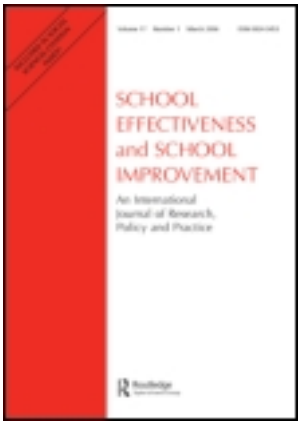

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The effectiveness of private school franchises in Chile's national voucher program

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There is persistent debate over the role of scale of operations in education. Some argue that school franchises offer educational services more effectively than small independent schools. Skeptics counter that large centralized operations create hard-to-manage bureaucracies and foster diseconomies of scale and that small schools are more effective at promoting higher quality education. We can gain insight into this debate by examining Chile's national voucher program. This paper uses 4th-grade data to compare achievement in private franchises, private independent, and public schools in Chile. Our findings suggest that franchises have a large advantage over independent schools, once student and peer attributes and selectivity are controlled for. We also find that further disaggregating school franchises widens the larger franchise advantage. We conclude that policies oriented to create incentives for private school owners to join or start up a franchise may have the potential for improving educational outcomes.

Keywords: school effectiveness; private school franchises; Chile's national voucher program

Introduction

Unlike the issues raised by the famous Coleman Report (Coleman et al., 1966), the school effectiveness literature suggests that variables at the classroom and school levels have a significant impact on educational outcomes (Creemers, 1996; Scheerens, 1992; Stringfield & Slavin, 1992). Based on this idea, several studies have tested models of school effectiveness that attempt to model educational outcomes as a function that depends on variables at the school, classroom, and student levels. This research has found that variables such as school policy for teaching, the school learning environment, and other contextual factors linked to the internal environment of the school have a significant impact on educational outcomes in different education systems (Kyriakides, 2008).

On the other hand, several studies have examined the differences between school networks and independent schools. Most of these studies show that the schools

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belonging to networks have characteristics that distinguish them from independent schools. These differences relate mainly to factors within the school, linked to the institutional environment, financial management, and the relationship with the school community (e.g., Darling-Hammond, Ancess, & Falk, 1995; McMeekin, 2003).

The latter has generated a persistent debate about the optimal scale of operation of the schools and the potential of school networks to improve educational outcomes. This debate has focused mainly on internal aspects of the school that may have effects on educational outcomes and therefore is clearly linked to the school effectiveness literature.

One view is that larger schooling operations offer educational services more effectively than small independent schools. Proponents argue that increasing the size of schooling operations would lower per-pupil costs and free up resources for use at the school and classroom levels (Chubb, 2001). Researchers also claim that private school franchises promote the creation of sound institutional environments in member schools. McMeekin (2003) argues that being part of a franchise provides a shared experience within the network and facilitates the flow of information (such as on best practices) to network members.

Advocates also maintain that school franchises provide political benefits and credibility and legitimacy in the eyes of the community. Wohlstetter, Malloy, Hentschke, and Smith (2004) maintain, based on their research of charter school partnerships in the United States, that well-established charter school networks can build credibility for fundraising more easily than small independent charter schools. Proponents also argue that larger schooling operations will have more opportunities to access private investments to expand than smaller ones (Symonds, 2000).

These assertions have sparked two different trends in school management: consolidating public school districts and increasing public funding for private and charter school franchises and Educational Management Organizations (EMO). Both gained legitimacy from research suggesting that there were inefficiencies present in traditional public school systems (Hoxby, 1994) and in the belief that there are economies of scale in education (Chubb, 2001). Underlying the public school district consolidation movement is a belief that consolidation is a way for school districts to cut costs (Duncombe & Yinger, 2007) and improve how educational services are delivered (Smith & Wohlstetter, 2001). Underlying the privatization movement are the beliefs that by introducing competition and a business approach to schooling, schools will succeed (or fail) like firms and that private and charter school franchises and schools run by EMOs will produce educational outcomes more effectively and efficiently than public schools and small independent private schools (Chubb, 2001).

Critics fear that these reforms could have potential negative unintended consequences. They argue that large centralized operations will create hard-to-manage bureaucracies and foster diseconomies of scale due to associated problems of managing complex organizations, maintaining a sense of order, and creating a sense of community among students, parents, teachers, and administrators (Brown, Henig, Lacireno-Paquet, & Holyoke, 2004; Stiefel, Berne, Iatarola, & Fruchter, 2000). Opponents of school consolidation also claim that large schooling operations would empower administrators and other professionals far removed from the classroom (Hill, Pierce, & Guthrie, 1997). Others are concerned that consolidation reforms would encourage more standardization and less innovation. For instance, Belfield and Levin (2005) maintain that school franchises must establish a brand to

be successful, which requires relative uniform operations and services from site to site. They argue that such a branded approach to education could stifle innovation.

Some have argued that reducing the size of schooling operations is a more effective way to improve educational outcomes. They claim that small autonomous schools can improve the quality of education by creating intimate learning communities where students are encouraged by educators who know them (Wasley et al., 2000). Small school advocates also argue that small schools reduce the anonymity and isolation that many students experience in larger schooling operations and they increase students' sense of belonging (Barker & Gump, 1964). Proponents also argue that smaller schools foster higher levels of cooperation between teachers, better relations with school administers, and higher trust in the school community (Lee & Loeb, 2000). In addition, they maintain that small schools will encourage parental involvement, which benefits students and the entire community (Schneider, Teske, & Marshall, 2000).

Following these insights, many current proposals for reform in the United States share a vision of small, autonomous schools, encouraged to strengthen school communities (Raywid, 1998). In this vision of small schools, teachers and parents are viewed as essential to school governance and to the creation of effective schools (Bryk & Schneider, 2002). Working together, stakeholders promote higher quality education, making the relationship between parents, students, teachers, and administrators more cooperative (Henig, 1994).

Although evidence on the optimal scale of operations is limited, there is little doubt that these movements have been increasing. School consolidation may represent one of the most significant reforms in education government and management in the United States in the 20th century (Tyack, 1974). Despite a growing population, over 100,000 school districts have been eliminated since 1938, a decline of nearly 90% (National Center for Education Statistics [NCES], 2003). There are also a growing number of private school franchises and charter school partnerships and EMOs in the United States (Lips, 2000). For instance, Edison Schools, the United States' largest for-profit manager of schools, has become one of the nation's largest charter school management organizations and has increased from slightly more than 200 charter schools in 1995 to more than 3,600 charter schools in 2006.

The small schools movement has also made significant progress in recent years. For example, the Bill and Melinda Gates Foundation invested over US $ 1 billion to divide large urban high schools in the United States. For instance, these resources partly funded the creation of 197 small high schools in New York City alone (Arcaira et al., 2010).

Much of the existing empirical evidence has focused on the consequences of public school district consolidation and the division of large public school districts (Andrews, Duncombe, & Yinger, 2002), and only a small number of studies have examined the benefits of school franchises (Gill, Zimmer, Christman, & Blanc, 2007) and small independent schools (American Institutes for Research [AIR] & SRI International, 2006). The empirical evidence is often clouded by methodological limitations. In their extensive review of the literature, Andrews et al. (2002) conclude: ''both the claims of supporters of consolidation and detractors that claim small is beautiful have not adequately been tested using good evaluation methods'' (p. 256).

The research that examines the benefits of private school franchises versus small independent schools also suffers from thin data because it derives from the

evaluation of small-scale programs. The empirical findings on the impact of these small-scale programs in the United States are mixed. For instance, in their evaluation of Edison Schools, which was not a randomized study, researchers find that the performance of these schools varies (Gill et al., 2007). Similarly, the evaluations of the small high schools funded by the Gates' Foundation also suggest that there is wide variation in the quality of these schools (AIR & SRI, 2006; Bloom, Levy Thompson, & Unterman, 2010).

The evidence on private school franchises and small private independent schools is limited because most educational systems only provide funding to public schools (Organisation for Economic Co-operation and Development [OECD], 2003). We can gain insight into the distinct strands of arguments on the optimal size of schooling operations by examining school systems where vouchers have been implemented on a large scale and where private school supply has increased. In 1981, Chile began financing public and most private schools with vouchers. The reform sparked a redistribution of students across private and public schools, as well as the creation of many new private schools. While many private voucher schools are run by religious organizations, the majority are operated by private entrepreneurs (Elacqua, 2007). Private voucher schools currently account for over 50% of the total enrollment, and about one third of these schools belong to private voucher school franchises. This paper compares the achievement of fourth graders in private voucher franchise, private voucher independent, and public schools.

