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For-profit schooling and the politics of education reform in Chile: When ideology trumps evidence

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Abstract

For-profit schooling is one of the most hotly debated issues in education policy discussions in Chile. Proponents argue that for-profit schools have incentives to reduce costs and to innovate, leading to both higher quality and greater efficiency in education. Critics maintain that for-profit schools cannot be trusted to place the interest of children over profitability. Buried in this position is the belief that for-profits would cut quality in the process of cutting costs. Researchers can gain insight into this debate by examining school systems where vouchers have been implemented on a large scale and where for-profit and non-profit school supply has increased. In 1981, Chile began financing public and most private schools with vouchers. Education in Chile occurs in a mixed market with 46 percent of students enrolled in public schools, 31 percent in for-profit voucher schools, 16 percent in non-profit (religious and secular) voucher schools, and 7 percent in private non-voucher schools. This paper compares the academic achievement of fourth and eighth-grade students across for-profit, non-profit and public schools. What I find is a mixed story. Initial results indicate that non-profits have a small advantage over for-profit and public schools and for-profit school students have slightly higher test scores than comparable public school students at fourth grade, once student and peer attributes and selection bias are controlled for. There is no significant difference in achievement between for-profit and public eighth grade students. When for-profits and non-profits are subdivided by ownership, for-profit chains and Catholic schools have a substantial advantage over other sectors. There is not a consistent statistically significant difference between for-profit independent and public schools. In some cases, evangelical schools produce the lowest achievement.

1 Introduction

There is a persistent debate on the comparative performance of for-profit and non-profit organizations. Researchers have developed a number of theories as to why non-profit organizations might outperform for-profit firms in mixed industries. One view is that for-profit firms have incentives to take advantage of customers by providing inferior services buyers cannot evaluate (Hausmann, 1987). Under these circumstances, economic theory predicts that non-profit providers will come into existence to provide high quality services to poorly informed customers who seek a trustworthy organization (Weisbrod, 1988). A second viewpoint is that non-profits are better positioned to provide under-satisfied demands, such as the provision of goods to disadvantaged populations, than for-profit firms because they may rely on donations of money or volunteer time to finance the provision of these goods, while for-profits must satisfy a market survival test (Rose-Ackerman, 1996).

These claimed advantages have not gone unchallenged. Critics argue that the ambition of profit fosters efficient decision making by for-profit firms. In contrast, non-profit organizations are insulated from competitive pressures and thus have little incentive to manage their firms efficiently. For instance, because non-profits cannot distribute profits to owners, critics assert that their managers have less incentive to minimize costs and may, for example, pay themselves excessive salaries (Glaeser and Schleifer, 2001).

Other skeptics suggest that there are likely no systematic differences in the objectives of for-profit and non-profit suppliers. Non-profits may engage in profit making activities and, conversely, for-profit firms may have a deep commitment for the services they produce. Mission driven firms may find the constraints placed on non-profit organizations too restrictive, and profit maximizing firms may find it more advantageous to choose non-profit forms, due to tax exemptions, for example (Weisbrod, 1998).

Empirical studies generally corroborate the theoretical predictions of higher quality in the non-profit sector. For instance, Lukesetich et al. (2000) find that non-profit nurs-

ing homes spend more per-patient on nursing care and less on administrative expenses than for-profit homes. Ford and Kasserman (2000) find that non-profit kidney dialysis clinics provide significantly longer treatment than for-profit dialysis clinics. Similarly, non-profit hospitals provide more uncompensated care than for-profits (Schlesinger et al., 1987). In studies of prisons, Hart et al. (1997) find that for-profit prisons hire lower quality prison guards than non-profits. The empirical studies of day care centers also show systematic quality differences between non-profit and for-profit centers. Non-profits rank higher along input measures such as child-staff ratios and staff experience, while for-profits generally provide lower quality services for similar fees (Morris and Helburn, 2000).

For-profit schooling is also a hotly debated issue in current educational policy reform discussions. Chubb and Moe (1990) assert that public schools are organized to serve bureaucratic needs rather than the goals derived from public interest, while for-profit schools are goal oriented and forced to respond to consumers (parents). They also argue that for-profit schools have more discretion than non-profit schools in terms of choosing what they want to do to achieve the school's mission, which is driven by parents. In contrast, most non-profit schools are managed according to rules of the organization (often the Church), which determines the schools mission. They conclude that because of for-profit schools' greater freedom and fewer rules, they could be laboratories for change and experimentation in pedagogical innovation that could provide examples for other schools.

Others have argued that schools should not differ significantly and that the differences across sectors will be mainly cosmetic. For example, Brown (1992) suggests that schools will offer similar curricula and educational models. He theorizes that schooling is an uncertain business and that parents are risk averse and look for schools that are tried and true. Brown (1992) therefore concludes that parents will drive schools across sectors to act like one another in their pedagogical approach. He surmises that schools will differentiate themselves from other schools through offering secondary services,

such as foreign languages.[1]

Much of the existing empirical research in education treats private schools as an aggregate category and very few few studies have examined whether performance differs across for-profit and non-profit schools. The evidence on this point is limited because there are so few schooling systems that provide public funding to private schools. While different combinations of private and public provision (funding and management) are observed in many countries, most schools continue to be funded and operated primarily by the government (OECD, 2006), and non-profit status is usually required for private educational institutions (James, 1993).[2]

Researchers can gain insight into this debate by examining school systems where vouchers have been implemented on a large scale and where private (for-profit and non-profit) school supply has increased. Education in Chile occurs in a mixed market with 46 percent of students enrolled in public schools, 31 percent in for-profit voucher schools, 16 percent in non-profit (religious and secular) voucher schools, and 7 percent in private non-voucher schools. The issue of for-profit schooling was one of the factors that sparked one of the largest protests in Chilean history. In July of 2006, more than 600,000 students walked out of class and occupied hundreds of schools all over Chile, demanding that the government cease funding for-profit schools (El Mercurio, 2006a).

The position taken by the students and others opposed to funding for-profits is the belief that for-profit providers cannot be trusted to place the interests of children ahead of profitability (OEI, 2007). Skeptics have countered that for-profit schools have stronger incentives to reduce costs, and more importantly, to innovate, leading to both higher quality and greater efficiency in education (Tironi, 2006). Neither of

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[1]In Chile, the adoption of foreign names for schools is also an example of the latter tendency (Espinola, 1993).

[2]Some researchers in the United States have made finer distinctions between non-profit charter schools. For instance, recent research distinguishes between "market-oriented" and "mission-oriented" non-profit charter schools (Brown et al., 2005). Although they find differences between market-oriented schools and mission-oriented schools across different dimensions, the theoretical typology they use for distinguishing between non-profit charter schools limits their ability to disentangle the inter-institutional differences driven by incentives and legal constraints placed on non-profit and for-profit schools.

these arguments, however, is based on any data in Chile on the quality of education provided by the different types of private schools (for-profit or non-profit).

The goal of this paper is to examine whether or not for-profit voucher schools are more or less effective, all else equal, than non-profit voucher schools in Chile. Using a highly-detailed unique data set I've constructed from the administrative records of the Ministry of Education, I compare schooling inputs and student achievement in public schools, for-profit and non-profit voucher schools, and private non-voucher schools.

This is not the first paper to examine differences in school types in Chile's national voucher program. Earlier work used aggregated school level data (Mizala and Romaguera, 2000). More recently, researchers used student-level data and attempted to control for selection bias (Anand et al., forthcoming; Sapelli and Vial, 2002; McEwan, 2004). Most of these studies show a private school advantage over public schools, although the differences are usually small.

This paper differs from earlier work by examining achievement across private voucher schools according to their ownership type (for-profit and non-profit). I consider for-profit (independent and franchise) voucher schools, non-profit (religious and secular) voucher schools, and private non-voucher schools; prior researchers have used a single category to describe all private vouchers schools, with the exception of McEwan (2004) who studied Catholic school achievement and Elacqua et al. (2008) who examined achievement across private voucher schools according to their network size. The findings presented in this study demonstrate that, while differences are found across private voucher school types (for-profit and non-profit), the differences do not always comport with theory or the positions on either side of the policy debate in Chile.

The remainder of the paper is organized as follows. The second section explores the politics of education reform in Chile. The third section reviews background on Chile's school system and describes the school ownership types that will serve as the key analytical categories. In this section I explore the differences between for-profit and non-profit schools in terms of size, mission, location, student demographics, schooling inputs, programs, and teacher quality. The fourth section sets forth the empirical

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strategy that will be used to compare student achievement in public and private school types, and describes the data that will be used to implement it. The next section presents and interprets the empirical results. The final section concludes and discusses policy implications.

2   The politics of education reform in Chile

Some have argued that the most profound transformation ever experienced in the Chilean educational system was an idea conceived, designed, and implemented by the military government in about eighteen months (Guari, 1998). During the 1980s, the military government enacted a sweeping education reform program (1973-1990). First, the Ministry of Education decentralized education service delivery to regional and provincial offices and the administration of public schools to municipal governments, whose maximum authority is an elected mayor. Second, the government altered the financing scheme of public and most private schools. Municipalities and private school owners that did not charge tuition started to receive vouchers on a per-student basis.[3] As a result, enrollment gains or losses began to have a impact on their budgets. Fee-charging private schools continued to operate without public funding.

