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#### THE CHILE EXPERIMENT

COMPARING CHILE'S FREE SCHOOL CHOICE  
MODEL WITH QUASI-MONOPOLY EDUCATIONAL  
SYSTEMS IN LATIN AMERICA ON ACADEMIC  
OUTCOMES AND SCHOOL SEGREGATION

MARIANO NARODOWSKI

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## THE CHILE EXPERIMENT

### Comparing Chile's Free School Choice Model with Quasi-Monopoly Educational Systems in Latin America on Academic Outcomes and School Segregation\*

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\* This research study was partially financed by EdChoice Foundation. The author thanks Carlos Mongan (Universidad Nacional de La Plata) for his invaluable assistance in the development of statistical models, Carolina Snaider (Teachers College, Columbia University), and Mauro Moschetti (Universitat Autònoma de Barcelona) and the three reviewers for their comments and suggestions as well as Verónica Stewart (Universidad Torcuato Di Tella) and Verónica Gottau (Universidad Torcuato Di Tella and ORT Organization) for their invaluable work as research assistants

## **THE CHILE EXPERIMENT**

### **Comparing Chile's Free School Choice Model with Quasi-Monopoly Educational Systems in Latin America on Academic Outcomes and School Segregation \***

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#### **EXECUTIVE SUMMARY**

The aim of this study is to show the achievements and challenges of Chile's system of free school choice compared to countries with similar socioeconomic structures and common educational histories, but with traditional education systems: Argentina, Brazil, Colombia, the Dominican Republic, Mexico, Peru, and Uruguay.

#### **Research Questions**

Despite the huge progress made by Chile in the last two decades regarding quality of education, school choice opponents have downplayed its relevance, arguing that the significant increase in social segregation stems from a system of free school choice. In the American media and academic debate on school choice, Chile tends to appear as an example of a segregated educational system beneficial to the rich and detrimental to the poor.

Nevertheless, other Latin American countries neighboring Chile have similar political and educational histories, yet they have shown smaller improvements in educational quality and socioeconomic segregation than Chile.

The main hypothesis of this study is that school segregation in Chile's case has mostly resulted from issues unrelated to the configuration of the educational system since other countries with comparable social and economic characteristics have had a similar or even higher evolution of

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segregation despite not having a system of free school choice. In fact, a pro-school choice system, as compared to a quasi-State monopoly, may drive better educational quality. The subsequent question is whether a tradeoff exists between socioeconomic segregation and educational choice.

## **Research Design and Data**

To analyze the evolution of educational achievements and social segregation in schools, this study compares Latin American countries based on the data collected from the 2000 to 2015 waves of the Programme for International Student Assessment (PISA) for all countries. I considered different indexes for measuring segregation to quantify socio-economic segregation, including the Dissimilarity Index and the Square Root Index. Additionally, to test the robustness of those measures, this analysis also employs the Gorard Index and the Isolation Index.

A data panel was constructed with the six waves of PISA (2000, 2003, 2006, 2009, 2012, and 2015) to explore the determinants of social segregation and educational achievement.

## **Results**

The differences we observe in the PISA data between Chile and other countries support the hypothesis. Chile formed an educational voucher system that largely adjusts to the characteristics listed by the theory: demand-side subsidy, free school choice, administrative and pedagogic school autonomy, and competition among schools. The rest of the countries seem to form quasi-State monopolies of the educational systems even with differences within this structure.

### ***Academic Performance***

The evidence presented showed considerably higher academic achievement for Chile, which continued to improve between 2000–2015. In PISA 2000, Mexico ranked as the top Latin American country with an average of 410 points followed by Chile (402) and Argentina (400). In PISA 2015, Chile ranks first with 443 points followed by Mexico and Costa Rica (both 416). The data suggest variables linked with school autonomy and competition play a prominent role in a school choice model. Among the variables considered, the most significant factor was a school's autonomy to determine its own education policies, as greater autonomy correlates positively with better academic results.

