

Preferential School Subsidy Law (SEP): Some Preliminary Results of its Implementation

Ley de Subvención Escolar Preferencial (SEP): algunos resultados preliminares de su implementación

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Abstract

This study provides several quantitative results of the impact of the Preferential School Subsidy Law (SEP) in the quality and equity of the Chilean education system. Given the significant amount of resources, the changes in the financing structure and the transformations in the continuous improvement process that it has provided, the SEP is considered to be one of the major reforms of the last decades. The present study gives preliminary results of the SEP studies in three areas: The delivery of a greater choice to vulnerable students, the improvement of academic performance, and increased system integration. The results show that, despite being a well-targeted policy and attaining important achievements, the SEP can not be considered as the main mechanism for schools to close quality gaps, as it has generated limited changes in the choice of vulnerable students, an improvement in academic performance which has been heterogeneous and focused mainly in more autonomous schools and almost no improvement in the levels of school segregation. All this raises the need to complement this reform with a series of policies, which are discussed in the article.

Keywords: Preferential School Subsidy, education quality, vulnerable students

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Resumen

El presente estudio entrega diversos resultados cuantitativos del impacto de la Ley de Subvención Escolar Preferencial (SEP) en la calidad y equidad del sistema educativo chileno. Considerando la importante cantidad de recursos, los cambios en la estructura de financiamiento y las transformaciones en el proceso de mejora continua que ha generado, la SEP se considera una de las mayores reformas de las últimas décadas. Se entregan resultados de estudios preliminares de la SEP en tres áreas: la entrega de mayores oportunidades de elección a los alumnos vulnerables, la mejora de resultados académicos y la mayor integración del sistema. Los resultados muestran que, a pesar de ser una política bien orientada y con importantes logros, la SEP no puede considerarse el principal mecanismo para que las escuelas cierren las brechas de calidad, ya que ha generado limitados cambios en las posibilidades de elección de los alumnos vulnerables, un mejoramiento de los resultados académicos heterogéneo y de mayor impacto en las escuelas autónomas y una casi inexistente mejora en los niveles de segregación escolar. Todo esto lleva a plantear la necesidad de complementar esta reforma con una serie de políticas que se discuten en este artículo.

Palabras clave: Subvención Escolar Preferencial, calidad educativa, alumnos vulnerables

The Chilean school system has been undergoing an intensive reform process since the mid-2000s. These changes reflect the fact that a large part of society is dissatisfied with the education of their children, and particularly with the different opportunities accessible to the Chilean people according to their respective socioeconomic and cultural status.

However, Chilean students are showing an improvement in reading scores on both national and international tests. Moreover, in recent years there has been a significant reduction in the academic achievement gap between students of a different socioeconomic status, even though this does not occur in the mathematics subsector, which retains a considerably higher gap than in countries with similar levels of development or similar averages to those obtained by OECD countries (OECD, 2010).

The Preferential School Subsidy Law (SEP - *Ley de Subvención Escolar Preferencial*), approved in early 2008, is defined as the major reform aimed at achieving a high level of learning equity among vulnerable students. The novelty of the SEP is that it not only corrects a funding system that was neutral with respect to the socioeconomic conditions of students' families (incorporating a significant amount of additional resources into the subsidized school system, with a budget of over 320 billion pesos for 2012), but also develops a new model of institutional management, which transfers the responsibility of designing and implementing teaching and management improvement strategies to the administrators, management teams, and teachers at the schools, while at the central level, it creates the technical and financial conditions and support necessary to improve learning among vulnerable students (Weinstein, Fuenzalida, & Muñoz, 2010).

Now, it is important to note that the reform contains far more than a simple financial component. This aspect lies at the center of its design, since it significantly modifies state contributions for the most vulnerable third of all students, but the reform also aims to create improvement processes in the schools that serve these students. However, expectations on this point should not be overblown, as international and national evidence indicates that increased financial resources, even when they are substantial, do not guarantee an improvement in educational performance¹ (Barber & Mourshed, 2008; Hanushek, 2006; OECD, 2010). The key to this sort of transformation lies in the school system's institutional design, capacity building in schools, and the quality of the management teams and teachers.

Given the high expectations the reform generated among educational stakeholders, its extensive coverage (more than 70% of schools in the country), the huge resources involved in the program, and Chile's current political and social context (where there is demand for a new social contract for school and higher education), in recent years an intensive research agenda has developed around various aspects of

¹ For the case of Chile, see the null effect of shared funding in Mizala and Torche (2012) or the minimal effect of the full school day (Arzola, 2011).

the reform's implementation, which has allowed for evaluation and monitoring of the SEP (Contraloría General de la República, 2012; Raczynski, Muñoz, Weinstein, & Pascual, 2013; Romaguera & Gallegos, 2010; Weinstein et al., 2010) and an informed debate on the process's scope and needs for adjustment.

The 4th grade SIMCE results in recent years show a significant increase in reading scores in 2010 and in mathematics scores in 2011, which has led not only ministry authorities but also various academics and educational policymakers to note that the effects of the Preferential School Subsidy implementation can already be seen in schools participating in the policy. Figure 1 shows that between 2007 (before the start of the reform) and 2010 these schools have seen an increase of between 13 and 19 points in their average SIMCE reading scores in all socioeconomic groups (SEG), except those from a high SEG. This increase is also observed in schools with medium-high SEGs, very few of which are part of the SEP Law. Moreover, the improvement in mathematics in the same group of schools during the same period is considerably smaller (between 4 and 9 points), which shows that the improvements in Chilean schools could be associated with other factors or a partial impact of the reform.

