

## Enrollment practices in response to vouchers: Evidence from Chile

August 2006

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**Abstract:** Voucher advocates argue that the introduction of educational vouchers can make improved educational opportunity available to the most disadvantaged children. Critics contend that vouchers increase the risk of exacerbating inequities based on race and socioeconomic status. They fear that in order to remain competitive and save costs, private schools will have incentives to skim off the highest performing students who are usually least demanding in terms of resources. Most evidence suggests that unrestricted choice in Chile has exacerbated stratification. Researchers have found that private voucher schools “cream skim” off the high income students while relegating disadvantaged students to public schools. What has been overlooked, however, is stratification levels within public and private school sectors and variation within private school for-profit and nonprofit (religious and secular) sectors. In this paper we examine public and private school enrollment practices in response to vouchers. We find that public schools are more likely to serve disadvantaged student populations than private voucher schools. We also find that the typical public school is more internally diverse with regard to parental income and education than the typical private voucher school. While differential behavior is also found across private school ownership types, the differences do not always comport with theory.

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I would like to thank Henry Levin, Stephen Macedo, Alejandra Mizala, and Miguel Urquiola for their comments on earlier drafts of this article. All remaining errors are the authors. I also wish to thank Ana María Baeza, Guillermo Fuentes, Jorge Sirriya, and the Chilean Ministry of Education and for providing data. Felipe Salazar provided outstanding research assistance.

## INTRODUCTION

Private school vouchers are perhaps the most hotly debated issue in current education policy reform discussions. Advocates have often argued that the introduction of educational vouchers can make improved educational opportunity available to the most disadvantaged children (e.g. Sugarman, 1999). Since the option of school choice through residential mobility or through enrollment in private schools has long been available to higher income parents, voucher proponents maintain that expanding the right of parents of lower socio-economic status to leave their low performing local schools for higher performing ones may reduce stratification as parental income become less important in determining who attends private schools (Neal, 2002; Nechyba, 2000).

Voucher skeptics contend that vouchers increase the risk of exacerbating inequities based on race and socioeconomic status (Fiske and Ladd, 2000; Levin, 1998; Henig, 1994). Critics have identified both demand side and supply side reasons why educational vouchers may lead to more stratified schools. On the demand side, they are worried about whether families – particularly lower-income and less educated families – have enough information to make informed decisions (Schneider et al. 2000; Henig, 1996) and whether parental preferences will lead families to select schools based on the race or class composition of their student bodies and not on their academic quality (Buckley and Schneider, 2002; Elacqua et al., 2006). On the supply side, voucher critics fear that in order to remain competitive and save costs, schools may have incentives to skim off the highest performing students who are usually least demanding in terms of resources (Levin, 2002).

We can gain insight into these arguments 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. Private voucher schools currently account for over 40 percent of total enrollment.

Over the last quarter-century, scholars have developed a substantial body of empirical literature on the impact of school choice on different outcomes in Chile. While there is still debate on whether or not 25 years of vouchers has improved student achievement,<sup>1</sup> most evidence suggests that unrestricted choice in Chile has exacerbated

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<sup>1</sup> For instance, McEwan and Carnoy (2000) suggest that competition has resulted in modest gains in achievement in public schools in Santiago, but slightly negative effects outside of the capital. Hsieh and Urquiola (2006) found that in Chile competition is not associated with higher public school performance

stratification. Researchers have found that private voucher schools “cream skim” off the high-income students while relegating disadvantaged students to public schools (see, for example, Hsieh and Urquiola, 2006).

Many voucher critics may hold up these results as proof that unfettered choice will exacerbate stratification. However, when considering how much educational vouchers and private schools contribute to the stratification of children of different socioeconomic levels, there are two components to the question. One is between sector stratification and the other is between school stratification within a sector. For example, although private schools enroll fewer disadvantaged students than public schools, they may be evenly distributed across all private schools, while poor students may be isolated from their more advantaged counterparts in public schools. Therefore, while the between-sector stratification may be greater in private schools, the between-school stratification may be greater in public schools.

While in the past, Chilean researchers have focused on the extent of stratification between public and private schools,<sup>2</sup> stratification within a sector may do more to produce economically homogenous schools than patterns of between-sector stratification. 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, who often draw disproportionately on a teacher’s time and can pressure each other away from learning (e.g. Zimmer and Toma, 2000).<sup>3</sup> High levels of stratification among schools could, therefore, have an adverse effect on learning outcomes of disadvantaged students and widen the rich-poor test score gap in Chile.<sup>4</sup> Thus, when considering how much private school vouchers contribute to stratification, researchers and policymakers should consider both components of the question.

In addition, the overrepresentation of middle and upper-class students in the private sector does not necessarily imply that all private schools cream skim. Much of the existing literature in Chile treats private schools as an aggregate category where all

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because, according to the authors, private voucher schools responded to the competitive pressures let loose under the voucher system not by raising productivity, but rather by choosing better students. Conversely, Gallego (2005) found that greater competition is associated with higher student achievement. In addition, most studies comparing test scores in private voucher and public schools show a private school advantage (see, e.g., Anand et al., 2006; Sapelli and Vial, 2002; Bravo et al. 1999), although the differences are usually small.

<sup>2</sup> For a review of the literature in Chile, see OECD (2004).

<sup>3</sup> Research evidence also suggests that stratification can have a negative impact on non-cognitive outcomes – attitudes and behaviors – that are important to employers (Hawley, 1981, Rothstein, 2004).

<sup>4</sup> For an analysis of the rich-poor test score gap in Chile, see Mizala and Romaguera (2005)

schools are considered to be largely identical, when in fact there is reason to believe that there is considerable variation across private voucher school sectors in Chile. While many nonprofit voucher schools (religious and secular) declare in their missions that they target disadvantaged students, for-profit schools are profit oriented and more likely to target less expensive to educate students.

Using a highly-detailed dataset constructed from the administrative records of the Ministry of Education, we examine public and private voucher school enrollment practices. We find that public schools are more likely to serve disadvantaged student populations than private voucher schools. Moreover, we also find that the typical public school is more internally diverse with regard to parental income and education than the typical private voucher school. While differential behavior is also found across private school types, the differences do not always comport with theory. We provide suggestive evidence that while public schools actively seek socioeconomic diversity in their student bodies, Catholic voucher schools, and to a lesser degree for-profit voucher schools, stratify student populations. We also find that private voucher schools that charge fees admit fewer disadvantaged students and have higher degrees of stratification than free private voucher schools. Our data suggest that tuition is much more important than ownership type in explaining stratification levels between and within school sectors. The results presented in this study demonstrate the importance of examining both between-sector and between-school stratification as well as going beyond aggregate private voucher school categories.