This is not the first paper to compare private and public school achievement in Chile. Researchers have examined student-level data and attempted to control for selection bias (e.g., Anand, Mizala, & Repetto, 2006; Contreras, 2002; Gallego, 2006; McEwan, 2001; Sapelli & Vial, 2002). Most of these studies show a small private school advantage.

This paper differs from earlier work by examining achievement across private voucher schools according to their network size. We consider private voucher franchise schools and private voucher independent schools that do not belong to a franchise. The results presented in this study provide suggestive evidence that, all else equal, private voucher franchise schools are more effective than private voucher independent and public schools.

The remainder of the paper is organized as follows. The second section reviews some background on Chile's voucher program and describes the private school categories that we will use in the empirical analysis. The third section presents the empirical strategy that will be used to compare student achievement across school categories and describes the data that will be used to implement it. The fourth section presents and interprets the results. The final section concludes and discusses policy implications.

Background on Chile

During the 1980s, the military government in Chile (1973 to 1990) instituted a sweeping education reform package. First, the government decentralized the administration of public schools, transferring responsibility for public school management from the Ministry of Education to municipal governments, whose maximum authority is the mayor. Second, the government changed the manner in which public and private schools were funded. Public schools continued to be funded centrally, but municipalities started to receive a per-student voucher for every child

attending their schools. As a result, enrollment losses began to have a direct effect on their education budgets. Private schools that did not charge tuition also began to receive the same per-student voucher as the public schools. Elite private schools that charged tuition continued to operate without public funding.

Education has become increasingly privatized since the voucher reforms were introduced. In 1980, 14% of Chilean K–12 students attended private schools that received some public subsidy, and another 6% attended unsubsidized private schools. By 1990, 34% of the students attended private voucher schools. By 2008, enrollment in such schools had reached almost 47% of the total enrollment. Adding in the 7% of students in elite private non-voucher schools leaves a slight majority of Chilean students in private schools (see Figure 1).

The essential features of the national voucher system have remained in place for almost 3 decades. The democratic governments in power since 1990 have chosen to focus on improving the quality of schools and teachers through targeted programs and training, while maintaining the organizational and funding components introduced in the 1980s (Martinic & Elacqua, 2010; OECD, 2004).[1]

Most researchers generally use a single category to describe all private voucher schools in Chile. However, as we will demonstrate below, there is variation in the size of private voucher school operations. The data presented in Table 1 suggest that the private voucher school sector is essentially a cottage industry. More than 70% of the private voucher schools are independent schools that do not belong to a franchise. Private voucher school franchises, which are defined in Chile as schools that belong to a network of schools that are operated by the same legal private voucher school ''owner'' (sostenedor), account for about one third of private voucher schools and enrollments. Most of the franchises are fairly small in scale, and only about 18% of primary private voucher students attend schools that belong to franchises that have more than four schools.

Private voucher schools are diverse in membership. Prior to the educational reforms in the 1980s, most private schools were Catholic (Aedo, 2000). When private

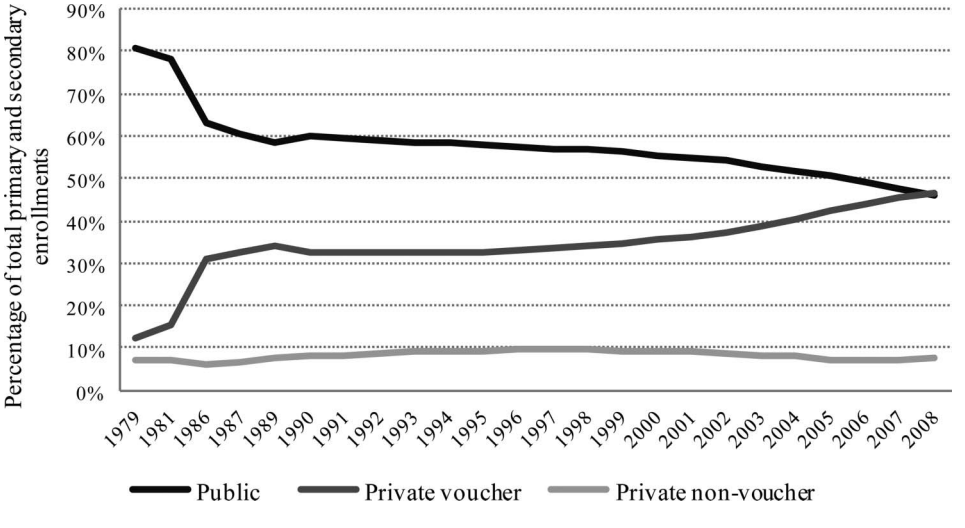

Figure 1. Enrollment share in private and public schools (1979–2008).

voucher schools began to receive the same per-pupil payment as the public schools, a group of new, mostly for-profit voucher schools entered the market. Table 2 provides information on the school type of private voucher school franchises and independent schools.

For-profit franchises, which are often controlled by a group of off-site owners, in many cases with private shareholders (Elacqua, 2007), represent 16% of all for-profit schools in Chile. These for-profit schools stand in varying degrees of contrast to independent for-profit voucher schools, most of which are owned and run by former public school teachers (Corvalán Elacqua, & Salazar, 2008), which account for about 84% of all for-profit schools. Nonprofit voucher schools, including Catholic,[2] Protestant,[3] and secular organizations,[4] are more likely to be characterized by networks (franchises) that are affiliated through religious congregations or nondenominational foundations.

Methodology

Empirical strategy

In this section, we describe an empirical strategy for comparing public, private voucher independent, and private voucher franchise schools' student achievement that will correct for selection bias.[5] Our empirical model builds on previous work by McEwan (2001).

We hypothesize that student achievement, measured as student performance on standardized tests, can be modeled as a function of student socioeconomic

Table 1. Distribution of primary schools and students across private voucher school categories (2008).

School category	Schools		Students		Average school size	Rural (%)
	N	(%)	*N*	(%)		
Voucher independent school	2,275	71.3	625,433	64.3	275	26.2
Voucher franchise 2 schools	332	10.4	112,278	11.5	338	31.9
Voucher franchise 3 schools	133	4.2	62,344	6.4	469	11.3
Voucher franchise 4 schools	51	1.6	27,103	2.8	531	11.8
Voucher franchise 5 or more schools	400	12.5	146,048	15.0	336	36.0
Total private voucher schools	3,191	100.0	973,206	100.0	302	27.2

Source: Ministry of Education and authors' calculations.

Table 2. Distribution of primary schools by ownership type and franchise size (2008).

School category	Independent school		Franchise school		Total private voucher schools	
	N	(%)	*N*	(%)	*N*	(%)
For-profit	2,013	84.0	384	16.0	2,397	100.0
Catholic voucher	157	35.8	281	64.2	438	100.0
Protestant voucher	15	18.1	68	81.9	83	100.0
Secular non-profit voucher	90	33.0	183	67.0	273	100.0

Source: Ministry of Education and authors' calculations.

characteristics (family background, home resources and peer groups[6]). Formally, we posit that linear models of the following form can explain student achievement:

$$A_{ij} = X_{ij}\beta_j + \varepsilon_{ij} \quad (1)$$

where A_{ij} is the test score of the *ith* student in the *jth* school type, X_{ij} is a set of independent variables that describe the socioeconomic background of the student and the student's peer group and ε_{ij} is an error term. In this paper, we have one public school category, while private voucher schools are classified according to whether they are independent or belong to a franchise. Additionally, depending on the specification, the latter are classified by size (number of schools) of the franchise to which they belong. The sample is separated into different types of schools, and regressions are estimated for each subsample. Thus, the coefficients are not restricted to be equal for different types of schools.[7]

Using the estimates $\widehat{\beta}_j$, one can predict the achievement of an "average" student in each school category. Although our empirical strategy has been used before (McEwan, 2001), the methodology has some weaknesses that should be taken into account before interpreting our results. Our estimates come from cross-sectional variation, which makes it difficult to claim causality. A better identification of the causal effect would be to include variation across schools and over time (longitudinal variation) at the same time. This requires a measure of the evolution of private school franchises over time (Gustafsson, 2007). Unfortunately, this information is not available and it is a topic for future research. In spite of this limitation, and given the focus of our paper is to examine a very specific question, we follow the same empirical strategy for comparison reasons. However, the results should be taken with some caution given the above caveats.