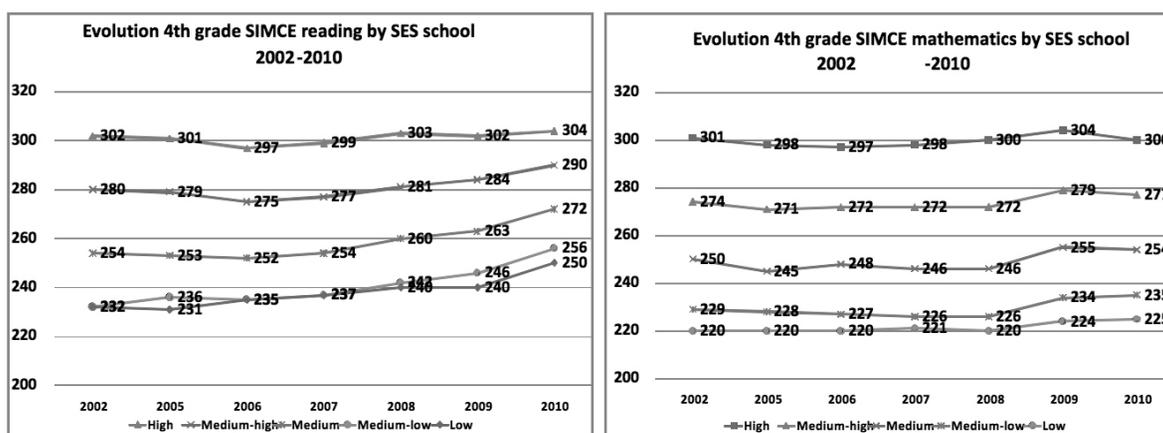


Figure 1. Evolution of 4th grade SIMCE scores from 2002 to 2010 for schools according to their SES.

The goal of this article is to describe a set of recent quantitative studies that account for some preliminary findings regarding the SEP Law's implementation. It also describes the differentiated funding experience of the Dutch school system, which has several similarities with the Chilean system, and the results of which offer valuable lessons. The paper concludes with a reflection on the expectations that should be had regarding the impact of the Preferential School Subsidy on quality of learning for vulnerable students, and a set of proposals to strengthen this objective based on international and national evidence.

Literature Review

International experience with student-differentiated funding systems: the Dutch case

Generalized compensation systems that provide monetary support to schools differentially according to student vulnerability exist in various school systems, in England, New Zealand, and the province of Ontario, Canada, among others. However, considering the recent research done on the Dutch system (Ladd & Fiske, 2009), and the similarity the system has with some features of the Chilean system, it is worth analyzing this valuable case.

In Dutch primary schools that serve students from 4 to 12 years of age, a system of differential funding by student has been in place since 1985 (*Weighted Student Funding* [WSF]). This system uses different variables to determine the amount of funding and gives the institution ample freedom regarding the use of the money. The main objective of this program is to generate greater equality in the educational opportunities that schools offer, which results in a search for ways to close gaps between schools rather than ways to concentrate the additional resources among vulnerable students within a school. The program also does not aim to reduce levels of socioeconomic segregation or segregation by academic ability between institutions, although it does aim to eradicate the differences between the results of students with a certain characteristic in the school system (Ladd & Fiske, 2009, pp. 6-9). In fact, its implementation over the past twenty years has not precluded a systematic increase in social segregation in Dutch schools, especially in its major cities (Ladd, Fiske, & Ruijs, 2009).

The WSF amounts mean 25% more resources for students whose parents are Dutch but have a low level of education, and 90% more for the children of disadvantaged immigrants. Institutions mainly direct these additional resources to recruiting more teachers and support staff per student. A feature of this policy is that additional funding is given to schools only when the total number of vulnerable students exceeds 9% of enrollment.² The evaluation of WSF results between 2003 and 2007 reveals that the policy has not managed to close the average academic achievement gap between schools with different concentrations of vulnerable students, although the 1994 - 2004 period saw a reduction in the gap in average outcomes between children of immigrant parents and the children of Dutch parents who completed at least secondary education.

Finally, Ladd and Fiske (2009) offer two important reflections on the results of the WSF program evaluation in the Netherlands. The first is that the program may fail to reduce the gap between schools with different concentrations of vulnerable students because simply increasing funding for schools is not enough, as these schools have greater difficulties regularly maintaining quality teachers and stable management. Additionally, the authors show that the Dutch authorities are well aware that schools cannot be solely responsible for children's development of children and for improving their opportunities, and thus the financial policy is complemented by a high level of investment in preschool education and language skill acquisition programs and a strong health system that systematically monitors the condition of every child in primary school.

Main features of the Preferential School Subsidy Law (SEP)

On February 1, 2008, the Preferential School Subsidy Law was published in the country's Official Journal. It has two explicitly stated objectives: a) to modify the demand subsidy, allocating more resources to the most vulnerable students, and b) to make commitments with educational stakeholders in order to improve the quality of education (Mineduc, 2008, pp. 2-3). In addition, authorities including the President of the Republic and the Ministry of Education (MINEDUC) have said that another main objective of the law is to provide equal opportunities for all students in the country (Mineduc, 2008), thus underlining the SEP's potential impact on educational equity (Raczynski et al., 2013).

² The system was modified in 2006, eliminating migrant status as a criterion, including an additional 30% more resources for students whose parents have a low level of education and 120% for those whose parents have a very low level of education (mostly immigrants), and initiating a gradual change process from direct financing of teacher costs to a system of general transfer to the administrators to make payments for personnel costs.

While the original draft law planned for the SEP to be implemented universally, after the parliamentary negotiation process it was defined as voluntary (Congreso Nacional, 2008). Therefore, to participate in the program it is necessary for the institutional administrator³ to sign an equal opportunity agreement with the Ministry of Education, under which the school commits to creating an Educational Improvement Plan (PME - *Plan de Mejoramiento Educativo*), improving standardized test results, not selecting students, and not charging the families of priority students (shared funding). The definition of a priority student is determined annually by the Ministry of Education, taking into account factors such as pertaining to the Chile Solidario social protection system, pertaining to the third most vulnerable sector of the population according to their Social Protection Card, or classification in health section A, among other conditions.⁴

After signing the agreement, the Ministry of Education ranks schools according to their SIMCE results (70%) and additional indicators (30%) in three categories: autonomous, emerging, and in recovery. Autonomous institutions are those with the best evaluation, and therefore they have greater freedom to manage their resources and create their PMEs. In contrast, schools in recovery require much more oversight of their actions; for example, their PMEs must be approved by the Ministry of Education prior to implementation.

With respect to financing amounts, the SEP awards a 60% increase over the regular average subsidy per priority student enrolled in pre-kindergarten through 6th grade, and two thirds of this amount for those enrolled in 7th through 12th grade (Raczynski et al., 2013), plus an additional amount based on the concentration of priority students the school has.⁵ According to the Ministry of Education, this means that the state has invested more than 720 billion in 2012 pesos in the first four years of the SEP's implementation (Mineduc, 2012), which is one of the largest and most significant educational interventions in recent decades (Treviño, Órdenes, & Treviño, 2009, p. 2).