The remainder of the paper is organized as follows. The second section briefly reviews the literature on educational vouchers and stratification. The third section reviews some background on Chile's voucher program and describes the school types that will serve as the analytical categories. Section four examines between-sector stratification across public and private voucher schools in Chile. The fifth section analyzes between-school stratification among public and private voucher schools. The final section concludes and discusses policy implications.

## **THE LITERATURE: EDUCATIONAL VOUCHERS AND STRATIFICATION**

One of the most heated educational debates is on the optimal provisional mode of primary and secondary education. Critics of public school systems point to the

significant increases in public expenditures on schools in recent decades, which have not been accompanied by corresponding improvements in the quality of education (Hanushek, 2003). Privatization proponents argue that if education were privatized, schools would have stronger incentives to reduce costs, and more importantly, to innovate, leading to both higher quality and greater efficiency in education (Chubb, 2001). Voucher advocates also claim that educational vouchers provide more options to low-income parents, who in a public school assignment system are more likely to be assigned to a low-quality public school. Proponents argue that vouchers extend to all students a privilege previously only available to those who could afford to live in a high-income neighborhood or send their children to a private school (Neal, 2002; Nechyba, 1999, 2000).

In contrast, the opponents of educational vouchers fear that schools would cut quality in the process of cutting costs. For instance, critics worry that profit oriented private schools will try to save costs by hiring less experienced teachers whose salaries are lower, and recruiting and retaining students who are least demanding in terms of resources, thereby increasing stratification and jeopardizing the quality of education (Levin, 2002). Voucher skeptics also fear that wealthier families with higher education are much more likely to avail of vouchers. They argue that low-income families are less likely to have the time, ability and resources to choose the best schools for their children (Schneider et al. 2000; Henig, 1996).

Because educational vouchers are a relatively new phenomenon, the prior evidence on their consequences is limited. In a survey of the literature on stratification in small-scale voucher programs in the United States, McEwan (2004) reports mixed evidence on whether those who take advantage of vouchers are substantially different from other eligible families. In some cases, voucher students have parents with higher education levels than public school students (Metcalf, 2003). Yet, in other cases, voucher-users are more likely to be from low-income families (Howell et al. 2002). This evidence, however, is clouded by the fact that in all of the programs in the United States, voucher access has been restricted to disadvantaged families.

Epple and Romano (1998) constructed computational models that simulate the sorting behavior of families in response to the introduction of a large scale universal voucher program. Their model's results suggest that an unrestricted flat per-pupil voucher would lead to increased stratification across schools. The model's key implications are consistent with sorting patterns in Chile, where similar flat per-pupil

vouchers were introduced. Hsieh and Urquiola (2006) found that the main effect of unfettered school choice in Chile was an exodus of middle class students from public schools. In municipalities where the private school sector grew, the authors show that there is a greater decline in the socioeconomic status of public school students relative to the municipality average.

While voucher critics may take this as evidence that unrestricted large scale voucher systems will lead to greater stratification, it may be unwise to generalize those results to all private schools. Much of the existing empirical literature in Chile treats private schools as an aggregate category and only a small number of studies have examined whether behavior differs across private school types. While some studies distinguish between Catholic and “other” private schools (e.g. McEwan, 2001), few if any have made finer distinctions within these two categories, or have examined whether outcomes differ across nonprofit and for-profit schools.

Empirical research has identified significant differences in for-profit and nonprofit behaviors in many mixed industries, including hospitals, nursing homes, prisons, day care centers, and various social services (e.g. Rose-Ackerman, 1996; Weisbrod, 1988).<sup>5</sup> Some researchers make finer distinctions between private nonprofit charter schools.<sup>6</sup> For instance, recent research distinguishes between “market-oriented” and “mission-oriented” nonprofit charter schools (Brown et al., 2005; Lacireno-Paquet et al., 2002).<sup>7</sup> Although they find evidence that market oriented schools are less likely to serve needy populations than mission oriented schools, the theoretical typology they use

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<sup>5</sup> For instance, in studies of nursing homes, Nyman (1994) and Weisbrod (1998) find that nonprofit homes charge significantly lower fees than for-profits. Luksetich, Edwards, and Carroll (2000) show that nonprofit homes spend more per-patient on nursing care and less on administrative expenses than for-profit homes. In studies of kidney dialysis clinics, Ford and Kasserman (2000) demonstrate that nonprofit clinics provide significantly longer treatment than for-profit dialysis clinics. Similarly, nonprofit hospitals provide more uncompensated care than for-profit hospitals (Schlesinger et al., 1987). In research of nursing homes and facilities for the mentally disabled, Weisbrod (1998) finds that for-profits have more staff per-patient than nonprofit facilities. In studies of prisons, Hart, Shleifer, and Vishny (1997) find that to save costs, private for-profit prisons hire lower quality prison guards than nonprofit institutions. The empirical studies of day care centers also show systematic differences between nonprofit and for-profit centers. Nonprofits 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; Kisker et al., 1991).

<sup>6</sup> Charter schools are independent public schools designed and operated by educators, parents, community leaders, educational entrepreneurs, and others. They are sponsored by local or state educational organizations who monitor their quality and effectiveness but allow them to operate outside of the traditional system of public schools. See [www.nps.k12.va.us/NCLB/NCLB\\_glossary.htm](http://www.nps.k12.va.us/NCLB/NCLB_glossary.htm)

<sup>7</sup> The authors define market oriented schools as more likely to have a relationship with a for-profit educational management organization (EMO) and to be founded by individuals outside the community. They characterize mission oriented schools as those with long established social service ties to their local community.

for distinguishing between nonprofit charter schools limits their ability to disentangle the inter-institutional differences driven by incentives and legal constraints placed on nonprofit and for-profit schools.<sup>8</sup>

The evidence on this point is limited because there are so few educational 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, 2003), and nonprofit status is usually required for private educational institutions (James, 1993).

## **BACKGROUND ON CHILE**

We can gain insight into this debate through the examination of supply behavior in a mixed market in which public, private nonprofit (religious and secular) and for-profit voucher schools compete for enrollment. During the 1980s, the school system in Chile experienced a sweeping reform program enacted by the military government (1973-1990). First, the government decentralized the administration of schools, transferring responsibility for public school management from the Ministry of Education to local municipalities. Second, the government altered the financing of public and most private schools. Public schools continued to be funded centrally, but municipalities started to receive a per-pupil payment for every child attending their schools. As a result, enrollment losses came to have a direct effect on their education budgets. Most importantly, private schools that did not charge tuition began receiving the same per-pupil payment as public schools.<sup>9</sup> Tuition-charging private schools continued to operate without public funding.