We use the mean characteristics of private voucher independent school students (denoted as $\bar{X}$). Thus, the predicted achievement of the average private voucher independent school student in the *jth* school category is:

$$\widehat{A}_j = \bar{X}\widehat{\beta}_j \quad (2)$$

To measure the difference in achievement between two school categories, we subtract one prediction from another. The corresponding standard error can also be calculated. For example, we may estimate the corrected difference between private voucher independent schools *(j = 1)* and private voucher franchise schools *(j = 2)*. This provides an approximation of the expected increase (or decrease) in test scores for the average private voucher independent school student if she were to attend a private voucher franchise school.

If the control variables perfectly account for student and peer demographics, then the above strategy yields unbiased results. More likely is that some variables are not precisely measured or omitted from the regressions. For instance, private voucher schools may be able to select more qualified students, on average, than their public school counterparts ("school choice bias"). Similarly, the average student attending a private 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 public school ("parental choice bias").

For these reasons, a simple comparison of student achievement in private voucher and public schools is unlikely to give unbiased estimates of the impact of

private voucher schools on student achievement. Towards diminishing "parental choice" selection bias,[8] prior research has often used variants of two-stage procedures developed by Heckman (1979) and Lee (1983) for cases where choice is among two or several alternatives, respectively. Unlike McEwan (2001), we use the methodology proposed by Lee (1983) for the case of binary decisions. We chose this method over others based on assumptions about how parents choose schools for their children. Here, we assume that parents base their choice on whether the school is public or private rather than whether or not the school belongs to a franchise.[9] Thus, the selection equation, which models the probability of attending a particular type of school, includes only the alternatives of attending a public school or a private voucher school.[10]

The key empirical problem in implementing a two-stage model is in distinguishing the private voucher 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 private voucher school and that is not correlated with the error term in the outcomes equation.

In related studies in the United States, researchers have assumed that family religious affiliation or the supply of Catholic schools is a determinant of Catholic school choice but is not correlated with student achievement (e.g., Neal, 1997). Others have used variables that relate to the density of private schools for identification. We hypothesize that an individual's probability of choosing a private voucher school is affected by the public and private voucher schools' density in their community.[11] All else equal, students are more likely to choose schooling alternatives that are more densely concentrated in their municipalities.[12] It is assumed, however, that school densities are not correlated with student achievement.[13] Thus, school choice is influenced by local school supply, but school densities at the neighborhood level do not influence individual achievement.

There are reasons to doubt this assumption. For example, private voucher schools are likely to establish themselves in larger communities with high population density to reduce commuting costs. They are also likely to locate in higher income communities where parents may be more willing to pay tuition for higher quality schools. These types of unobservable variables that likely influence school location decisions may also affect test scores.[14]

In order to identify school choice and its effects on educational achievement accurately, researchers have two alternatives. First, better instrumental variables are needed to convincingly purge school choice bias from student outcomes. Although this strategy is theoretically correct, researchers face data limitations in order to find better instruments. The second strategy consists of identifying school choice by using some exogenous variation. For instance, Angrist, Bettinger, Bloom, King, and Kremer (2002) present results of a randomized natural experiment in Colombia, where lotteries were used to distribute vouchers. Under these circumstances, school choice depends on a random variable (the lottery), thus making it possible to correctly identify the influence of a specific school type on student achievement.

Another potential problem related to the selection model is misspecification. As established in Stolzenberg and Relles (1997), there are no techniques or combination of tools to account for the sometimes severe problem of selection bias.[15] The two-step estimator is a delicate balance of selection bias against errors introduced by adding a regressor that is highly correlated with the variable of substantive interest. Therefore, under significant selection bias it is easy to confuse the direction of

causality in cross-sectional data, and therefore it is necessary to be cautious when making causal statements on the basis of analysis conducted with such data.

We also acknowledge that 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 (e.g., Vandenberghe & Robin, 2004). In this article, rather than developing a different empirical strategy to control for selection bias, our empirical model builds on previous published work by McEwan (2001) that uses the same student-level data in Chile. This will allow us to compare, with the limitations already discussed, outcomes across private school types.

Data

The previous models are estimated with student data from Chile's national standardized test, *Sistema de Medición de la Calidad de la Educación* (the System of Measurement of the Quality of Education [SIMCE]), which assesses students in Grades 4, 8, and 10 in language, mathematics, history and geography, and natural sciences in odd years. In 2008, SIMCE evaluated 245,607 fourth graders, which represent 95% of the total enrollment at that level. Student test scores are complemented with parent and teacher questionnaires, which include socioeconomic and background information on the students, their families, peers, and schools. Table 3 provides definitions of the dependent and independent variables used in the analysis. The dependent variables SPANISH and MATH were standardized to a mean of 0 and a standard deviation of 1.

Previous research has established a relation between socioeconomic status (SES) and academic achievement[16] (for reviews, see Marzano, 2000; Scheerens, 2000). In order to assess a student's SES impact on academic performance, we have included a set of independent variables that characterize student demographics at the individual

Table 3. Variable definitions.

Variable	Description
SPANISH	Student score on the fourth-grade Spanish test (standardized to a mean of 0 and a standard deviation of 1).
MATH	Student score on the fourth-grade mathematics test (standardized to a mean of 0 and a standard deviation of 1).
FEMALE	Dummy variable indicating whether student is female.
MTHSCH	Years of schooling of student's mother.
MTHMISS	Dummy variable indicating whether MTHSCH is missing.
FTHSCH	Years of schooling of student's father.
FTHMISS	Dummy variable indicating whether FTHSCH is missing.
INCOME	Monthly family income, divided by 100,000.
BOOKS1-BOOKS7	Seven dummy variables indicating the number of books in the family home, ranging from 1 (none) to 7 (more than 100). BOOKS2 is omitted in regressions.
AVMTHSCH	Average schooling of student mothers in classroom.
AVFTHSCH	Average schooling of student fathers in classroom.
AVINCOME	Average monthly household income of students in classroom.
RURAL	Dummy variable indicating whether school is rural.

level: years of parental schooling (MTHSCH and FTHSCH, for mother and father schooling, respectively), and self-reported household income (INCOME). Parental schooling and household income reflect "the potential for social and economic resources available to the student" (Sirin, 2005). We imputed the missing parent education information using student peer characteristics. A set of dummy variables (MTHMISS and FTHMISS) is included to identify those observations with imputed data.

We also include the number of non-school-related books in the student's home (BOOKS1-BOOKS7, expressed as a series of dummy variables) as a proxy of parents' scholarly culture, which could "endow children with tools that are directly useful in learning at school: vocabulary, information, comprehension skills, imagination, broad horizons of history and geography, familiarity with good writing, understanding of the importance of evidence in argument, and many others" (Evans, Kelley, Sikora, & Treiman, 2010, p.189).

The last demographic variable included at the individual level is the student's gender (FEMALE). SIMCE national reports (from Chile's Ministry of Education) show that there is a statistically significant difference between men and women averages (Ministerio de Educación, 2010). This evidence suggests that female students outperform males in language tests but score lower on the math and science tests.

We measured peer group characteristics in order to assess potential peer effects on academic achievements. The hypothesis is that students can be affected by the achievement of their schoolmates (Hoxby, 2000). We calculated student peer information by averaging individual student information over all of the students in a given classroom. AVMTHSCH and AVFTHSCH provide measures of average parental schooling, while AVINCOME is the average household income in each classroom.

Finally, we also introduce a set of variables that describe the schools' neighborhoods. A variable indicating the relative isolation of the school (RURAL), expresses the absence of alternative schools (hence, the lack of competitive pressure) and the access difficulties imposed on the students. Although not reported in the subsequent analysis, we also included regional dummy variables – relative to the Metropolitan Region – in the regressions to account for differences across regions. To approximate the number of neighborhood schooling options a family confronts, we include a measure of the number of public and private voucher schools per square kilometer in each municipality (SCHOOLSKM2).

Table 4 provides descriptive statistics for the 221,608 students that comprise the sample, across school categories. The distribution of students by school type in the sample is similar to the universe of primary enrollments. The data presented in Table 4 also shows that most (64%) of the private voucher school students attend private voucher independent schools that do not belong to a franchise, which is consistent with percentages reported in Table 1.