Results: A quantitative analysis of the SEP implementation process

Here are some results of the Preferential School Subsidy implementation process. Considering the numerous objectives of this reform, this study aims to answer three central questions: a) Does the SEP Law provide greater opportunities for vulnerable students? b) Has led the implementation of the SEP resulted in improved academic performance? and c) Has the SEP led to greater social integration in the Chilean school system?

SEP Law: more opportunities for vulnerable students?

To answer this question, Acevedo and Valenzuela (2011)⁶ propose a theoretical simulation of the behavior of administrators of municipal and subsidized private schools with the implementation of the SEP Law. Following the work of Epple and Romano (1998, 2002) and Auguste and Valenzuela (2003), they anticipate that in a context where public schools cannot select students or collect financial contributions from families (shared funding) and where participation in the SEP Law is voluntary, all the institutions will sign the agreement to participate in the SEP Law. However, this would not expand educational options for vulnerable students, as these options existed before the reform implementation.

In contrast, subsidized private administrators would have a more heterogeneous reaction to the signing of the participation agreement, which would be directly linked to the relationship between the SEP value per vulnerable student, the marginal cost of accepting this group of students (which includes the effects associated with a smaller *peer effect* on the non-vulnerable students), the pre-reform shared funding (SF) of the institution, and the fixed cost of participating in the program. In this sense, it can be anticipated that free subsidized private schools and those with SF below the SEP value will sign the participation agreement, while those with SF in the range of the SEP value will not sign, because in doing so they

³ In Chile the term *sostenedor*, or administrator, is used to refer to the person legally in charge of managing a subsidized private school.

⁴ For a detailed classification of priority students, see Congreso Nacional (2008), particularly pp. 1237-1239.

⁵ In 2011 there were two important changes made to the SEP amounts, increasing both the amount for concentration and the amount of the subsidy per priority student.

⁶ Other authors have arrived at similar conclusions as this work, notably Elacqua and Santos in their recent study (2013b).

would lose students with higher SES and skills. For their part, subsidized private schools with very few or no priority students have little incentive to sign the SEP agreement, due to the high fixed costs that the initiative could generate compared to the limited additional resources they would receive.

In brief, it is anticipated that public schools will continue to lose students (particularly the most vulnerable students) and that the loss rate will depend on the amount of the SEP per priority student. Thus, the higher the amount, the greater the loss, and it may be accompanied by the emergence of new subsidized private institutions in sectors with a high concentration of vulnerable students.

Upon analysis of municipal and subsidized private institutions that offer between a 1st and 4th grade education it is seen that almost all municipal schools (97.8%) signed the agreement with the Ministry of Education in 2010,⁷ which accounted for 99% of the enrollment subject to potential benefit. However, in the subsidized private sector the situation is more mixed, and 43.9% of institutions, representing a similar percentage of enrollment between pre-kindergarten and 4th grade, had not signed the agreement at the end of 2010.

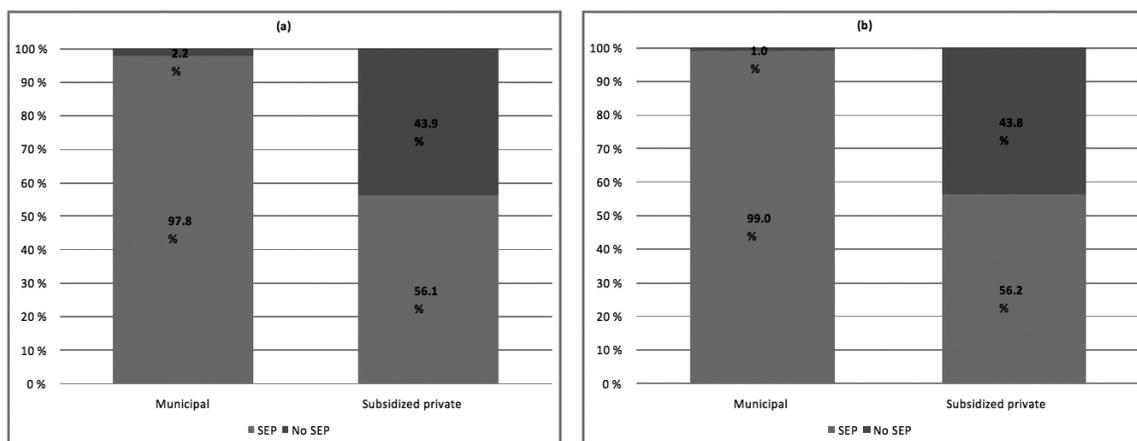


Figure 2. Distribution of schools (a) and students (b) in the SEP 2010, according to institutional area. Source: Acevedo and Valenzuela (2011).

Figures 3 and 4 describe some of the salient features of subsidized private schools that sign and do not sign the SEP Law participation agreement, and it is clear that a large part of free schools and schools with a low average amount of shared funding⁸ participate in the program. However, those schools that charge on average above 9,385 pesos per month mostly did not sign the agreement in 2010, as was the case for more than 80% of institutions that charged monthly average amounts exceeding 16,000 pesos, which shows that the high value of the SEP was not enough to attract a significant proportion of institutions with SF. A similar and probably highly correlated result is observed when analyzing the level vulnerability of the school, measured by the IVE-SINAE Index prepared annually by Junaeb.

⁷ Elacqua and Santos (2013b) analyze the signing of agreements for 2008 and Romaguera and Gallegos (2010) describe in detail the evolution of the schools that signed the agreement in 2008, 2009, and 2010.

⁸ Quintile 1 for SF fees is for up to an average of \$4,800 monthly, quintile 2 is up to \$9,385, quintile 3 up to \$15,990, quintile 4 up to \$27,088, and quintile 5 up to \$70,800.