### ***School Segregation***

Higher levels of school segregation change considerably when the reference variable changes. Reference variables examined in this report include:

- families' economic, social, and cultural status, a variable constructed by PISA based on parents' occupation and home possessions

- families' wealth, based primarily on home possessions, such as a private bedroom for study, educational software, internet access, cell phones, television, cars, and access to a bathroom
- a school's autonomy over its own resources, such as hiring, firing, wage setting, and budgets
- a school's autonomy over its decision making, such as discipline, student assessment, admissions, curriculum
- rurality, or whether a school is located in a rural area
- coverage, a measure of students who live in poor economic conditions that are zoned to a certain public school
- private school status, the proportion of private schools in the market
- schools that require students to live in residence zones
- schools that have control over their own admissions processes
- a school's quality of educational resources
- a school's student-teacher ratio
- the number of certified teachers a school has

This sensitivity to the measure instrument added to the weight of the out-of-school variables brings to light that quasi-State monopolistic educational systems could reach much higher levels of segregation than voucher systems do. From 2000– 2015, segregation levels in Peru increased by 17.8 percent. Meanwhile, Chile's free school choice system has not significantly increased the degree of segregation in schools.

### ***The Political Debate vs. The Evidence***

American opponents of school choice often paint Chile's voucher system as the example of what not to do<sup>1</sup>.

Contrary to their claims, however, recent PISA scores show Chile scored highest in math, reading, and science of any other Latin American country and is the only country in Central and South America with a voucher system.

Results from this comparative study suggest that those observed academic outcomes may be a consequence of the characteristics of a free school choice system. Chile is more effective by those measures than its neighboring countries, and we cannot rule out that this is because of its voucher system.

The evidence also suggests that school segregation is not exclusive to the Chilean free school choice model. Most Latin American countries experience similar segregation trends without

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<sup>1</sup> Jennifer Pribble and Jennifer L. Erkulwalter (2017, January 17), Betsy DeVos Wants 'School Choice.' Chile Tried That Already, The Washington Post, retrieved from <https://www.washingtonpost.com/news/monkey-cage/wp/2017/01/17/betsy-devos-wants-schoolchoice-chile-already-tried-vouchers-it-hasnt-worked>

voucher systems. In fact, this report's analysis reveals that other Latin American countries have higher segregation and lower academic performance, while the Chilean voucher system stabilizes segregation levels and improves test scores.

Latin American countries that lead in education but did not implement a pro-market reform (Argentina and Uruguay) not only show worse results than Chile, but also their academic performance tends to become stagnant over time.

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### Comparing Chile's Free School Choice Model with Quasi-Monopoly Educational Systems in Latin America on Academic Outcomes and School Segregation

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## INTRODUCTION

Inspired by Milton Friedman's work, the Chilean government designed its education system as an educational quasi-market in 1981, so state funding is allocated to families through a voucher system.<sup>1</sup> As a result, families can freely choose any public school or private school subject to certain regulations. Chilean schools are given autonomy for pedagogic and administrative decision making, and they compete for a share of total enrollments.

Although the school system was implemented under the military dictatorship that ruled Chile between 1973 and 1990, it has remained largely unchanged since the rebirth of democracy and through all successive governments, including those headed by moderates of the Christian democracy, the center leftists of the socialist and democrat parties, and the center right. Each government proposed some reforms but each kept the quasi-market conditions of the educational system. Since 2014, the Chilean educational system has experienced significant reform, but the core of a voucher system remains, establishing free school choice (private or public), competition among schools, and a demand-side funding framework.<sup>2</sup>

Because of the extended time since the implementation of the system, an accurate assessment of the Chilean educational experience may yield important information on the achievements and challenges of the voucher system. By comparing the Chilean free school choice model with models used in other Latin American countries with a similar socioeconomic structure and a common educational history but without a school voucher system, this study provides rigorous evidence for and precise interpretation of the effects of the quasi-market educational system.

Based on international assessments, this report explores the remarkable progress of Chile in academic achievement.<sup>3</sup> In the 1997 United Nations Educational, Scientific, and Cultural Organization (UNESCO) assessment of students, Chile ranked third—behind Cuba and Argentina—but was ranked first in the latest assessment of Latin American and Caribbean countries.<sup>4</sup> According to the 1999, 2003, and 2011 Trends in International Mathematics and Science Study (TIMSS) assessments, Chile was the only Latin American country to participate, and between 1999 and 2011, improved its performance, moving closer to the overall average and achieving meaningfully better results than other countries with similar economic development.<sup>5</sup> Chile also showed improved academic achievement between 2000–2015 on the Programme for International Student Assessments (PISA).<sup>6</sup>

In spite of the progress made in the quality of education, some argue that significant increases in social segregation are the consequences of free school choice. For example, in the American and global media as well as in academia, the Chilean case is cited as an example of a segregated educational system.<sup>7</sup>

The debate over free school choice informs the research questions of this study:

First, is the educational quasi-market a key factor in improving educational measures?