Empirical results

A brief summary of the results for public and private franchise schools coefficients is provided in Table 5. Table 5 presents 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

Table 4. Variable means and standard deviations (fourth grade 2008).

Variable	Overall sample	Public	Voucher franchise size: 1 school	2 schools	3 schools	4 schools	5 or more schools
SPANISH	0.000	−0.247	0.074	0.116	0.162	0.314	0.248
	(1.000)	(0.966)	(0.977)	(0.952)	(0.955)	(0.939)	(0.946)
MATH	0.000	−0.288	0.088	0.134	0.184	0.396	0.239
	(1.000)	(0.942)	(0.967)	(0.941)	(0.941)	(0.919)	(0.945)
FEMALE	0.506	0.509	0.516	0.486	0.485	0.494	0.466
MTHSCH	11.0	9.9	12.0	11.9	12.4	12.7	12.3
	(3.4)	(3.3)	(3.3)	(3.2)	(2.9)	(3.1)	(3.1)
MTHMISS	0.083	0.087	0.082	0.075	0.068	0.062	0.076
FTHSCH	11.0	9.9	12.0	11.9	12.4	12.7	12.2
	(3.5)	(3.3)	(3.3)	(3.3)	(3.1)	(3.1)	(3.2)
FTHMISS	0.120	0.129	0.114	0.107	0.101	0.093	0.109
INCOME	3.493	2.653	4.327	4.167	4.325	4.723	4.110
	(2.947)	(1.955)	(3.559)	(3.385)	(3.221)	(3.722)	(3.128)
BOOKS1	0.061	0.084	0.041	0.039	0.032	0.029	0.036
BOOKS2	0.175	0.223	0.132	0.126	0.112	0.116	0.130
BOOKS3	0.217	0.249	0.188	0.187	0.177	0.165	0.194
BOOKS4	0.275	0.255	0.292	0.302	0.31	0.289	0.296
BOOKS5	0.134	0.101	0.163	0.166	0.167	0.185	0.161
BOOKS6	0.083	0.055	0.107	0.108	0.121	0.125	0.11
BOOKS7	0.056	0.033	0.078	0.071	0.081	0.091	0.073
RURAL	0.125	0.201	0.053	0.047	0.045	0.034	0.063
AVMTHSCH	11.0	9.8	12.1	12.0	12.4	12.7	12.2
	(2.2)	(1.7)	(2.1)	(1.9)	(1.6)	(1.8)	(1.8)
AVFTHSCH	11.0	9.9	12.1	12.0	12.4	12.7	12.2
	(2.2)	(1.7)	(2.1)	(2.0)	(1.6)	(1.9)	(1.8)
AVINCOME	3.507	2.630	4.399	4.196	4.340	4.743	4.081
	(1.959)	(0.987)	(2.388)	(2.240)	(1.840)	(2.434)	(1.804)
N (students)	221,608	107,766	72,910	13,079	7,296	3,251	17,306
N (schools)	7,341	4,447	2,071	296	119	48	360
N (franchises)	2,310	n/a	2,071	154	44	13	28

Source: Ministry of Education and authors' calculations.
Note: Standard deviations in parentheses and not reported for dummy variables.
n/a: not applicable.

the results for Mathematics. The first row presents the unadjusted difference in test scores between public and private voucher franchise schools and private voucher independent schools, the omitted reference category.[17] The subsequent rows present the differences after accounting for individual and peer attributes and selection bias. The first column presents the public–private voucher independent school test score gap. The second column displays the private voucher franchise–private voucher independent school achievement gap.

The uncorrected estimates of Equation (1) show that the Spanish and Mathematics achievements of students that attend private voucher independent schools are higher, on average, than those of public schools students. However, the first row also indicates a large unadjusted test score gap between private voucher franchise and private voucher independent schools.

Table 5. Difference between school types and private voucher independent schools for student with average characteristics of private voucher independent school student (fourth grade 2008).

	Public	Voucher franchise (2 or more schools)
SPANISH		
Unadjusted difference	−0.321***	0.122***
	(0.015)	(0.021)
Difference adjusted for:		
Individual SES	−0.171***	0.102***
	(0.014)	(0.018)
Individual SES/peer SES	−0.039**	0.085***
	(0.019)	(0.017)
Individual SES/peer SES/selectivity	−0.037*	0.086***
	(0.020)	(0.017)
Number of observations	97,886	37,773
MATH		
Unadjusted difference	−0.376***	0.120***
	(0.018)	(0.025)
Difference adjusted for:		
Individual SES	−0.181***	0.113***
	(0.016)	(0.021)
Individual SES/peer SES	−0.028	0.094***
	(0.022)	(0.020)
Individual SES/peer SES/selectivity	−0.026	0.094***
	(0.022)	(0.019)
Number of observations	98,236	37,886

Source: Ministry of Education and authors' calculations.
Note: Standard errors are in parentheses. All regression results cluster standard errors at the school level. ***Significant at 1%; **Significant at 5%; *Significant at 10%.

After controlling for student and peer attributes and selection bias, we also find a positive and significant private voucher franchise school Spanish (0.086 *SD*) and Mathematics (0.094 *SD*) achievement effect. The corrected test score gap between public and private voucher independent schools is negative and significant – but small – in the case of Spanish (–0.037 *SD*) and negative but not significant in the case of Mathematics.

These results provide some evidence of the effectiveness of private school franchises. However, a more precise analysis is needed to understand the optimal size of a franchise. Here, we examine whether larger franchises are more effective than smaller franchises. Table 6 summarizes the results separating private voucher schools by franchise size. The results show that, after controlling for student and peer attributes and selection bias, private voucher schools that belong to a franchise of four or more schools have a more substantial advantage (between 0.11 and 0.18 *SD*) over private voucher independent schools than private voucher schools that belong to smaller franchises of 2 or 3 schools (0.07 to 0.09 *SD*).[18]

To probe these findings further, we compared test scores in private voucher franchise and private voucher independent schools after controlling for whether or not the private voucher school owners were Catholic. It is essential to control for the Catholic school effect because previous research in Chile (McEwan, 2001) and in the

Table 6. Difference between school types (by franchise size) and private voucher independent schools for student with average characteristics of private voucher independent school student (fourth grade 2008).

		Voucher franchise size			
	Public	2 schools	3 schools	4 schools	5 or more schools
SPANISH					
Unadjusted difference	−0.321***	0.042	0.088*	0.240***	0.174***
	(0.015)	(0.031)	(0.048)	(0.062)	(0.028)
Difference adjusted for:					
Individual SES	−0.171***	0.063**	0.096**	0.173***	0.146***
	(0.014)	(0.027)	(0.039)	(0.053)	(0.025)
Individual SES/peer SES	−0.039**	0.070***	0.073**	0.125***	0.114***
	(0.019)	(0.027)	(0.035)	(0.047)	(0.025)
Individual SES/peer SES/selectivity	−0.037*	0.071***	0.073**	0.122***	0.111***
	(0.020)	(0.027)	(0.035)	(0.042)	(0.024)
Number of observations	97,886	12,013	6,771	3,046	15,943
MATH					
Unadjusted difference	−0.376***	0.046	0.096	0.308***	0.151***
	(0.018)	(0.037)	(0.060)	(0.074)	(0.032)
Difference adjusted for:					
Individual SES	−0.181***	0.079***	0.106**	0.222***	0.155***
	(0.016)	(0.030)	(0.051)	(0.060)	(0.028)
Individual SES/peer SES	−0.028	0.091***	0.082*	0.181***	0.117***
	(0.022)	(0.029)	(0.044)	(0.056)	(0.028)
Individual SES/peer SES/selectivity	−0.026	0.092***	0.083**	0.177***	0.113***
	(0.022)	(0.029)	(0.042)	(0.048)	(0.028)
Number of observations	98,236	12,057	6,788	3,051	15,990

Source: Ministry of Education and authors' calculations.
Note: Standard errors are in parentheses. All regression results cluster standard errors at the school level. ***Significant at 1%; **Significant at 5%; *Significant at 10%.