The provision of education in Chile has become increasingly privatized since the voucher reforms were instituted. In 1981, 15 percent of Chilean K-12 students attended private schools that received some public subsidy, and another 7 percent attended more elite, unsubsidized private schools. Between 1981 and 1986 more than 1,000 new schools entered the education market and the private voucher enrollment rate increased from 15 percent to 25 percent. By 1990, over 31 percent of students attended private voucher schools (see figure 1).

Since the design and implementation of the sweeping voucher reforms occurred in a setting that did not permit political opposition, researchers, policymakers and the

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[3]Chile's voucher formula includes adjustments for rural schools and high schools, but until very recently did not take into account student socioeconomic characteristics or the existence of a high concentration of poor students in public schools.

public in Chile were unable to examine the many tradeoffs of school choice that have been an important part of eduction policy debates in other countries (Godwin and Kemerer, 2002). For instance, in the United States, the advent of school vouchers has generated movements among both advocates and opponents (Moe, 2001) and a large body of empirical findings that have fueled the public debate (Henig, 2008).

Since the return of democracy in Chile in 1990, education reforms have focused on improving quality and equity through curricular reform, increased investment in teachers' salaries, textbooks, student meal programs, targeted academic programs, longer school days, and the provision of computers and the Internet in all schools (Cox, 2003). They also introduced a teacher labor law (*el Estatuto Docente*) that established centralized bargaining, a single pay structure of wages, and made it virtually impossible to fire a public school teacher who is not performing adequately (OECD, 2004). The only significant modification of the voucher program was in 1994, when the Ministry instituted a financing scheme that allowed all private voucher schools to charge limited tuition (Montt et al., 2006).

The education reforms of the 1990s were politically popular because they provided politicians with resources to distribute to constituencies (e.g. jobs in construction and textbook companies, children in school more hours a day which helps reduce child care expenses). They also imposed fewer costs and provided more benefits (jobs, job stability, improved working conditions and wages) for teachers, administrators, and bureaucrats. [4] The national teachers' union (*Colegio de Profesores*) was the principal advocate of these reforms. The conservative political opposition was also receptive to the reforms because they did not challenge the voucher program and the decentralization of public schools.

Most experts agree that these investments increased coverage, especially for low-income children in high school[5] and preschool [6] improved the quality of school facilities,

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[4]See Grindle (2004) for an analysis of education reforms in several Latin American countries.

[5]Between 1990 and 2006 the percentage of 20 to 24 old adults from the lowest income quintile that had completed high school increased from 26 to 62 percent.

[6]While there have also been significant advances in pre-school coverage across socioeconomic

provided many children with the opportunity to spend more hours a day at school,[7] increased teachers salaries and the quality of applicants,[8] school construction, and increased parent satisfaction with the quality of their children's schools [9]. Public opinion polls also suggest that many parents value the availability of a subsidized private education (CIDE, 2001). School and enrollment data also suggest a robust response to parental preferences for private schools. Between 1990 and 2008 the enrollment rate in private voucher schools increased from 31 percent to 47 percent percent of total enrollments. Most of these gains were at the expense of public school enrollments. Adding in the 7.3 percent of students in elite private non-voucher schools, leaves a majority of Chilean students in private voucher schools (Figure 1).

Figure 1 Here

Despite these positive outcomes, and a fourfold increase in spending in inflation adjusted terms since 1990, there has not been significant improvement in the average quality of learning. Student achievement in Chile is among the highest in Latin America,[10] but still lags significantly behind a number of emerging countries in Asia and Eastern Europe, as demonstrated by the poor results achieved on the Trends in International Mathematics and Science Study (TIMSS), the Programme for International Student Assessment (PISA), and the International Civic Education Study (CIVIC). National test scores have also been stagnant since 1997, and large test score gaps persist among socioeconomic groups.[11] Schools are also stratified by socioeconomic status. Students attending private schools, on average, come from families that have

groups, Chile is still lagging behind most industrialized and some developing countries. Michelle Bachelet - Chile's current president - made this issue a cornerstone of her campaign platform.

[7]Since 1997, over 75 percent of primary schools have adopted a full day school program.

[8]Between 1990 and 2002 Chilean teachers real salaries grew by 156 percent, school of education applicants increased 39 percent, and the average university entrance exam score of applicants increased by 16 percent (Vegas, 2007).

[9]citetfuturo reports that over 75 percent of parents surveyed report high levels of satisfaction with their children's schools and teachers.

[10]Cuba is the only country in the region that consistently scores higher than Chile on UNESCO's Latin American Laboratory of Educational Evaluation - LLECE (Carnoy, 2007)

[11]For an analysis of the quality and equity of Chile's education system see Contreras and Elacqua (2005) and Mizala and Romaguera (2006).

much higher incomes and that are headed by parents with substantially more schooling than students enrolled in public schools.[12]

These factors converged to motivate one of the largest protests in Chilean history that is widely known as "the march of the penguins" - in reference to the protesters' school uniforms. The protest began in May 2006, less than three months after President Michelle Bachelet took office. More than 300,000 high school students walked out of class and occupied hundreds of schools all over Chile. The student movement had widespread popular support among university students, the teachers' union, the workers' union, and average citizens.[13]

The student demands included more teachers and improved school construction, the elimination of fees for the national college entrance exam, free student public transportation fares, and most importantly, the L.O.C.E's (*Ley Organica Constitucional de Ensenanza*) reform.[14] The L.O.C.E was a Pinochet-era constitutional education law, enacted three days prior to the end of the military regime, that promoted increased private school provision, making it possible for almost anyone to open a school and receive government funding without having to conform to any standard of quality.[15] The Law granted schools and teachers freedom on how to provide education and limited the State's role to ensuring access to education services, but it not give the State the authority to ensure high quality schooling.

President Bachelet responded to the students' demands by offering additional resources and by introducing three education reform proposals that are currently under Congressional review. First, the Administration proposed legislation that would put an end to the L.O.C.E. and create a new General Law of Education (LGE) (Ministry

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[12]For an analysis of stratification and enrollment practices across sectors and sub-sectors or public and private voucher schools in Chile, see Elacqua (2009)

[13]Public support for the protests was nearly universal with almost 90 percent of Chileans polled saying that they supported the student movement (El Mercurio, 2006a).

[14]With prices of copper, Chile's chief export, at record highs at the time, and government reserves with several years of budget surpluses, the students maintained that the government could afford to invest more in education. A common slogan on student banners read "Copper sky high and education in the gutter" (Rohter, 2006).

[15]The only formal requirement to open a school in Chile was to have a high school diploma (Montt et al., 2006).

of Education, 2007), which redefines the balance between school and teacher autonomy and students' right to receive a high quality education. The key points of the legislative initiative deal with increasing public and private voucher school regulation and reducing discrimination and selection in private voucher schools, which is currently a widespread practice. President Bachelet also introduced a bill that creates a new education quality assurance system, including the creation of two agencies that would be responsible for school supervision and accountability: The Education Quality Agency (Agencia de Calidad) and the Superintendency of Education.[16] Finally, the Bachelet Administration introduced a separate bill that would reform the institutional framework for publicly managed education and provide additional funding and technical pedagogical support to public schools.

Bachelet's proposals sparked a national debate on education policy. The LGE was rejected by students, the national teachers' union,[17] and several influential lawmakers from the center-left ruling coalition, who, in addition to the increased resources, demanded the overhaul of the national voucher program (e.g. FLAPE, 2007) [18] One of their main objections was that for-profit schools were still allowed to compete with non-profit and public schools for students.[19] The main criticism from the conservative opposition and the private voucher school guild was that Bachelet's accountability, no school selection, and public school proposals would stifle innovation and restrict the diversity of private school supply and parent's freedom to pursue their own educational preferences. They argue that the problem with Chile's education system is not its voucher program and for-profit schooling, rather the fault lies in not allowing

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[16]Congress also passed the Preferential Subsidy Law, introduced by the Lagos'administration, that differentiated the voucher by the students socioeconomic status and introduced some measures of accountability in the schooling system. This bill had bipartisan support and passed by a majority.

[17]The teachers' union organized national strikes in June and July of 2008 and have threatened to strike on April 2, 2009 to protest the LGE.

[18]Some lawmakers have also opposed the quality assurance system because, they have argued that it legitimizes the national voucher system.

[19]The president of the students' union maintained in a recent interview that "profit is the cancer that is killing Chilean education" (La Tercera 06/28/08). The three senators from the ruling coalition that voted against the law expressed similar views in their floor speeches.

educational markets to function to their full extent (e.g. Libertad y Desarrollo, 2007).[20]

The goal of this study is to inform the scholarly and education policy debate in Chile by examining differences in schooling inputs and outcomes across for-profit, non-profit and public schools.

3 Private school diversity in Chile

Most researchers generally use a single category to describe private voucher schools in Chile. However, there is a great deal of variability in the private voucher sector. Prior to the voucher reforms in 1981, most subsidized private schools were non-profit (Aedo, 2000). When private subsidized schools began to receive the same per-pupil payment as the public schools, a number of mostly for-profit voucher schools entered the market. Table 1 shows how primary and secondary school students are distributed across school types. Public schools account for the majority (54 percent) of schools and less than half of enrollments (46 percent). For-profit voucher schools account for 30 percent of schools and 31 percent of enrollments. Non-profit voucher schools account for about 9 percent of schools and 16 percent of enrollments. Non-voucher schools represent 7 percent of schools and enrollments.