Second, is socioeconomic segregation of the educational system an appropriate tradeoff for a voucher system?

Two studies showed that methodological inconsistencies emerge when social processes precede the organization and implementation of free school choice.<sup>8</sup> According to these comparative studies, both Chile and Argentina, with different educational systems, had similar indicators of socioeconomic segregation in their educational systems. With the PISA databases, this study broadens and completes this explanation based on evidence collected over time.

The paper is organized as follows. It offers the theoretical description of the quasi-market and quasi-monopoly of the educational system in the Latin American context. Then, it describes the method used to understand the academic achievement and school segregation data provided by PISA. The next section illustrates empirically collected data. Based on the evidence observed, the general characteristics of each educational model is inferred, and the Chilean voucher system is compared with other educational systems established in Latin America. Finally, the paper addresses the theoretical and political debates based on the results obtained and explores the consequences for other countries, including the United States, that are contemplating these educational systems.

## **Educational Quasi-Markets and Quasi-Monopolies in Latin America**

### ***The Educational Quasi-Market in Chile***

Until 1981, organization of the Chilean education system was similar to those of other Latin American countries. For example, financing was guaranteed centrally through state funds allocated to schools regardless of the educational preferences of the population, and access to a small, private sector was limited to high-income families.<sup>9</sup>

Quasi-markets are a hybrid which combine practices designed to efficiently distribute market resources with measures concerned with equity that are true of state activity. As was designed by Le Grand, a quasi-market means free school choice based on families' preferences when it comes to demand and, in terms of supply, competition between schools to attract said demand. What makes quasi-markets unique is that the financing comes from the state but is applied directly to



the demand in the form of a voucher. In conclusion, this model allows for government activity to be implemented through pro-market measures (such as free choice and competition), while still guaranteeing financing and state regulations to maintain equity when providing the service.<sup>10</sup>

The change to an educational quasi-market creates two unique situations. First, the geographic priority zone restrictions for school choice are abolished such that families can opt for private or public schools outside their residential areas. Second, the traditional state financing mechanism shifts to per-student funding allocated to the parent-selected school under a free school choice framework; that is, state supply-side funding is replaced by state demand-side funding.<sup>11</sup>

An educational quasi-market does not necessarily translate to modifications of the educational state budget. Rather, it affects modes of channeling funds, so funds funnel not directly to schools, but through parents to schools. The quasi-market does not determine the state unit chosen as a funding source, which could be the local or national government.<sup>12</sup> Free school choice and demand-side state funding highlight the need for competition among schools to attract students and prevent bankruptcy. Funding for student enrollments must exceed the costs of school operations.

The Chilean voucher framework does not necessarily lead to profit. In fact, most private schools in Chile do not seek to make a profit. An efficient administration leverages the benefits of scale to reinvest in utilities, as is done in public and some private schools, or it can distribute the funding among owners of private schools through a top-up payment, which is added to the voucher (“copago”) and passed on to those entering the school. The co-payments are at the heart of current education reforms in Chile.<sup>13</sup>

According to the theory, both competition among schools and free school choice allow for two central elements. First, the school has an incentive to improve educational outcomes and attract a bigger share of the demand—avoiding shutdown and perhaps even expanding to serve more students. Second, schools can adapt to meet the heterogeneous preferences and interests of families; that is, the school system offers a heterogeneity that matches with the expectations of the parents who select it.<sup>14</sup>

### ***The Educational Quasi-Monopolies in Latin America***

During the first six decades of the 20th century, Latin American countries organized state monopolies to finance, administrate, and provide almost all school offerings. The small private sector was mainly religious and subject to the state regulatory system. Parental public school choice did not make sense because the pedagogic offerings were homogeneous and schools could not respond to changing demand.<sup>15</sup>

In the 1960 and 1970s (as varied by case), Latin American countries started to develop problems financing the monopolistic school systems as they were pressured by some social sectors previously excluded from the educational system to provide schooling and to accommodate

culturally diverse educational profiles. In the face of this situation, an exit sector emerged from the monopoly.<sup>16</sup> Private schools satisfied the needs of those informed families with the financial capacity to exit the traditional state monopoly. As those in affluent social sectors sought private schooling, the monopoly kept the traditional mechanisms for financing, regulation, and state provision of education for low-income social sectors. This scenario of the old monopolistic order and a new sector created for the affluent shaped a quasi-monopoly of the state educational system.<sup>17</sup> Both sectors combine to form a dynamic equilibrium such that private family financing for education complements the state monopoly of public schools so that education is available for everyone. The state can directly finance part of the school offerings, as through supply-side subsidies in Argentina,<sup>18</sup> or indirectly finance them through tax exemptions or discounts in public services, such as is done in Brazil, Peru, and Uruguay.<sup>19</sup> Both direct and indirect financing enables balanced cost-effective state funding.<sup>20</sup>