The reform sparked a massive redistribution across private and public schools, as well as the creation of many new private schools. In 1980, 14 percent of Chilean K-12 students attended private schools that received some public subsidy, and another 6 percent attended more elite, unsubsidized private schools. By 1990, 34 percent of students attended private voucher schools. By 2003, enrollment in such schools had reached over 40 percent of total enrollment. Most of these gains were at the expense of public school enrollments.

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<sup>8</sup> Institutional features include distributional constraints, tax exemptions, and private donation laws (e.g. Weisbrod, 1998).

<sup>9</sup> Chile's voucher formula includes adjustments for rural schools and high schools, but is flat with respect to student socioeconomic characteristics (Gonzalez et al., 2004).

Most researchers generally use a single category to describe all private voucher schools in Chile. However, as we will demonstrate, there is a great deal of variability in the private voucher sector. Prior to the voucher reforms in 1981, most subsidized private schools were Catholic (Aedo, 2000). When private subsidized schools began to receive the same per-pupil payment as the public schools, a flood of new, mostly for-profit voucher schools entered the market. Table 1 describes the management and financing of the public and 5 types of private schools in Chile (Catholic voucher, Protestant voucher, secular nonprofit voucher, for-profit voucher, and private nonvoucher). Table 2 summarizes basic descriptive information about public and the 4 types of private voucher elementary schools.<sup>10</sup>

**Table 1 Here**

**Table 2 Here**

For-profit voucher schools in Chile are diverse in membership. For-profit networks, which represent about one-third of all for-profit schools, are probably those that best fit the description of educational privatization proponents (e.g. 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,<sup>11</sup> and are characterized by networks of campuses. These for-profit schools stand in varying degrees of contrast to family run private voucher schools, which account for about two-thirds of all for-profit schools. Family run for-profit 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 neighborhood. Many of these schools were founded during the first decade of the reform, and anecdotal evidence suggests that many of the owners are former public school teachers who were expelled by the military government.<sup>12</sup> While management practices may differ between firm and family school operators, we hypothesize that both school types will behave like profit maximizers by recruiting and retaining a higher portion of less expensive to educate students.

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<sup>10</sup> We do not include the private non-voucher schools in this analysis. This set of schools charge high tuition, do not receive per-pupil subsidies, and are mainly focused on high income students.

<sup>11</sup> See, for example, La Tercera (2005).

<sup>12</sup> Walter Oliva, the former president of the National Private Voucher School Association (CONACEP), provided us with this information.



Nonprofit voucher schools, including Catholic, Protestant,<sup>13</sup> and secular organizations,<sup>14</sup> are more likely to be characterized by a mission that targets disadvantaged students rather than profit maximization. These schools, which are often subsidized 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 disadvantaged students whose costs exceed the voucher. Most nonprofit schools are also characterized by networks of campuses that are affiliated through religious congregations or foundations. We hypothesize that nonprofit (secular and religious) schools will be more likely to serve disadvantaged students than for-profit voucher schools.

Table 3 shows how schools and enrollments are distributed across school types. For-profit operated schools account for around 24 percent of schools and 25 percent of enrollments. Most of the other voucher schools are Catholic, but a growing number are operated by Protestant churches and secular foundations. In urban areas, and even more so in rural areas, the majority of schools are still public, but important numbers are also operated by for-profit providers.

**Table 3 Here**

## **BETWEEN-SECTOR STRATIFICATION**

To examine enrollment practices across public and private voucher schools, we use a highly-detailed dataset constructed from the 2003 administrative records of the Ministry of Education of Chile. This dataset provides information on schools, their ownership type based on data provided by the Ministry of Education, enrollment, and information on shared financing and costs.

Our dependant variable is the percentage of elementary school students<sup>15</sup> classified as “vulnerable” in the Ministry of Education’s socioeconomic status classification system. This system determines whether a student is “vulnerable” or not based on

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<sup>13</sup> There are 4 private voucher schools of other religious orientations. These schools were dropped from the sample.

<sup>14</sup> Most of the secular nonprofit 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.

<sup>15</sup> We focused on elementary schools because high school students are less likely to be classified as disadvantaged by the Ministry of Education.

individual and household surveys collected by the Ministry of Planning and the Ministry of Education. Appendix 1 provides details on the decision tree used to identify vulnerable students. Vulnerable students represent 26 percent of total enrollment. We acknowledge that using this indicator as a proxy for low socioeconomic status is not perfect. We chose this index for two reasons. First, qualifications for the program are dependent on the family demonstrating low levels of income and education. Second, the Ministry of Education uses the vulnerability index for school level affirmative action policies.<sup>16</sup> and differentiated voucher programs.<sup>17</sup>

Table 4 presents descriptive statistics for the 8,389 schools that participate in Chile's voucher program, divided by school type. Data confirms prior research suggesting that, in the aggregate, private voucher schools serve fewer vulnerable students than public schools. However, it also indicates that this aggregate analysis masks some differences within the private voucher sector. For instance, Catholic schools enroll the lowest proportion of disadvantaged students.

#### **Table 4 Here**

To formally test whether or not public schools serve more disadvantaged students than private voucher schools, and whether there is variation within the private sector, we construct a regression analysis where we model the percentage of vulnerable students as a function of school type and the set of control variables listed in Table 5.

We introduce measures of primary and secondary enrollment (PRIMENROLLMENT and SECONROLLMENT, respectively). School size is important control variables because, holding all else constant, larger schools may be able to more easily support the higher costs of enrolling disadvantaged students. We also include a variable to indicate whether the school is part of a network of two or more schools (NETWORK), as more campuses permits schools to access a larger number of students and reduced operating costs (Chubb, 2001).

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<sup>16</sup> All subsidized schools in Chile will be required - as of March 2007 - to enroll a minimum of 15 percent of students classified as vulnerable. For more information see [http://www.modernizacion.cl/1350/articles-66426\\_ley\\_19979.pdf](http://www.modernizacion.cl/1350/articles-66426_ley_19979.pdf)

<sup>17</sup> A recent legislative initiative proposes to use the vulnerability index to differentiate Chile's per pupil voucher.