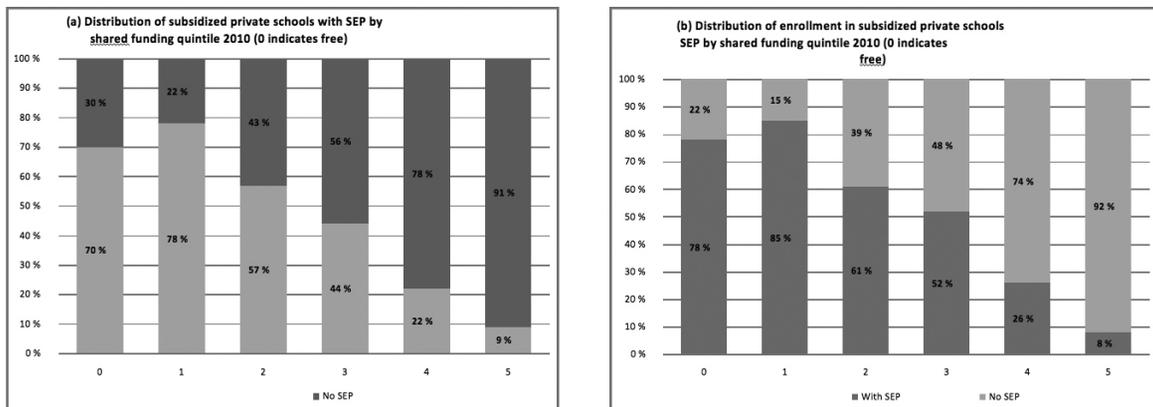


Figure 3. Distribution of schools (a) and students (b) of subsidized private schools in SEP 2010, according to the amount of shared funding. Group 0 are free schools, group 1: 1.58-4,961 pesos; group 2: 4,970-9,385 pesos; group 3: 9,398-15,991 pesos, group 4: 16,018-27,088 pesos and group 5: 27,270-70,815 pesos. Source: Acevedo and Valenzuela (2011).

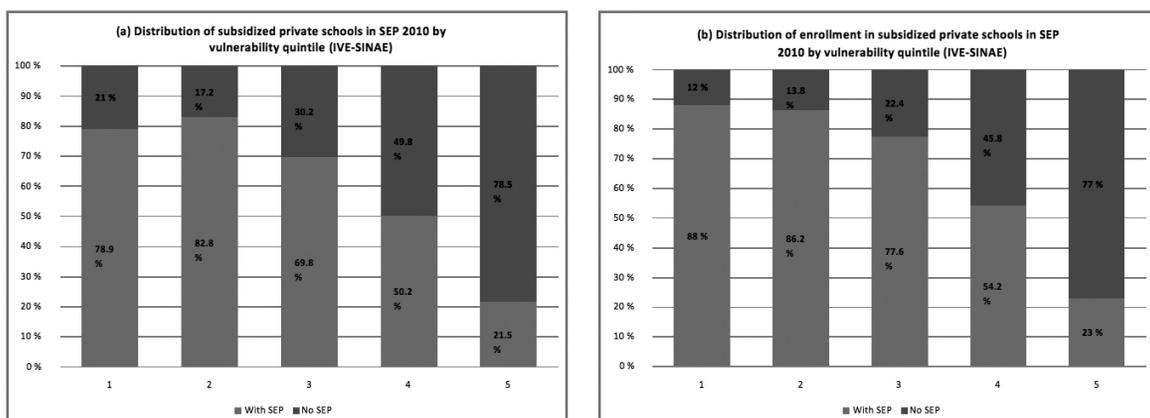


Figure 4. Distribution of schools (a) and students (b) of subsidized private schools in SEP 2010, according to the Vulnerability Index (IVE-SINAE). Source: Acevedo and Valenzuela (2011).

Furthermore, it verifies the consistency of the results of the theoretical model using a *probit* estimation regarding the decision to sign or not sign the participation agreement in 2010. The alternative specifications reveal that a greater amount of shared funding is a critical variable for program participation. In addition, small schools are less likely to sign the agreement, which is consistent with the relationship between fixed costs and the potential additional resources these schools could obtain. Moreover, the greater the school's vulnerability (that is, the greater the IVE-SINAE index value), the higher the probability that it will participate in the program. Interestingly, after controlling for the aforementioned variables, the school's academic effectiveness in terms of student learning outcomes, as measured by the average 4th grade SIMCE scores for 2005-2009, does not affect the decision of whether to participate in program or not.

Table 1
Marginal effects of the probit estimation on the decision to participate in the SEP Law 2010

Variables	Model Specification								
	I	II	III	IV	V	VI	VII	VIII	IX
Part. sub. school ^a	-.216** (.012)	-.218** (.013)	-.204** (.013)	-.206** (.013)	-.201** (.013)	-.204** (.013)	-.205** (.013)	-.202** (.013)	-.202** (.013)
Selection by ability ^a	-.015* (.006)		-.010 (.008)	-.016† (.009)	-.012 (.008)	-.010 (.008)	-.009 (.008)	-.013 (.008)	-.013 (.008)
Selection by SES ^a	-.012* (.006)		-.005 (.007)	-.002** (.007)	-.003 (.007)	-.004 (.007)	-.004 (.007)	-.003** (.007)	-.003** (.007)
Selection by religion ^a	.020** (.004)		.023** (.007)	.020* (.009)	.021** (.007)	.023** (.007)	.023** (.007)	.021** (.007)	.021** (.007)
SF range 1 ^a		-.048** (.014)	-.015 (.010)	-.018 (.012)	-.015 (.011)	-.014 (.010)	-.014 (.010)	-.015 (.011)	-.015 (.011)
SF range 2 ^a		-.15** (.031)	-.084** (.023)	-.097** (.026)	-.083** (.023)	-.083** (.023)	-.081** (.023)	-.085** (.024)	-.085** (.024)
SF range 3 ^a		-.440** (.041)	-.203** (.039)	-.219** (.043)	-.196** (.039)	-.201** (.040)	-.198** (.040)	-.201** (.042)	-.201** (.042)
SF range 4 ^a		-.684** (.039)	-.351** (.059)	-.348** (.062)	-.336** (.061)	-.348** (.059)	-.343** (.059)	-.343** (.064)	-.343** (.064)
Rural school ^a	-.018** (.008)		-.019† (.010)	-.007 (.011)	-.022* (.011)	-.019† (.010)	-.019† (.010)	-.022* (.011)	-.022* (.011)
School size < 20 ^a	-.289** (.053)		-.232** (.046)		-.186* (.072)	-.235** (.047)	-.239** (.047)	-.186** (.072)	-.186** (.072)
School size 21- 50 ^a	-.099** (.025)		-.074** (.024)		-.053† (.029)	-.075** (.025)	-.077** (.025)	-.053* (.029)	-.053* (.029)
School size 51 -100 ^a	-.029** (.011)		-.019† (.012)		-.007** (.012)	-.020† (.012)	-.021† (.012)	-.007 (.012)	-.007 (.012)
IVE	.003** (.000)		.002** (.000)						
Priority students 0-10 ^a				-.185** (.062)	-.028 (.038)			-.026 (.038)	-.026 (.038)
Priority students 11-30 ^a				-.096** (.024)	-.024 (.022)			-.023 (.022)	-.023 (.022)
Priority students 31-50 ^a				-.034* (.014)	-.016 (.014)			-.015 (.014)	-.015 (.014)
Priority students 51-100 ^a				-.025** (.009)	-.020* (.009)			-.020* (.009)	-.020* (.009)
Dummy has secondary ed. ^a								.003 (.007)	
Type by secondary ed. ^a									.003 (.007)
SIMCE reading score						-.0001 (.0002)			
SIMCE math score							-.0001 (.0002)		
Regional controls ‡	Yes	Yes	Yes	Yes		Yes	Yes		
N	5,828	5,828	5,828	5,828	5,828	5,828	5,828	5,828	5,828
Pseudo R ²	0.48	0.49	0.51	0.51	0.51	0.51	0.51	0.51	0.51