Table 1 Here

Over the period 1990 and 2008, the total number of for-profit schools increased by 96 percent, and total enrollment in for-profit schools increased by 113 percent (see Table 2). For-profit schools have far outpaced growth rates of other school types. The total number of public schools decreased by 7 percent and total enrollments decreased by 3 percent. Non-profits have consolidated over the years yielding a moderate growth in the number of schools and enrollments (see table 2).

Table 2 Here

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[20]Ernesto Tironi, a Chilean economist and for-profit voucher school owner, argues on his blog that if the Instituto Nacional - Chile's most prestigious public high school that educated many of the countries leaders - had been for-profit rather than public, we would have 30 rather than only one of these institutions.

For-profit and non-profit voucher schools in Chile are diverse in membership. Table 3 shows how primary and secondary school schools and students are distributed across for-profit and non-profit school categories.

Table 3 Here

For-profit franchises, which represent about 20 percent of all for-profit schools, are probably those that best fit the description of educational privatization proponents (Chubb, 2001). Most of these schools were founded in the last 5 years. They are often controlled by a group of off-site owners, in some cases with private shareholders, often have ties to other industries, and are characterized by networks of campuses.[21] These for-profit schools, which account for 6 percent of schools and 7 percent of enrollments, stand in varying degrees of contrast to for-profit independent schools, which account for about 80 percent of all for-profit schools and one-forth of total schools and enrollments. For-profit independent schools are especially small in size and scale, suggesting that when these groups set out to establish a school, they are probably looking to create a school that only provides services to children in the community. Many of these schools were founded during the first decade of the reform, and recent survey evidence suggests that the majority (75 percent) of the owners are former public school teachers (Corvalan et al., 2008) who were were often expelled by the military government.[22]

Non-profit voucher schools, including Catholic,[23] Protestant,[24] and non-sectarian organizations[25] are more likely to be characterized by an academic and/or religious mission rather than profit maximization.[26] These schools, which are often subsidized

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[21]Most for-profit networks are small in size. Less than 20 percent of for-profit networks have more than 3 schools in their networks.

[22]The National Private Voucher School Association (CONACEP) also provided me with information about for-profit voucher school owners.

[23]Branches of the Catholic church that run schools include religious orders, parishes, archdiocese and religious foundations.

[24]Protestant churches include Methodist, Baptist, Seventh-Day Adventist, Anglican, Lutheran, and Presbyterian churches.

[25]Most of the non-sectarian non-profit schools are branches of foundations that were created for other specific tasks, such as the Aid Corporation for Children with Cancer. Some foundations were created by community development groups such as the Rural Social Development Corporation.

[26]There are 4 private voucher schools of other religious orientations. These schools were dropped from the sample.

by the Church or local businesses, often have access to donated facilities and teachers willing to work for below-market salaries, and thus are able to provide a range of services to students whose costs exceed the voucher and tuition payments. Most non-profit schools are also characterized by networks of campuses that are affiliated through religious congregations or foundations. Catholic schools account for about 72 percent of non-profit schools and 6 percent of all schools and 12 percent of total enrollments. Only about 3 percent of students in Chile are enrolled in Protestant and non-sectarian voucher schools.

Table 4 provides basic descriptive information about the for-profit and non-profit school types. Catholic non-profit schools have, on average, more students per school than other school types. The data show that public schools are more likely to serve low-income and rural students than all categories of private schools.[27] Table 4 also shows that for-profit voucher schools enroll a slightly higher proportion of disadvantaged and rural students than non-profit voucher schools and that students that attend private non-voucher schools come from the most highly educated families. The data also show that a higher proportion of for-profit schools are located in the Metropolitan Region (R.M.) of Santiago. Over 75 percent of Catholic and Protestant schools are located outside of the R.M..

<div align="center">Table 4 Here</div>

Table 5 provides descriptive evidence on schooling inputs, programs, and teacher quality across public and private schooling sectors. Non-profit schools have, on average, almost 6 more students per class than for-profit schools. Catholic schools have the largest class sizes and secular and for-profit independent schools have the smallest. Table 5 also shows that less than half of private voucher schools (for-profit and non-profit) charge tuition. Catholic schools charge the highest tuition (USD 2-4 more per month) than other private voucher school types and for-profit franchise schools charge the lowest. Table 5 also shows that non-profits are more likely to offer full-school

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[27] For an analysis of stratification across sectors, see Elacqua (2009)

day and preschool programs than for-profit voucher schools. About half of eligible non-profit and for-profit schools participate in the voluntary preferential voucher and accountability program, which pays schools an additional 50 percent for each student classified as vulnerable, as well as a differential per-student subsidy depending on the total proportion of vulnerable students enrolled. The program also holds participating schools accountable for academic outcomes over a four year period.[28] Protestant schools are more likely to participate in the program and for-profit schools less likely than other sub-sectors. Finally, the data in table 5 also indicates that non-profit schools, particularly Catholic schools, are much more likely to receive the teacher productivity award than for-profit schools.[29] Table 4 also shows that a lower proportion of for-profit independent schools receive the productivity award than public schools.

<center>Table 5 Here</center>

The goal of this paper is to examine whether or not for-profit schools are less effective, all else equal, than non-profit and public schools.

4 Empirical strategy and data

In this section, I describe an empirical strategy for comparing public and private for-profit and non-profit schools student test scores that will account for selection bias.[30] My empirical model builds on previous work by McEwan (2001).

I posit that student achievement, measured as student performance on standard-

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[28]Participating schools cannot use admission exams and parent interviews to select students. They are classified into one of three categories: Autonomous, Emerging or In Recovery. The categories are based on a school's national test scores (SIMCE) over time and on other indicators, such as retention rates, school integration and teacher evaluations. For a detailed description of the law see Elacqua (2009).

[29]Teacher productivity awards (SNED) are given each year to 25 percent of the highest-rated schools within clusters of socioeconomic school groupings in each region (there are 15 regions in Chile). The rankings are based on test score gains within the groupings based on socioeconomic levels and urban and rural locations (Mizala and Romaguera, 2002).

[30]Much of the debate around differences between public and private schools has revolved around statistical techniques that purport to control for student background characteristics and for potential selection on unobserved variables. See Vandenberghe and Robin (2004) for a critical review of different methods.

ized tests, can be modeled as a function of student background characteristics (family socioeconomic status, household resources, and peer groups).[31] In this analysis, I have one public school category, one private non-voucher school category and 2 categories of private voucher schools (for-profit and nonprofit).[32] The sample is divided among school categories, as I estimate separate regression coefficients for each school type.

Using these estimates, I can predict the achievement of an "average" student in each school category. Here I will use the mean characteristics of for-profit school students because I am interested in comparing for-profit voucher and non-profit voucher school outcomes. To measure the difference in test scores between two school categories, I subtract one prediction from another. For example, I may estimate the adjusted difference between non-profit voucher schools and for-profit voucher schools.

The previous strategy provides an approximation of the expected change in test scores for the "typical"for-profit voucher school student if she were to enroll in a non-profit voucher school. However, a simple comparison of student outcomes in for-profit and non-profit schools is unlikely to give unbiased estimates of the impact of for-profit schools on student achievement. For instance, non-profit voucher schools may be able to select more qualified students, on average, than their for-profit voucher school counterparts ("school choice bias"). Similarly, the average student attending a non-profit voucher school may be more likely to have other attributes (such as having parents who place a higher value on education) than the average student attending a for-profit voucher school ("parental choice bias").

Towards diminishing this "parental choice selection bias", I apply a two-stage procedures developed by Heckman (1979).[33] This analysis consists of a single equation

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[31]I include peer group controls because a body of literature has documented the positive spillover effects of having high-ability peers and the negative effects of being surrounded by disadvantaged students (Zimmer and Toma, 2000).

[32]For ease of exposition, I am using the two aggregate private voucher school categories to explain the empirical strategy. In the empirical analysis, I will also subdivide for-profit schools in two categories (franchise and independent) and non-profits in three categories (Catholic, Protestant and nonsectarian).

[33]In order be able to control for "school choice bias", information on school selection practices would be required. This information is currently not available in Chile.

model in which the dependent variable is the probability of choosing a private voucher school (e.g. for-profit or non-profit) and the independent variables are factors that are believed to influence the choice. I assume that a choice is made between only two schooling alternatives: public and private voucher.[34]

In general, the explanatory variables that influence student test scores are very similar to those which influence parental school choice. The key empirical problem in implementing a two-stage model is in distinguishing the non-profit school effect (or the for-profit school effect) from the effect of other variables that are not observed. A variable (or variables) is needed that affects the probability of attending a non-profit voucher school and that is not correlated with the error term in the outcomes equation (IV). Following McEwan (2004), I hypothesize that a family's probability of choosing a given school type is influenced by the number of schools of each school type (public, for-profit voucher and non-profit voucher) per square kilometer of each type in her municipality. All else equal, parents are more likely to choose schooling alternatives for their children that are more densely concentrated in their municipalities.[35]

4.1 Location choice IV

Researchers have pointed out that credible implementation of Heckman two-stage selection equation requires a valid instrument (Puhani, 2000). The instrumental variables method must satisfy three assumptions in order to identify a meaningful causal quantity (Morgan and Winship, 2007). The first stipulates that the instrument must be independent of the outcome. It is assumed that school densities are not correlated with

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[34]In a previous iteration of this research, I used the two-stage selection bias procedure developed by Lee (1983) for cases where school choice is among more than two school types. Here I use the two stage procedure developed by Heckman (1979) because it is unlikely that parents can distinguish between the for-profit school categories (independent and network) when choosing a school. My results are substantively similar when I use Lee's selection bias correction. These results are available upon request.

