



# Effects of differentiated school vouchers: Evidence from a policy change and date of birth cutoffs



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## ABSTRACT

This paper studies the effects of an increase in school choice by examining a 2008 reform that made the value of Chile's (previously flat, universal) school voucher a step function of student income. This policy increased the number of private schools that low income children could access free of charge. I identify the impact of the policy by combining its introduction with variation from a date of birth enrollment cutoff. I show that the differentiated voucher lowered, but only slightly, the probability that students used public schools. Students more likely to move to private schools experienced better school characteristics but no increase in test scores. Further analysis suggests a rise in test scores for students most likely to stay in public schools. These results suggest that the effects of the policy on test scores were caused by responses from public schools, instead of by the re-sorting of students into private schools.

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## 1. Introduction

The past decades have seen the creation of dozens of school voucher programs. The motivation has been that if there were an increase in school choice and competition, it would improve educational outcomes (Friedman, 1962). Most of these programs remain small in size (Epple, Romano, & Urquiola, 2015), and only in a few cases is their reach national. Consequently, there is still limited evidence on the effects of large school choice programs on achievement. These effects may differ from small-scale programs due, for example, to the possible re-sorting of students across schools (e.g., Hsieh & Urquiola, 2006), or to school responses to the increased competitive pressure (e.g., Neilson, 2013). In addition, the literature on large-scale programs has generally focused on the aggregate effects of such programs or used structural estimation. Thus, effects on different types of students are barely known. Finally, Epple et al. (2015) highlights that much work remains to be done on the design of school vouchers. For instance, should their value be flat or a function of students' income?

In this paper I consider a reform that allowed the value of the voucher to vary with family income in the context of Chile's na-

tionwide voucher system, and I assess the effects of this reform on different types of students. Specifically, this policy allowed public and private schools to potentially receive significantly higher subsidies when they enrolled eligible, lower-income children. In exchange, the schools had to set achievement targets, and to stop charging tuition add-ons for eligible children. The number of private schools free of charge for eligible students increased by about 20 percentage points in the initial years of the policy.

To analyze the effects of this policy, I use the pool of students enrolling in 1st grade. I match these data to socioeconomic and test score information obtained from a national standardized exam that takes place every year for 4th grade students.

I combine two sources of variation to identify the impact of this reform. First, I exploit the timing of the policy, which was introduced in 2008. Second, I rely on the fact that, like other countries, Chile has an enrollment cutoff – children born after June 30th must, in principle, wait a year to enroll in school. Taken together, these facts imply that students born only a few days apart faced potentially different amounts of school choice when they enrolled in 1st grade.

A comparison of their outcomes in a regression discontinuity (RD) design thus provides an assessment of the effects of increased school choice. Additionally, by using the RD created by the enrollment cutoff for years prior to the introduction of the differenti-

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ated voucher, I can identify possible trends and confounders that could be biasing the RD estimates of the effects of the differentiated voucher. Then, taking differences of the RD estimates, I obtain unbiased estimates of the impact of the voucher reform. In contrast to most of the literature on large-scale voucher programs, this identification strategy allows me to analyze the effects of the increased school choice separately for different types of students.

The introduction of the differentiated voucher in 2008 seemingly implies that the increase in school choice will be a one-time event. However, in practice, information on the program seems to have disseminated slowly, thus, in most specifications I apply a similar analysis to subsequent cohorts. This is consistent with evidence that families did not understand their eligibility immediately, and that schools similarly were slow to understand the rules of the program. Additionally, this reflects that families had to research which private schools were participating in the program in order to benefit from the increased school choice.

I use the two sources of variation (i.e., timing of the policy and date of birth) to carry out three exercises. First, I quantify and characterize compliers – students that enrolled in private schools instead of public schools in response to the introduction of the differentiated voucher. Second, I look at changes in enrollment choices for all students, and I compare public schools where compliers would have enrolled in the absence of the program to the private schools where they actually enrolled, at baseline. Then, I analyze the effects of the increased school choice on current school characteristics, specifically on school socioeconomic composition, class size, teachers' average years of teaching experience and teacher hiring, and, finally, I look at the effects on test scores.

To quantify and characterize compliers, I instrument enrollment in private schools with whether students were exposed to the policy at the time of enrollment in 1st grade, that means the interaction of the timing of the policy and whether a student was born after the enrollment cutoff. From this first stage, I find that, although about 50% of the population was eligible for the new voucher, only a small fraction of students changed their enrollment decisions in response to the increased school choice.