The monopoly sector presents a homogeneous profile: little autonomy for administrative or pedagogic decision making and a supply-side state funding framework. Furthermore, teachers are hired through a centralized and bureaucratic system, and families can choose only public schools in their area of residence; that is, their options are determined by attendance zones. In the private sector, state regulations are enforced more leniently; staff have greater autonomy; and schools can compete for teachers based on market demand. Usually, there are no restrictions for private school fees.<sup>21</sup>

Unlike in a voucher system, a quasi-monopoly is not the result of a specific policy reform but is established through political decisions and the social and economic behavior of the population. These decision factors are affected by constraints on the state budget for education, the growing demand for education, and the need of heterogeneous programs that satisfy an increasingly diverse culture. In Latin American countries, the traditional public and private sectors can vary in terms of the program heterogeneity, the obligations imposed by regulations, the financing scheme, and leeway for decision making. However, the central elements that describe this contradictory and complementary system—the channeling of the most vulnerable population to one sector and those with financial capacity to the other—are common to many educational systems.

## **METHOD**

### **Sample**

Since 2000, the PISA has conducted evaluations every three years to determine if 15-year-old students (i.e., those about to finish compulsory education in almost all the countries considered) demonstrate the necessary knowledge and skills to participate in their respective society. The assessment consists of standardized tests that cover reading, mathematical, and scientific literacies. PISA also administers a complementary survey for students, parents, and directors of schools to determine the students' socioeconomic status, family background, and attitude toward learning.<sup>22</sup>

**TABLE 1**

Latin American Countries That Participate in PISA

2000	2003	2006	2009	2012	2015
Argentina	Brazil	Argentina	Argentina	Argentina	Argentina*
Brazil	Mexico	Brazil	Brazil	Brazil	Brazil
Chile	Uruguay	Chile	Chile	Chile	Chile
Mexico		Colombia	Colombia	Colombia	Colombia
Peru		Mexico	Costa Rica	Costa Rica	Costa Rica
		Uruguay	Mexico	Mexico	Mexico
			Panama	Peru	Peru
			Peru	Uruguay	Uruguay
			Uruguay	Venezuela (Miranda)	Dominican Republic
			Venezuela (Miranda)		Argentina (CABA)

Source: Author's analysis of OECD (2000), *PISA 2000 Database: School questionnaire* [data file and codebook], retrieved from <http://www.oecd.org/pisa/data/database-pisa2000.htm>; OECD (2015), *PISA 2015 Database: School questionnaire* [data file and codebook], retrieved from <http://www.oecd.org/pisa/data/2015database>  
 Note: \*The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable.

Although only Mexico and Chile are part of the Organization for Economic Co-operation and Development (OECD), which administers the assessments, other Latin American countries participate in PISA.

The sample used for this study consists of the results of seven Latin American countries that most frequently take part in PISA, and where school attendance rates, education investments and gross domestic product (GDP) per capita is similar to those of Chile: Argentina, Brazil, Colombia, Costa Rica, Dominican Republic, Mexico, Peru, and Uruguay.<sup>23</sup>

### Academic Performance

To study academic performance, this work analyzes PISA test scores in mathematics, reading, and science for the seven selected countries from 2000 to 2015, keeping in mind some countries have not taken part in all tests. The measure of academic performance by country is by subject and on average over time.

### School Segregation

Segregation describes the distributive difference of diverse social groups among different units or linked to specific geographical zones.<sup>24</sup> School segregation refers to the unequal (unbalanced) distribution of students from different socioeconomic backgrounds among schools with similar educational goals. Several indicators found in the academic literature are used to quantify segregation.<sup>25</sup> This study focuses on segregation of students between schools. Unfortunately, it is not possible to generate measures of residential segregation from the data provided by PISA. I used the Duncan Dissimilarity and Square Root Indexes to analyze school segregation, and I used the Gorard Segregation and Isolation Indexes to test the robustness of the analysis.

