

## The impact of school choice and public policy on segregation: Evidence from Chile

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## Abstract

School choice advocates argue that the introduction of 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 are worried about whether disadvantaged parents have enough information to make good choices 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. Critics also 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 in Chile confirms skeptics' concerns. Researchers have found that Chile's unrestricted flat per-pupil voucher program has led to increased stratification across public and private schools. What has been overlooked, however, is segregation between schools within a sector and variation within private voucher for-profit and non-profit (religious and secular) school sectors. Using a highly detailed dataset, I examine public and private school segregation. I find that public schools are more likely to serve disadvantaged – low-income and indigenous – students than private voucher schools. I also find that the typical public school is more internally diverse with regard to ethnicity and socioeconomic status 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. The data suggest that school tuition is much more important than other factors in explaining segregation patterns between and within school sectors. I also find that policies that provide incentives for schools to enroll disadvantaged students can help to mitigate the stratifying effects of educational vouchers.

# 1 Introduction

School choice is 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 (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 minorities and parents of lower socio-economic status to leave their low performing local schools for higher performing ones may reduce school segregation (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 minority and less educated families - have enough information to make informed decisions (Schneider et al., 2000) and whether parental preferences will lead parents 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 argue that in order to remain competitive and save costs, schools have incentives to skim off the highest performing students who are usually least demanding in terms of resources (Epple and Romano, 1998).

Researchers can gain insight into this debate 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 47 percent of total enrollments.

Over the last quarter-century, the Chilean system has generated a veritable cottage industry of research scholarship that has yielded a range of conflicting findings. While there is still debate on whether or not 28 years of vouchers has improved student achievement,<sup>1</sup> most evidence suggests that unrestricted choice in Chile has exacerbated stratification between public and private schools. Researchers have found that parents seek out educational environments in which their children attend schools with peers of similar social backgrounds (Elacqua et al., 2006) and that private voucher schools “cream skim” off middle and high-income students while relegating the most disadvantaged students to public schools (Hsieh and Urquiola, 2006).

Voucher critics often hold up these results as proof that unfettered choice will increase stratification (OECD, 2004). However, the overrepresentation of advantaged students in the private voucher sector does not necessarily imply that all private school types are segregated. Most of the existing literature in Chile treats private schools as an aggregate category where all schools are considered to be largely identical, when in fact there is variation across private voucher school sectors. For instance, while many non-profit voucher schools (religious and secular), which enroll 16 percent of students, declare in their missions that they target low-income and minority students, for-profit schools, which represent one-third of enrollments, are profit oriented and more likely

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<sup>1</sup>For instance, Hsieh and Urquiola (2006) report that in Chile competition is not associated with higher public school performance because, according to the authors, private voucher schools respond to the competitive pressures let loose under the voucher system not by raising productivity, but rather by choosing better students. Conversely, Gallego (2005) finds that greater competition is associated with higher student achievement. In addition, most studies comparing standardized test scores between private voucher and public schools show a private school advantage, although the differences are usually small (Anand et al., forthcoming; Sapelli and Vial, 2002) and vary across private school types (Elacqua, 2009; McEwan, 2001).

to target more advantaged and less expensive to educate students.

In addition, when considering how much educational vouchers and private schools contribute to the segregation of minorities and children from low-income families, there are two components to the question. One is between sector segregation and the other is between school segregation 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 and minority students may be isolated from their more advantaged counterparts in public schools. Therefore, while the between-sector segregation may be greater in private schools, the between-school segregation may be greater in public schools.

While in the past, Chilean researchers and policymakers have focused on the extent of stratification between public and private schools (Hsieh and Urquiola, 2006; OECD, 2004), segregation within a sector may have a more adverse affect on educational outcomes than between-sector stratification. For example, researchers have found that high levels of segregation among schools can have a negative effect on the learning outcomes of disadvantaged students (Zimmer and Toma, 2000; Hoxby, 2003; Kahlenberg, 2001). Research evidence also suggests that within school segregation can have a negative impact on non-cognitive outcomes - attitudes and behaviors - that are important to employers (Rothstein, 2004). Scholars have also found that students who experience the most racial and ethnic segregation in classroom settings score the lowest on intellectual engagement, motivation, and citizenship indices (Levinson and Levinson, 2003).<sup>2</sup> Therefore, when considering how much private school vouchers contribute to segregation, researchers and policymakers should consider both components of the

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<sup>2</sup>See Massey and Denton (1993); Fischer et al. (2006); Camille et al. (2004) on the negative effects of residential segregation on academic and other outcomes.

question.

Using a highly-detailed panel dataset constructed from the administrative records of the Ministry of Education, I examine public and private voucher school segregation. I find that public schools are more likely to serve disadvantaged student populations than private voucher schools. I also find that the typical public school is more internally diverse with regard to ethnicity and socioeconomic status than the typical private voucher school. Indigenous students, across the board, are more segregated than their non-indigenous low-income peers. These patterns are constant over time. While differential behavior is also found across private school types, the differences do not always comport with theory. The data also suggest that school tuition is much more important than other factors in explaining socioeconomic stratification patterns between and within public and private voucher school sectors. I also find that an adjusted voucher policy can mitigate the stratifying effects of educational vouchers.

The remainder of the paper is organized as follows. The next section briefly reviews the literature on school choice and stratification. The second section presents some background on Chile's voucher program and describes the school types that will serve as the analytical categories. Section three examines between-sector segregation across public and private voucher schools in Chile. The fourth section analyzes between-school segregation among public and private voucher schools. Section five examines the impact of policies (shared financing and an adjusted voucher) on segregation. The final section concludes and discusses policy implications.

## 2 The Literature: School choice and stratification

Discussions of the effects of school choice and vouchers have often raised questions about social equity. Viteritti (2003) maintains that the significant question in school choice is not an empirical one, rather it is a normative question: whether or not to extend school choice to a population that does not enjoy its advantages. He argues that an educational system that provides choice to some and not others is inherently unfair, especially when the opportunity is determined by income. Since the option of school choice through residential mobility or through enrollment in private schools has long been available to more wealthy families, Viteritti (2003) and other voucher proponents maintain that expanding the right of disadvantaged parents to leave their low performing neighborhood schools for higher performing ones may improve social equity as parental income becomes less important in determining who attends higher quality private schools (Neal, 2002; Sugarman, 1999). Voucher advocates have also argued that given the high levels of residential segregation in most metropolitan areas, choice can reduce school segregation by providing disadvantaged parents access to more integrated schools (Moe, 2001).

As the push for school choice has intensified, a series of critiques have identified the costs of educational vouchers. Perhaps the most consistent criticism is that choice increases the risk of school segregation. Voucher critics have frequently argued that disadvantaged parents do not have the ability to make good choices. A Twentieth Century Fund report argued that parents are not “natural consumers of education” and that few parents are able to acquire the information necessary to make informed educational choices (Ascher et al., 1996). Similarly, Henig (1994) maintains that low-income

and minority parents will base their decisions on non-academic aspects of education, including the availability of sports and other extracurricular activities, and the proximity to home or work. Critics are concerned that if minority and low-income families choose schools based on non-educational dimensions and white and wealthy families focus their choices on academic quality, then schools will become more segregated, as more advantaged families choose higher quality schools, leaving disadvantaged children in low-quality schools.

Other choice skeptics are concerned that parental choice may increase diversity among educational programs across schools in response to different tastes in academic programs, and this may increase segregation. For instance, working class families may choose schools that emphasize traditional childrearing values and upper-middle class families may choose schools that emphasize abstract thinking and the development of problem solving skills (Lareau, 2003). In the Netherlands, for instance, researchers have found that progressive subsidized private schools are more likely to serve white middle class families (Dijkstra et al., 2004). Researchers in the United States report that charter schools<sup>3</sup> that emphasize an Afro centrist curriculum are more likely to attract African American students than whites and charter schools that emphasize a bilingual curriculum are more likely to draw Hispanic students (Fuller, 2000).

Others have suggested that parents will select schools based on the race or class composition of their student bodies and not on their academic programs (Wells, 1996; Jellison, 2002; Saporito and Lareau, 1999). Most studies in the United States find that parents choose schools with children of the same race or socioeconomic status (Buck-

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<sup>3</sup>Charter schools are independent 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)

ley and Schneider, 2002; Weiher and Tedin, 2002; Saporito, 2003). Researchers have also found evidence of ‘white flight’ and ‘Latino flight’ from public schools into private schools when public schools have large concentrations of blacks or minorities (Clotfelter, 1976, 2001; Farlie, 2002) and ‘native flight’ from public schools in response to inflows of immigrants (Betts and Farlie, 2003). Voucher critics have argued that, to the extent that school choice is driven by demographics rather than student achievement, unregulated choice programs, such as Chile’s, may actually reduce the pressure on schools to improve their performance and increase the pressure on schools to “improve” their student demographics (Epple and Romano, 1998).

Most empirical research in Chile also confirm school choice skeptics’ concerns. For instance, a recent study in Chile finds that parents are more likely to choose schools based on the class composition of the student body than on objective academic performance (Elacqua et al., 2006). Researchers have also found that Chile’s unrestricted flat per-pupil voucher has led to increased stratification across schools. For example, Hsieh and Urquiola (2006) finds 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 analyze student achievement between Catholic and other private schools (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 (Elacqua, 2009).

There is a vigorous scholarly debate on the comparative behavior of for-profit and non-profit schools. Choice skeptics have argued that for-profit schools will try to save costs by recruiting and retaining students who are least demanding in terms of resources (Levin, 2002). Some scholars have also argued that non-profits are better positioned to provide quality education to disadvantaged students than for-profit schools because they may rely on donations of money or volunteer time to finance the higher costs involved in educating poor and minority students, while for-profits must satisfy a market survival test (Rose-Ackerman, 1996). Skeptics have countered that there are likely no systematic differences in the objectives of for-profit and non-profit schools. Non-profits may be highly selective and, conversely, for-profit schools may have a deep commitment to educating disadvantaged students. Mission driven schools may find the constraints placed on non-profit organizations too restrictive, and profit maximizing schools may find it more advantageous to choose non-profit forms, due to tax exemptions, for example (Weisbrod, 1998).