We also introduce a measure of average monthly tuition charged<sup>18</sup> (SCHOOLFEE), and a variable to indicate the relative isolation of the school (RURAL). To approximate the level of competitiveness schools confront, we include a measure of the number of schools per square kilometer of each municipality (SCHOOLSKM2). It may be the case that highly populated areas and competitive schooling markets demand certain services driving private voucher school behavior externally rather than internally. We also included regional dummy variables in the regressions to account for differences across regions.

We also introduce a measure of the number of years a school has been in operation (SCHOOLAGE). A school's age is important because, holding all else constant, newer schools may not have had enough time to establish a reputation to be able to select high performing (and high SES) students.

Finally, to control for sorting patterns, we take into account municipality poverty rates (MUNPOVERTY). Neighborhood stratification is a central consideration, since the enrollment practices of schools will depend upon their ability to obtain access to alternative student populations.

Since our empirical analysis requires us to look for the effect of variation across public and private voucher schools, we categorize schools as a set of dummy variables: private voucher (aggregate), for-profit voucher, Catholic voucher, Protestant voucher, secular nonprofit voucher, with public schools serving as the omitted reference group.

### **Table 5 Here**

## **Empirical Results**

Looking at whether there is a difference in the percentage of vulnerable students enrolled in private voucher schools and public schools, table 6 shows regression coefficients for two different specifications for our model. The first specification (1) includes a dummy variable for private voucher schools. The second specification (2)

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<sup>18</sup> In 1994, 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 (Elacqua et al., 2006). The “shared financing” law in Chile allows private voucher schools and public high schools to charge fees that can be up to 1.6 times the basic voucher payment. Discounts to vouchers are applied progressively. If monthly tuition is less than half the level of the *Unidad de Subvención Escolar* (USE), no discount is applied. Tuition fees between one half and one USE incur a 10% deduction. Fees between one and two USE incur a 20% deduction. Fee charging schools must also devote up to 10% of their additional income to finance scholarships. The USE is the monetary index, valued at \$12.100 Chilean pesos (US\$ 16.28) in 2003.

includes dummy variables for private voucher school sub-sectors. Public schools serve as the omitted reference categories in both specifications. Specification (1) confirms bivariate patterns found in table 6. The coefficient for private voucher schools indicates that they serve seven percentage points fewer vulnerable students compared to public schools when controlling for other school and neighborhood characteristics. However, coefficients in (2) reveal a slightly different story than the descriptive statistics suggest. The results presented in table 8 indicate that vulnerable students make up six percentage points less of the for-profit voucher schools' student body compared to public schools. The coefficient for Catholic voucher schools indicates, surprisingly, that they serve twelve percentage points fewer vulnerable students compared to public schools. Secular non-profit voucher schools serve over seven percentage points fewer vulnerable students compared to public schools. The regression results indicate that public schools serve the highest percentage of vulnerable students, with for-profit voucher schools serving higher proportions of disadvantaged students than nonprofit (religious and secular) voucher schools.

Table 6 also indicates that rural schools are much more likely to serve vulnerable students than urban schools and schools located in poor neighborhoods and in municipalities with more competitive schooling markets, tend to enroll more vulnerable students. Table 8 also shows that cream-skimming is much more evident when private schools charge tuition.

#### **Table 6 Here**

To probe this finding further, we compare levels of stratification between free and fee charging private voucher schools.<sup>19</sup> The data presented in table 7 suggest that while public schools enroll larger proportions of vulnerable students than private voucher schools, the gap narrows significantly when comparing schools that do not charge fees. There is also some variation across private voucher school sectors that do not charge tuition. For-profit free schools serve a similar proportion of vulnerable students as public schools. Conversely, Catholic schools serve thirteen percentage points fewer vulnerable students compared to public and for-profit voucher schools. There are only minor differences between private school types that charge tuition.

#### **Table 7 Here**

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<sup>19</sup> Public primary schools are not permitted to charge tuition.

## **BETWEEN-SCHOOL STRATIFICATION**

Although the data in tables 4, 6, and 7 highlight the disproportionately high percentage of vulnerable students enrolled in public schools and as well as differences across private school sub-sectors, including schools that charge tuition and free private schools, it does not indicate how these students are distributed across schools within each sector. The public sector in Chile could, for example, be highly stratified with the poor isolated from their advantaged counterparts.

Researchers in the United States have documented differences in between-stratification patterns among public and private schools. For instance, Coleman and his colleagues (1982) found that although private schools in the United States tended to enroll fewer black students than public schools, black-white segregation was lower among private schools than among public schools. And a seminal study by Bryk, Lee, and Holland, based on a national database of student performance, revealed that Catholic schools in the United States were more internally diverse with regard to race and income than the typical public school or secular private school (Bryk et al. 1993).

To examine how vulnerable students are distributed among schools in Chile, we calculate segregation curves, which are analogs of the Lorenz curves commonly used for analysis of income inequalities.<sup>20</sup> A segregation curve is constructed by arranging schools in descending order of their vulnerable student percentages, and then plotting the cumulative proportion of vulnerable students against the cumulative proportion of non-vulnerable students. We calculate segregation curves for public schools and private voucher schools (figure 1) and for different types of private voucher schools (figures 2 and 3).

In figures 1, 2, and 3 the diagonal represents the condition of no segregation. On the horizontal axis, we depict schools arranged in order of percentage of vulnerable students served. On the vertical axis, we measure the percentage of non-vulnerable students accruing to any particular fraction of the population of schools. More unequal distributions lie further below the no segregation 45 degree line. The private voucher sector curve plotted in figure 1 traces a path closer to the axes representing complete stratification than to the diagonal representing no segregation. Conversely, the public school curve is closer to the no segregation line. This is graphic evidence that private

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<sup>20</sup> See Frankel and Volij (2005) for a technical discussion of Lorenz curves and other segregation indices.

voucher schools in the aggregate display much higher degrees of stratification than public schools. For instance, the point where the curve meets the right axis indicates that almost 45 percent of private voucher school students and less than 5 percent of public school students do not have disadvantaged classmates.

Figures 2 illustrate that there is some variation within the private voucher sector. The curve for for-profit voucher schools in figure 3 lies below the curves of the other sectors, suggesting an uneven distribution of vulnerable students in this set of voucher schools. For instance, figure 2 shows that vulnerable students are more evenly distributed among secular nonprofit schools.<sup>21</sup> than within the for-profit sector. Figure 3 illustrates that the curve for tuition voucher schools lies well below the curves of free schools and public schools, suggesting an uneven distribution of vulnerable students in this set of voucher schools.