Note: robust standard errors are in parentheses, and were calculated according to White (1980) and the Delta method. Dependent variables: whether the school is subsidized private or municipal; whether the school selects students by academic ability, socioeconomic status, or religion; the school's shared funding range, with range 1: 1.58-9,385 pesos, range 2: 9,398-15,990 weights, range 3: 16,018-27,088 pesos, range 4: 27,270-70,800 pesos. Category without shared funding is a control. *School size* refers to the number of students enrolled in preschool and 1st to 4th grade; the IVE is the social vulnerability index of the school, ranging from 0 to 100, where a higher value implies greater vulnerability; *priority students* refers to the number of students who can receive SEP between pre-kindergarten and 4th grade; to have secondary education implies that the school also offers this level; *SIMCE reading and math* is the school's average on the 2007 test for 4th grade. ‡ Regions II-XV. ** < 1% level of significance, * < 5% level of significance, † < 10% level of significance. a indicates a discrete change of a *dummy* variable from 0 to 1.

Finally, in all the specifications, subsidized private schools were 20% less likely to participate in the program, which could be partially explained by the need to provide this group of administrators with more information about the implications of signing the agreement. In other words, in the following years a higher percentage of these schools could join the reform. However, this is not conclusive, as the results could also be linked to unobservable variables in this subgroup.

In short, the participation in the SEP Law of schools with public funding was differentiated. While in public schools there was almost universal participation, among subsidized private schools those with higher shared funding charges were marginalized, reflecting a strategic behavior that restricts opportunities for vulnerable students, especially for those schools with better socioeconomic conditions and, therefore, better averages on national standardized tests.

Implementation of the SEP Law: has school quality improved in the three years since the law took effect?

Since the results were given for the 2010 4th grade SIMCE test, great expectations have been generated as to whether the sustained increase in the reading subsector is due to the implementation of the SEP Law, and these expectations extended to the math subsector for the 2011 SIMCE results.

Villarroel's 2012 study investigates whether or not the SEP is indeed correlated with the trajectory of the results in the reading subsector, analyzing the results at the school level from the pre-reform period (2007) and the 2010 results, i.e. three years into the reform. The use of different semiparametric methodologies for program evaluation excludes municipal schools from the study, since almost all of them have been participating in the program from the beginning in 2008. This precludes the definition of a control group to estimate its average effect.

However, the heterogeneity in treatment among subsidized private schools allows for an identification of the program's impact on treated schools and on other relatively similar schools that were not yet participating in the program in 2010. The basic method for estimating the average effect of program participation is the difference-in-difference estimation based on a matching of treated schools with untreated schools that serve as a control group. The selection of control schools is based on characteristics that are observable before treatment and that are linked to program participation.⁹ Finally, using the *nearest neighbor* criterion the numerous "clones" of each treated school are selected, allowing an untreated school to be used as a control for more than one school that received the program.

Since it is possible that the treatment itself has changed the composition of students in treated schools and in control schools, and thus skewed the criteria for estimating the policy's effect, school-level control variables are included for 2007 and 2010 of the main characteristics that affect educational performance, such as the average education of the students' mothers and fathers, the average number of books in students' families, and average income (all proxies of the *peer effect* at the school level); the urban situation of the school; if it also offers secondary education; the implementation of mechanisms for selecting families (Contreras, Sepúlveda, & Bustos, 2010); the percentage of male students, and regional dummies that control for unobservable regional conditions. In order to reduce bias in the program estimation related to non-random errors, generally present in schools where a small number of students take the test each year (Kane & Staiger, 2002), only institutions where at least 15 students take the test annually were included.

The results of the estimated effect explain effects of between 3 and 5 points for language and mathematics (see Table 2). However, given that the participant schools in the SEP Law started at different times, this differential effect should be considered in the evaluation. Therefore three dummies are included, accounting for whether 1, 2 or 3 years have passed since the approval of the PME, leaving as a control schools with unapproved PMEs, which interact with the treatment condition (SEP school and year 2010). Moreover, since SEP schools have diverse concentrations of priority students, it is essential to control for this condition. This is solved by distributing the schools in quintiles according to the degree

⁹ The school characteristics used for 2007 were geographical location, selectivity mechanisms, levels of shared funding, size of enrollment, concentration of vulnerable students, socioeconomic characteristics of students' parents, concentration of males in the school, and whether secondary education is offered.

of concentration of priority students, so that the specification for evaluating the impact includes four dummies of these quintiles (leaving as a control quintile 5: the lowest 20% of schools in terms of priority student concentration), as well as the interaction of these quintiles by treatment condition, where the coefficients of these variables correspond to the differential impact of the SEP Law according to the concentration of vulnerable students.

The results given in Table 2 explain a high heterogeneity in the correlation of the program at the school level. First, only schools that in 2010 had had their PMEs approved for three years (all autonomous schools¹⁰) saw positive results from the SEP Law treatment: between 1.6 and 10.5 points in reading and between 8.1 and 13.7 points in math. The second group that saw a positive outcome at the school level in 2010 consists of schools that have a high percentage of priority students, that is, those in the quintile with the highest concentration (over 60% of enrollment). For this group, having participated in the SEP program added about 3 additional points in reading, with a similar result for math. However, most subsidized private schools participating in the program still have not seen an improvement in student learning directly linked to this condition. Additionally, most of the improvement in the reading subsector between 2007 and 2010 was widespread among schools. The explanation for this goes beyond the scope of this research, but the optimistic hypothesis is that the development of an institutional structure that regulates improvement, finances and supports strategies for this purpose, and creates a culture of greater accountability and transparency could be contributing to the overall improvement of educational performance, as it is easier to initiate change in the reading subsector than in the math subsector.