United States (e.g., Bryk, Lee, & Holly, 1993) has demonstrated that Catholic schools, all else equal, outperform public schools and other private schools. By doing so, we avoid confounding the effect of attending a private franchise school with the effect of a Catholic school. The results, reported in Table 7, do not change the substantial findings of our previous analysis, which suggests that the positive private voucher franchise school effect is not related to the religious affiliation of the schools.[19]

In order to test for consistency over time, we ran our model with 2002, 2005, and 2006 fourth-grade SIMCE test score data. Appendices 2–7 show that our results are consistent over time. First, we find that the public–private voucher independent school achievement gap is very narrow, and in some cases not significant, indicating that there is not a significant difference between these types of schools once student and peer characteristics and selection bias are controlled for. Second, the results indicate that the positive effect associated with school franchises is between 0.086 and 0.108 standard deviations. Finally, we also find that, all else equal, schools that belong to a franchise of four or more schools produce higher student achievement than schools that belong to smaller franchises (two or three schools).

Table 7. Difference between school types (by franchise size) and private voucher independent schools for student with average characteristics of private voucher independent school student, controlling for Catholic status (fourth grade 2008).

		Voucher franchise size			
	Public	2 schools	3 schools	4 schools	5 or more schools
SPANISH					
Unadjusted difference	−0.321***	0.042	0.088*	0.240***	0.174***
	(0.015)	(0.031)	(0.048)	(0.062)	(0.028)
Difference adjusted for:					
Individual SES	−0.171***	0.058**	0.057	0.118*	0.157***
	(0.014)	(0.029)	(0.036)	(0.068)	(0.033)
Individual SES/peer SES	−0.039**	0.072**	0.059*	0.124**	0.138***
	(0.019)	(0.028)	(0.032)	(0.062)	(0.032)
Individual SES/peer SES/ selectivity	−0.037*	0.073***	0.060*	0.120**	0.135***
	(0.020)	(0.028)	(0.033)	(0.055)	(0.031)
Number of observations	97,886	12,013	6,771	3,046	15,943
MATH					
Unadjusted difference	−0.376***	0.046	0.096	0.308***	0.151***
	(0.018)	(0.037)	(0.060)	(0.074)	(0.032)
Difference adjusted for:					
Individual SES	−0.180***	0.070**	0.086**	0.192**	0.163***
	(0.016)	(0.032)	(0.042)	(0.085)	(0.038)
Individual SES/peer SES	−0.028	0.091***	0.091**	0.202**	0.142***
	(0.022)	(0.032)	(0.038)	(0.082)	(0.037)
Individual SES/peer SES/selectivity	−0.026	0.091***	0.092**	0.195***	0.136***
	(0.022)	(0.032)	(0.038)	(0.071)	(0.037)
Number of observations	98,236	12,057	6,788	3,051	15,990

Source: Ministry of Education and authors' calculations.
Note: Standard errors are in parentheses. All regression results cluster standard errors at the school level. ***Significant at 1%; **Significant at 5%; *Significant at 10%.

Conclusions and policy implications

This paper compares the academic achievement of fourth graders in private voucher franchise, private voucher independent, and public schools. Controlling for individual and peer characteristics and selection bias, the initial results suggest that private voucher franchise school students consistently outperform comparable private voucher independent school students. Private voucher independent schools – by far the largest category of private voucher schools – produce similar test scores, all else equal, as public schools.

We also considered the effect of the size of private voucher school franchises. We find that, after controlling for individual and peer characteristics and selection bias, larger private school franchises (four or more schools) outperform smaller franchises (two or three schools). Student achievement is more than 0.10 of a standard deviation higher on the Spanish and Mathematics tests. On the other hand, schools that belong to smaller franchises outperform private independent voucher schools, but the differences are smaller. Our results are consistent over time and after controlling for the effect of the religious affiliation of the school.

Although this paper shows that the franchise schools have positive effects on educational outcomes, more research is needed to analyze the mechanisms that explain this result. For this, qualitative research is needed within schools to collect data on processes, inputs, and context. Some of the reasons that may explain the positive private school franchise effect include the substantial benefits of scale of educational professionals and administrators (Chubb, 2001), the bulk purchases of supplies and equipment, and the costs of implementation of innovations in curriculum (Duncombe & Yinger, 2007). Private school franchises may also be more likely to benefit from access to credit and private investment than smaller private independent schools in Chile. In addition, some argue that being embedded within a larger organization reduces agency problems and facilitates transactions between parents, teachers, administrators, and students (McMeekin, 2003) and influences the development of professional school communities (Bulkley & Hicks, 2003; Smith & Wohlstetter, 2001).

Before holding these results up as proof that private school franchises are more effective than private independent schools, we need additional information on the factors that may influence a school owner to establish a franchise that may determine educational outcomes. For instance, high-achieving schools may be more likely to establish franchises (or to join a franchise) than lower quality schools. In a competitive schooling environment, low-quality schools may be unable to attract students and additional resources needed to expand operations. Private school franchises may also require superior technical skills to manage than small independent schools. An instrumental variable, which may allow us to identify such causal effects, is a topic for future research.

From a policy perspective, the results of this study also suggest that more information is needed on the factors that influence schools' incentives to establish franchises. For instance, how profitable are private school franchises? The data presented in Table 1 reveal that 70% of the private voucher schools do not belong to a franchise. Small private independent schools may not have incentives to establish a franchise if they are able to attract enough students and resources to cover the opportunity costs of operating a school. Survey evidence in Chile suggests that many of the independent private voucher school owners are former public school teachers (Corvalán et al., 2008). Therefore, the opportunity cost of running a private voucher school, in many cases, may only be a public school teacher's salary after covering operational costs. Data on the characteristics of school owners would improve our understanding of the complex decisions involved in establishing a private school franchise.

The results of this paper offer some insights for the debate in other countries on school vouchers, the scale of operations of public and private schools, and on the benefits of Educational Management Organizations (EMO) that manage several schools in a franchise. The findings provide some grounds for optimism about the effects of school vouchers and some (but not all) categories of private schools on student achievement. Perhaps the two most interesting findings of this research are the small or the lack of any significant differences in achievement between private voucher independent schools that do not belong to a franchise and public schools and the large private school franchise effects. This suggests that policies oriented to create incentives for schools to establish franchises or to be managed by an organization that runs a network of schools, may have the potential for increasing educational outcomes.

However, as noted above, the advantages for school networks are necessarily explained by internal factors that differ between franchise and independent schools. Thus, the results found in this article can also be discussed in the context of education systems without school choice. The relevant question here is whether those features that explain the advantages of private franchise schools can be replicated in public schools.[20]

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Notes

1. Only two significant modifications have been introduced since 1980. The first was in 1994, when the Ministry instituted a shared financing scheme that allowed all private voucher schools – both elementary and secondary – and public secondary schools to charge limited tuition (Montt, Elacqua, González, & Razyinski, 2006). The second was in 2008, when the Chilean legislature enacted the Adjusted Voucher Law (Ley de Subvención Escolar Preferencial or SEP). The SEP law recognizes that it is more costly to educate disadvantaged students by introducing an extra per-pupil subsidy (50% over the base voucher) for students classified as priority in the Ministry of Education's socioeconomic status classification system and for schools with a high concentration of priority students. This system determines whether a student is ''priority'' based on individual and household surveys collected by the Chilean government. See Elacqua, Mosqueira, and Santos (2009) for details on the decision tree the Ministry of Education uses to classify ''priority'' students.
2. Catholic voucher schools are operated by religious orders, parishes, archdioceses, and religious foundations.
3. Protestant church schools include Methodist, Baptist, Seventh-Day Adventist, Anglican, Lutheran, and Presbyterian churches. There are four private voucher schools of other religious orientations.
4. Most of the secular non-profit schools are branches of foundations that were created for other specific tasks, such as the Rural Social Development Corporation.
5. We do not include the private non-voucher schools in this analysis. This set of schools charge high tuition fees, do not receive per-pupil subsidies, and are mainly focused on high income students. In a previous version of this paper, we included private non-voucher schools in our analysis. The results (available upon request) do not change the substantive conclusions reported here.
6. We 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 (e.g., Zimmer & Toma, 2000).
7. It is possible to test whether it is more suitable to estimate a single equation model (which only allows the intercept to vary between different types of schools) or a multiple equations model (where both the intercept and the slope can vary between different types of schools). We estimate a model with a single equation, which includes a set of dummies identifying the type of school, a set of control variables, and a set of interactions between school type dummies and the control variables. In this model, we test the null hypothesis that the coefficients of all interaction terms are jointly equal to 0. This hypothesis can be rejected, which justifies the use of independent equations. These results are available upon request.
8. In order be able to control for ''school choice bias'', information on school selection practices would be required.