### *Dissimilarity Index*

The Dissimilarity Index, originally developed by Otis Duncan and Beverly Duncan to analyze residential segregation, has become the most widely used measure for both residential and school segregation. Similarity is a relative (not absolute) measure: A group is segregated if it is differently distributed to another group. This index would reflect the percentage of socioeconomic vulnerable students that would need to change school to achieve a homogeneous distribution of students among schools. The values fluctuate between 0 and 1, where the closer the value is to 1, the higher the segregation will be.

The Dissimilarity Index is computed by

$$D = \frac{1}{2} \sum_{i=1}^k \left| \frac{A_i}{A} - \frac{B_i}{B} \right|$$

where  $i$  is the number of schools;  $A_i$  represents the number of socioeconomically vulnerable students in school  $i$ ;  $A$  is the total of vulnerable students;  $A = \sum A_i$ ,  $B_i$  is the number of students with relatively little socioeconomic vulnerability while attending school  $i$ ; and  $B$  is the total number of students not considered vulnerable:

$$B = \sum_{i=1}^K B_i$$

### *Square Root Index*

Unlike the Dissimilarity Index the Square Root Index contributes desirable properties for a numerical measure of segregation, including additive decomposition.<sup>26</sup> This is computed by

$$H = \frac{1}{2} \sum_{i=1}^k \sqrt{\left| \frac{A_i}{A} - \frac{B_i}{B} \right|}$$

**TABLE 2** Comparing Latin American Countries Based on Various Wealth Measures

	ECWEALTH (Index)	Own Room (Percentage)	Software (Percentage)	Internet (Percentage)	Own Desk (Percentage)	Cell-phone (Units Per Household)	T.V. set (Units Per Household)	Computer (Units Per Household)	Car (Units Per Household)	Bathroom (Units Per Household)
Argentina*	9.82	52%	50%	66%	67%	2.15	2.07	1.47	0.75	1.06
Brazil	9.53	75%	27%	79%	60%	1.97	1.89	1.00	0.82	1.40
Chile	11.06	83%	34%	71%	70%	2.23	2.44	1.50	1.02	1.33
Colombia	7.36	68%	24%	52%	60%	1.50	1.76	0.78	0.37	0.92
Costa Rica	9.68	70%	36%	66%	83%	2.44	2.04	1.21	0.84	0.65
Dominican Republic	7.69	77%	28%	66%	50%	1.52	1.64	0.68	0.57	1.05
Mexico	8.17	51%	18%	39%	73%	1.76	1.87	0.71	0.93	1.09
Peru	6.91	67%	26%	41%	73%	1.24	1.56	0.72	0.36	1.03
Uruguay	10.78	69%	40%	87%	82%	2.30	2.27	1.47	0.80	1.20

Source: Author's analysis of OECD (2015), PISA 2015 Database: School questionnaire (data file and codebook), retrieved from <http://www.oecd.org/pisa/data/2015database>.  
 Note: \*The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. These results should be treated with caution since they may not be comparable.

## Gorard Index

The Gorard Segregation Index is computed

$$G = \frac{1}{2} \sum_{i=1}^k \left| \frac{A_i}{A} - \frac{t_i}{t} \right|$$

where  $t_i$  is the total of students in school  $i$  and  $t$  is the total number of students:

$$t = \sum_{i=1}^K t_i$$

$G$  is a transformation of the Duncan Dissimilarity Index according to Gorard and Fitz,  $G=D(1=)$  such that it is correlated to the Dissimilarity Index.<sup>27</sup>

## Isolation Index

The Isolation Index is a predictor of the intensity of segregation; that is, it refers to the intensity of interaction among members of the same group or social category under identical conditions.<sup>28</sup> As a result of the situation, the probability of interaction among members of different social groups differs, and in this case, the Isolation Index predicts the percentage of vulnerable students who study in schools that enroll a large proportion of vulnerable students than the other schools, on average, in the studied territory.