[35]Municipalities are recognized neighborhoods in Chile around which many municipal services are organized. Municipalities are important in how people think about neighborhoods and how municipal services are organizedthat is, they have both a social reality in terms of defining neighborhoods and a political reality in terms of defining public services (e.g. Valenzuela, 1997). Over 80 percent of primary school students (K-8) go to school in their home municipality. Thus, the density measure provides a good proxy for local neighborhood schooling options.

student achievement. The second assumption is a non-zero effect of the instrument on the treatment. The second assumptions stipulates that the instrument must predict treatment assignment for at least some individuals. There must be at least some parents that respond to the availability of different school types in their municipalities. The third assumption is a monotonicity assumption that specifies that the effect of the instrument on the treatment must be either weakly positive or weakly negative for all families. I assume that it is not weakly negative.

The first assumption - that the instrument has no effect on the outcome variable - is a strong and untestable assumption. In this framework, I assume that household location is fixed. Households do not choose their location. They simply choose between two available schools. In the United States and other highly mobile societies, families likely choose their schools and household locations simultaneously. This is less of a concern in Chile for two reasons. First, the universal voucher system allows parents to choose schools outside of their neighborhoods. Second, residential mobility is very low in Chile compared to other countries. For instance, according to census figures in the United States, 14 percent of families changed residences last year alone.[36] In Chile, only 8 percent of families have moved residences in the last five years. Of the those families that have moved, most are in the highest income groups (Larranaga and Sanhueza, 2007). These families usually send their children to private non-voucher schools, which are not the focus of this analysis.

The model and the empirical work below also involve another important assumption, that is much more problematic. This framework assumes that school location is also exogenous. In Chile, private voucher schools are free to choose any neighborhood. In this case, randomization clearly does not generate the instrumental variable. For example, it is possible that private voucher school owners locate in greater density in higher income areas. To the extent that is happening, my results could be biased toward finding greater private voucher benefits than is actually the case. For these reasons, my comparisons between private voucher and public schools should be interpreted cau-

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[36]See www.census.gov

tiously. However, this potential source of bias is unlikely to affect comparisons between for-profit and non-profit voucher schools, the main focus of this analysis.[37]

The second assumptions -that the instrument must predict treatment assignment for at least some individuals- is a testable assumption. I estimated the change in the predicted probability of choosing a given school type with respect to a marginal increase in the density of that same school type per square kilometer in her municipality. The results, which are not reported here and are available upon request, show that increasing predicted probabilities accords with expectations-that increasing the availability of a given type of school increases the probability that it is chosen. The estimates are all positive and statistically significant.[38]

4.2 Data

The previous empirical model is estimated with student level data from Chile's national standardized test, (*Sistema de Medicion de la Calidad de la Educacion*-SIMCE), which assesses students in grades 4, 8, and 10 in language, mathematics, history and geography.[39] In 2005, SIMCE began to evaluate fourth grade students every year and eighth and tenth grade students every other year. In this paper I will examine fourth grade student achievement in 2002, 2005, and 2006. I will also analyze eight grade student achievement in 2004.[40]

Table 6 summarizes the number of students evaluated each year included in the analysis. Students test scores are complemented with parent and teacher questionnaires, which include socioeconomic and environmental information regarding the students,

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[37]Another potential problem is that if student achievement is low in for-profit or non-profit schools, demand may decline, which could eventually affect supply. While there is no evidence on the supply of schools to support or refute this concern, previous research on the demand side in Chile does suggest that parental decisions are more influenced by student demographics than actual school quality (Elacqua et al., 2006)

[38]Morgan and Winship (2007) notes that there are no clear guidelines on how large an association between an IV and a treatment should be before a researcher can proceed with her analysis safely.(p.199)

[39]For additional information on the SIMCE test, see www.simce.cl. SIMCE employs an Item Response Theory Methodology.

[40]I do not analyze tenth grade test scores because differential dropout rates across sectors will likely confound the results.

their families, their peers, and their schools. The dependent variables SPANISH and MATH were originally reported as the number of items correct on the test, although I standardized these variables to a mean of 0 and a standard deviation of 1.

Table 6 Here

Several explanatory variables characterize student demographics. They include years of student's parental schooling (MTHED and FTHED), student's gender (FE-MALE), self-reported household income (HHINCOME), the number of non-academic books in the student's household (BOOKS1-BOOKS6, a group of 6 dummy variables). I imputed missing parent education information using student peer characteristics. A set of dummy variables (MTHEDMIS and FTHEDMIS) is included to identify those observations with imputed data.

I calculated student peer information by averaging individual student information over all the students in a student's classroom. AVGMTHED and AVGFTHED are measures of the average parental schooling, while AVGHHINCOME is the average household income in each classroom.

I also introduce a dummy variable to indicate whether or not the school is located in a rural area (RURAL) and the average monthly school tuition (TUITION). I also included regional dummy variables - relative to the Metropolitan Region - in the regressions to account for differences across regions. These are not reported in the tables. To approximate the number of neighborhood schooling options a family confronts (IV), I include a measure of the number of schools in each category per square kilometer in each municipality.

Tables 7 and 8 provide descriptive statistics for the students that comprise the 2004 and 2006 fourth grade samples, divided by school type. In the interest of space I do not include descriptive statistics for the other samples. These data are available upon request.

According to table 7, 58 percent of students attend public schools, 27 percent of students are enrolled in for-profit voucher schools, and 15 percent attend non-profit voucher schools. The data presented in Table 7 also shows that most of the for-profit

school students attend independent schools that do not belong to a franchise and most of the non-profit students are enrolled in Catholic schools.

On average, most schools are urban, though a larger proportion of public schools (19 percent) are rural compared to all categories of private schools (less than 9 percent). Catholic schools charge the highest tuition. In general, Catholic voucher school parents have higher levels of education, books in the household, and income.

<div align="center">Table 7 Here</div>

The descriptive statistics provided in table 8 are similar to the 2002 sample. However, the data show that a lower proportion of students are enrolled in public schools (51 percent) and a higher proportion (32 percent) in for-profit schools. The data presented in table 8 also reveal that fourth grade parents in 2006, on average, have higher levels of education and income than fourth grade parents in 2002.

<div align="center">Table 8 Here</div>

5   Empirical Results

A summary of the results for private and public school coefficients is provided in Tables 9, 10, 11, and 12.[41] Tables 9-12 present the results when a broad set of control variables and corrections for selection bias are made. The table is divided into two panels. The top panel summarizes the results for Spanish, while the bottom presents the results for mathematics. The first row displays the unadjusted difference in test scores between non-profit, public, and for-profit voucher schools, which is the omitted reference category. The subsequent rows present the differences after accounting for individual and peer attributes and selection bias. The first column displays the for-profit-non-profit school test score gap and the second column shows the for-profit-public school achievement gap.

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[41]See the appendix for the logit model (appendix 1) and the achievement regressions with the selectivity corrections (appendix 2 for Spanish and 3 for mathematics). In the interest of space, I've only included the results for the first model in the 2002 sample. The regression output for the 2004-2006 samples and for the second model in all samples that I present below are available upon request.

The simple uncorrected estimates show that the Spanish and mathematics achievement of students that attend for-profit schools is substantially lower, on average, than that of non-profit school students and higher than that of public school students on the 4th (tables 9-11) and 8th grade (table 12) tests.

After controlling for student and peer attributes and selection bias,[42] I still find a significant and positive, but small, non-profit school Spanish (0.08 standard deviations) and mathematics (approximately .06 standard deviations) effect on the 4th grade tests (tables 9-11) and slightly larger effects on both 8th grade tests (table 12). The corrected test score estimates also indicate that there is a small and significant difference in 4th grade Spanish and mathematics achievement between for-profit and public schools (.07) (tables 9-11). However the difference between the for-profit and public schools on 8th grade Spanish and mathematics tests are not statistically significant after accounting for confounding factors (table 12).