Empirical research has identified significant differences in for-profit and non-profit behaviors in many mixed industries, including hospitals, nursing homes, prisons, day care centers, and various social services.<sup>4</sup> Some researchers have made finer distinctions between private nonprofit charter schools. For instance, recent research distinguishes

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<sup>4</sup>For instance Weisbrod (1998) finds that non-profit nursing homes charge significantly lower fees than for-profits. Lukešetič et al. (2000) show that non-profit homes spend more per-patient on nursing care and less on administrative expenses than for-profit homes. Non-profit hospitals provide more uncompensated care than for-profits (Schlesinger et al., 1987). In studies of prisons, Hart et al. (1997) find that for-profit prisons hire lower quality prison guards than non-profits. The empirical studies of day care centers also show that non-profits rank higher along input measures such as child-staff ratios and staff experience, while for-profits generally provide lower quality services for similar fees (Morris and Helburn, 2000).

between “market-oriented” and “mission-oriented” non-profit charter schools (Brown et al., 2005). Although they find differences in enrollment practices between market-oriented schools and mission-oriented schools, the theoretical typology they use for distinguishing between non-profit charter schools limits their ability to disentangle the inter-institutional differences driven by incentives and legal constraints placed on non-profit and for-profit schools.<sup>5</sup>

The evidence on this point is limited because there are so few schooling systems that provide public funding to for-profit schools. While different combinations of private and public provision (funding and management) are observed in many countries, most schools continue to be funded and operated primarily by the government (OECD, 2006), and non-profit status is usually required for private educational institutions (James, 1993). Researchers can gain insight into this debate through the examination of supply behavior in Chile’s mixed educational market in which public, private non-profit (religious and secular) and for-profit voucher schools compete for enrollments.

The issue of for-profit schooling was one of the main factors that sparked one of the largest protests in Chilean history. In July of 2006, more than 300,000 students walked out of class and occupied hundreds of schools all over Chile, demanding that the government cease funding for-profit schools (El Mercurio, 2006). Students and others opposed to funding for-profit schools argued that for-profit providers could not be trusted to place the interests of disadvantaged children ahead of profitability (OEI, 2007). Critics countered that for-profit schools expand the diversity of private schooling options for many low-income students in Chile (e.g. Libertad y Desarrollo, 2007). Neither of these arguments, however, is based on any data in Chile on student segregation across the

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<sup>5</sup>Institutional features include distributional constraints, tax exemptions, and private donation laws (Weisbrod, 1998).

different types of private schools (for-profit or non-profit).

One goal of this paper is to inform the scholarly and education policy debate in Chile by examining student segregation patterns across for-profit, non-profit and public schools.

### **3 Background on Chile**

During the 1980s, the military government enacted a sweeping education reform program (1973-1990). First, the Ministry of Education decentralized education service delivery to regional and provincial offices and the administration of public schools to municipal governments, whose maximum authority is an elected mayor. Second, the government altered the financing scheme of public and most private schools. Municipalities and private school owners that did not charge tuition started to receive vouchers on a per-student basis.<sup>6</sup> As a result, enrollment gains or losses began to have an impact on their budgets. Fee-charging private schools continued to operate without public funding.

The essential features of this system have remained in place for over a quarter-century. The center-left coalition in power since 1990 has chosen to focus on improving the quality of poor schools through direct resource investments, while maintaining the organizational and funding components introduced in the eighties (Cox, 2003; OECD, 2004).

The provision of education in Chile has become increasingly privatized since the voucher reforms were instituted. In 1981, 15 percent of Chilean K-12 students attended

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<sup>6</sup>Chile's voucher formula includes adjustments for rural schools and high schools, but until very recently did not take into account student socioeconomic characteristics or the existence of a high concentration of poor students in public and private voucher schools.

private schools that received some public subsidy, and another 7 percent attended more elite, unsubsidized private schools. Between 1981 and 1986 more than 1,000 new schools entered the education market and the private voucher enrollment rate increased from 15 percent to 25 percent. By 1990, over 31 percent of students attended private voucher schools. Between 1990 and 2008 the enrollment rate in private voucher schools increased from 31 percent to 47 percent percent of total enrollments. Most of these gains were at the expense of public school enrollments. Adding in the 7.3 percent of students in elite private non-voucher schools, leaves a majority of Chilean students in private voucher schools (Figure 1).

Figure 1 Here

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

Table 1 Here

Over the period 1990 and 2008, the total number of for-profit schools increased by 96 percent, and total enrollment in for-profit schools increased by 113 percent (see

table 2). For-profit schools have far outpaced growth rates of other school types. The total number of public schools decreased by 7 percent and total enrollments decreased by 3 percent. Non-profits have consolidated over the years yielding a moderate growth in the number of schools and enrollments (see table 2).

Table 2 Here

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

Table 3 Here

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

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<sup>7</sup>Most for-profit networks are small in size. Less than 20 percent of for-profit networks have more than 3 schools in their networks.

were often expelled by the military government.<sup>8</sup>

Non-profit voucher schools, including Catholic,<sup>9</sup> Protestant,<sup>10</sup> and non-sectarian organizations<sup>11</sup> are more likely to be characterized by an academic and/or religious mission rather than profit maximization.<sup>12</sup> 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 and tuition payments. Most non-profit schools are also characterized by networks of campuses that are affiliated through religious congregations or foundations. Catholic schools account for about 72 percent of non-profit schools and 6 percent of all schools and 12 percent of total enrollments. Only about 3 percent of students in Chile are enrolled in Protestant and non-sectarian voucher schools.

Table 4 provides basic descriptive information about the for-profit and non-profit school types. Catholic non-profit schools have, on average, more students per school than other school types. Non-profit schools have, on average, almost 6 more students per class than for-profit schools. Catholic schools have the largest class sizes and secular and for-profit independent schools have the smallest. The data also show that a higher proportion of for-profit schools are located in the Metropolitan Region (R.M.)

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<sup>8</sup>The National Private Voucher School Association (CONACEP) also provided me with information about for-profit voucher school owners.

<sup>9</sup>Branches of the Catholic church that run schools include religious orders, parishes, archdiocese and religious foundations.

<sup>10</sup>Protestant churches include Methodist, Baptist, Seventh-Day Adventist, Anglican, Lutheran, and Presbyterian churches.

<sup>11</sup>Most of the non-sectarian non-profit schools are branches of foundations that were created for other specific tasks, such as the Aid Corporation for Children with Cancer. Some foundations were created by community development groups such as the Rural Social Development Corporation.

<sup>12</sup>There are 4 private voucher schools of other religious orientations. These schools were dropped from the sample.

of Santiago. Over 75 percent of Catholic and Protestant schools are located outside of the R.M..

Table 4 Here

## 4 Between sector stratification

To examine enrollment practices across public and private voucher schools, I use a highly-detailed original panel dataset I've constructed from the administrative records of the Ministry of Education of Chile. I will use two measures to compare the level of segregation between sectors. The first measure is the vulnerability index (IVE). IVE is constructed by the *Junta Nacional de Auxilio Escolar y Becas* (JUNAEB, National Scholarship and School Aid Board). JUNAEB estimates IVE on the basis of the results of a parent survey conducted by schools. These surveys provide information about the student's background. The IVE has a minimum value of 0, which represents 0 percent of children at social risk, and goes up to a maximum value of 100, indicating the most disadvantaged schools (100 percent social risk). I acknowledge that using this indicator as a proxy for low socioeconomic status is not perfect.<sup>13</sup> I chose this index for three reasons. First, the Ministry of Education uses IVE to determine eligibility for school breakfast and lunch programs. Second, qualifications for the program are dependent on the family demonstrating low levels of income and education and other social indicators (e.g. health and hygiene) (Marshall and Correa, 2005). Third, JUNAEB has published

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<sup>13</sup>Croxford (2000) and Valenzuela et al. (2008) discuss some of the drawbacks of this measure. In a previous iteration of this research, I included an analysis of mothers' level of education (elementary school and less than high school) as a proxy for social disadvantage. Here I only report IVE, but my results are substantively similar when I replace IVE with mother's level of education. These results are available upon request.

comparable IVE data since 2000.<sup>14</sup>

The second measure I use to examine the level of segregation between public and private schools is the percentage of indigenous students enrolled across sectors. I used parent questionnaires collected by Chile's national standardized test (*Sistema de Medicion de la Calidad de la Educacion-SIMCE*) to estimate the indigenous student population between schools. The survey question asks parents if the child's mother identifies herself as indigenous.<sup>15</sup> The proportion of indigenous students is similar to the overall population (Mideplan, 2007).

Tables 5 and 6 present segregation data across school types. The data confirm prior research suggesting that, in the aggregate, private voucher schools serve fewer disadvantaged students than public schools. However, the results also indicate that this aggregate analysis masks some differences within the private voucher sector. For instance, Catholic schools serve fewer at risk and indigenous students than for-profit schools. Protestant schools enroll the highest proportion of disadvantaged (vulnerable and indigenous) students in the private sector. Table 6 also indicates that indigenous students make up 8.1 percent of for-profit enrollments and only 6.4 percent of non-profit enrollments. Indigenous student enrollment rates in Protestant schools (9.5 percent in 2006) are similar to those of public schools (table 6). Vulnerable student enrollment rates have remained relatively constant over time across sectors. The proportion of indigenous students has increased across sectors, on average about 1.5 percent between 1999 and 2006.

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<sup>14</sup>JUNAEB has published IVE scores since 1996. However, due to changes in the methodology used to construct this measure, IVE school level data are only comparable between 2000 and 2006 (Marshall and Correa, 2005).

<sup>15</sup>Specifically the question asks whether the student's mother belongs to one of the following nine indigenous groups Aymara, Rapa-Nui, Quechua, Mapuche, Atacamenno, Coya, Kawaskar, Yagan, and Diaguita.

Table 5 Here

Table 6 Here

The simple bivariate analyses presented in Tables 5 and 6 do not control for other factors that may be simultaneously related to the level of segregation between public and private school sectors. Tables 7 and 8 present regression coefficients for four different models. 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, I construct a regression analysis where I model the percentage of at risk students (PIVE) in 2006 in table 7 and indigenous students (PIND) in 2006 in table 8 as a function of school type and a set of control variables described below. I introduce measures of primary and secondary enrollment (PRENROLL and SECENROLL, respectively). School size is an important control variable because, holding all else constant, larger schools may be able to more easily support the higher costs of enrolling disadvantaged students. I also introduce a dummy variable to indicate whether or not the school is located in a rural area (RURAL).