The Isolation Index is calculated as

$$IA = \sum_{i=1}^K \frac{A_i}{A} \frac{A_i}{t_i}$$

## *Categories*

To conduct the analysis, the segregation categories must be established. The socioeconomic stratification in Latin America represents one of the most relevant forms of segregation, and the variable used to determine the different social strata is quite important.<sup>29</sup> All the previous works on student segregation among schools are based on different indexes. Thus, Stephen Gorard and John Fitz identified children with precarious economic circumstances according to their eligibility to benefit from free food served at the school.<sup>30</sup> Other authors who use data from PISA applied the ESCS (index of economic, social, and cultural status) variable constructed by PISA.<sup>31</sup> The ESCS was formed by three other compound variables, HISEI (highest occupational status of parents), PARED (highest parental occupation), and HOMEPOSS (home possessions). This last variable is, in turn, formed by a composite of two variables: CULTPOS (cultural possessions) and HEDRES (home education resources). Additionally, based on the evidence provided by PISA, we created the variable ECWEALTH, based on home possessions and is measured in values between zero and 14.<sup>32</sup> The possessions are grouped as follows: (1) private bedroom for the student, educational software, internet access, personal desk to study and (2) cell phones, television set, car(s), bathroom.

Based on ECWEALTH and ESCS, the four segregation indexes and two measures are taken into account to define the vulnerable population. Students who fall into the first quartile of each measured variable and the students who fall below the second quartile of each variable are considered vulnerable for the purpose of this study. WEALTH and HOMEPOS, both variables built by PISA, were also used to test the robustness of the analysis.

## **Estimation of Segregation and Performance Determinants**

To investigate the possible effects of the educational system on student academic performance and school segregation, a data panel from the six years PISA (2000, 2003, 2006, 2009, 2012 and 2015) was constructed.<sup>33</sup> To determine performance and segregation, the functional relationship is estimated through a fixed-effects model that allows for control over unobserved heterogeneity constant over time, thus eliminating this source of endogeneity caused by the correlation of explicative variables.<sup>34</sup>

Among all the variables considered to estimate the determinant factors of academic achievements, apart from those traditionally used on educational production functions,<sup>35</sup> this study presents evidence on the influential characteristics of the educational system, such as school management, autonomy for decisions about school resources and educational policies, and school choice mechanisms.<sup>36</sup> The same variables, except those related to school inputs, are used to explore the determinants of school segregation.

With regard to school autonomy, the PISA survey collects information from which two variables were constructed: a) AUTON\_RESOURCE, which reflects school autonomy and considers i) hiring and ii) firing of teachers, iii) wage setting, iv) wage adjustments, v) formulation of the

educational budget, and vi) location of the educational budget for management of school resources and b) AUTON\_ASSESS, which establishes educational policy criteria through i) capacity for disciplinary decision making, ii) student assessment criteria, iii) student admission, iv) textbook selection, v) content of courses, and vi) courses offered.

## RESULTS

### Characteristics of Latin American Educational Systems

As shown in Table 3, the Chilean educational system has fewer public schools, which account for approximately 50 percent of the total among the Latin American countries studied, wherein the percentage of public schools far exceeds 70 percent with the exception of Peru (64 percent, the second highest percentage of private schools). Mexico and Uruguay are in the group of educational systems with a smaller percentage of private schools that do not receive state funding.

State funding goes to the most schools in Argentina (92.4 percent), Chile (90.6 percent), and Costa Rica (90.6 percent). (See Table 3 on page 10.) About 79 percent of schools in Argentina are traditional public schools, but the share during PISA 2012 was 68 percent, which casts doubt on these results. One should be cautious inferring anything from the Argentina data.

**TABLE 3** Proportions of School Types by Latin American Country (PISA 2015)

	Public Schools	Private Schools with State Funds	Private Schools without State Funds	Total
Argentina*	78.9%	13.5%	7.6%	100.0%
Brazil	79.5%	0.1%	20.4%	100.0%
Chile	48.7%	41.9%	9.4%	100.0%
Colombia	69.5%	2.3%	28.2%	100.0%
Costa Rica	89.7%	1.0%	9.4%	100.0%
Dominican Republic	77.0%	2.8%	20.2%	100.0%
Mexico	85.0%	0.0%	15.0%	100.0%
Peru	64.0%	2.2%	33.8%	100.0%
Uruguay	77.9%	0.0%	22.1%	100.0%

Source: Author's analysis of OECD (2015), *PISA 2015 Database: School questionnaire* [data file and codebook], retrieved from <http://www.oecd.org/pisa/data/2015database>  
 Note: \*The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable.

Figures 1 and 2 on the next page show Chile offers the most autonomy in decision making about school resources and for measures of autonomy in decision making regarding educational policies, in both cases followed by Peru.

Figure 3 on page 13 shows the percentage of students who attend schools in areas where the director says school choice is unrestricted to students living in that area. Chile ranks first on this measure of accessibility. The figure shows the percentage of children who are recruited according to their academic performances or based on recommendations from a previous school.