9. For example, according to Elacqua and Fabrega (2007), 62% of parents know the religion of their children's school, 83% know whether or not the schools is public or private, but only 24% know the principal's name. The latter demonstrates the low level of parental knowledge about the administrative features of schools.
10. In a previous iteration of this research, we used the two-stage selection bias procedure developed by Lee (1983) for cases where school choice is among more than two school categories. Here, we use only two categories because it is unlikely that parents can distinguish between an independent private school and a private school that belongs to a franchise. However, our results are substantively similar. These results are available upon request.
11. The results of the selection equation are presented in Appendix 1. This equation is estimated with a Logit model for predicting the probability of attending a private voucher school.
12. Over 80% of primary school students go to school in their home municipality. Thus, the density measure provides a good proxy for local neighborhood schooling options.
13. This assumption was tested. Following McEwan (2001), Neal (1997), and Evans and Schwab (1995), we re-estimated the achievement regressions by including density measurements as an independent variable. The results, which are available upon request, suggest that the exclusion restrictions are reasonable.
14. In addition, the proposed instruments have other potential problems. For example, the instrument is likely correlated with parent preferences for quality schools due to student mobility and thus is correlated with the error term in the student achievement equation, making the school choice estimates biased. Thus, school density may partially reflect unobserved characteristics of families or communities. In other words, school density cannot properly be excluded from the achievement regressions.
15. The authors present a method for decomposing the selection bias. This approach permits an analysis to develop an intuition and makes a judgment about the sources, severity, and direction of sample selection bias.
16. Although the strength of this relation is not well established (see Sirin, 2005; White, 1982).
17. We use private independent schools as the omitted reference category because we are interested in comparing private franchise and independent school outcomes.
18. In a separate analysis not reported here, we excluded the largest private voucher school franchise in Chile that has 147 schools to make sure it was not confounding our findings. The results (available upon request) do not change the substantive conclusions reported here.
19. In addition, our findings are substantively similar when we only consider urban schools in the Metropolitan Region of Santiago. These results are available upon request.
20. An additional topic for future research that is relevant for other countries, which is beyond the scope of this paper, is to compare the effectiveness of smaller and larger public school districts (municipalidades).

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References

Aedo, R. (2000). *La educación privada en Chile: Un estudio histórico analítico desde el periodo colonial hasta 1990* [Private education in Chile: An historical analysis from the colonial period to 1990]. Santiago, Chile: RIL Editores.

American Institutes for Research (AIR) & SRI International. (2006). *Early college high school initiative 2003–2005 Evaluation Report*. Retrieved from http://www.earlycolleges.org/Downloads/ECHS_Eva_2003-2005.pdf

Anand, P., Mizala, A., & Repetto, A. (2006). *Using school scholarships to estimate the effect of government subsidized private education on academic achievement in Chile* (Occasional Paper No.120). New York, NY: National Center for the Study of Privatization in Education, Teachers College, Columbia University.

Andrews, M., Duncombe, W., & Yinger, J. (2002). Revisiting economies of size in American education: Are we any closer to a consensus? *Economics of Education Review*, *21*, 245–262.

Angrist, J.D., Bettinger, E., Bloom, E., King, E., & Kremer, M. (2002). Vouchers for private schooling in Colombia: Evidence from a randomized natural experiment. *American Economic Review*, *92*, 1535–1558.

Arcaira, E., Coleman, S., Reisner, E., Scott, T., Turner, T., & Woods, Y. (2010). *Approaches of Bill & Melinda Gates Foundation-funded intermediary organizations to structuring and supporting small high schools in New York City*. Retrieved from http://www.policystudies.com/studies/school/PSA%20Study%20of%20Intermediary%20Organizations.pdf

Barker, R.G., & Gump, P.V. (1964). *Big school, small school: High school size and student behavior*. Stanford, CA: Stanford University Press.

Belfield, C., & Levin, H. (2005). Vouchers and public policy: When ideology trumps evidence. *American Journal of Education*, *111*, 548–567.

Bloom, H.S., Levy Thompson, S., & Unterman, R. (2010). *Transforming the high school experience: How New York City's new small schools are boosting student achievement and graduation rates*. Retrieved from http://www.mdrc.org/publications/560/full.pdf

Brown, H., Henig, J., Lacireno-Paquet, N., & Holyoke, T.T. (2004). Scale of operations and locus of control in market versus mission-oriented charter schools. *Social Science Quarterly*, *85*, 1035–1051.

Bryk, A.S., Lee, V.E., & Holly, P.B. (1993). *Catholic schools and the common good*. Cambridge, MA: Harvard University Press.

Bryk, A.S., & Schneider, B. (Eds.). (2002). *Trust in schools: A core resource for improvement*. New York, NY: Russell Sage Foundation.

Bulkley, K., & Hicks, J. (2003). *Educational management organizations and the development of professional community in charter schools* (Occasional Paper No. 69). New York, NY: National Center for the Study of Privatization in Education, Teachers College, Columbia University.

Chubb, J.E. (2001). The private can be public. *Education Next, 1(1)*. Retrieved from http://educationnext.org/the-private-can-be-public/

Coleman, J.S., Campbell, E., Hobson, C., McPartland, J., Mood, A., Weinfield, F., & York, R. (1966). *Equality of educational opportunity*. Washington, DC: Government Printing Office.

Contreras, D. (2002). *Vouchers, school choice and the access to higher education* (Center Discussion Paper No. 845). New Haven, CT: Economic Growth Center, Yale University.

Corvalán, J., Elacqua, G., & Salazar, F. (2008). *El sector particular subvencionado de la educación chilena: descripción, tipologización, análisis de su dinámica y percepciones frente a las nuevas regulaciones* [The private voucher sector in Chile: Description, typology, and analysis of its dynamics and perceptions in response to new regulations] (Final report of Proyect FONIDE No. 69). Santiago, Chile: Ministerio de Educación de Chile. Retrieved from http://ded.mineduc.cl/mineduc/ded/documentos/FONIDE_Informe_CIDE_UDP.pdf

Creemers, B.P.M. (1996). The school effectiveness knowledge base. In D.Reynolds, R.Bollen, B. Creemers, D. Hopkins, L. Stoll, & N. Lagerweij (Eds.), *Making good schools: Linking school effectiveness and school improvement* (pp. 36–58). London, UK: Routledge.

Darling-Hammond, L., Ancess, L.J., & Falk, B. (1995). *Authentic assessment in action*. New York, NY: Teachers College Press.

Duncombe, W., & Yinger, J. (2007). Does school district consolidation cut costs? *Education Finance and Policy*, *2*, 341–376.

Elacqua, G. (2007, August). *The politics of education reform in Chile: When ideology trumps evidence*. Paper presented at the Latin American Studies Association Annual Conference, Montreal, Canada.

Elacqua, G., & Fabrega, R. (2007). El consumidor de la educación: El actor olvidado de la libre elección de escuelas en Chile [The education consumer: The forgotten player in Chile's system of school choice]. In S. Cueto (Ed.), *Uso e impacto de la información educativa en America Latina* (pp. 353–398). Santiago, Chile: PREAL.

Elacqua, G., Mosqueira, U., & Santos, H. (2009). *La toma de decisiones de un sostenedor: Análisis a partir de la ley SEP* [School owner decision making: Analysis based on the SEP legislation] (Serie En Foco Educación No. 1). Santiago, Chile: Centro de Políticas Comparadas de Educación/Instituto de Políticas Públicas Expansiva-UDP, Universidad Diego Portales.

Evans, M.D.R., Kelley, J., Sikora, J., & Treiman, D.J. (2010). Family scholarly culture and educational success: Books and schooling in 27 nations. *Research in Social Stratification and Mobility*, *28*, 171–197.

Evans, W.N., & Schwab, R.M. (1995). Finishing high school and starting college: Do Catholic schools make a difference? *Quarterly Journal of Economics*, *110*, 941–974.

Gallego, F. (2006). *Voucher school competition, incentives, and outcomes: Evidence from Chile* (Unpublished PhD dissertation). Massachusetts Institute of Technology, Cambridge, MA.