¹⁰ Schools classified as autonomous are those that have maintained consistently good results on SIMCE tests.

Table 2
Difference-in-difference estimation at the school level according to treatment intensity for reading and math in subsidized private schools, 4th grade (2007 and 2010)

Impact of the SEP Law by school according to priority student concentration quintiles and years in the program - SIMCE reading

	<i>1 year with PME</i>	<i>2 year with PME</i>	<i>3 year with PME</i>
Models	Total effect	Total effect	Total effect
Specification (1)			
Undifferentiated effects	3.5***	3.5***	3.5***
Only differentiated by PME year	- 1.8	- 0.6	5.4**
Differences by PME year and priority student concentration	Sum	Sum	Sum
Q I	2.9***	3.7***	10.5***
Q II	- 0.4	0.4*	7.2***
Q III	- 2.8**	- 2.1	4.7**
Q IV	- 6.0***	- 5.2**	1.6

Impact of the SEP Law by school according to priority student concentration quintiles and years in the program – SIMCE mathematics

	<i>1 year with PME</i>	<i>2 year with PME</i>	<i>3 year with PME</i>
Models	Total effect	Total effect	Total effect
Undifferentiated effects	5.3***	5.3***	5.3***
Only differentiated by PME year	- 0.4	- 0.3	9.2***
Differences by PME year and priority student concentration	Total effect	Total effect	Total effect
Q I	3.7**	3.4**	13.7***
Q II	0.2	0.0	10.2**
Q III	- 1.7	- 2.0	8.3**
Q IV	- 1.9	- 2.1	8.1**

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

The significance of the sum of the coefficients corresponds to a Wald test that verifies that the sum of respective coefficients equals 0.

It is interesting to note that among schools positively impacted by the implementation of the SEP Law, there is a fairly symmetrical trend in language and mathematics at the school level, although of greater magnitude in math than in reading, which is contrary to what happens in the evolution of the generalized results for all schools, where only there is a positive and significant trajectory in the reading subsector. This would indicate that the school improvement associated with the SEP Law has a condition that is systemic and integral, although not widespread, and highly heterogeneous.¹¹

Moreover, when considering the high heterogeneity of the results at the school level, it becomes necessary to determine whether this is reflected in a differentiated manner between priority and non-priority students, as this may more accurately reflect the program’s impact. To do this, the study considers the individual effects of the SEP Law among students who attend the treated and control schools used in the previous estimation. However, given the school changes that students considered in this model might have experienced due to the implementation of the SEP Law, the estimated results should be considered only the effects of correlation and not of causation.

Table 3
Difference-in-difference estimation at the school level according to treatment intensity for reading and math in subsidized private schools, 4th grade (2007 and 2010) —Only individual effects are given^a—

Variables	SIMCE reading	SIMCE mathematics
Effects at the priority student level		
Priority student* treat.	0.9 (1.62)	- 1.7 (1.85)
Priority student in school 1 year PME* treat.	-2.1 (1.97)	1.2 (2.29)
Priority student in school 2 years PME* treat.	- 3.0 (1.84)	- 0.6 (2.09)
Priority student in school 3 years PME* treat.	0.7 (1.78)	2.6 (2.11)
N of students	112 184	112 184
R2	0.120	0.118

Standard errors corrected by clustering by RBD of school in parentheses. *** < 0.01; ** < 0.05; and * < 0.10

Priority student is 1 for those that meet this condition; *treatment* means the schools participating in the SEP Law; and three *dummies* corresponding to the years since the passage of the Education Improvement Program (PME).

The estimations include additional controls at the school level: rural, regional dummies, if the school offers secondary education; dummies depending on whether there is selection for cognitive abilities, income, and/or religious orientation; average monthly charge for shared funding; concentration quintile; average education of mother; average education of father; average household income; and average number of books in the home. At the student level there are controls for gender; education of mother; education of father; household income; and number of books in the home (as a proxy for cultural capital).

a) For more details, see Villarroel (2012).

¹¹ In order to incorporate higher robustness in the results of the evaluation, an alternative estimation is performed, the Propensity Score Double Robust methodology, which allows all the available information to be used, with estimators that are consistent and more efficient than other alternative methodologies (Emsley, Lunt, Pickles, & Dunn, 2008). In this case, estimates of the effect of participating in the SEP law are in line with those obtained previously, where the average effect for reading is between 2 and 3 points, and between 3 and 4 points for math, both statistically significant effects.

The results are very similar to the estimations at the school level. The school's participation in the SEP has a heterogeneous impact, concentrated mainly in autonomous schools and the top 20% of schools with high concentrations of vulnerable students (in the latter with an increase of only 2-3 points improvement on SIMCE tests). Meanwhile, among institutions that saw positive effects, the best results are generalized for all students, regardless of their priority status. Furthermore, only autonomous schools (with 3 years of PME) see any additional effects among priority students, but only in the case of mathematics, with 2.5 additional points as compared to their non-priority classmates.

This set of results seems to indicate that the implementation of the SEP Law, although it has a positive effect, does not yet have a high impact on most of the country's schools. By 2010, only a third of subsidized private schools experienced a positive effect directly linked to this program. Moreover, the schools that show a more substantial improvement are those that have historically obtained good results (autonomous schools), thus reinforcing their better management and relative performance. Meanwhile, in non-autonomous schools, the additional resources generated a positive effect in the schools with higher concentrations of priority students (about 20%). These schools considerably increased their financial resources, and this enabled a reduction in the inequality of children's educational opportunities, as these schools have the highest percentage of vulnerable students. However, the impact resulted in a maximum of only 3 to 4 additional points in the two disciplines evaluated.

These results indicate that only part of the increase in 4th grade educational performance between 2007 and 2010 is directly related to the implementation of the SEP Law. Also, a large number of schools participating in the program have not yet been able to generate significant changes in the standardized test results associated with this policy.

Has the SEP furthered integration of the Chilean school system?

Although the law does not explicitly state it as one of its goals, from its early years of implementation various actors in the Chilean education system have said that one of the main expectations of the SEP Law is that it will increase incentives for subsidized private school administrators to admit vulnerable students to their schools, and that this group of students will have a higher mobility from municipal to subsidized private schools with better educational outcomes (Gallego & Sapelli, 2007; González, Mizala, & Romaguera, 2002).