**Figure 1 Here**

**Figure 2 Here**

**Figure 3 Here**

Segregation curves are useful graphic devices to demonstrate the levels of stratification among schools within sectors, but if the curves intersect, as they do in the left axis in figure 2, we need to use other methods to rank the levels of segregation. The Gini Coefficient, the most commonly used index in economics studies, is a more precise way of measuring the position of the segregation curve. To work out the Gini Coefficient we measure the ratio of the area between the segregation curve and the 45 degree line to the whole area below the 45 degree line. If the segregation curve was the 45 degree line - then the value of the Gini Coefficient would be zero, but as the level of segregation grows so does the Gini Coefficient. In the most extreme possible scenario the Gini Coefficient would be 1.

By this measure of segregation,<sup>22</sup> table 8 confirms most of our findings illustrated in figures 1,2, and 3. Among all schools, public schools have the most economically diverse enrollments and the lowest levels of segregation. For-profit schools have slightly higher levels of stratification than other private voucher school types. The data

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<sup>21</sup> We do not include Protestant schools in Figure 3 because they have similar levels of stratification as Catholic schools. These results are available upon request.

<sup>22</sup> We also calculated other commonly used measures of segregation including the dissimilarity index, exposure rates, and the information theory index. The results (available upon request) of these alternate measures do not change the substantive conclusions reported here.

also indicate that free private voucher schools have significantly lower levels of stratification than tuition charging private schools. This is suggestive evidence that while public and free private voucher schools seek socioeconomic diversity in their student bodies, tuition-charging private voucher schools stratify student populations based on ability to pay.

**Table 8 Here**

## **CONCLUSIONS AND IMPLICATIONS**

Consistent with previous research, we find that public schools are more likely to serve disadvantaged student populations than private voucher schools. We also find that the typical public school is more internally diverse with regard to parental income and education than the typical private voucher school. These results are not surprising given that public schools are mandated by law to accept all students who apply, regardless of ability to pay, while private schools are permitted to use parental interviews to select and expel students as they see fit.

We also found evidence that this aggregate pattern may be masking some differences across private voucher school sectors. For-profit schools, surprisingly, are more likely to serve disadvantaged students than other private voucher schools. We also found that free for-profit schools serve similar proportions of vulnerable students as free public schools. However, vulnerable students in for-profit (free and tuition-charging) schools are more isolated from their more advantaged peers than in other private voucher school sectors. This suggests that this set of schools is finding market niches in both low and middle-income communities.<sup>23</sup>

Perhaps the most counter-intuitive finding presented in this the paper is that, despite having a mission to serve the needy, Catholic voucher schools enroll, on average, fewer disadvantaged students than public and other private school types. This pattern is likely due to several factors. First, Catholic schools may have been forced to adapt their personnel practices to meet the needs of the current workforce. For instance, in the past, Catholic schools were able to rely on cheap labor costs. However, according to survey evidence in Chile, the number of women and men currently going into religious life has dwindled (Conferencia Episcopal de Chile, 2002). At present, just 4 percent of the

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<sup>23</sup> Market segmentation is a common strategy used by private enterprises to tailor their products to different consumers (Smith, 1956).

professional staff at Catholic schools is religious and clergy. Lay teachers who replaced the religious teachers may be demanding higher wages. As labor costs rise, Catholic schools in Chile may be serving fewer disadvantaged students to account for higher costs, where voucher adjustments do not account for the cost differences of serving low-income children.

A second reason why Catholic schools may be focusing on a more elite clientele may be related to what parents value when they choose a school. For instance, recent evidence in Chile suggests that parents' decisions are influenced by a school's student demographics (Elacqua et al., 2006). In Chile, schools are given latitude to levy fees and select students from more high status families and refuse applicants from disadvantaged families. Thus, if parents care about demographics, schools will be less inclined to enroll vulnerable students.

Some may also contend that this behavior reflects that some Catholic schools may be "for-profits in disguise" (Weisbrod, 1988). Chilean nonprofit schools are not bound by a non-distribution constraint. For example, owners are permitted to distribute profits to principals or board members. Therefore, it is plausible that some profit seeking entrepreneurs may be taking advantage of public subsidies to nonprofit Catholic schools, turning them into private gain.

We also found evidence that among all private school types, tuition charging schools enrolled the fewest number of disadvantaged students. Poor students were also more isolated from their advantaged peers in this sector. Free private voucher schools, conversely, are less stratified than tuition charging private schools and admit a similar proportion of disadvantaged students as public schools.

Results from this study have implications for future research and policy. The findings reported here demonstrate that, when considering how much private school vouchers contribute to stratification, it is important to examine both between-sector stratification and between-school stratification within a sector. The findings also suggest that education research should not treat private schools as an aggregate category where all schools are considered to be largely identical.

From a policy perspective, the results of this study suggest that private schools respond differently to vouchers than public schools. However, before concluding that private voucher programs would aggravate stratification, more research needs to be conducted to determine the factors that influence enrollment practices. For instance, how important is the voucher design? Most studies suggest that the flat per-pupil



voucher –such as Chile’s flat voucher scheme– leads to greater stratification across schools (e.g. Epple and Romano, 2002). If the voucher was differentiated by socioeconomic status, would Catholic schools, for instance, be willing to enroll more disadvantaged students? Or would it create larger markets for free for-profit schools in low-income communities? How does private school screening affect stratification? The ability of private schools in Chile to select students undoubtedly acts as a strong force in favor of cream skinning. Sorting is also likely induced by the demand side factor of self-selection, particularly in tuition charging schools.

Although it is unclear how Chile’s policy design affects school enrollment practices, our findings show that, in the presence of private voucher school selection, shared financing, and a flat per-pupil funding formula, private voucher schools, particularly tuition-charging schools, respond to market incentives by focusing on a more elite student body and by stratifying student populations.