In short, Chile leads almost all the indicators related to the conditions for an educational quasimarket. Again, in all cases followed by Peru; however, this has a very different educational system with greater presence of the private sector. The other countries in this study show homogeneous profiles, which indicate quasi-monopolies of their state educational systems.

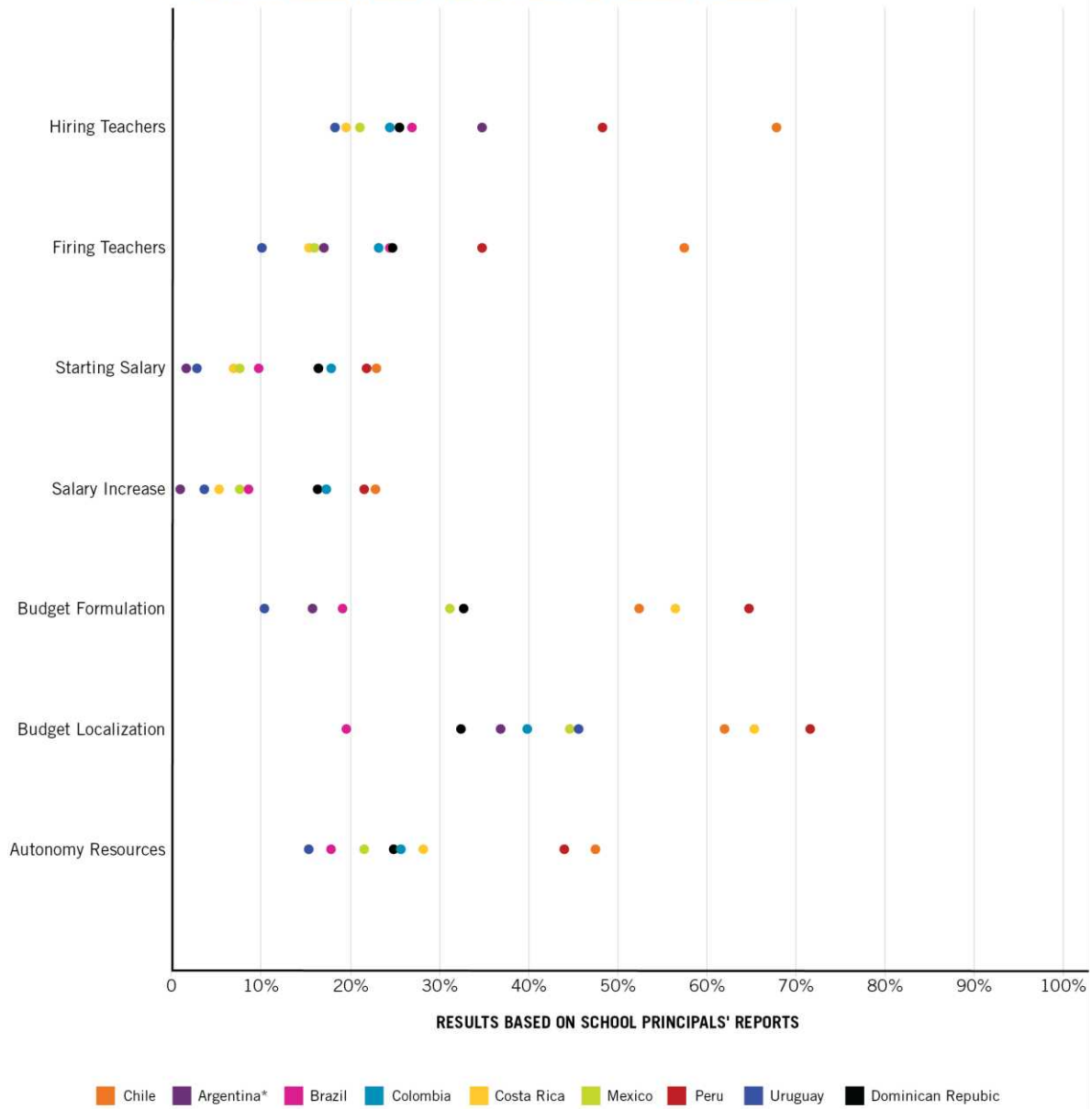


**FIGURE 1**

Levels of School Autonomy Based on Different School Responsibilities (PISA 2015)

Chile leads other Latin American countries in four of six autonomy-related school resource types. Chile's educational system has the largest proportion of autonomous schools.