In the second stage, I obtain the average characteristics for compliers. The most relevant result is that most students that switched sectors in response to the new voucher had mothers that completed high school education. Therefore, compliers were not the poorest students within the group of eligible students. In addition, I use mother level of education to classify students and look at heterogeneity in the effects, since the proportion of eligible students in the population was not stable over the period.

Next, I use the differences in RD estimates to examine the effects on enrollment decisions. My results show that the probability of enrolling in a public school fell slightly for students with mothers that had basic education or less and for students with mothers that completed high school. This probability remained constant for students with mothers that completed university education.

Instrumenting enrollment in public and private schools in a two-stage least squares system, I find that, on average, compliers stopped enrolling in low achievement public schools to enroll in low achievement private schools instead. Nevertheless, the schools they moved to had better socioeconomic characteristics and average test scores, smaller classes and less experienced teachers at baseline.

Regarding current school characteristics, the results of the difference in RD estimates show that, on average, no group of students classified according to the mother's education level experienced changes in the socioeconomic composition of its peers after the introduction of the differentiated voucher. Additionally, students with mothers that completed high school, on average, had smaller class sizes and less experienced teachers, which is consistent with the changes in enrollment choices of compliers. With re-

spect to students with mothers that had basic education or less – who were mostly enrolled in public schools – my analysis uncovers one potential channel through which public schools could be responding to the introduction of the differentiated voucher. These students had, on average, less experienced teachers once the differentiated voucher is introduced. This suggests that public schools may have replaced more experienced teachers with less experienced instructors.

Despite the fact that compliers enrolled in schools with generally better characteristics, the difference in RD estimates shows that there are no positive effects on average test scores for students with mothers that completed high school. This result is consistent with a part of the literature in school choice that finds small or in-existent effects for students transferring to better schools (e.g., [Abdulkadiroglu, Angrist, & Phatak, 2014](#); [Dobbie & Fryer, 2014](#)).

In contrast, results suggest that the average test scores of students with low education mothers – those were more likely to be enrolled in public schools – increased. This is consistent with another strand of the school choice literature which suggests that school choice leads to responses by public schools (e.g., [Hoxby, 2003](#); [Chakrabarti, 2008](#)). This impact in test scores could be related to the decrease in average experience of teachers for this group of students. But other mechanisms could be at work as well.

This paper relates to several strands of previous work. First, identification of the effects of large-scale voucher programs is generally difficult. These programs distribute vouchers nation-wide to all students who want to use them, and may have effects on non-voucher users through changes in student composition or other school characteristics. Therefore, it is hard to define control groups. Generally, the literature has either focused on the aggregate effects of such programs (e.g., [Hsieh & Urquiola, 2006](#)) or used structural estimation (e.g., [Neilson, 2013](#); [Bravo, Mukhopadhyay, & Todd, 2010](#)). In a controlled experimental setting, [Muralidharan and Sundararaman \(2015\)](#) considered the effects of the introduction of targeted school vouchers in India on voucher users, students remaining in public schools and students already enrolled in private schools. My identification strategy allows me to quantify and characterize students responding to the introduction of a national differentiated voucher in Chile, compare schools where responding students would have enrolled and actually enrolled in response to the policy, and analyze the impact of the policy on students affected in different ways.

Since this large-scale program was overlaid on top of the national voucher system, its effects may have been more limited and thus relevant to work on small-scale programs. Thus, I also contribute to a broad literature on school choice that has found mixed results on outcomes of students that transfer to private or charter schools (e.g., [Abdulkadiroglu et al., 2014](#); [Deming, Hastings, Kane, & Staiger, 2014](#); [Rouse, 1998](#)) or to higher quality schools (e.g., [Deming et al., 2014](#)). My estimates suggest that students that enrolled in private schools instead of public schools, due to the differentiated voucher, did not increase achievement, despite the improvement in some school characteristics.

Additionally, students left behind in public schools also have been shown to benefit from voucher programs, especially in public schools likely to be affected by the increased competition ([Figlio & Hart, 2014](#); [Hoxby, 2003](#)). In this paper I show that, even though the program did not generate a large re-sorting of students, students more likely to enroll in public schools experienced some increase in average test scores. Even though many mechanisms could be responsible for this result, I find some evidence of response by public schools through changes in their teaching teams.

The remainder of the paper is organized as follows: the following section describes the differentiated voucher program and the Chilean school system. [Section 3](#) explains the possi-

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