I also introduce a measure of the number of years a school has been in operation (SCHOOLAGE).<sup>16</sup> A school's age is important because, all else equal, newer schools may not have had enough time to establish a reputation to be able to select high performing (and more advantaged) students.

To control for sorting patterns, I take into account the percentage of at risk students (PIVEMUN) or indigenous students (PINDMUN) in a municipality. Neighborhood stratification is a central consideration, since the enrollment practices of schools will

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<sup>16</sup>School level data is not available prior to 1990. Therefore, I can only estimate whether a school has been in operation for 16 or more years.

depend upon their ability to obtain access to alternative student populations. I've also included regional dummy variables in the regressions, which I do not report in the tables, but are available upon request, to account for differences across regions.

Finally, I include a variable to indicate whether or not a private voucher school charges tuition (TUITION).<sup>17</sup> I include all of the models with and without this variable to examine the effect of tuition on enrollment patterns.

Since the empirical analysis examines the effect of variation across public and private voucher schools, I categorize schools as a set of dummy variables: public and private voucher (aggregate) schools; for-profit voucher and non-profit voucher; for-profit independent, for-profit network, Catholic voucher, Protestant voucher, and secular nonprofit voucher. I've excluded private non-voucher schools from this analysis because they enroll students mainly from high income families (see tables 5 and 6).

## 4.1 Empirical Results

The first model (1) includes a dummy variable for public schools. The second model (2) includes a dummy variable for whether or not a private voucher school charges tuition. Private voucher schools serve as the omitted reference categories in both models. The third specification (3) includes dummy variables for private voucher school sub-sectors (for-profit and non-profit). The fourth model (4) includes a dummy variable for whether or not for-profit and non-profit voucher schools charge tuition. For-profit voucher schools serve as the omitted reference categories in the third and fourth models. The fifth specification (5) includes dummy variables for private for-profit and non-profit voucher school sub-sectors (for-profit independent, and Catholic, Protestant and

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<sup>17</sup>Private voucher schools can charge fees to parents and receive public funding as long as the fees do not exceed 1.6 times the voucher.

secular voucher non-profit). The sixth model (6) includes a dummy variable for whether or not for-profit and non-profit sub-sectors charge tuition. For-profit network voucher schools serve as the omitted reference categories in the fifth and sixth models.

Model (1) in table 7 confirms bivariate patterns reported in figure 2. The coefficient for public schools indicates that, on average, public schools serve 9 percentage points more high risk (vulnerable) students than private voucher schools after controlling for other school, local, and regional characteristics. Coefficients in model (2) suggest that the differences between public and private voucher schools decline by over 7 percentage points after controlling for whether or not private voucher schools charge tuition. Model (3) indicates that, all else equal, non-profit schools serve 3 percentage points fewer vulnerable students than for-profit voucher schools. Public schools serve 8.3 percentage points more high risk students than for-profit voucher schools, holding other covariates constant. However, model (4) indicates that, after controlling for whether or not private voucher schools charge tuition, the difference between for-profit and public schools is no longer statistically significant. Non-profit schools continue to serve a lower percentage of vulnerable students than for-profit schools, all else equal. Model (5) shows that, all else equal, for-profit independent schools enroll 3.5 percentage points fewer high risk students than for-profit network voucher schools. The gaps are even larger for religious (Catholic and Protestant voucher schools). For example, Catholic schools, all else equal, enroll 6.2 percentage points fewer vulnerable students than for-profit network schools. Public schools serve 5.5 percentage points more vulnerable students than for-profit network schools. However, model (6) indicates that after controlling for tuition and other covariates, public school serve 2 percentage points fewer high risk students than for-profit voucher schools that belong to a network.

Table 7 also indicates that larger schools are less likely to serve high risk students than smaller schools and older schools are more likely to enroll vulnerable students than newer schools. Table 7 also indicates that rural schools are much more likely to serve vulnerable students than urban schools and schools located in poor neighborhoods (PIVEMUN) tend to enroll more high risk students. Table 7 also shows that high risk students are under-represented in private voucher schools that charge tuition. I will address this point in more detail below.

Table 7 Here

Models (1) and (2) in table 8 indicate that after controlling for other school, local, and regional characteristics, private voucher schools serve more indigenous students than public schools. Model (2) indicates that, holding other covariates constant, public schools enroll 3 percentage points fewer indigenous students than private voucher schools. Models (3) and (4) report that, all else equal, non-profit schools serve 3 percentage points fewer indigenous students than for-profit voucher schools. Public schools serve 2 percentage points fewer indigenous students than for-profit voucher schools, holding other covariates constant. Model (4) indicates that, after controlling for whether or not private voucher schools charge tuition, the difference between for-profit and public schools is even larger (4 percentage points). Model (5) shows that, all else equal, for-profit independent schools enroll 3 percentage points more indigenous students than for-profit network voucher schools. Catholic schools, all else equal, enroll 6 percentage points fewer indigenous students than for-profit network schools. In contrast to bivariate findings reported in table 6, Protestant schools serve 5 percentage points fewer indigenous students than for-profit network schools. Model (6) indicates that public schools serve 7 percentage points fewer indigenous students than for-profit

voucher schools that belong to a network.

Table 8 Here

Table 8 also indicates that rural schools serve over 8 percentage points more indigenous students than comparable urban schools and schools located in neighborhoods with higher concentrations of indigenous students (PINDMUN) tend to enroll more indigenous students. Table 8 also shows private voucher schools that charge tuition serve, all else equal, enroll 4 percentage points fewer indigenous students than schools that do not levy fees.

In sum, the regression results in table 7 indicate that high risk students are over-represented in public schools, with for-profit voucher schools serving higher proportions of vulnerable students than non-profit voucher schools. However, after controlling for whether or not a school charges tuition, the differences between public and for-profit schools disappear or become negative in the case of for-profit schools that belong to a network. The findings reported in table 8 indicate that, holding other covariates constant, private voucher schools, in particular for-profit voucher schools, are more likely to serve indigenous students than public and non-profit schools.

## 5 Between school stratification

Although the previous results reveal the higher percentage of high risk students enrolled in public schools and indigenous students in private voucher schools, as well as some differences across private voucher school sub-sectors, they do not indicate how these students are distributed within each sector. The public sector in Chile could, for example, be highly stratified with the poor isolated from their middle and high-income counterparts. Similarly, indigenous-non-indigenous segregation may be greater in the

private voucher sector than in the public sector.

Researchers in the United States have examined segregation among public and private schools. For instance, James Coleman and his colleagues (1982) find that although private schools in the United States tend to enroll fewer black students than public schools, black-white segregation is lower among private schools than among public schools. Clotfelter (2004) reports similar findings. And a seminal study of Catholic Schools in the United States by the sociologists Bryk, Lee, and Holland, based on a national database of student performance, reports that Catholic schools are more internally diverse with regard to race and income than the typical public school or secular private school (Bryk et al., 1993). More recently, Betts and Farlie (2001) find that black-white and Latino-white segregation is greater in the public sector than in the private sector.

To examine how disadvantaged students are distributed among public and private schools in Chile, I calculate segregation curves, which are analogs of the Lorenz curves commonly used for analysis of income inequalities.<sup>18</sup> A segregation curve is constructed by arranging schools in descending order of their disadvantaged student percentages, and then plotting the cumulative proportion of disadvantaged students against the cumulative proportion of non-vulnerable (or non-indigenous) students. I calculate segregation curves for public schools and private voucher schools (figures 2 and 3), for for-profit and non-profit voucher schools (figures 4 and 5) and for different types of for-profit and non-profit voucher schools (figures 6 and 7).<sup>19</sup>

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<sup>18</sup>See Frankel and Volij (2005) for a technical discussion of Lorenz curves and other segregation indices.

<sup>19</sup>I've excluded rural students from this analysis because most students who attend these small schools, most of which are public, are disadvantaged (and thus highly segregated) and their parents have few school choice opportunities. The segregation curves, nonetheless, are very similar when I include rural schools in the analysis. These results are available upon request. I've also excluded

In figures 2-7 the diagonal represents the condition of no segregation. On the horizontal axis, I depict schools arranged in order of percentage of vulnerable (or indigenous) students served. On the vertical axis, I measure the percentage of non-vulnerable (or non-indigenous) 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 2 traces a path closer to the axes representing complete segregation 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 voucher schools in the aggregate display much higher degrees of segregation than public schools. For instance, the point where the curve meets the right axis indicates that almost 35 percent of private voucher school students and less than 5 percent of public school students do not have high risk (vulnerable) classmates.

Figure 3 illustrates that indigenous students are more segregated from other non-indigenous students in private voucher schools than those in public schools. However, indigenous-non-indigenous segregation is much higher in the public sector than vulnerable-non-vulnerable public school segregation. For instance, the point where the curve meets the right axis indicates that almost 20 percent of public school students do not have indigenous classmates (compared to less than 5 percent of public school students who do not have vulnerable peers).

Figure 2 Here

Figure 3 Here

Figures 4-7 illustrate the variation within the private voucher sector. The curve  

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private non-voucher schools from this analysis because they enroll students mainly from high income families (see tables 5 and 6).

for for-profit voucher schools in figure 4 lies below the curves of the public and non-profit sectors, suggesting a more uneven distribution of vulnerable students in this set of voucher schools. Figure 5 does not provide graphical evidence of differences in indigenous student segregation levels across for-profit and non-profit voucher schools. Figure 6 illustrates that vulnerable students are more evenly distributed among religious non-profit schools<sup>20</sup> than within other private for-profit voucher school sectors. The Protestant voucher schools segregation line lies is just below the public school segregation line. Figure 6 and 7 also indicate that, despite serving a higher proportion of disadvantaged students than Catholic schools (see tables 5 and 6), for-profit independent schools display much higher degrees of segregation than other school sectors. For instance, the point where the curve meets the right axis in figure 6 indicates that almost 40 percent of for-profit independent voucher school students, compared to less than 15 percent of Protestant school students do not have students classified as vulnerable as classmates. Figure 7 also illustrates that indigenous students are more integrated with other non-indigenous students in for-profit network schools than in public and other private voucher school sectors.