These incentives could reduce the high levels of socioeconomic segregation in the Chilean school system, which not only are at extreme levels nationwide, starting in the early years of schooling, but also have increased during the last decade. It has also been established that socioeconomic segregation in schools is higher than the segregation of the same families at the urban level, indicating that the school system does not simply reflect the concentration of families by social conditions in the neighborhoods and districts of the cities, but also considerably accentuates it. Competition, selectivity, and shared funding mechanisms are closely correlated with this situation, especially in subsidized private schools (Elacqua & Santos, 2013a; Mizala & Torche, 2012; Valenzuela, Bellei, & De los Ríos, 2008, 2010). Moreover, at the comparative level, the Chilean school system has the highest socioeconomic segregation levels of the 65 countries participating in the 2009 PISA (OECD, 2010).¹²

The importance of reducing levels of educational segregation is not only to achieve a more integrated and inclusive school system, a feature of all quality education systems (Contreras, 2010), but also giving vulnerable students more opportunities for quality education, mediated by a greater peer effect (OECD, 2010; Taut & Escobar, 2012) and more opportunities to have higher quality teachers and administrators (Goldhaber, 2008; Meckes & Bascopé, 2010; Rufinelli & Guerrero, 2009).

In order to analyze the recent trajectory of socioeconomic segregation in the Chilean school system, a SES index was created for each student based on the education of the mother and father and household income, information collected annually by complementary surveys of families of students who take the 4th grade SIMCE test. Using the SES index values, a dissimilarity (or Duncan) index was estimated, which is

¹² This remains unchanged when including the 10 additional countries that participated in PISA 2009+ (OECD, 2011).

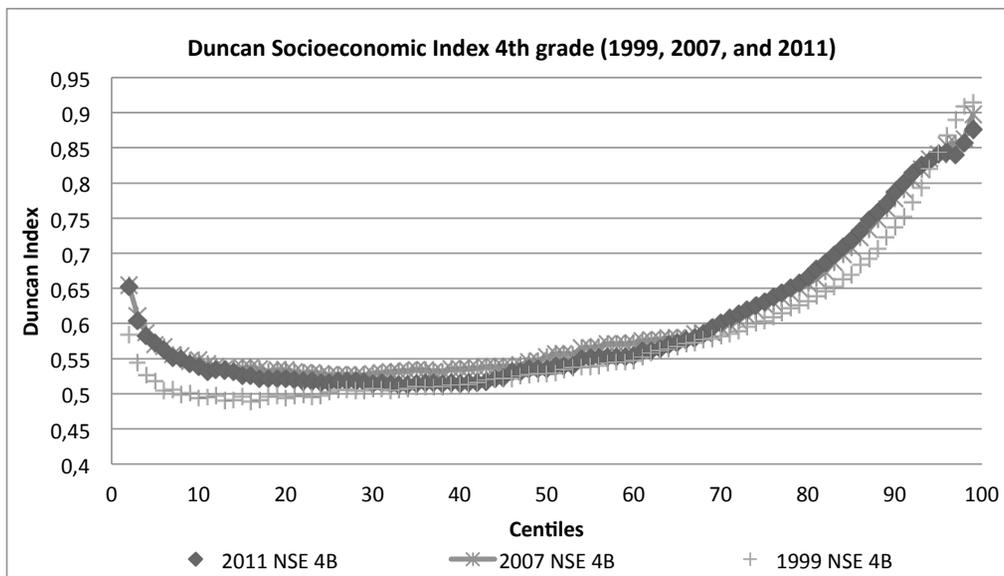
widely used internationally for its statistical attributes, its simplicity, and its intertemporal comparability (Allen & Vignoles, 2006; Duncan & Duncan, 1955). The Duncan index has a range between 0 and 1, where values closer to 0 mean an absence of segregation in the student group for which a certain attribute has been defined, while values closer to 1 mean a greater degree of segregation. In a school context, the index reflects the percentage of students who have to transfer schools for there to be a homogeneous distribution among all schools.

To more precisely determine the evolution of the degree of segregation, Valenzuela, Villalobos, and Gómez (2013) estimate this index for each cumulative percentile of the SES Index, i.e. the result for the 1st decile represents the degree of segregation of the lowest 1% of students in terms of SES level (as compared to the remaining 99% of students) while the 25th percentile estimates the degree of segregation of the bottom 25% of students in terms of SES as compared to the remaining 75%. Given the symmetrical nature of the Duncan Index, the index for the 95th percentile describes the degree of segregation of the top 5% of students in terms of SES as compared to the remaining 95%. Thus, the effect that may be related to the evaluation of the SEP implementation has to do with changes in the segregation of the 40% most vulnerable students. Evidence for 4th grade students is consistent with preliminary estimates (Valenzuela et al., 2010), although the estimate at the cumulative percentile level also reflects very high socioeconomic segregation for all percentiles,¹³ with extreme results in the top 3 percentiles, probably related to the concentration of these students in isolated areas, and from the 70th percentile, which shows that students from medium-high and high SES families tend to study almost exclusively with students from families in the same condition.

In observing the change in the segregation levels of vulnerable students between 2007 and 2011, it is seen that initial levels are maintained, with no differences above 0.02 in any of the cases. This implies that the implementation of the SEP Law, at least in its first four years, has not substantially reduced the high homogeneity of the social composition of Chilean schools, although it may have nudged it off its previous trajectory. This could be explained by the fact that the movement of priority students from municipal schools to subsidized private schools that have signed the SEP agreement with the Ministry is not homogeneous. Rather, it is more likely to consist of students of parents with greater sociocultural capital, who tend to make more informed decisions but who cannot access all the private schools receiving public funding, since not all schools have joined the SEP.

Moreover, it is likely that some of the families who chose subsidized private schools that have now signed the SEP agreement will migrate to other more selective institutions. Thus, there appears to be concurrent processes involving greater segregation of vulnerable students in municipal schools and restricted access to subsidized private schools for medium, medium-low, and low SES groups, as well as a restructuring between subsidized private schools with SEP and without it, which precludes a significant reduction in socioeconomic segregation in the early years of schooling. However, the fact remains that given the recent implementation of the SEP Law, assessing the overall impact of the reform on school segregation will require waiting a few more years.

¹³ Glaeser and Vidgor (2001) estimate that levels above 0.6 reflect a hypersegregation of the system.