Gill, B., Zimmer, R., Christman, J., & Blanc, S. (2007). *State takeover, school restructuring, private management, and student achievement in Philadelphia*. Washington, DC: Rand Corporation. Retrieved from http://www.rand.org/pubs/monographs/2007/RAND_MG533.sum.pdf

Gustafsson, J.-E. (2007). Understanding causal influences on educational achievement through analysis of differences over time within countries. In T. Loveless (Ed.), *Lessons learned: What international assessments tell us about math achievement* (pp. 37–63). Washington, DC: The Brookings Institution.

Heckman, J.J. (1979). Sample selection bias as a specification error. *Econometrica*, *47*, 153–161.

Henig, J. (1994). *Rethinking school choice: Limits of the market metaphor*. Princeton, NJ: Princeton University Press.

Hill, P.T., Pierce, L., & Guthrie, J. (1997). *Reinventing public education: How contracting can transform America's Schools*. Chicago, IL: University of Chicago Press.
Hoxby, C. (1994). *Do private schools provide competition for public schools?* (NBER Working Paper No. W4978). Cambridge, MA: National Bureau of Economic Research.
Hoxby, C. (2000). *Peer effects in the classroom: Learning from gender and race variation* (NBER Working Paper No. W7867). Cambridge, MA: National Bureau of Economic Research.
Kyriakides, L. (2008). Testing the validity of the comprehensive model of educational effectiveness: A step towards the development of a dynamic model of effectiveness. *School Effectiveness and School Improvement*, *19*, 429–446.
Lee, L.-F. (1983). Generalized econometric models with selectivity. *Econometrica*, *51*, 507–512.
Lee, V.E., & Loeb, S. (2000). School size in Chicago elementary schools: Effects on teachers' attitudes and students' achievement. *American Educational Research Journal*, *37*, 3–31.
Lips, C. (2000). *Edupreneurs: A survey of for-profit education* (Cato Policy Analysis No. 386). Washington, DC: Cato Institute.
Martinic, S., & Elacqua, G. (2010). *Fin del ciclo. Cambios en la gobernanza del sistema educativo* [End of the cycle: Changes in governance in the educational system]. Santiago, Chile: UNESCO.
Marzano, R.J. (2000). *A new era of school reform: Going where the research takes us*. Aurora, CO: Mid-continent Research for Education and Learning. Retrieved from http://www.mcrel.org/topics/products/81/
McEwan, P.J. (2001). The effectiveness of public, Catholic, and non-religious private schools in Chile's voucher system. *Education Economics*, *9*, 103–128.
McMeekin, R.W. (2003). Networks of schools. *Education Policy Analysis Archives*, *11*(16).
Ministerio de Educación. (2010). *Resultados nacionales SIMCE* [National results SIMCE]. Retrieved from http://www.simce.cl/fileadmin/Documentos_y_archivos_SIMCE/Informes_Resultados_2009/Informe_Nacional_2009.pdf
Montt, P., Elacqua, G., González, P., & Razyinski, D. (2006). *Hacia un sistema escolar descentralizado, sólido y fuerte: El diseño y las capacidades hacen la diferencia* [Toward a more decentralized, solid, and strong schooling system: Design and capacities make the difference]. Santiago, Chile: Ministerio de Educación de Chile.
National Center for Education Statistics. (2003). *Digest of education statistics 2002*. Retrieved from http://nces.ed.gov/pubs2003/2003060.pdf
Neal, D. (1997). The effect of Catholic secondary schooling on educational achievement. *Journal of Labor Economics*, *15*, 98–123.
Organisation for Economic Co-operation and Development. (2003). *Education at a glance*. Paris, France: Author.
Organisation for Economic Co-operation and Development. (2004). *Revisión de políticas nacionales de educación: Chile* [Revision of national education policies]. Paris, France: Author.
Raywid, M.A. (1998). Small schools: A reform that works. *Educational Leadership*, *55*(4), 34–39.
Sapelli, C., & Vial, B. (2002). The performance of private and public schools in the Chilean voucher system. *Cuadernos de Economía*, *39*, 423–454.
Scheerens, J. (1992). *Effective schooling: Research, theory and practice*. London, UK: Cassell.
Scheerens, J. (2000). *Improving school effectiveness*. Paris, France: International Institute for Educational Planning.
Schneider, M., Teske, P., & Marshall, M. (2000). *Choosing schools*. Princeton, NJ: Princeton University Press.
Sirin, S.R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, *75*, 417–453.
Smith, A.K., & Wohlstetter, P. (2001). Reform through school networks: A new kind of authority and accountability. *Educational Policy*, *15*, 499–519.
Stiefel, L., Berne, R., Iatarola, P., & Fruchter, N. (2000). High school size: Effects on budgets and performance in New York City. *Educational Evaluation and Policy Analysis*, *22*, 22–39.
Stolzenberg, R.M., & Relles, D.A. (1997). Tools for intuition about sample selection bias and its correction. *American Sociological Review*, *62*, 494–507.
Stringfield, S.C., & Slavin, R.E. (1992). A hierarchical longitudinal model for elementary school effects. In B.P.M. Creemers & G.J. Reezigt (Eds.), *Evaluation of educational effectiveness* (pp. 35–69). Groningen, The Netherlands: ICO.

Symonds, S. (2000, February). For-profit schools: They're spreading fast. Can private companies do a better job of educating America's kids? *Business Week*. Retrieved from http://www.businessweek.com/datedtoc/2000/0006.htm

Tyack, D. (1974). *The one best system*. Cambridge, MA: Harvard University Press.

Vandenberghe, V., & Robin, S. (2004). Evaluating the effectiveness of private education across countries: A comparison of methods. *Labour Economics*, *11*, 487–506.

Wasley, P.A., Fine, M., Gladden, M., Holland, N.E., King, S.P., Mosak, E., & Powell, L.C. (2000). *Small schools: Great strides: A study of new small schools in Chicago*. Retrieved from http://www.bnkst.edu/gems/publications/smallschools.pdf

White, K.R. (1982). The relation between socioeconomic status and academic achievement. *Psychological Bulletin*, *91*, 461–481.

Wohlstetter, P., Malloy, C.L., Hentschke, G.C., & Smith, J. (2004). Improving service delivery in education through collaboration: An exploratory study of the role of cross-sectoral alliances in the development and support of charter schools. *Social Science Quarterly*, *85*, 1078–1096.

Zimmer, R.W., & Toma, E.F. (2000). Peer effects in private and public schools across countries. *Journal of Policy Analysis and Management*, *19*, 75–92.

Appendix 1. Logit model for predicting the probability of attending a private voucher school

Variable	Coefficient
FEMALE	−0.03
	(−1.27)
MTHSCH	0.09***
	(−26.50)
FTHSCH	0.06***
	(−19.72)
INCOME	0.14***
	(−19.54)
BOOKS1	−0.18***
	(−5.71)
BOOKS2	−0.19***
	(−9.22)
BOOKS3	−0.10***
	(−6.39)
BOOKS5	0.10***
	(−5.76)
BOOKS6	0.09***
	(−3.93)
BOOKS7	0.01
	(−0.38)
RURAL	−0.91***
	(−9.92)
DENSITY	0.52***
	(−3.44)
DENSITY2	−0.03
	(−0.92)
CONSTANT	−2.11***
	(−14.57)
N	204,835
Pseudo R-squared	0.17

Robust *t* test in brackets.

*Significant at 10%; **Significant at 5%; ***Significant at 1%.

Appendix 2. Difference between school types and private voucher independent schools for student with average characteristics of private voucher independent school student (fourth grade 2002)

	Public	Voucher franchise (2 or more schools)
SPANISH		
Unadjusted difference	−0.308***	0.161***
	(0.019)	(0.026)
Difference adjusted for:		
Individual SES	−0.159***	0.124***
	(0.015)	(0.019)
Individual SES/peer SES	0.000	0.093***
	(0.015)	(0.016)
Individual SES/peer SES/selectivity	−0.001	0.095***
	(0.015)	(0.017)
Number of observations	121,041	38,001
MATH		
Unadjusted difference	−0.282***	0.152***
	(0.019)	(0.026)
Difference adjusted for:		
Individual SES	−0.126***	0.134***
	(0.015)	(0.020)
Individual SES/peer SES	0.019	0.106***
	(0.016)	(0.018)
Individual SES/peer SES/selectivity	0.018	0.108***
	(0.016)	(0.018)
Number of observations	121,268	38,044

Source: Ministry of Education and authors' calculations.