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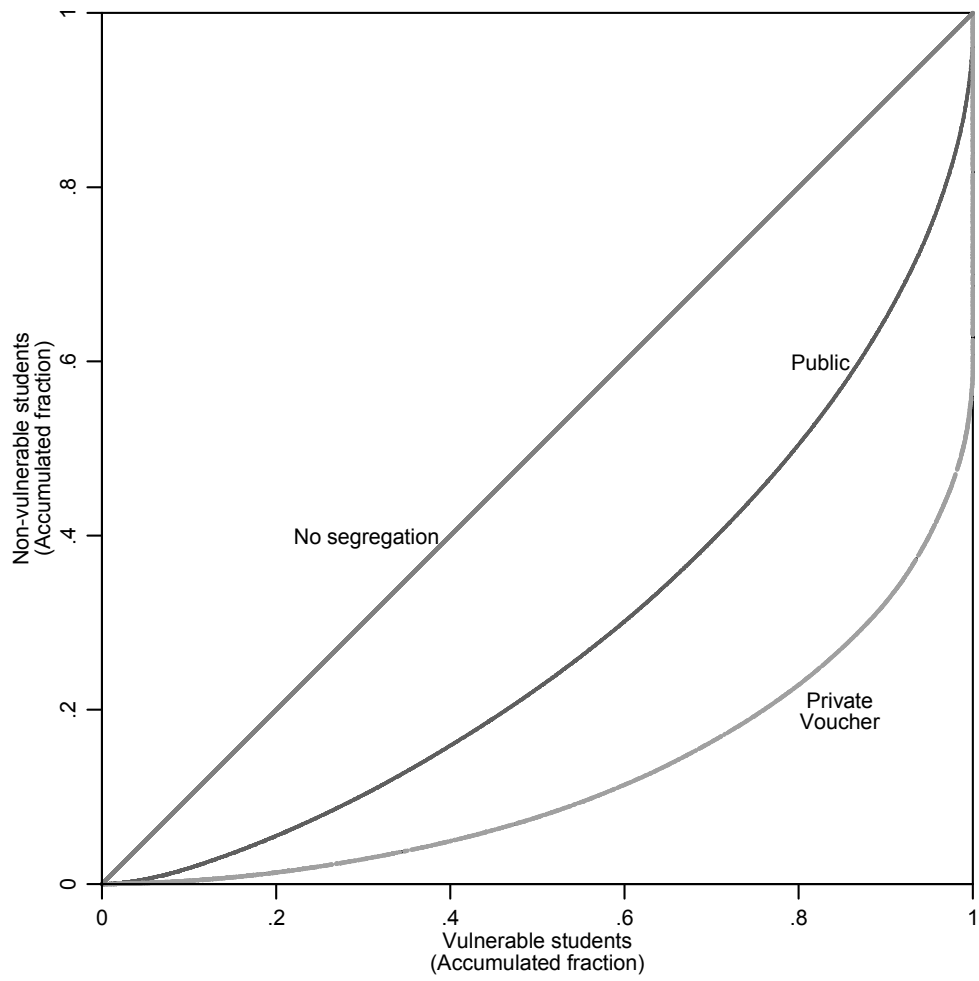
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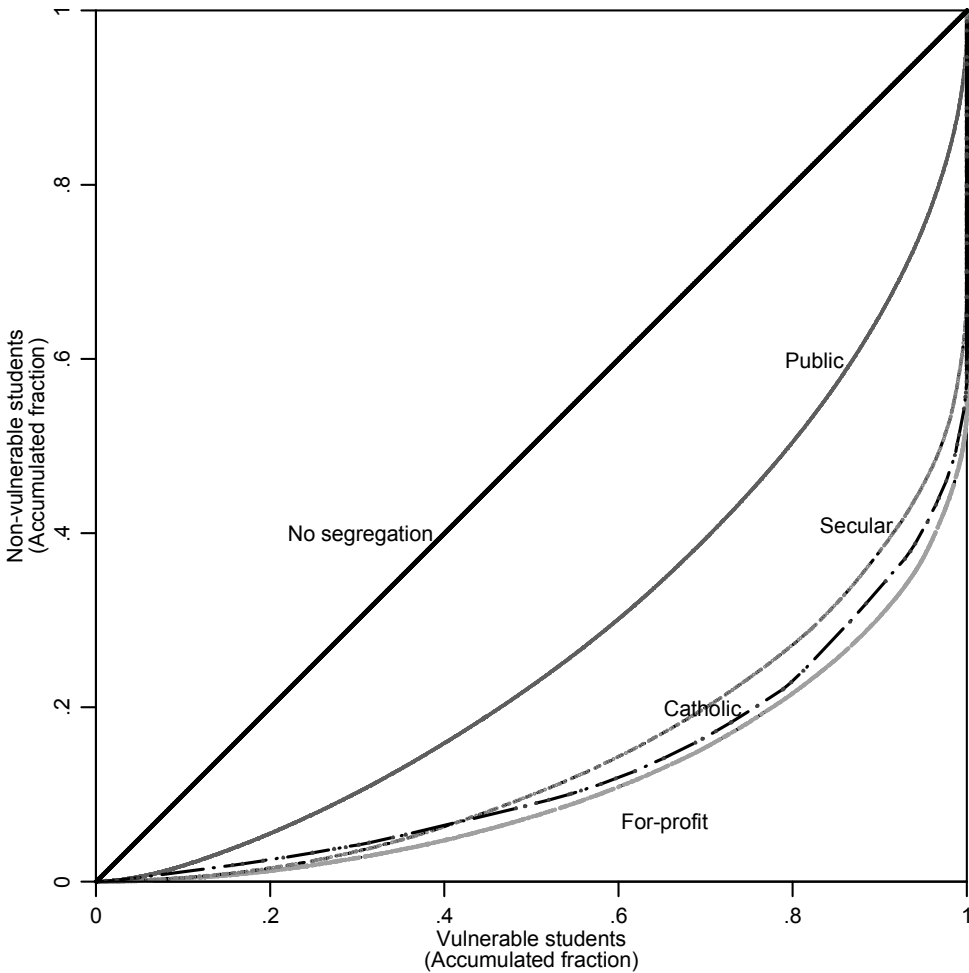
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**Figure 1.** Segregation curves for public and private schools