Figure 4 Here

Figure 5 Here

Figure 6 Here

Figure 7 Here

Segregation curves are useful graphic devices to demonstrate the levels of student segregation among schools within sectors, but if the curves intersect, as they do, for

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<sup>20</sup>I do not include secular schools in Figure 6 because they have similar levels of stratification as for-profit school types. These results are available upon request.

example, in the left axes in figures 6 and 7 we need to use other methods to rank the levels of segregation. The dissimilarity index, which is a function of the geometry of the segregation curve, is a more precise way of measuring the position of the segregation curve. It is the maximum distance between the segregation curve and the diagonal that represents perfect integration. The dissimilarity index can also be interpreted as the percentage of disadvantaged students that would have to change schools in order to produce a completely integrated distribution of students.

By this measure of segregation,<sup>21</sup> tables 9 and 10 confirm most of my findings illustrated in figures 2-7. Among all schools, public schools have the most diverse enrollments and for-profit independent schools have the highest levels of segregation. I also find that vulnerable-non-vulnerable segregation is lower among Protestant and Catholic schools than among for-profit and secular schools, but indigenous-non-indigenous segregation is greater in religious schools than in for-profit network schools. Table 9 also indicates that vulnerable-non-vulnerable segregation declined slightly over time in all school sectors, with the exception of for-profit independent schools. Conversely, indigenous student segregation levels reported in table 12 have increased in public, for-profit independent, Protestant, and secular non-profit schools and remained stable between 1999 and 2006 in the Catholic and for-profit network sectors.<sup>22</sup>

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<sup>21</sup>I also calculated the Gini Coefficient, the most commonly used index in economics, and report the findings in the appendix. To calculate the Gini Coefficient I 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. I also calculated the information theory segregation index. The results, not reported here but available upon request, do not change the conclusions of this analysis.

<sup>22</sup>International comparisons suggest that school segregation in Chile is not higher, and is in some cases lower, when compared to school segregation - using the index of dissimilarity - in other developing and industrialized countries. For instance, Chilean public school students appear significantly less segregated than British students when the IVE or free school meal eligibility is used as a proxy for social disadvantage (Allen and Vignoles, 2006). And segregation of indigenous students in public and private voucher schools in Chile is distinctly lower than indigenous students in Bolivian schools

Table 9 Here

Table 10 Here

## 6 Public policies and stratification

The preceding sections have focused on segregation between and within the public and private school sectors over time. In this section, I turn my attention to the impact of two different policies - both designed to change the rules under which the voucher system operates - on school segregation. First, I analyze the effect of the change in the school financing mechanism that was instituted in 1994. Under this rule, private voucher schools may charge monthly tuition fees in addition to the voucher. Second, I analyze the effect of the targeted adjusted voucher program (*Ley SEP*) on school segregation. This law provides a larger per-student voucher for schools serving disadvantaged students.

### 6.1 Shared financing

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 (Montt et al., 2006). The “shared financing” law in Chile allows private voucher schools and public high schools to charge monthly fees, in addition to the per pupil subsidy, that can be up to 1.6 times the basic voucher payment.<sup>23</sup> The data

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(McEwan, 2004), black students of African or Caribbean heritage and Indian and Pakistani students in England’s schools (Burgess and Wilson, 2004), and African-American students in schools in the United States (Taeuber and James, 1982). These findings contradict other studies that have suggested that school segregation in Chile is substantially higher than in other countries (e.g. Valenzuela et al., 2008).

<sup>23</sup>Discounts to vouchers are applied progressively. If monthly tuition is less than half the level of the Unidad de Subvencion Escolar (USE), no discount is applied. Tuition fees between one half and one USE incur a 10 percent deduction. Fees between one and two USE incur a 20 percent deduction. Fee charging schools must also devote up to 10 percent of their additional income to finance scholarships.

presented in figure 8 indicate that about 50 percent of private voucher schools charge some tuition. Figures 8 and 9 illustrate that private voucher schools that charge tuition have far outpaced growth rates of free private voucher schools since 1994.

Figure 8 Here

Figure 9 Here

Tables 11 and 12 highlight the stark differences in disadvantaged student enrollment patterns between free and tuition charging private voucher schools. There is also significant variation across free private voucher school sub-sectors. For instance, free for-profit schools serve a larger proportion of disadvantaged (vulnerable and indigenous) students than public schools. Conversely, free non-profit schools serve fewer vulnerable students than free for-profit and public schools. However, they enroll a higher proportion of indigenous students than public schools. These findings are consistent with the regression results presented in tables 7 and 8. The differences between for-profit and non-profit voucher schools that charge tuition are less significant.

Table 11 Here

Table 12 Here

Figure 10 illustrates that the segregation 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. The dissimilarity index, reported in table 13 confirm these differences. This is suggestive evidence that while public and free for-profit private voucher schools seek socioeconomic diversity in their student bodies, tuition-charging private voucher schools and most non-profit schools stratify student populations based on ability to pay. However, the findings reported in figure 11

also suggest that school fees may not be as important in explaining indigenous student segregation patterns. For instance, according to table 14, for-profit tuition schools are more internally diverse with regards to their indigenous and non-indigenous student populations than private voucher schools that do not charge tuition.

Figure 10 Here

Figure 11 Here

Table 13 Here

Table 14 Here

## 6.2 Adjusted Voucher

In 2008, the Chilean legislature enacted the adjusted voucher law (*Ley de Subvencion Preferencial or SEP*). The SEP law recognizes that it is more costly to educate disadvantaged students by introducing an extra per-pupil subsidy (50 percent 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.<sup>24</sup> The additional per-student voucher is tied to an increased role of the Ministry of Education in monitoring and classifying schools based on student performance and holding them accountable for their outcomes (Elacqua et al., 2009). The SEP law also forbids participating schools from using parental interviews and admissions tests to select and expel students. In addition, participating schools cannot charge tuition to priority students.

Figures 12 and 13 and tables 15 and 16 show changes in student segregation levels

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<sup>24</sup>This system determines whether a student is “priority” based on individual and household surveys collected by the Chilean government. See Elacqua et al. (2009) for details on the decision tree the Ministry of Education uses to classify “priority” students.

of students classified as priority and indigenous students across all subsidized school (public and private voucher) before and after the SEP law was instituted in 2008. The results indicate that segregation declined slightly across all school sectors between 2007 and 2008. This is not to downplay the segregation that still persists at fairly high levels in most sectors. But this preliminary evidence suggests that the adjusted voucher program may provide schools with incentives to enroll more disadvantaged student populations and reduce segregation.

Figure 12 Here

Figure 13 Here

Table 15 Here

Table 16 Here

## **7 Conclusion and policy implications**

Consistent with previous research, I find that public schools are more likely to serve disadvantaged student populations than private voucher schools. I also find that the typical public school is more internally diverse 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. However, I also find that indigenous-non-indigenous segregation is greater in the public sector than vulnerable-non-vulnerable public school segregation. I also find evidence that these aggregate patterns may be masking some differences across private voucher school sectors. For-profit schools, surprisingly, are more likely to serve disadvantaged students

than non-profit voucher schools.

I also find that free for-profit schools serve similar proportions of disadvantaged students as public schools. However, vulnerable students in for-profit schools that charge tuition are more isolated from their more advantaged peers than in the free for-profit schools. This suggests that this sub-sector of schools is finding market niches in both low and middle-income communities.

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 (vulnerable and indigenous) than public and other private voucher 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 Chilean 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 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.

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 on the Chilean voucher system suggests that parents care about student demographics when choosing a school (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 minority and high risk students.

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. It also suggests that policies that provide schools with incentives to charge tuition, even if it is only limited, can have a negative impact on school segregation.<sup>25</sup> However, the findings also suggest that an adjusted voucher that provides an extra per-pupil subsidy for disadvantaged students can mitigate some of the stratifying effects of unfettered voucher programs.

Overall, segregation remains moderately high in Chile,<sup>26</sup> but there is promising news: there has been a slight decline of school segregation over the last decade. However, more research needs to be conducted to determine the factors that influence or reduce student segregation. For instance, how important is the voucher design? Most studies suggest that the flat per-pupil voucher leads to greater segregation across schools (Epple and Romano, 1998). Preliminary evidence presented in this paper sug-

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<sup>25</sup>There is some anecdotal evidence that the shared financing policy may have helped foster school integration in elite private non-voucher schools. Between 2002 and 2006, 30 percent of elite non-voucher schools closed down. Many of these schools re-opened as tuition charging private voucher schools and began to enroll students from diverse social backgrounds (Hales, 2009). While in this research I only emphasize segregation of disadvantaged - vulnerable and indigenous - students across school types and over time, in later work, I will address more fully the possible effects of shared financing on the integration of elite private schools.

<sup>26</sup>However, as noted in footnote 22, school segregation in Chile is not higher, and is often lower than in other countries.

gests that the segregation decline between 2007 and 2008 may have been linked to the adjusted voucher instituted in 2008. If the voucher was differentiated by ethnicity, would schools be willing to enroll more indigenous students? If the adjusted voucher was greater than 50 percent, would it create larger markets for private voucher schools in low-income communities? How does private school screening affect stratification? The ability of private schools in Chile to select students undoubtedly leads to greater student segregation. Sorting is also likely induced by the demand side factor of self-selection, particularly in tuition charging schools. How do school location decisions affect segregation? For example, anecdotal evidence in Chile suggests that Catholic schools are more likely than for-profit schools to locate in neighborhoods with high proportions of high school and college educated adults than in poor areas with high concentrations of vulnerable and indigenous students. Given high levels of residential segregation in Chile, especially in the Metropolitan Region of Santiago, and absent any policy on the part of the Catholic Church to address student segregation, the student composition of Catholic schools (and other private voucher sectors) likely reflects stratified residential patterns.

Although it is unclear what the causal factors are that explain segregation patterns, the findings reported in this paper suggest that, in the presence of residential segregation, private school selection, and shared financing, private voucher schools, particularly tuition-charging schools and Catholic schools, respond to market incentives by focusing on a more elite student body, and, in the case of for-profit independent schools, by stratifying student populations. However, preliminary evidence also suggests that public policies that provide incentives for schools to enroll disadvantaged students can offset some of these effects.