<div align="center">

Table 9 Here

Table 10 Here

Table 11 Here

Table 12 Here

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These results provide evidence of the effectiveness of non-profit voucher schools, but no consistent and substantial evidence on the difference in quality between public and for-profit schools. However, for-profit schools and non-profit schools, as I discussed above, are a heterogeneous lot. The data presented in table 4 show that 80 percent of for-profit schools are independent and many are run by former teachers. In contrast, franchise schools, which account for about 20 percent of this sector, are often controlled by a group of off-site entrepreneurs that and are characterized by networks of campuses. In addition, non-profit schools are composed of Catholic, Protestant and non-sectarian

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[42]Point estimates of the selectivity coefficients (Mills) suggests negative selection in the private voucher sector. I find similar findings (available upon request) in the model that subdivides for-profit and non-profit schools by ownership type. I acknowledge that the results do not provide enough evidence to rule out selection bias in the private voucher (for-profit and non-profit) sector. Therefore, the findings that compare public and for-profit school achievement should be interpreted with caution.

schools with very different educational missions. It is essential to separate Catholic schools from other schools because previous research has demonstrated that Catholic schools, all else equal, usually outperform public schools and other private schools (McEwan, 2004; Bryk et al., 1993). By doing so, we avoid confounding the effect of attending a non-profit school with the effect of a Catholic school.

Here I examine whether some types of for-profit and non-profit schools are more effective than others. Tables 13, 14, 15, and 16 summarize the results separating for-profit and non-profit schools by ownership type. As in the prior analysis, unadjusted estimates suggest that students in for-profit independent schools (the omitted reference category) have higher Spanish and mathematics achievement than public school students and lower achievement than other private voucher sectors. For-profit students that attend schools that belong to a franchise score, on average, 0.10 standard deviation higher than for-profit independent students. Raw differences are even higher between Catholic and for-profit independent students (on average .3 standard deviations). There is no significant unadjusted difference in Spanish or mathematic achievement between Protestant, non-sectarian and for-profit independent schools.

After controlling for student and peer attributes and selection bias, I still find a significant and even more substantial positive for-profit franchise school (over 0.10 standard deviations), Catholic school (over 0.12 standard deviations), and non-sectarian school (over .1 standard deviations)[43] Spanish achievement effect.[44] The corrected test score estimates also indicate that there is a very small (less than .04) and negative significant difference in 4th grade Spanish achievement between for-profit independent and public schools (tables 13-15). However, the corrected estimates also indicate that public school students outperform their for-profit voucher school peers by 0.07 on the 8th grade Spanish exam (table 16) and there is no significant difference in Spanish achievement between Protestant and for-profit independent schools. The results in

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[43]The for-profit and non-sectarian 8th grade Spanish test score gaps are not significant.

[44]Accounting for selection bias does not change a non-profit school sector's advantage or disadvantage relative to for-profit independent schools.

tables 13-16 also demonstrate that for-profit franchise schools and Catholic schools have a considerable advantage in mathematics (over 0.12 standard deviations) over for-profit independent schools, once student and peer attributes and selection bias are controlled for. In addition, there is a substantial non-sectarian school mathematics effect in 4th grade. In 8th grade the difference is not significant. The corrected test score estimates also indicate that there is a small and significant difference in 4th grade Spanish and mathematics achievement between for-profit and public schools (.05) (tables 13-16).There is no significant difference in mathematic achievement between for-profit independent and Protestant schools. In fact, in most cases Protestant schools produce slightly lower mathematics test scores than for-profit independent schools after accounting for confounding independent variables.

Table 13 Here

Table 14 Here

Table 15 Here

Table 16 Here

Are the magnitudes of these Catholic, non-sectarian, and for-profit franchise effects substantial? Research in the United States has found that Catholic schools have an effect size of less than .10 standard deviations (Neal, 2002), which some have argued is not of practical importance for public policy (Levin, 1998). I find that Catholic schools and for-profit schools that belong to a franchise have larger effect sizes, over .12 of a standard deviation. Finally, I find a lack of any consistent substantial difference between student achievement in public, Protestant and for-profit independent schools. In some cases it appears that Protestant schools and public schools produce slightly lower achievement than for-profit independent schools.

6   Conclusion

There has been a vigorous policy debate in Chile on the performance of for-profit and non-profit schools. Some argue that for-profit schools cannot be trusted to place the interest of students over profitability. Buried in this position is the belief that for-profits would cut quality in the process of cutting costs (OEI, 2007). Skeptics have countered that for-profit schools have incentives to reduce costs and to innovate, leading to both higher quality and greater efficiency in education (Tironi, 2006; Hoxby, 2003). Neither of these arguments, however, is based on any empirical evidence on the differential performance across school types.

To gain insight into this debate, I've examined the Chilean school system where vouchers have been implemented on a large scale and where for-profit and non-profit school supply has increased. This paper compares the academic achievement of fourth and eighth-grade students across for-profit, non-profit, public, and non-voucher schools. I have also subdivided for-profit and non-profit schools by ownership type: for-profit independent, for-profit franchise, Catholic, Protestant, and non-sectarian voucher schools. What I find is a mixed story. Controlling for individual and peer characteristics and selection bias, the results suggest that a representative for-profit school student achieves slightly lower than a comparable student in a non-profit school and slightly higher than similar fourth grade public school students. There is no consistent difference in eighth- grade student achievement in for-profit and public schools. However, an average student in a for-profit independent school performs significantly lower than a similar student enrolled in a Catholic, non-sectarian, and for-profit franchise school. The results also show that there is no important difference (less than .05 or not statistically significant) in achievement between public and for-profit independent schools. There is also not a statistically significant difference in Spanish test scores between for-profit independent and Protestant schools. In mathematics, it appears that Protestant voucher schools consistently have slightly lower achievement than for-profit independent schools.

The Catholic school effect is consistent with previous research in the United States (Neal, 2002). Researchers have argued that Catholic schools foster an environment in which rigorous academic work is pursued within a supportive and caring environment (Bryk et al., 1993). The positive for-profit franchise effect is also consistent with previous research in Chile (Elacqua et al., 2008). Some of the reasons that may explain the for-profit franchise advantage include the benefits of scale of educational inputs (Chubb, 2001). In addition, some researchers have argued that being embedded in a larger organization reduces and facilitates the flow of information (such as research on best practices) between the schools in a franchise (McMeekin, 2003).[45] The evidence on low-quality Protestant schools is also consistent with some research in the United States, which has found that these schools dedicate more of their resources for preparing its students for the Kingdom of Heaven than on academic activities (Peshkin, 1986).

From a policy perspective, perhaps the most interesting finding of this research is the variation of student achievement within both the for-profit and non-profit sectors. These findings suggest that policies oriented to eliminate for-profit schools and continue funding non-profit (religious and non-sectarian) schools, is unlikely to improve educational outcomes. However, the results also cast doubt on whether, as the conservative opposition and others have argued, that the problem with Chile's education system lies in not allowing educational markets to function to their full extent. For-profit independent schools, the largest private voucher school sector, perform significantly worse than most other non-profit and for-profit sub-sectors.

It is highly unlikely that these mixed research findings will resolve the education policy debate in Chile. As some scholars and practitioners have pointed out, nuanced research findings are usually much harder to interpret and less likely to influence policy and public understanding than straightforward ideological positions (Henig, 2008;

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[45]It may also be the case that high achieving for-profit schools may be more likely to establish franchises (or to join a franchise) than low quality for-profit schools. In a competitive schooling environment, low quality for-profit schools may be unable to attract students and additional resources needed to expand operations. Data on the characteristics of for-profit school owners would improve our understanding of the complex decisions involved in establishing a for-profit voucher school and expanding operations.

Belfield and Levin, 2005). At a recent conference that explored the reasons why research rarely influences policy, David Driscoll, the Commissioner of Education of the state of Massachusetts, summarized the terms of this debate: "The exact science of ideology always trumps the inexact science of research" (Driscoll, 2007) [46].

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[46]I would like to thank Mark Schneider for giving me the reference to this conference.

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Figure 1 Enrollment share in public and private schools, 1981–2008.
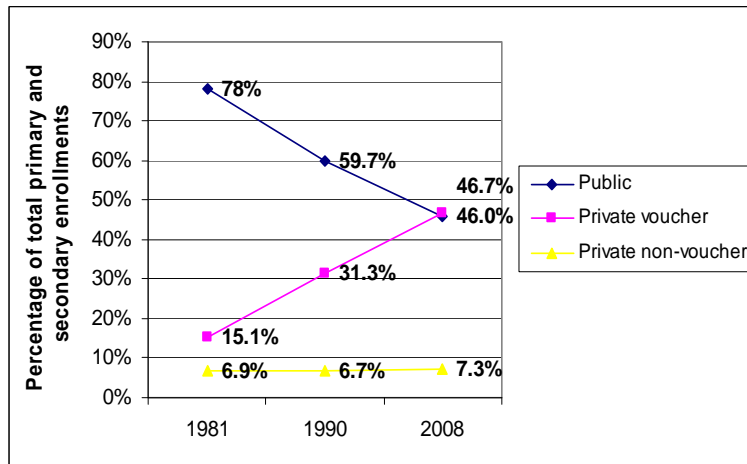
Table 1: Distribution of primary and secondary school students across school types, 2008

	Percent of schools	Percent of enrollments
Public	54.3	46.1
For-profit voucher	30	30.6
Non-profit voucher	9.1	16
Private non-voucher	6.6	7.3
Total	100	100
Number of schools or students	10,397	3,448,644