NSE = SES

Figure 5. Evolution of the Duncan Index by socioeconomic status of 4th grade students between 1999 and 2011. Source: Valenzuela, Villalobos, and Gómez (2013).

In short, these results reveal that expectations regarding changes in segregation levels as a result of the SEP implementation should be kept in check, as it is even possible that on the path to a long-term equilibrium, differential effects between different groups of students could be produced. For this reason, the goal of a more integrated and inclusive school ought to be addressed by structural policies that affect all schools funded with state resources, instead of expecting a partial funding mechanism to reverse a situation that undermines equal opportunities for the most vulnerable students and the possibility of achieving a more cohesive society.

Conclusions and policy discussion

The SEP Law is a well-targeted policy with a complex design, which has had significant achievements in its implementation and has changed the minds of many educational stakeholders regarding the possibility of improving quality of education, by recognizing, institutionally and financially, that reversing the unequal conditions present from the cradle to achieve quality education for all children requires differentiated efforts. Critical elements of its design are the greater financial resources supporting the most vulnerable students; the focus at the school level on developing an improvement plan that initiates continuous improvement processes within a reasonable period (4 years), which may be then be reimplemented; and the priority given to leadership of this design in local and school teams, assigning roles for technical support, regulation, evaluation, and strategic management to the Ministry of Education. These elements all point in the right direction.

However, there is a structural error in the SEP Law's approach, for its promoters and those responsible for its implementation have lauded it as one of the primary mechanisms for schools to close the gaps in educational quality for vulnerable students. For example, in the first cycle of the PME's, an important part of this goal was expected to occur in a period of only four years, with increases of up to 30 to 40 points on the 4th grade SIMCE tests, which is far from what actually happened. The law also re-emphasizes the mechanisms of family choice and competition between administrators as pillars of improving the quality and equity of the education system, yet these mechanisms have shown tremendous weaknesses in the Chilean school system. Thus, it appears that the SEP has created unreasonable expectations among many actors regarding its effectiveness and impact.

In addition, the design of the SEP Law states that financial support and public account mechanisms should close the inequality gaps in student learning, through both improved pedagogical management and educational change among management teams and teachers in each school as well as through a reduction in socioeconomic segregation in the school system, since the amount of money in the Preferential School Subsidy should be a strong incentive for subsidized private schools to participate in the policy. However, international evidence shows that implementing a policy very similar to the SEP Law in the Netherlands for decades has not guaranteed a decline in average performance gaps between institutions and between specific groups of students. From this one can infer that this mechanism is only one of several aimed at achieving equal opportunities starting with the early years of schooling.

On the other hand, the quantitative studies presented in this paper give four partial results that must be considered in both monitoring SEP implementation and in creating a quality education for all. First, and as the theoretical models predicted, the willingness of administrators who receive public funding for education to sign a SEP agreement had a differential response: in public schools there was widespread implementation, while subsidized private schools with intermediate and high levels of shared funding and a low number of priority students enrolled refrained from signing the agreement, which reduced options for priority students.

Second, the effect in terms of changes in SIMCE scores was also highly heterogeneous among subsidized private schools, at least in the first three years of the program. In general, it is the schools that have consistently shown that they can do better than their peers (autonomous schools) that, given greater financial resources and a mandatory improvement plan, continue to progress towards higher levels of learning in reading and math. However, the schools with high concentrations of vulnerable or priority students, which have considerable amounts of additional resources from the SEP, also achieve a systematic increase in performance thanks to the law, although this increase is still small (between 2 and 5 points in the period in question). This impact may be greater over time as the implementation process of this reform is completed.

Third, among the schools that improve, increased results are seen in both language and math, and the improvement occurs at the school level and is not limited to priority students. This reflects the need for effective strategies to reduce the high variance in 4th grade school performance that occurs within the schools. Finally, the high levels of socioeconomic segregation in the school system appear only slightly altered since the implementation of the SEP Law, which reduces the potentially positive impact of this policy and calls for complementary initiatives to modify the system's current high segregation.

It is important to note that it is still early to draw definitive conclusions regarding the impact of the SEP Law on the school system, since most of the schools signed their PME's in mid-2009 for implementation occur between 2009 and 2012, with the most significant results reflected in the 4th grade SIMCE test in 2013 (when the pre-kindergarten students who entered school in 2008 reach this grade). However, sustained and intensive monitoring of this policy is essential, not only because of the enormous expectations that have been formed concerning the impact on educational equity, but also because of the considerable resources involved annually in its implementation.

With respect to the goal of closing the quality gap for vulnerable students in the school system, and considering the results that are accumulating from the reform and the changing educational outcomes, it is possible to suggest a set of proposals and criteria for short and medium term policy design.

A first step is to narrow expectations regarding SIMCE score improvement from the SEP Law, as most of the closure in the quality gap ought to come from other structural reforms and be funded with regular resources associated not only with this compensatory law. In this regard, it is important not to continue to increase financial resources to schools through the SEP until it is certain that they effectively achieve the desired objectives, that they are effective in relation to the policy cost, and that they are used properly.

A second suggestion is to eliminate policies that are inconsistent with the SEP Law's strategy for improving educational performance. In this sense, the tax reform law that allows families of medium-high groups to partially deduct contributions made through shared funding, approved in 2012, is not only a regressive measure but also strengthens socioeconomic segregation in the school system. Similarly, the additional resources in the subsidy for other student groups, for example, the middle class, ought to be consistent with the current design of the SEP Law, i.e. the schools that receive it should be the same schools operating under the current law and be forced to remove the shared funding charge for this new group of students.

Additionally, it is important for the Superintendent of Education to rigorously regulate compliance with non-selectivity of students by academic conditions until at least 6th grade. It also seems reasonable that priority student families should receive proper information on the best school options that are available to them as part of the SEP Law. Finally, it is necessary to refine the SEP Law's financial design to include a fixed or school-level differentiated contribution for schools with low enrollment, with a design consistent with the regular funding for these institutions.

Finally, based on the results of these studies, as well as the Dutch experience with a differentiated funding system like the SEP in Chile, it can be concluded that more structural reforms to the school system are essential. These include reforms related to teacher education and quality, strengthening public education, elimination of shared funding, and the creation of a system of social services at the local level that effectively facilitates a more inclusive, cohesive, and higher quality education for all children and reduces the still considerable gaps due to initial social conditions, recognizing that differential funding in the school subsidy is just one way, and not the main way, to achieve this objective.

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