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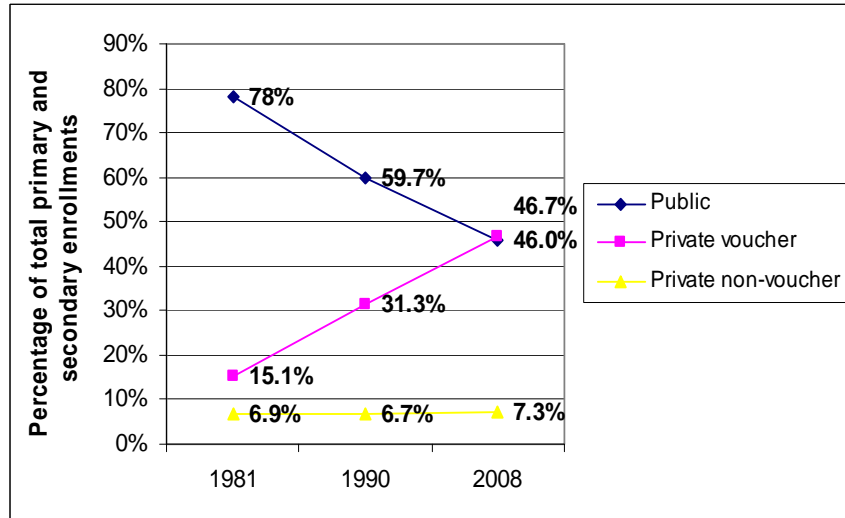
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**Figure 1 Enrollment share in public and private schools, 1981–2008.**



**Table 1: Distribution of primary and secondary school students across school types, 2008**

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

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

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

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

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

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

School type	N	Rural (%)	Metropolitan Region (%)	Average school size*	Average class size*
<u>Public</u>	5,129	65%	13%	560	30.1
<u>For-profit voucher</u>	2,441	29%	32%	519	29.2
Independent	1,997	29%	30%	490	28.8
Network	444	30%	41%	651	31.1
<u>Non-profit voucher</u>	803	21%	27%	738	34.9
Catholic	575	24%	26%	839	37.1
Protestant	88	18%	16%	563	35.1
Secular	80	13%	44%	561	27.6
<u>Private non-voucher</u>	442	3%	47%	555	20.7

\*Only urban primary schools

**Table 5.** Vulnerability index across public, for-profit, and non-profit voucher schools (2000-2006)

	2000	2001	2002	2003	2004	2005	2006
Public	39.1%	41.8%	39.8%	39.9%	39.7%	39.3%	39.6%
Private voucher	20.2%	21.6%	20.6%	21.4%	20.6%	19.7%	20.5%
<b>For-profit voucher</b>	<b>20.9%</b>	<b>22.9%</b>	<b>21.9%</b>	<b>22.4%</b>	<b>21.8%</b>	<b>21.4%</b>	<b>21.5%</b>
Independent	21.9%	24.1%	22.9%	22.3%	21.6%	21.4%	21.3%
Network	18.5%	20.3%	19.5%	22.7%	22.3%	21.5%	22.1%
<b>Non-profit voucher</b>	<b>18.9%</b>	<b>19.3%</b>	<b>18.3%</b>	<b>19.6%</b>	<b>18.8%</b>	<b>18.4%</b>	<b>19.2%</b>
Catholic	18.3%	18.6%	17.6%	18.9%	17.9%	17.6%	18.5%
Protestant	20.8%	20.9%	20.5%	21.7%	21.8%	21.2%	22.8%
Secular	22.3%	23.2%	21.8%	24.0%	23.1%	22.2%	21.0%
Private non-voucher	0.3%	0.7%	0.7%	0.9%	1.0%	0.0%	0.0%

**Table 6. Indigenous students across public, for-profit, and non-profit voucher schools (2000-2006)**

	1999	2006
Public	8.1%	9.6%
Private voucher	6.0%	7.4%
<b>For-profit voucher</b>	<b>6.4%</b>	<b>8.1%</b>
Independent	6.7%	8.2%
Network	5.7%	7.7%
<b>Non-profit voucher</b>	<b>5.2%</b>	<b>6.4%</b>
Catholic	5.0%	6.1%
Protestant	7.3%	9.5%
Secular	4.5%	5.2%
Private non-voucher	0.7%	0.6%

**Table 7. Regression: Percentage of vulnerable students as a function of a set of independent variables (2006)**

	(1)	(2)	(3)	(4)	(5)	(6)
PUBLIC	.092*** [.005]	.020*** [.006]	.083*** [.005]	.01 [.006]	.055*** [.009]	-.02** [.009]
NON-PROFIT	-	-	-.028*** [.007]	-.032*** [.007]	-	-
FOR-PROFIT INDEP.	-	-	-	-	-.035*** [.01]	.036*** [.009]
CATHOLIC	-	-	-	-	-.062*** [.01]	-.062*** [.001]
PROTESTANT	-	-	-	-	-.05** [.02]	-.042** [.019]
SECULAR	-	-	-	-	-.029 [.024]	-.077*** [.024]
PRIMENR	-.00003*** [.00001]	-.00003*** [.00001]	-.00003*** [.00001]	-.00003*** [.00001]	-.00003*** [.00001]	-.00003*** [.00001]
SECONDENR	-.0001*** [.00002]	-.0001*** [.00001]	-.0002*** [.00001]	-.0001*** [.00001]	-.0002*** [.00001]	-.0001*** [.00001]
RURAL	.238*** [.006]	.223*** [.006]	.235*** [.006]	.222*** [.006]	.234*** [.006]	.22*** [.006]
SCHOOLAGE	.005*** [.0005]	.004*** [.0005]	.005*** [.0006]	.004*** [.0005]	.005*** [.0006]	.004*** [.0005]
PIVEMUN	.444*** [.025]	.370*** [.024]	.442*** [.024]	.369*** [.024]	.442*** [.024]	.368*** [.024]
TUITION	-	-.174*** [.007]	-	-.175*** [.007]	-	-.176*** [.007]
CONSTANT	.097*** [.009]	.227*** [.011]	.11*** [.01]	.242*** [.011]	.137*** [.013]	.274*** [.014]
R-squared	.65	.68	.64	.67	.64	.68
N	8,450	8,450	8,245	8,245	8,241	8,241

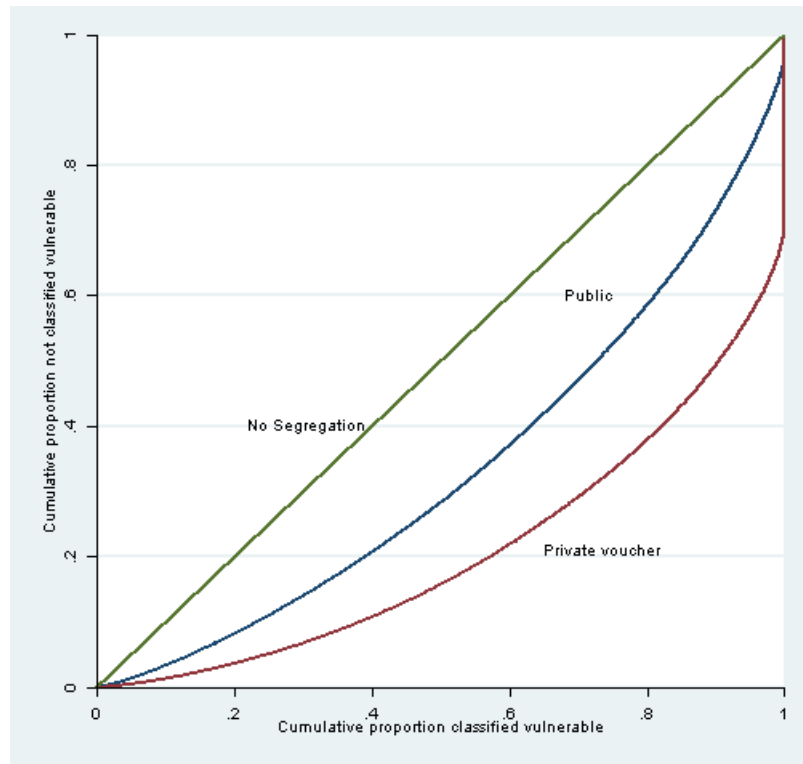
\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 8. Regression: Percentage of indigenous students as a function of a set of independent variables (2006)**

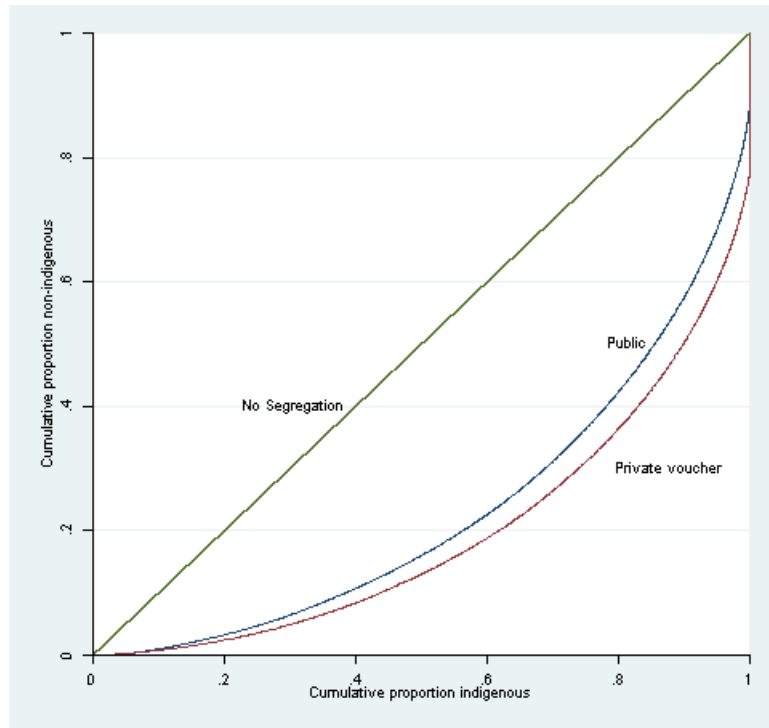
	(1)	(2)	(3)	(4)	(5)	(6)
PUBLIC	-.01* [.006]	-.03*** [.009]	-.02*** [.007]	-.04*** [.009]	-.05*** [.01]	-.07*** [.01]
NON-PROFIT	-	-	-.03*** [.008]	-.03*** [.008]	-	-
FOR-PROFIT INDEP.	-	-	-	-	-.033*** [.01]	.03*** [.01]
CATHOLIC	-	-	-	-	-.056*** [.01]	-.06*** [.01]
PROTESTANT	-	-	-	-	-.05*** [.02]	-.05*** [.02]
SECULAR	-	-	-	-	-.04*** [.02]	-.05*** [.02]
PRIMENR	-.00002*** [.00001]	-.00002*** [.000006]	-.00002*** [.000006]	-.00002*** [.000006]	-.00002*** [.000007]	-.00002*** [.000006]
SECONDENR	-.00003*** [.000009]	-.00002*** [.000008]	-.00003*** [.000008]	.000009*** [.000008]	.00003*** [.000008]	.000009*** [.000008]
RURAL	.09*** [.006]	.08*** [.006]	.09*** [.006]	.08*** [.006]	.08*** [.006]	.08*** [.006]
SCHOOLAGE	.002*** [.0005]	.002*** [.0004]	.002*** [.0005]	.002*** [.0005]	.002*** [.0005]	.002*** [.0005]
PINDMUN	2.18*** [.13]	2.15*** [.13]	2.18*** [.13]	2.15*** [.13]	2.18*** [.13]	2.15*** [.13]
TUITION	-	-.04*** [.007]	-	-.04*** [.008]	-	-.043*** [.008]
CONSTANT	.017*** [.006]	.05*** [.009]	.02*** [.007]	.05*** [.01]	.05*** [.01]	.08*** [.01]
R-squared	.45	.45	.45	.46	.45	.45
N	6,980	6,980	6,834	6,834	6,831	6,831