Table 2 The growth of private schooling in Chile, 1990-2008

School type	School numbers			Student enrollments		
	1990	2008	Percent change	1990	2008	Percent change
Public	6,072	5,641	-7.1%	1,642,414	1,589,468	-3.2%
For-profit voucher	1,592	3,118	95.9%	494,843	1,056,090	113.4%
Non-profit voucher	700	949	35.6%	343,755	550,635	60.2%
Private non-voucher	521	689	32.2%	198,602	252,451	27.1%
Total	8,885	10,397	17.0%	2,679,614	3,448,644	28.7%

Table 3: Distribution of primary school students across 7 school categories, 2008

	Percent of schools	Percent of enrollment
Public	54.8	46.5
For-profit franchise	5.7	7.3
For-profit independent	24.6	23.6
Non-profit Catholic	6.3	12.3
Non-profit Protestant	0.9	1.4
Non-profit non-sectarian	1.0	1.6
Private non-voucher	6.7	7.4
Total	100	100
Number of schools or students	10,299	3,420,594

Table 4: Primary schools by ownership type: Descriptive summary, 2008

School type	N	Rural (%)	Average school size*	Metropolitan Region (%)	Vulnerable students (%)	Average mothers' years of education
<u>Public</u>	5,129	65%	560	13%	61%	8.6
<u>For-profit voucher</u>	2,441	29%	519	32%	37%	10.5
For-profit franchise	444	30%	651	41%	44%	10.2
For-profit independent	1,997	29%	490	30%	45%	10.5
<u>Non-profit voucher</u>	803	21%	738	27%	31%	11.13
Non-profit Catholic	575	24%	839	26%	37%	11.3
Non-profit Protestant	88	18%	563	16%	39%	10.8
Non-profit secular	80	13%	561	44%	33%	11.1
<u>Private non-voucher</u>	442	3%	555	47%	0%	14.8

*Only urban primary schools

Table 5: Primary schools by ownership type: Schooling inputs, programs, and teacher quality, 2008

| School type | N | Schooling Inputs | | | Programs | | | Teacher quality |
		Class size*	Charge tuition (%)	Tuition**	Full day program*** (%)	Preschool program (%)	Preferential student and accountability program (%)	Teacher productivity award*** (%)
Public	5,129	30.1	0%	0	86%	51%	99%	22%
For-profit voucher	2,441	29.2	48%	6,110	60%	60%	48%	19%
For-profit franchise	444	31.1	46%	4,909	62%	53%	51%	22%
For-profit independent	1,997	28.8	46%	6,394	59%	61%	47%	18%
Non-profit voucher	803	34.9	46%	7,356	73%	70%	53%	42%
Non-profit Catholic	575	37.1	48%	7,698	82%	71%	53%	46%
Non-profit Protestant	88	35.1	62%	6,784	53%	71%	64%	30%
Non-profit secular	80	27.6	35%	5,766	61%	62%	52%	27%
Private non-voucher	442	20.7	100%	N/A	N/A	73%	-	-

*Only urban primary schools
1 USD = 523 pesos in 2007
***2007 data

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Table 6. Chile's National Standardized Test (SIMCE)

	Number of schools	Number of students
SIMCE 2002 4th grade	6,140	274,861
SIMCE 2005 4th grade	7,517	255,431
SIMCE 2006 4th grade	7,607	250,829
SIMCE 2007 8th grade	5,614	279,886

Source: Ministry of Education

Table 7 Sample descriptive statistics, 4th grade 2002

	Sample	Public	For-profit independent	For-profit franchise	Catholic	Protestant	Nonsectarian
SPANISH	0.000	-0.230	0.003	0.131	0.409	0.065	0.018
	[1.000]	[.960]	[.985]	[.967]	[.883]	[.966]	[1.009]
MATH	0.000	-221	-0.009	0.167	0.346	0.001	0.001
	[1.000]	[.963]	[.964]	[.976]	[.899]	[.941]	[1.019]
Public	0.584						
For-profit independent	0.188						
For-profit franchise	0.075						
Catholic	0.12						
Protestant	0.016						
Nonsectarian	0.020						
FEMALE	0.488	0.482	0.466	0.483	0.556	0.492	0.475
MTHSCH	9.25	7.55	9.28	9.45	10.57	9.78	8.89
	[4.15]	[4.26]	[4.19]	[4.1]	[3.82]	[4.08]	[4.41]
MTHMISS	0.13	0.14	0.13	0.12	0.10	0.12	0.15
FTHSCH	9.25	7.62	9.37	9.52	10.49	9.69	8.91
	[4.11]	[4.19]	[4.12]	[4.02]	[3.79]	[4.13]	[4.41]
FTHMISS	0.14	0.172	0.16	0.14	0.12	0.15	0.182
INCOME	2.80	2.01	2.83	2.79	3.41	2.86	2.87
	[2.283]	[1.65]	[2.73]	[2.111]	[2.637]	[2.085]	[2.941]
BOOKS1	0.17	0.221	0.113	0.101	0.063	0.126	0.172
BOOKS2	0.213	0.247	0.173	0.170	0.139	0.199	0.205
BOOKS3	0.215	0.217	0.215	0.219	0.205	0.205	0.211
BOOKS4	0.202	0.172	0.235	0.247	0.263	0.235	0.194
BOOKS5	0.109	0.08	0.142	0.141	0.17	0.136	0.118
BOOKS6	0.037	0.026	0.05	0.051	0.063	0.043	0.039
RURAL	0.136	0.193	0.06	0.056	0.033	0.087	0.134
AVMTHSCH (peer)	9.26	7.56	9.38	9.48	10.63	9.78	8.74
	[2.06]	[1.84]	[2.23]	[2.05]	[1.60]	[2.1]	[2.54]
AVFTHSCH (peer)	9.28	7.637	9.47	9.55	10.54	9.7	8.8
	[2.09]	[1.89]	[2.20]	[2.03]	[1.67]	[2.13]	[2.642]
AVINCOME (peer)	2.79	2.02	2.87	2.80	3.431	2.83	2.83
	[2.619]	[.715]	[1.34]	[1.15]	[1.48]	[.999]	[2.14]
TUITION	1.9	0	2.51	2.47	2.64	2.30	1.49
	[2.15]	[0]	[2.67]	[2.54]	[2.91]	[2.27]	[2.49]
N(students	250,216	146,120	47,055	17,645	30,014	3,866	5,516

Note: Standard deviations are in brackets.

Table 8 Sample descriptive statistics, 4ᵗʰ grade 2006

	Sample	Public	For-profit independent	For-profit franchise	Catholic	Protestant	Nonsectarian
SPANISH	0.000	-0.225	0.033	0.088	0.316	0.019	0.143
	[1.000]	[.971]	[.982]	[.971]	[.931]	[.960]	[.996]
MATH	0.000	-.248	0.049	0.126	0.321	-0.005	0.106
	[1.000]	[.979]	[.967]	[.955]	[.893]	[.949]	[1.03]
Public	0.514						
For-profit independent	0.249						
For-profit franchise	0.073						
Catholic	0.128						
Protestant	0.016						
Nonsectarian	0.021						
FEMALE	0.49	0.488	0.466	0.476	0.561	0.483	0.471
MTHSCH	11.64	9.81	11.86	11.67	12.88	12.1	11.41
	[3.26]	[3.34]	[3.31]	[3.19]	[2.98]	[3.18]	[3.57]
MTHMISS	0.08	0.08	0.08	0.08	0.06	0.08	0.09
FTHSCH	11.67	9.89	11.96	11.76	12.79	12.14	11.47
	[3.34]	[3.39]	[3.38]	[3.23]	[3.14]	[3.3]	[3.6]
FTHMISS	0.11	0.12	0.11	0.11	0.08	0.11	0.12
INCOME	3.62	2.40	3.90	3.6	4.5	3.7	3.7
	[2.9]	[1.82]	[3.22]	[2.78]	[3.48]	[2.74]	[3.36]
BOOKS1	.081	0.112	0.054	0.053	0.032	0.051	0.078
BOOKS2	0.23	0.282	0.179	0.177	0.138	0.187	0.218
BOOKS3	0.223	0.234	0.212	0.207	0.199	0.232	0.212
BOOKS4	0.244	0.212	0.273	0.280	0.290	0.272	0.236
BOOKS5	0.114	0.087	0.137	0.141	0.160	0.134	0.126
BOOKS6	0.067	0.045	0.086	0.085	0.108	0.075	0.074
RURAL	0.128	0.20	0.056	0.054	0.031	0.081	0.122
AVMTHSCH (peer)	11.61	9.78	11.93	11.79	12.91	12.03	11.28
	[1.91]	[1.68]	[2.13]	[1.90]	[1.62]	[1.84]	[2.31]
AVFTHSCH (peer)	11.66	9.86	12.03	11.78	12.81	12.12	11.35
	[1.96]	[1.77]	[2.15]	[1.92]	[1.70]	[1.83]	[2.40]
AVINCOME (peer)	3.61	2.40	3.96	3.60	4.48	3.65	5.58
	[1.79]	[.864]	[2.13]	[1.72]	[2.11]	[1.44]	[2.45]
TUITION	2.39	0	3.3	2.8	3.53	2.67	2.06
	[2.69]	[0]	[3.55]	[2.86]	[3.83]	[2.65]	[3.28]
N(students	233,686	119,987	58,075	17,091	29,851	3,707	4,975

Note: Standard deviations are in brackets.