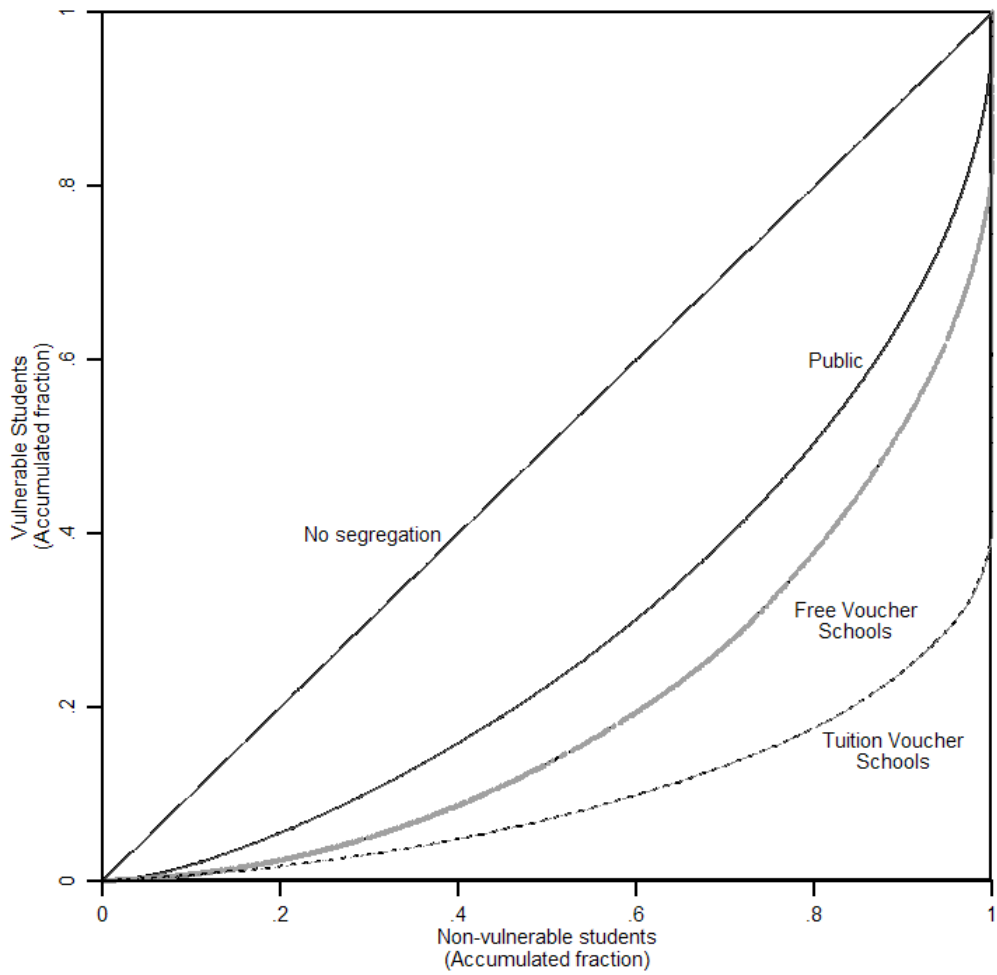


**Figure 2** Segregation curves for public and private schools across school types



Source: Ministry of Education and author's calculations

**Figure 3** Segregation curves for public and private free schools and private schools that charge tuition



Source: Ministry of Education and author's calculations

**Table 1 A taxonomy of public and private schools in Chile**

| <b>School Type</b>        | <b>Management</b>   | <b>Financing</b>   |
|---------------------------|---|--|
| Public Schools            | <i>Departamento de Administración de la Educación Municipal</i> ; part of municipal bureaucracy<br><br>Municipal Corporation; quasi-autonomous from municipal bureaucracy | National vouchers; municipal contributors; Regional Development Fund (infrastructure); tuition payments* |
| For-profit voucher        | Individual entrepreneurs, partnerships, firms (private shareholders)  | National vouchers; tuition payments; parent-center fees  |
| Catholic voucher          | Branches of Catholic church, including religious orders, parishes, archdiocese and religious foundations.   | National vouchers; tuition payments; parent-center fees; church contributions**                          |
| Protestant voucher        | Protestant churches, including Methodist, Baptist, Seventh-Day Adventist, Anglican, Lutheran, and Presbyterian churches.  | National vouchers; tuition payments; parent-center fees; church contributions**                          |
| Secular nonprofit voucher | Foundations, universities, Community development groups (NGOs)  | National vouchers; tuition payments; parent-center fees; foundation contributions**                      |
| Private non-voucher       | Catholic church; Protestant churches; for-profit individuals and firms; non-profit foundations.   | Tuition payments; parent-center fees; church and foundation contributions**                              |

Source: McEwan (2001) and author

\*Only public high schools can charge limited tuition.

\*\*Contributions include services of personnel and monetary and in-kind donations.

**Table 2 Private schools by ownership type: Descriptive Summary**

| School type               | N           | New schools<br>(founded post<br>1997)<br>% | Average<br>school<br>size | Single<br>campus<br>% | Network<br>of<br>campuses<br>% | Charge<br>tuition<br>% |
|---------------------------|-------------|--|---------------------------|-----------------------|--------------------------------|------------------------|
| Public Schools*           | 5464        | 2%   | 226.4                     | n/a                   | n/a                            | n/a                    |
| Private voucher schools   | 2893        | 23%  | 317.9                     | 67%                   | 33%                            | 49%                    |
| For-profit voucher        | 2129        | 27%  | 275.4                     | 82%                   | 18%                            | 49%                    |
| Catholic voucher          | 590         | 8%   | 458.1                     | 26%                   | 74%                            | 49%                    |
| Protestant voucher        | 92          | 16%  | 368                       | 15%                   | 85%                            | 53%                    |
| Secular nonprofit voucher | 82          | 40%  | 355.8                     | 56%                   | 44%                            | 33%                    |
| <b>Total</b>              | <b>8357</b> | <b>9%</b>                                  | <b>258.1</b>              | <b>67%**</b>          | <b>33%**</b>                   | <b>49%**</b>           |

\*Public schools are only permitted to charge tuition in high school. There are 581 public high schools in Chile.

\*\*Only private voucher schools

Source: Ministry of Education and author's calculations

**Table 3. Distribution of schools and students across school types, 2003**

| School type                   | Percent of schools |              |              | Percent of enrollment |              |              |
|-------------------------------|--------------------|--------------|--------------|-----------------------|--------------|--------------|
|                               | Total<br>(%)       | Urban<br>(%) | Rural<br>(%) | Total<br>(%)          | Urban<br>(%) | Rural<br>(%) |
| Public                        | 61.4               | 40.9         | 80.9         | 53.5                  | 49.2         | 80.6         |
| For-profit                    | 23.9               | 33.5         | 14.8         | 25.3                  | 27.4         | 12.3         |
| Catholic                      | 6.6                | 10.2         | 3.2          | 11.7                  | 12.8         | 4.5          |
| Protestant                    | 1.0                | 1.7          | 0.4          | 1.5                   | 1.5          | 1.0          |
| Secular nonprofit             | 0.9                | 1.7          | 0.2          | 1.3                   | 1.4          | .5           |
| Non-voucher                   | 6.1                | 12.1         | 0.4          | 6.7                   | 7.6          | 1.0          |
| <b>Total</b>                  | <b>100</b>         | <b>100</b>   | <b>100</b>   | <b>100</b>            | <b>100</b>   | <b>100</b>   |
| Number of schools or students | 8,900              | 4,340        | 4,560        | 2,311,703             | 1,996,943    | 314,760      |

