voucher SEP schools of the percentage of labor spending over SEP spending.

Figure O-23 shows the distribution of the share of labor expenses over SEP expenditure, including from 2008 to 2012. The distribution is more heterogeneous than the one for general resources, what it has to do with the legal change. We can split the data between years to see if the reform in 2011 change how schools spent their resources. Figures O-24 and O-25 show the same distribution as Figure O-23, but for 2008 and 2012, respectively. This evidence shows how the law change compress and increase the rate of resources spent on labor because of the more flexibility to do it.





Note: This figure shows the distribution between public and private voucher SEP schools of the percentage of labor spending over SEP spending for 2008.



Figure O-25: Share of Labor Spending over SEP Expenditure in 2012

Note: This figure shows the distribution between public and private voucher SEP schools of the percentage of labor spending over SEP spending for 2012.

Productivity of expenditures

Considering that the labor expenditures are the most significant component in the spending structure of schools, we can wonder if all these resources are being well-spent. There is a part of the literature on the economics of education that studies whether a higher amount of resources

and their usage, implies greater productivity and product(Glewwe et al., 2011; Mizala and Torche, 2012). Although these researchers conclude that more resources do not necessarily lead to better educational outcomes, there could be different nuances of the efficiency of the expenditure if we differentiate for type school.

To check if schools' expenditures on labor are productive, we can see the correlation between the amount of spending and signs of productivity of the labor. In this context, the main proxies for the productivity of teachers and teaching staff are test scores of teachers (a performance proxy) and the value added of the school. Figure O-26 shows the correlations between per teacher spending and these two measures. Per-teacher spending accounts for spending on labor resources divided by the number of teachers in the school. Teachers' math weighted average score represents the average of teachers' scores in the school weighted by their teaching hours. The math test is the test for entering college or tertiary education, at the end of high school. On the other hand, value added is a measure of the quality of the school (more details on the Value Added Section).

The main conclusion about Figure O-26 is that private voucher schools have a positive relationship between their labor expenses and the quality of the resources they get. However, public schools can spend less or more resources, without changing their quality significantly, being less productive on their expenses.



Figure O-26: Share of Labor Spending over SEP Expenditure in 2012

Note: This figure shows the correlation between labor spending and the average weighted teachers' score of the school in the left subfigure; and the correlation between labor spending and the school value-added in the right subfigure. Both subfigures are differentiated by types of school, showing a positive relationship between labor spending and the productivity proxies for private voucher schools, while public schools show low or none relationship.