Note: Standard errors are in parentheses. All regression results cluster standard errors at the school level. ***Significant at 1%; **Significant at 5%; *Significant at 10%.

Appendix 3. Difference between school types (by franchise size) and private voucher independent schools for student with average characteristics of private voucher independent school student (fourth grade 2002)

		Voucher franchise size			
	Public	2 schools	3 schools	4 schools	5 or more schools
SPANISH					
Unadjusted difference	−0.308***	0.052	0.178***	0.311***	0.219***
	(0.019)	(0.040)	(0.049)	(0.074)	(0.034)
Difference adjusted for:					
Individual SES	−0.158***	0.035	0.139***	0.216***	0.191***
	(0.015)	(0.029)	(0.035)	(0.034)	(0.025)
Individual SES/peer SES	0.000	0.051**	0.100***	0.158***	0.147***
	(0.015)	(0.025)	(0.030)	(0.042)	(0.023)
Individual SES/peer SES/selectivity	−0.001	0.050**	0.099***	0.146***	0.148***
	(0.015)	(0.025)	(0.030)	(0.039)	(0.023)
Number of observations	121,041	12,936	6,556	2,863	15,646
MATH					
Unadjusted difference	−0.282***	0.070*	0.134***	0.304***	0.200***
	(0.019)	(0.041)	(0.046)	(0.077)	(0.035)
Difference adjusted for:					
Individual SES	−0.125***	0.060*	0.114***	0.219***	0.210***
	(0.015)	(0.032)	(0.038)	(0.040)	(0.028)
Individual SES/peer SES	0.019	0.076***	0.078**	0.170***	0.171***
	(0.016)	(0.028)	(0.034)	(0.046)	(0.028)
Individual SES/peer SES/selectivity	0.018	0.074***	0.077**	0.156***	0.173***
	(0.016)	(0.028)	(0.034)	(0.045)	(0.028)
Number of observations	121,268	12,947	6,562	2,867	15,668

Source: Ministry of Education and authors' calculations.

Note: Standard errors are in parentheses. All regression results cluster standard errors at the school level. ***Significant at 1%; **Significant at 5%; *Significant at 10%.

Appendix 4. Difference between school types and private voucher independent schools for student with average characteristics of private voucher independent school student (fourth grade 2005)

	Public	Voucher franchise (2 or more schools)
SPANISH		
Unadjusted difference	−0.324***	0.130***
	(0.016)	(0.022)
Difference adjusted for:		
Individual SES	−0.117***	0.117***
	(0.013)	(0.016)
Individual SES/peer SES	0.013	0.098***
	(0.016)	(0.015)
Individual SES/peer SES/selectivity	0.014	0.101***
	(0.016)	(0.015)
Number of observations	113,572	40,620
MATH		
Unadjusted difference	−0.314***	0.122***
	(0.017)	(0.023)
Difference adjusted for:		
Individual SES	−0.100***	0.113***
	(0.014)	(0.018)
Individual SES/peer SES	0.035*	0.097***
	(0.018)	(0.016)
Individual SES/peer SES/selectivity	0.036**	0.101***
	(0.018)	(0.017)
Number of observations	113,804	40,725

Source: Ministry of Education and authors' calculations.

Note: Standard errors are in parentheses. All regression results cluster standard errors at the school level. ***Significant at 1%; **Significant at 5%; *Significant at 10%.

Appendix 5. Difference between school types (by franchise size) and private voucher independent schools for student with average characteristics of private voucher independent school student (fourth grade 2005)

		Voucher franchise size			
	Public	2 schools	3 schools	4 schools	5 or more schools
SPANISH					
Unadjusted difference	−0.324***	0.051	0.125***	0.290***	0.160***
	(0.016)	(0.032)	(0.045)	(0.061)	(0.029)
Difference adjusted for:					
Individual SES	−0.117***	0.052**	0.101***	0.224***	0.171***
	(0.013)	(0.023)	(0.033)	(0.041)	(0.021)
Individual SES/peer SES	0.013	0.070***	0.084***	0.189***	0.131***
	(0.016)	(0.022)	(0.031)	(0.039)	(0.020)
Individual SES/ peer SES/selectivity	0.014	0.073***	0.090***	0.191***	0.132***
	(0.016)	(0.023)	(0.029)	(0.037)	(0.020)
Number of observations	113,572	13,532	6,701	3,645	16,742
MATH					
Unadjusted difference	−0.314***	0.052	0.098*	0.264***	0.156***
	(0.017)	(0.034)	(0.052)	(0.062)	(0.031)
Difference adjusted for:					
Individual SES	−0.100***	0.058**	0.066	0.181***	0.183***
	(0.014)	(0.025)	(0.040)	(0.041)	(0.024)
Individual SES/peer SES	0.035*	0.078***	0.053	0.154***	0.143***
	(0.018)	(0.024)	(0.038)	(0.038)	(0.022)
Individual SES/peer SES/selectivity	0.036**	0.080***	0.065*	0.155***	0.144***
	(0.018)	(0.025)	(0.036)	(0.037)	(0.022)
Number of observations	113,804	13,560	6,716	3,654	16,795

Source: Ministry of Education and authors' calculations.

Note: Standard errors are in parentheses. All regression results cluster standard errors at the school level. ***Significant at 1%; **Significant at 5%; *Significant at 10%.

Appendix 6. Difference between school types and private voucher independent schools for student with average characteristics of private voucher independent school student (fourth grade 2006)

	Public	Voucher franchise (2 or more schools)
SPANISH		
Unadjusted difference	−0.303***	0.111***
	(0.015)	(0.020)
Difference adjusted for:		
Individual SES	−0.127***	0.098***
	(0.014)	(0.015)
Individual SES/peer SES	0.021	0.087***
	(0.019)	(0.014)
Individual SES/peer SES/selectivity	0.023	0.088***
	(0.018)	(0.014)
Number of observations	109,868	39,660
MATH		
Unadjusted difference	−0.341***	0.107***
	(0.017)	(0.022)
Difference adjusted for:		
Individual SES	−0.116***	0.108***
	(0.015)	(0.017)
Individual SES/peer SES	0.041*	0.093***
	(0.021)	(0.016)
Individual SES/peer SES/selectivity	0.041*	0.094***
	(0.021)	(0.016)
Number of observations	110,156	39,740

Source: Ministry of Education and authors' calculations.

Note: Standard errors are in parentheses. All regression results cluster standard errors at the school level. ***Significant at 1%; **Significant at 5%; *Significant at 10%.

Appendix 7. Difference between school types (by franchise size) and private voucher independent schools for student with average characteristics of private voucher independent school student (fourth grade 2006)

		Voucher franchise size			
	Public	2 schools	3 schools	4 schools	5 or more schools
SPANISH					
Unadjusted difference	−0.303***	0.051	0.089**	0.190***	0.150***
	(0.015)	(0.031)	(0.040)	(0.062)	(0.027)
Difference adjusted for:					
Individual SES	−0.127***	0.076***	0.068**	0.143***	0.140***
	(0.014)	(0.021)	(0.032)	(0.035)	(0.022)
Individual SES/peer SES	0.020	0.089***	0.043	0.110***	0.123***
	(0.019)	(0.021)	(0.032)	(0.038)	(0.022)
Individual SES/peer SES/selectivity	0.023	0.091***	0.038	0.113***	0.122***
	(0.018)	(0.021)	(0.032)	(0.036)	(0.022)
Number of observations	109,868	12,886	6,788	3,377	16,609
MATH					
Unadjusted difference	−0.341***	0.039	0.102**	0.216***	0.140***
	(0.017)	(0.034)	(0.042)	(0.063)	(0.030)
Difference adjusted for:					
Individual SES	−0.116***	0.071***	0.100***	0.175***	0.154***
	(0.015)	(0.025)	(0.032)	(0.042)	(0.025)
Individual SES/peer SES	0.040*	0.087***	0.076**	0.139***	0.127***
	(0.021)	(0.024)	(0.033)	(0.047)	(0.025)
Individual SES/peer SES/selectivity	0.040*	0.087***	0.073**	0.141***	0.124***
	(0.021)	(0.025)	(0.033)	(0.043)	(0.025)
Number of observations	110,156	12,922	6,795	3,374	16,649

Source: Ministry of Education and authors' calculations.

Note: Standard errors are in parentheses. All regression results cluster standard errors at the school level. ***Significant at 1%; **Significant at 5%; *Significant at 10%.