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

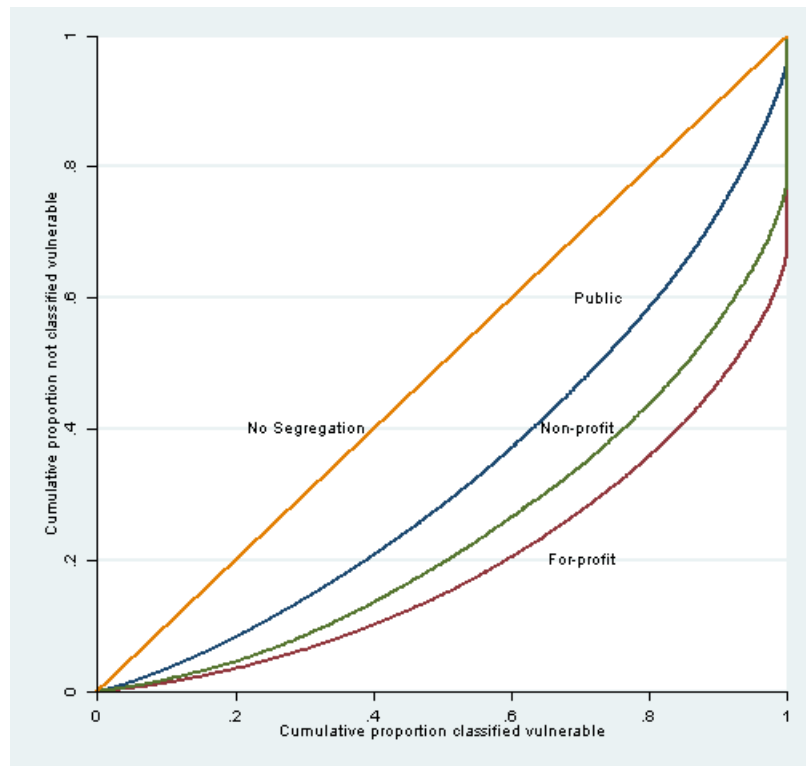
**Figure 2** Segregation curves for public and private voucher urban schools, 2006



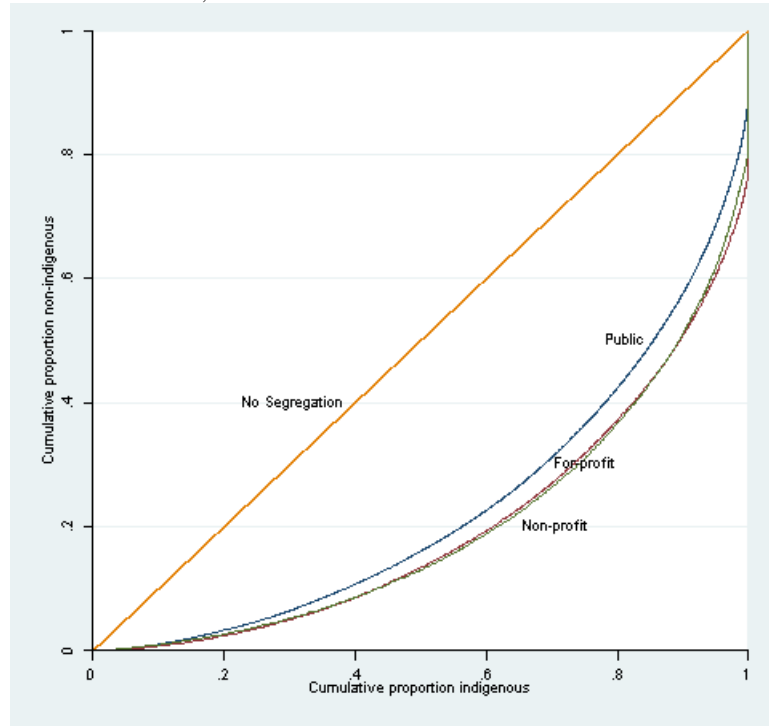
**Figure 3** Segregation curves for indigenous students in public and private voucher urban schools, 2006



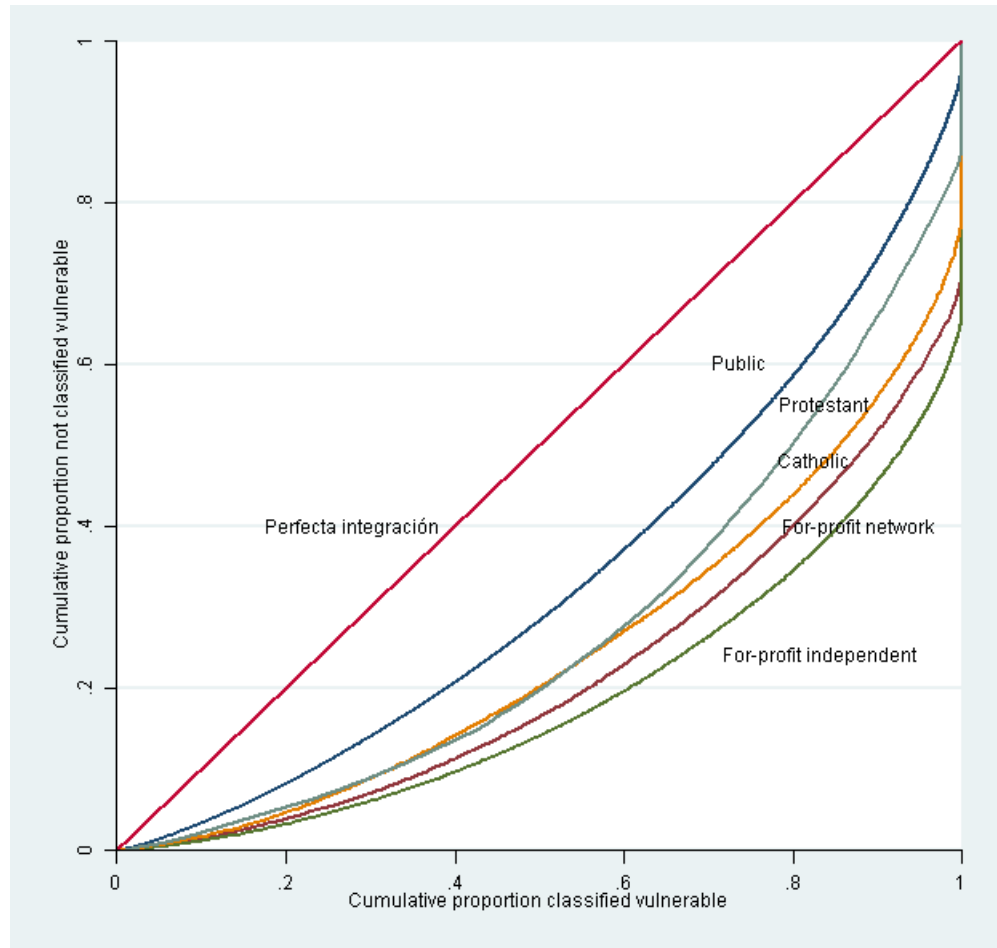
**Figure 4** Segregation curves for public and private for-profit and non-profit voucher urban schools, 2006



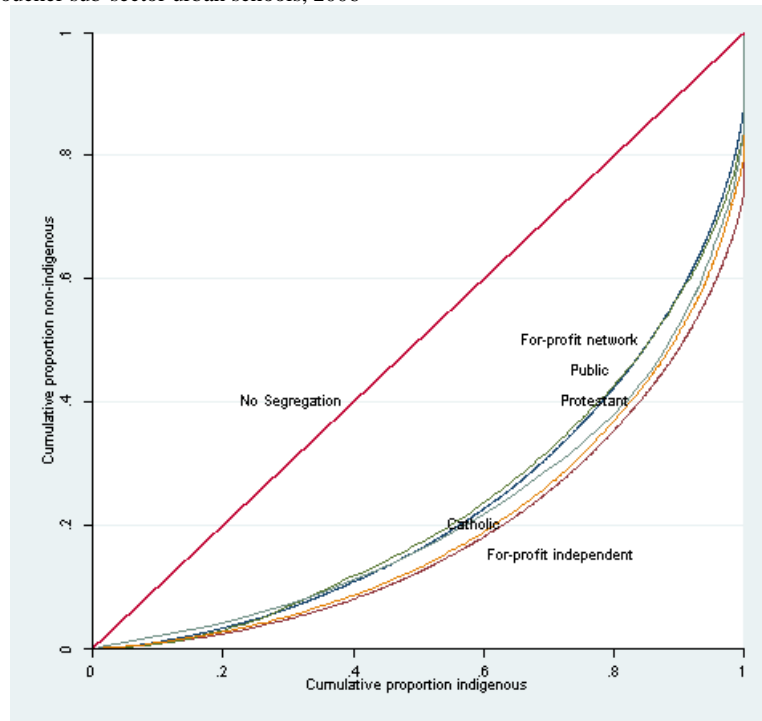
**Figure 5** Segregation curves for indigenous students in public and private for-profit and non-profit voucher urban schools, 2006