Source: Ministry of Education and author's calculations

**Table 4.** Stratification between school types, 2003

| <b>School type</b> | <b>Number of schools</b> | <b>Enrollment</b> | <b>Vulnerable students (%)</b> |
|--------------------|--------------------------|-------------------|--------------------------------|
| Public             | 5,464                    | 1,237,324         | 39%                            |
| Voucher            | 2,893                    | 919,720           | 17%                            |
| For-profit         | 2,129                    | 586,428           | 18%                            |
| Catholic           | 590                      | 270,259           | 13%                            |
| Protestant         | 92                       | 33,857            | 18%                            |
| Secular non-profit | 82                       | 29,176            | 19%                            |
| <b>Total</b>       | <b>8,357</b>             | <b>2,076,757</b>  | <b>26%</b>                     |

*Source:* Ministry of Education and author's calculations

**Table 5. Variable definitions**

| Variable         | Description   |
|------------------|---|
| VULN             | Percentage of disadvantaged students enrolled in 2003.  |
| PRIMENROLLMENT   | Total student population in primary grades.   |
| SECONDENROLLMENT | Total student population in secondary grades  |
| SCHOOLSKM2       | Number of private voucher and public schools per square kilometer in school's municipality.   |
| TUITION          | Multinomial variable indicating monthly school tuition, according to Ministry of Education voucher discount classification (equals 0 if charges less than 0.5 SSE*, 1 if more than 0.5 and less than 1 SSE, 2 if school charges between 1 and 2 SSE, and =3 if school charges more than 2 but less than 4 SSE, which is the maximum allowed). |
| RURAL            | Dummy variable indicating whether a school is rural.  |
| SCHOOLAGE        | Multinomial variable indicating whether the school is in operation less than 5 years (=1), less than 12 years but more than 5 (=2), 13 or more years (=3)   |
| NETWORK          | Dummy variable indicating whether school is part of a network with two or more campuses.  |
| MUNPOVERTY       | Proportion of vulnerable students in municipality.  |

\* SSE (*Unidad de Subvención Educacional*) is a monetary index, which was valued at \$12,100 Chilean pesos (US\$ 16.28) in 2003.

*Note:* Variables are from the 2003 administrative records of the Ministry of Education of Chile.

**Table 6.** Regression: Percentage of vulnerable students in school as a function of a set of independent variables

|                 | 1                        | 2                        |
|-----------------|--------------------------|--------------------------|
| PRIVATE VOUCHER | -0.065***<br>[0.011]     |                          |
| FOR-PROFIT      |                          | -0.057***<br>[0.011]     |
| CATHOLIC        |                          | -0.124***<br>[0.011]     |
| PROTESTANT      |                          | -0.136***<br>[0.024]     |
| SECULAR         |                          | -0.066***<br>[0.024]     |
| PRIMENROLLMENT  | -1.22E-4***<br>[1.86E-5] | -1.17E-4***<br>[1.83E-5] |
| SCHOOLSKM2      | 0.038**<br>[0.019]       | 0.041**<br>[0.019]       |
| MUNPOVERTY      | 0.509***<br>[0.069]      | 0.506***<br>[0.070]      |
| SCHOOLFEE2      | -0.213***<br>[0.009]     | -0.209***<br>[0.009]     |
| SCHOOLFEE3      | -0.247***<br>[0.011]     | -0.244***<br>[0.011]     |
| SCHOOLFEE4      | -0.241***<br>[0.013]     | -0.235***<br>[0.013]     |
| RURAL           | 0.160***<br>[0.014]      | 0.160***<br>[0.014]      |
| SCHOOLAGE       | 0.030***<br>[0.004]      | 0.034***<br>[0.005]      |
| CHAIN           | -0,001<br>[0.008]        | 0.030***<br>[0.008]      |
| Constant        | 0.228***<br>[0.023]      | 0.209***<br>[0.023]      |
| Observations    | 8356                     | 8356                     |
| R-squared       | 0,58                     | 0,58                     |

Robust standard errors in brackets  
\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%



**Table 7.** Stratification between school types (free and tuition), 2003

| School type        | FREE SCHOOLS      |            |                         | CHARGE TUITION    |            |                         |
|--------------------|-------------------|------------|-------------------------|-------------------|------------|-------------------------|
|                    | Number of schools | Enrollment | Vulnerable students (%) | Number of schools | Enrollment | Vulnerable students (%) |
| Public             | 5,464             | 1,237,324  | 39%                     | n/a*              | n/a        | n/a                     |
| Voucher            | 1,464             | 269,772    | 35%                     | 1,429             | 649,948    | 9%                      |
| For-profit         | 1,065             | 149,441    | 40%                     | 1,064             | 436,987    | 10%                     |
| Catholic           | 302               | 91,475     | 27%                     | 288               | 178,784    | 6%                      |
| Protestant         | 42                | 12,140     | 36%                     | 50                | 21,717     | 8%                      |
| Secular non-profit | 55                | 16,716     | 29%                     | 27                | 12,460     | 5%                      |
| Total              | 6,928             | 1,507,096  | 38%                     | 1,429             | 649,948    | 9%                      |

Source: Ministry of Education and author's calculations

\* Public primary schools are not permitted to charge tuition.

**Table 8.** Level of stratification by school type (Gini Coefficient)

|                             | Gini Coefficient (Total) | Gini Coefficient (free schools) | Gini Coefficient (charge tuition) |
|-----------------------------|--------------------------|---------------------------------|-----------------------------------|
| All public schools          | .22                      | .21                             | n/a                               |
| All private voucher schools | .38                      | .30                             | .37                               |
| For-profit                  | .38                      | .31                             | .37                               |
| Catholic                    | .35                      | .26                             | .35                               |
| Protestant                  | .35                      | .25                             | .35                               |
| Secular nonprofit           | .37                      | .28                             | .44                               |

Source: Ministry of Education and author's calculations

## APPENDIX 1

Students are classified as vulnerable when their families are part of the “Puente” program, an essential part of “Chile Solidario, the national social welfare system. The program’s objective is to remove families from extreme poverty, through diverse targeted programs in housing, health, education, and job training. There are currently 225,000 families enrolled in this program. The CAS Scorecard<sup>24</sup> is used to identify families eligible for this program. Students whose families do not qualify for the “Puente” program, but have a CAS score less or equal than the regional mean, are also classified as vulnerable. If a family does not have a CAS score registered, the students are classified according to the mother’s education level.

A decision tree illustrating the process of classification can be found in the figure A1

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<sup>24</sup> CAS is a socioeconomic status identification survey, applied to all those families seeking social aid. The information is summarized as a family score, where the lower the score, the poorer the family.