Table 9 Differences between non-profit voucher, public, and private non-voucher schools, with average characteristics of for-profit voucher school students (4th grade 2002)

	Non-profit voucher	Public
SPANISH		
Unadjusted Difference	0.284	-0.268
	[0.025]	[0.019]
Difference adjusted for:		
Individual SES	0.170	-0.195
	[0.020]	[0.018]
Individual/peer SES	0.086	-0.069
	[0.018]	[0.016]
Individual/peer SES/selectivity	0.088	-0.068
	[0.018]	[0.016]
N	34,054	121,036
MATH		
Unadjusted Difference	0.226	-0.260
	[0.026]	[0.019]
Difference adjusted for:		
Individual SES	0.141	-0.183
	[0.020]	[0.018]
Individual/peer SES	0.063	-0.067
	[0.018]	[0.017]
Individual/peer SES/selectivity	0.066	-0.065
	[0.018]	[0.017]
N	34,104	121,263

Source: Ministry of Education and author's calculations
Notes: Standard errors in brackets. All regression results cluster standard errors at the school level.
Reference category: "For-profit voucher". For-profit Spanish N= 54,656 ; For-profit Math N = 54,723

Table 10 Differences between non-profit voucher, public, and private non-voucher schools, with average characteristics of for-profit voucher school students (4th grade 2005)

	Non-profit voucher	Public
SPANISH		
Unadjusted Difference	0.221	-0.299
	[0.022]	[0.015]
Difference adjusted for:		
Individual SES	0.137	-0.208
	[0.018]	[0.017]
Individual/peer SES	0.081	-0.104
	[0.017]	[0.018]
Individual/peer SES/selectivity	0.078	-0.083
	[0.017]	[0.017]
N	35,546	113,560
MATH		
Unadjusted Difference	0.183	-0.299
	[0.024]	[0.016]
Difference adjusted for:		
Individual SES	0.111	-0.205
	[0.020]	[0.019]
Individual/peer SES	0.056	-0.097
	[0.019]	[0.020]
Individual/peer SES/selectivity	0.054	-0.073
	[0.020]	[0.019]
N	35,624	113,792

Source: Ministry of Education and author's calculations
Notes: Standard errors in brackets. All regression results cluster standard errors at the school level.
Reference category: "For-profit voucher". For-profit Spanish N= 66,344 ; For-profit Math N = 66,542

Table 11 Differences between non-profit voucher, public, and private non-voucher schools, with average characteristics of for-profit voucher school students (4th grade 2006)

	Non-profit voucher	Public
SPANISH		
Unadjusted Difference	0.219	-0.271
	[0.020]	[0.014]
Difference adjusted for:		
Individual SES	0.112	-0.217
	[0.019]	[0.016]
Individual/peer SES	0.068	-0.088
	[0.018]	[0.019]
Individual/peer SES/selectivity	0.070	-0.081
	[0.018]	[0.019]
N	36,020	109,866
MATH		
Unadjusted Difference	0.197	-0.314
	[0.023]	[0.016]
Difference adjusted for:		
Individual SES	0.113	-0.224
	[0.020]	[0.018]
Individual/peer SES	0.061	-0.087
	[0.020]	[0.021]
Individual/peer SES/selectivity	0.063	-0.076
	[0.020]	[0.021]
N	36,091	110,154

Source: Ministry of Education and author's calculations
Notes: Standard errors in brackets. All regression results cluster standard errors at the school level.
Reference category: "For-profit voucher". For-profit Spanish N= 60,587; For-profit Math N = 68,709

Table 12 Differences between non-profit voucher, public, and private non-voucher schools, with average characteristics of for-profit voucher school students (8th grade 2004)

	Non-profit voucher	Public
SPANISH		
Unadjusted Difference	0.265	-0.273
	[0.024]	[0.020]
Difference adjusted for:		
Individual SES	0.147	-0.098
	[0.019]	[0.032]
Individual/peer SES	0.194	0.034
	[0.019]	[0.038]
Individual/peer SES/selectivity	0.103	0.032
	[0.019]	[0.037]
N	37,468	138,819
MATH		
Unadjusted Difference	0.238	-0.279
	[0.028]	[0.023]
Difference adjusted for:		
Individual SES	0.140	-0.119
	[0.023]	[0.038]
Individual/peer SES	0.096	0.032
	[0.022]	[0.047]
Individual/peer SES/selectivity	0.095	0.029
	[0.022]	[0.046]
N	37,620	139,644

Source: Ministry of Education and author's calculations
Notes: Standard errors in brackets. All regression results cluster standard errors at the school level.
Reference category: "For-profit voucher". For-profit Spanish N= 68,514 ; For-profit Math N = 60,983

Table 13: Differences between for-profit franchise, Catholic, Protestant, Non-sectarian, Public, and non-voucher schools, with average characteristics of for-profit independent school students (4th grade 2002)

	For-profit franchise	Catholic	Protestant	Non-sectarian	Public
SPANISH					
Unadjusted Difference	0.128	0.406	0.062	0.015	-0.233
	[0.040]	[0.026]	[0.064]	[0.069]	[0.020]
Difference adjusted for:					
Individual SES	0.101	0.283	-0.049	0.093	-0.154
	[0.028]	[0.021]	[0.047]	[0.052]	[0.018]
Individual/peer SES	0.115	0.172	-0.103	0.071	-0.027
	[0.024]	[0.021]	[0.040]	[0.041]	[0.016]
Individual/peer SES/selectivity	0.115	0.171	-0.116	0.065	-0.027
	[0.024]	[0.021]	[0.039]	[0.042]	[0.016]
N	15,116	26,278	3,254	4,522	121,036
MATH					
Unadjusted Difference	0.176	0.355	0.010	0.010	-0.212
	[0.041]	[0.027]	[0.058]	[0.066]	[0.019]
Difference adjusted for:					
Individual SES	0.129	0.254	-0.136	0.150	-0.130
	[0.029]	[0.021]	[0.038]	[0.047]	[0.018]
Individual/peer SES	0.143	0.150	-0.197	0.130	-0.014
	[0.026]	[0.021]	[0.039]	[0.044]	[0.016]
Individual/peer SES/selectivity	0.145	0.149	-0.199	0.124	-0.013
	[0.027]	[0.021]	[0.038]	[0.046]	[0.016]
N	15,127	26,313	3,268	4,523	121,263

Source: Ministry of Education and author's calculations
Notes: Standard errors in brackets. All regression results cluster standard errors at the school level.
Reference category: "For-profit voucher independent".
For-profit independent Spanish N= 39,540 ; For-profit independent Math N = 39,596

Table 14: Differences between for-profit franchise, Catholic, Protestant, Non-sectarian, Public, and non-voucher schools, with average characteristics of for-profit independent school students (4th grade 2005)

	For-profit franchise	Catholic	Protestant	Non-sectarian	Public
SPANISH					
Unadjusted Difference	0.109	0.316	0.012	0.029	-0.272
	[0.032]	[0.023]	[0.058]	[0.058]	[0.016]
Difference adjusted for:					
Individual SES	0.100	0.214	0.056	0.143	-0.176
	[0.022]	[0.019]	[0.039]	[0.046]	[0.017]
Individual/peer SES	0.122	0.143	0.010	0.155	-0.067
	[0.021]	[0.019]	[0.039]	[0.040]	[0.018]
Individual/peer SES/selectivity	0.121	0.141	0.001	0.154	-0.055
	[0.021]	[0.019]	[0.039]	[0.040]	[0.018]
N	16,429	27,522	3,309	4,715	113,560
MATH					
Unadjusted Difference	0.123	0.275	-0.003	0.019	-0.269
	[0.041]	[0.027]	[0.058]	[0.066]	[0.019]
Difference adjusted for:					
Individual SES	0.105	0.184	0.019	0.157	-0.172
	[0.025]	[0.021]	[0.039]	[0.050]	[0.019]
Individual/peer SES	0.126	0.113	-0.044	0.165	-0.059
	[0.024]	[0.022]	[0.049]	[0.044]	[0.020]
Individual/peer SES/selectivity	0.127	0.112	-0.058	0.164	-0.042
	[0.024]	[0.022]	[0.050]	[0.044]	[0.020]
N	16,484	27,578	3,316	4,730	113,792

Source: Ministry of Education and author's calculations
Notes: Standard errors in brackets. All regression results cluster standard errors at the school level.
Reference category: "For-profit voucher independent".
For-profit independent Spanish N= 49,915 ; For-profit independent Math N = 50,058

Table 15: Differences between for-profit franchise, Catholic, Protestant, Non-sectarian, Public, and non-voucher schools, with average characteristics of for-profit independent school students (4th grade 2006)