**Figure 6** Segregation curves for public and private for-profit and non-profit voucher sub-sector urban schools



**Figure 7** Segregation curves for indigenous students in public and private for-profit and non-profit voucher sub-sector urban schools, 2006

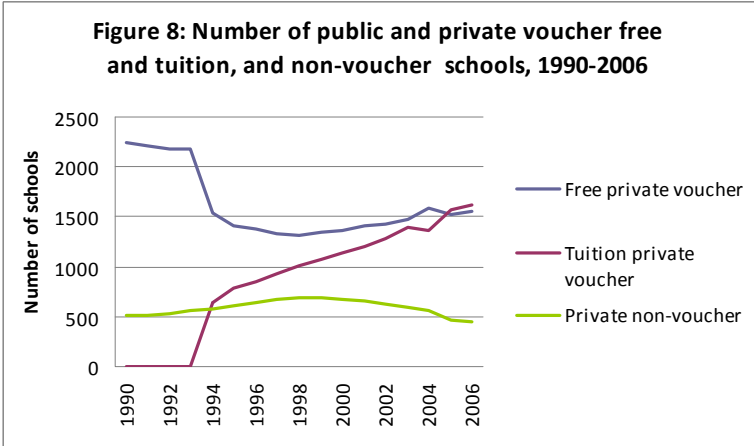


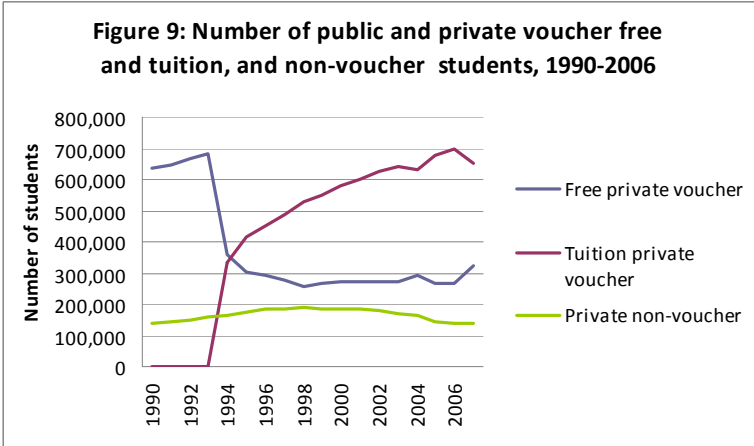
**Table 9.** High risk (vulnerable) and low risk student dissimilarity index values for public, for-profit and non-profit voucher urban schools, 2000-2006

	2000	2001	2002	2003	2004	2005	2006
Public and private voucher	.35	.38	.36	.35	.36	.37	.35
Public	.25	.28	.26	.23	.24	.25	.23
Private voucher	.43	.45	.42	.43	.44	.45	.42
<b>For-profit</b>	<b>.45</b>	<b>.47</b>	<b>.44</b>	<b>.46</b>	<b>.45</b>	<b>.46</b>	<b>.44</b>
Independent	.45	.47	.45	.47	.46	.48	.46
Network	.46	.47	.43	.42	.40	.43	.40
<b>Non-profit</b>	<b>.39</b>	<b>.41</b>	<b>.38</b>	<b>.39</b>	<b>.40</b>	<b>.39</b>	<b>.37</b>
Catholic	.39	.40	.37	.38	.40	.39	.36
Protestant	.39	.41	.37	.33	.37	.35	.33
Secular	.44	.47	.47	.45	.41	.41	.42

**Table 10.** Non-indigenous and indigenous student dissimilarity index values for public and for-profit and non-profit voucher urban schools, 1999 and 2006

	1999	2006
Public and Private voucher	.40	.42
Public	.36	.39
Private voucher	.43	.44
<b>For-profit</b>	<b>.42</b>	<b>.43</b>
Independent	.44	.45
Network	.38	.38
<b>Non-profit</b>	<b>.44</b>	<b>.44</b>
Catholic	.44	.44
Protestant	.38	.42
Secular	.36	.42





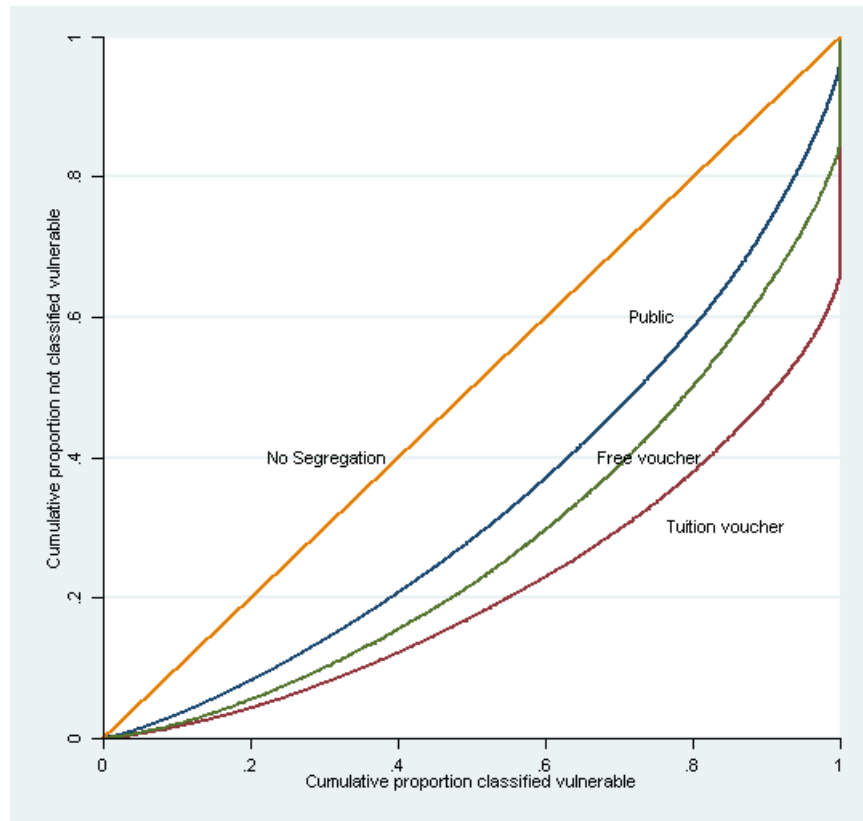
**Table 11.** Vulnerability index across public and private free and tuition voucher schools, 2000-2006

	2000	2001	2002	2003	2004	2005	2006
<b>Public</b>	39.1%	41.8%	39.8%	39.9%	39.7%	39.3%	39.6%
<b>Private voucher free</b>	35.4%	38.5%	37.3%	38.6%	35.4%	36.4%	37.0%
<b>For-profit free</b>	39.3%	43.2%	42.3%	43.6%	41.3%	42.8%	42.4%
<b>Non-profit free</b>	30.5%	32.5%	30.8%	32.4%	31.5%	30.5%	30.6%
<b>Private voucher tuition</b>	13.1%	13.9%	13.4%	14.2%	13.7%	13.0%	14.2%
<b>For-profit tuition</b>	13.8%	15.1%	14.4%	15.0%	14.6%	14.3%	14.9%
<b>Non-profit tuition</b>	11.8%	11.5%	11.4%	12.5%	11.5%	11.8%	13.2%
<b>Private non-voucher</b>	0.3%	0.7%	0.7%	0.9%	1.0%	0.0%	0.0%

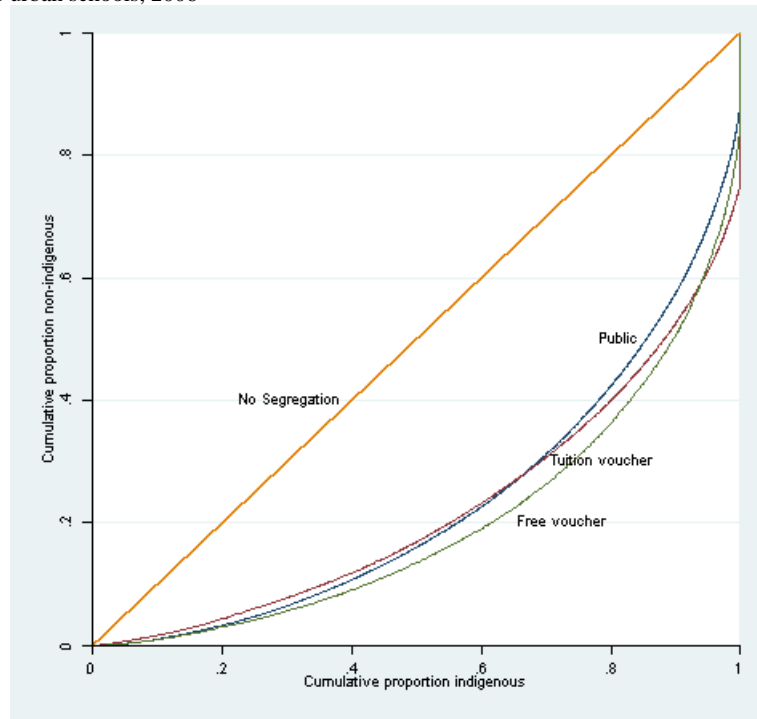
**Table 12.** Indigenous students across public and private free and tuition voucher schools, 1999 and 2006

	1999	2006
<b>Public</b>	8.1%	9.6%
<b>Private voucher free</b>	11%	15.3%
For-profit free	12%	18.5%
Non-profit free	8.9%	11.5%
<b>Private voucher tuition</b>	3.6%	4.4%
For-profit tuition	4.0%	4.8%
Non-profit tuition	3.0%	3.8%
<b>Private non-voucher</b>	0.7%	0.6%

**Figure 10** Segregation curves for public and private free and tuition voucher urban schools, 2006



**Figure 11** Segregation curves for indigenous students in public and private free and tuition voucher urban schools, 2006



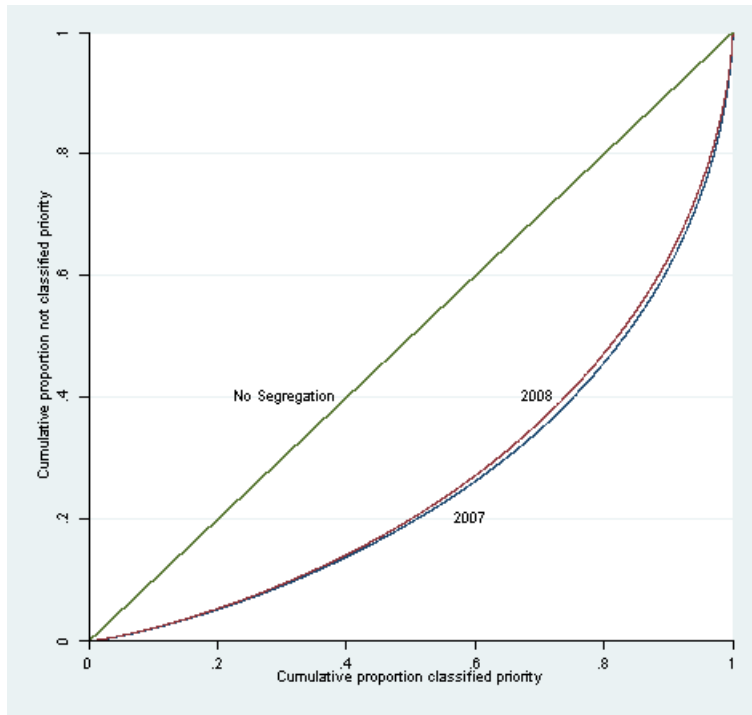
**Table 13.** High risk (vulnerable) and low risk student dissimilarity index values  
For public and private free and tuition voucher urban schools, 2000-2006

	2000	2001	2002	2003	2004	2005	2006
<b>Public</b>	.25	.28	.26	.23	.24	.25	.23
<b>Private voucher free</b>	0.35	0.38	0.34	0.31	0.33	0.32	0.31
<b>For-profit free</b>	0.39	0.41	0.35	0.32	0.32	0.32	0.32
<b>Non-profit free</b>	0.29	0.33	0.29	0.27	0.27	0.26	0.26
<b>Private voucher tuition</b>	0.42	0.43	0.40	0.44	0.44	0.46	0.42
<b>For-profit tuition</b>	0.43	0.44	0.42	0.46	0.45	0.46	0.43
<b>Non-profit tuition</b>	0.39	0.39	0.37	0.39	0.41	0.41	0.36

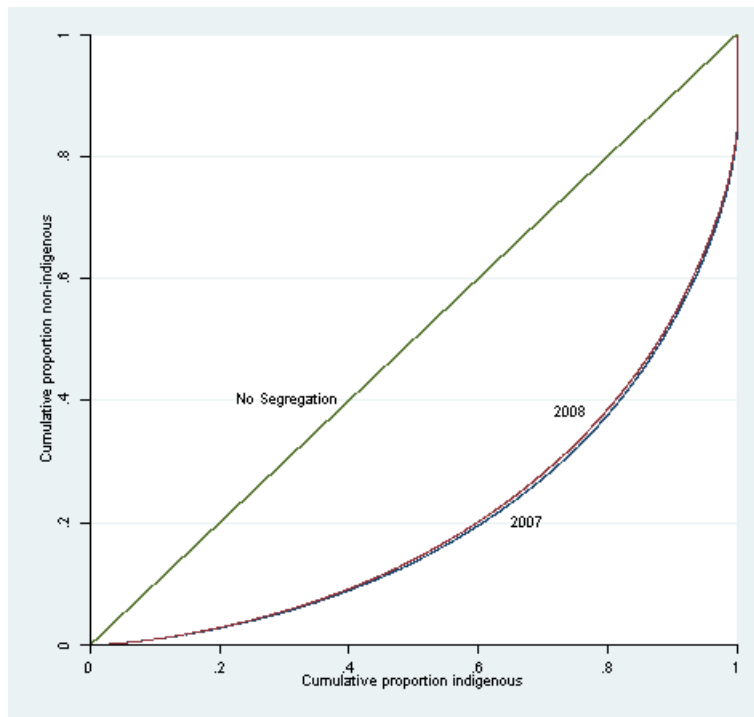
**Table 14.** Non-indigenous and indigenous student dissimilarity index values for public and private free and tuition voucher urban schools, 1999 and 2006

	1999	2006
<b>Public</b>	0.36	0.40
<b>Private voucher free</b>	0.44	0.44
<b>For-profit free</b>	0.44	0.44
<b>Non-profit free</b>	0.42	0.43
<b>Private voucher tuition</b>	0.38	0.40
<b>For-profit tuition</b>	0.37	0.40
<b>Non-profit tuition</b>	0.39	0.39

**Figure 12** Segregation curves over time for public and private voucher urban schools, 2007 and 2008



**Figure 13** Segregation curves for indigenous student over time for public and private voucher urban schools, 2007 and 2008



**Table 15.** High risk (priority) and low risk student dissimilarity index values  
For public and private voucher urban schools, 2007 and 2008

	<b>2007</b>	<b>2008</b>
<b>Public and private voucher</b>	0.35	0.34
<b>Public</b>	0.26	0.25
<b>Private voucher</b>	0.36	0.34
<b>For-profit</b>	0.34	0.33
<b>Independent</b>	0.36	0.34
<b>Network</b>	0.30	0.29
<b>Non-profit</b>	0.35	0.34
<b>Catholic</b>	0.34	0.32
<b>Protestant</b>	0.34	0.31
<b>Secular</b>	0.42	0.38

**Table 16.** Non-indigenous and indigenous student dissimilarity index values for public and private voucher urban schools, 2007 and 2008

	<b>2007</b>	<b>2008</b>
<b>Public and private voucher</b>	0.43	0.42
<b>Public</b>	0.41	0.40
<b>Private voucher</b>	0.44	0.43
<b>For-profit</b>	0.42	0.43
<b>Independent</b>	0.43	0.45
<b>Network</b>	0.37	0.37
<b>Non-profit</b>	0.46	0.43
<b>Catholic</b>	0.45	0.42
<b>Protestant</b>	0.43	0.39
<b>Secular</b>	0.40	0.40

**Appendix 1.** High risk (vulnerable) and low risk student Gini index values for public and private for-profit and nonprofit voucher urban schools, 2000-2006

	2000	2001	2002	2003	2004	2005	2006
Public and private voucher	.48	.52	.50	.48	.49	.51	.49
Public	.35	.38	.36	.32	.34	.35	.33
Private voucher	.59	.62	.58	.59	.59	.61	.58
<b>For-profit</b>	<b>.62</b>	<b>.64</b>	<b>.61</b>	<b>.62</b>	<b>.61</b>	<b>.62</b>	<b>.60</b>
Independent	.61	.64	.62	.63	.62	.63	.62
Network	.62	.63	.59	.58	.56	.58	.56
<b>Non-profit</b>	<b>.54</b>	<b>.57</b>	<b>.53</b>	<b>.54</b>	<b>.55</b>	<b>.54</b>	<b>.51</b>
Catholic	.53	.56	.51	.53	.55	.54	.51
Protestant	.54	.55	.51	.46	.51	.49	.45
Secular	.60	.63	.63	.61	.57	.57	.58

**Appendix 2.** Non-indigenous and indigenous student Gini index values for public and private for-profit and non-profit voucher urban schools, 1999 and 2006

<b>Gini</b>	<b>1999</b>	<b>2006</b>
<b>Public and Private voucher</b>	0.55	0.58
<b>Public</b>	0.50	0.54
<b>Private voucher</b>	0.60	0.61
<b>For-profit</b>	0.59	0.60
<b>Independent</b>	0.61	0.62
<b>Network</b>	0.53	0.53
<b>Non-profit</b>	0.59	0.60
<b>Catholic</b>	0.60	0.60
<b>Protestant</b>	0.49	0.56
<b>Secular</b>	0.49	0.58

**Appendix 3.** High risk (vulnerable) and low risk student Gini index values for public and private free and tuition voucher urban schools, 2000-2006

	2000	2001	2002	2003	2004	2005	2006
<b>Public</b>	0.35	0.38	0.36	0.32	0.34	0.35	0.33
<b>Free private voucher</b>	0.49	0.52	0.47	0.43	0.47	0.45	0.44
<b>For-profit</b>	0.53	0.56	0.5	0.44	0.45	0.45	0.46
<b>Non-profit</b>	0.42	0.45	0.4	0.39	0.39	0.37	0.38
<b>Tuition private voucher</b>	0.57	0.58	0.56	0.59	0.59	0.61	0.57
<b>For-profit</b>	0.58	0.6	0.58	0.61	0.6	0.61	0.59
<b>Non-profit</b>	0.53	0.53	0.5	0.53	0.55	0.55	0.5

**Appendix 4.** Non-indigenous and indigenous student Gini index values for public and private free and tuition voucher schools, 1999 and 2006

	<b>1999</b>	<b>2006</b>
<b>Public</b>	0.50	0.55
<b>Private voucher free</b>	<b>0.60</b>	<b>0.60</b>
<b>For-profit</b>	0.61	0.60
<b>Non-profit</b>	0.57	0.58
<b>Private voucher tuition</b>	<b>0.52</b>	<b>0.55</b>
<b>For-profit</b>	0.51	0.55
<b>Non-profit</b>	0.54	0.54

**Appendix 5.** High risk (priority) and low risk student Gini index values for public and private free and tuition voucher urban schools, 2007 and 2008

	<b>2007</b>	<b>2008</b>
<b>Public and private voucher</b>	0.48	0.46
<b>Public</b>	0.36	0.35
<b>Private voucher</b>	0.49	0.46
<b>For-profit</b>	0.47	0.46
<b>Independent</b>	0.49	0.47
<b>Network</b>	0.42	0.41
<b>Non-profit</b>	0.48	0.46
<b>Catholic</b>	0.46	0.44
<b>Protestant</b>	0.46	0.43
<b>Secular</b>	0.57	0.53

**Appendix 6.** Non-indigenous and indigenous student Gini index values for public and private voucher urban schools, 2007 and 2008

	<b>2007</b>	<b>2008</b>
<b>Public and private voucher</b>	0.59	0.58
<b>Public</b>	0.57	0.55
<b>Private voucher</b>	0.60	0.59
<b>For-profit</b>	0.58	0.60
<b>Independent</b>	0.60	0.62
<b>Network</b>	0.52	0.51
<b>Non-profit</b>	0.62	0.58
<b>Catholic</b>	0.61	0.58
<b>Protestant</b>	0.56	0.51
<b>Secular</b>	0.56	0.56