	For-profit franchise	Catholic	Protestant	Non-sectarian	Public
SPANISH					
Unadjusted Difference	0.055	0.282	-0.014	0.109	-0.258
	[0.029]	[0.022]	[0.048]	[0.057]	[0.015]
Difference adjusted for:					
Individual SES	0.071	0.175	-0.021	0.094	-0.195
	[0.024]	[0.021]	[0.053]	[0.054]	[0.017]
Individual/peer SES	0.086	0.116	-0.041	0.109	-0.060
	[0.024]	[0.021]	[0.046]	[0.051]	[0.020]
Individual/peer SES/selectivity	0.084	0.115	-0.049	0.109	-0.059
	[0.023]	[0.021]	[0.048]	[0.050]	[0.020]
N	15,620	28,089	3,408	4,523	109,866
MATH					
Unadjusted Difference	0.077	0.273	-0.044	0.057	-0.297
	[0.041]	[0.027]	[0.058]	[0.066]	[0.019]
Difference adjusted for:					
Individual SES	0.086	0.186	-0.046	0.108	-0.200
	[0.026]	[0.022]	[0.045]	[0.063]	[0.018]
Individual/peer SES	0.102	0.115	-0.067	0.127	-0.056
	[0.026]	[0.022]	[0.041]	[0.057]	[0.022]
Individual/peer SES/selectivity	0.100	0.115	-0.075	0.126	-0.049
	[0.026]	[0.022]	[0.043]	[0.057]	[0.023]
N	15,651	28,131	3,419	4,541	110,154

Source: Ministry of Education and author's calculations
Notes: Standard errors in brackets. All regression results cluster standard errors at the school level.
Reference category: "For-profit voucher independent".
For-profit independent Spanish N= 52,894; For-profit independent Math N = 53,058

Table 16: Differences between for-profit franchise, Catholic, Protestant, Non-sectarian, Public, and non-voucher schools, with average characteristics of for-profit independent school students (8th grade 2004)

	For-profit franchise	Catholic	Protestant	Non-sectarian	Public
SPANISH					
Unadjusted Difference	0.071	0.377	-0.046	-0.065	-0.253
	[0.036]	[0.026]	[0.059]	[0.060]	[0.021]
Difference adjusted for:					
Individual SES	0.093	0.234	0.013	-0.035	-0.068
	[0.023]	[0.023]	[0.043]	[0.039]	[0.031]
Individual/peer SES	0.099	0.176	-0.003	-0.009	0.072
	[0.022]	[0.023]	[0.039]	[0.040]	[0.039]
Individual/peer SES/selectivity	0.102	0.179	0.005	-0.015	0.069
	[0.022]	[0.023]	[0.040]	[0.043]	[0.037]
N	17,269	28,935	3,419	5,114	138,819
MATH					
Unadjusted Difference	0.096	0.359	-0.025	0.060	-0.251
	[0.041]	[0.027]	[0.058]	[0.066]	[0.019]
Difference adjusted for:					
Individual SES	0.121	0.244	-0.064	-0.016	-0.082
	[0.029]	[0.027]	[0.042]	[0.050]	[0.037]
Individual/peer SES	0.127	0.180	-0.076	-0.001	-0.076
	[0.028]	[0.028]	[0.045]	[0.051]	[0.048]
Individual/peer SES/selectivity	0.139	0.182	-0.076	-0.002	-0.074
	[0.028]	[0.028]	[0.046]	[0.053]	[0.046]
N	17,376	29,046	3,437	5,137	139,644

Source: Ministry of Education and author's calculations
Notes: Standard errors in brackets. All regression results cluster standard errors at the school level.
Reference category: "For-profit voucher independent".
For-profit independent Spanish N= 43,318; For-profit independent Math N = 43,607

Appendix 1 A logit model of school choice

FEMALE	0,06*
	(2,40)
MTHED	0,05***
	(19,37)
FTHED	0,03***
	(11,43)
HHINCOME	0,06***
	(6,39)
BOOKS1	-0,16***
	(-7,02)
BOOKS2	0,17***
	(10,24)
BOOKS3	0,33***
	(15,83)
BOOKS4	0,42***
	(16,50)
BOOKS5	0,45***
	(12,71)
BOOKS6	0,47***
	(10,74)
BOOKS7	0,35***
	(9,16)
RURAL	-0,94***
	(-8,15)
TUITION	0,88***
	(32,31)
DENSITY	-1,23***
	(-4,39)
DENSITY2	0,53***
	(4,57)
CONSTANT	-1,43***
	(-9,86)
Pseudo R-squared	0,30
N	226522

Robust standard errors in parentheses
*significant at 10%, ** significant at 5%, *** significant at 1%
Regional dummies were also included in the regressions.

Appendix 2 Spanish achievement regressions with school density

	Public	For-profit	Non-profit
FEMALE	0,15***	0,13***	0,15***
	(24,46)	(15,67)	(12,16)
MTHED	0,02***	0,02***	0,02***
	(22,79)	(12,77)	(11,61)
FTHED	0,02***	0,02***	0,02***
	(22,17)	(13,11)	(11,77)
HHINCOME	0,01***	0,01***	0,01***
	(8,13)	(6,84)	(7,36)
BOOKS1	-0,09***	-0,08***	-0,06**
	(-10,69)	(-5,41)	(-3,12)
BOOKS1	0,07***	0,06***	0,05***
	(9,23)	(4,83)	(3,43)
BOOKS2	0,14***	0,11***	0,12***
	(16,54)	(8,35)	(7,33)
BOOKS3	0,22***	0,19***	0,17***
	(18,96)	(13,31)	(8,71)
BOOKS4	0,24***	0,24***	0,21***
	(13,45)	(12,12)	(8,94)
BOOKS5	0,25***	0,25***	0,22***
	(10,61)	(9,14)	(7,56)
BOOKS6	0,25***	0,24***	0,22***
	(13,58)	(11,22)	(9,35)
RURAL	0,12***	0,15**	-0,02
	(6,82)	(2,78)	(-0,46)
TUITION	-0,02***	-0,02***	-0,01**
	(-3,97)	(-5,07)	(-3,22)
MTHEDMIS	-0,08***	-0,07***	-0,11***
	(-6,36)	(-3,42)	(-3,99)
FTHEDMIS	-0,04***	-0,03	-0,03
	(-3,66)	(-1,95)	(-1,42)
MISHHINCOME	-0,12***	-0,04	-0,11**
	(-6,94)	(-1,38)	(-3,19)
MISTUITION	-0,07***	-0,13***	-0,06
	(-5,37)	(-4,71)	(-1,93)
AVGMTHED	0,07***	0,10***	0,09***
	(11,10)	(9,89)	(7,36)
AVGFTHED	0,02***	0,02*	0,02
	(4,16)	(2,51)	(1,20)
AVGHHINCOME	0,07***	0,04**	0,04***
	(6,47)	(3,09)	(4,88)
MILLS	0,03**	-0,03	-0,05**
	(2,93)	(-1,51)	(-2,72)
CONSTANT	-1,63***	-1,62***	-1,42***
	(-41,63)	(-25,86)	(-16,81)
R-squared	0,13	0,18	0,20
N	121036	54656	34054

Robust standard errors in brackets
*significant at 10%; ** significant at 5%; significant at 1%
Regional dummies were also included in the regressions.

Appendix 3 Mathematics achievement regressions with school density

	Public	For-profit	Non-profit
FEMALE	-0,07***	-0,09***	-0,09***
	(-10,93)	(-9,55)	(-6,35)
MTHED	0,02***	0,01***	0,02***
	(25,96)	(11,79)	(13,68)
FTHED	0,02***	0,02***	0,01***
	(22,89)	(13,03)	(9,89)
HHINCOME	0,01***	0,01***	0,02***
	(7,01)	(4,56)	(7,70)
BOOKS1	-0,09***	-0,08***	-0,08***
	(-10,54)	(-4,83)	(-3,60)
BOOKS2	0,07***	0,07***	0,06***
	(8,69)	(5,59)	(4,12)
BOOKS3	0,14***	0,13***	0,12***
	(15,85)	(9,17)	(7,38)
BOOKS4	0,21***	0,19***	0,17***
	(18,22)	(13,03)	(8,96)
BOOKS5	0,23***	0,23***	0,21***
	(13,18)	(11,69)	(8,66)
BOOKS6	0,25***	0,24***	0,21***
	(10,44)	(9,04)	(7,15)
RURAL	0,02	0,07	-0,06
	(1,02)	(1,40)	(-1,31)
TUITION	-0,02***	-0,02***	-0,01*
	(-3,53)	(-5,21)	(-2,00)
MTHEDMIS	-0,09***	-0,09***	-0,13***
	(-7,29)	(-4,52)	(-4,68)
FTHEDMIS	-0,05***	-0,06***	-0,05**
	(-4,82)	(-3,68)	(-2,65)
MISHHINCOME	-0,14***	-0,04	-0,07*
	(-8,03)	(-1,56)	(-2,01)
MISTUITION	-0,08***	-0,11***	-0,02
	(-5,78)	(-4,31)	(-0,60)
AVGMTHED	0,06***	0,10***	0,08***
	(10,37)	(10,19)	(6,57)
AVGFTHED	0,02**	0,02	0,01
	(3,13)	(1,78)	(0,86)
AVGHHINCOME	0,06***	0,04**	0,05***
	(5,53)	(3,06)	(4,78)
MILLS	0,05***	-0,02	-0,05*
	(4,09)	(-0,91)	(-2,47)
CONSTANT	-1,46***	-1,46***	-1,24***
	(-35,83)	(-22,79)	(-15,09)
R-squared	0,12	0,18	0,19
N	121263	54723	34104

Robust standard errors in brackets
*significant at 10%; ** significant at 5%; significant at 1%
Regional dummies were also included in the regressions.