(Percentage of students in schools where the principal has considerable responsibility)

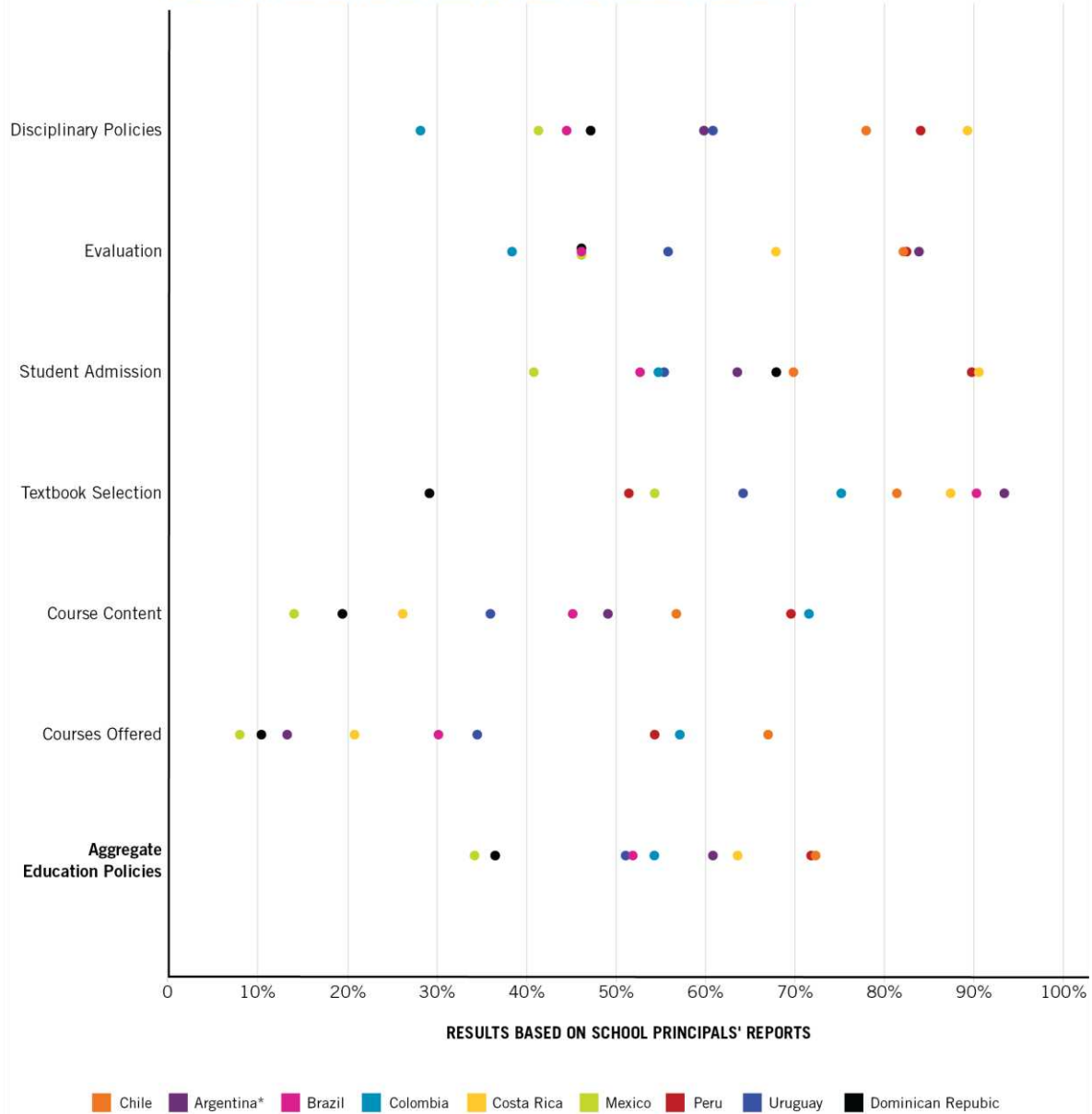


Source: Author's analysis of OECD (2015), *PISA 2015 Database: School questionnaire* [data file and codebook], retrieved from <http://www.oecd.org/pisa/data/2015database>  
 Notes: Based on school principals' reports. \*The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable.

**FIGURE 2****Levels of School Autonomy Based on Different Education Policy Types (PISA 2015)**

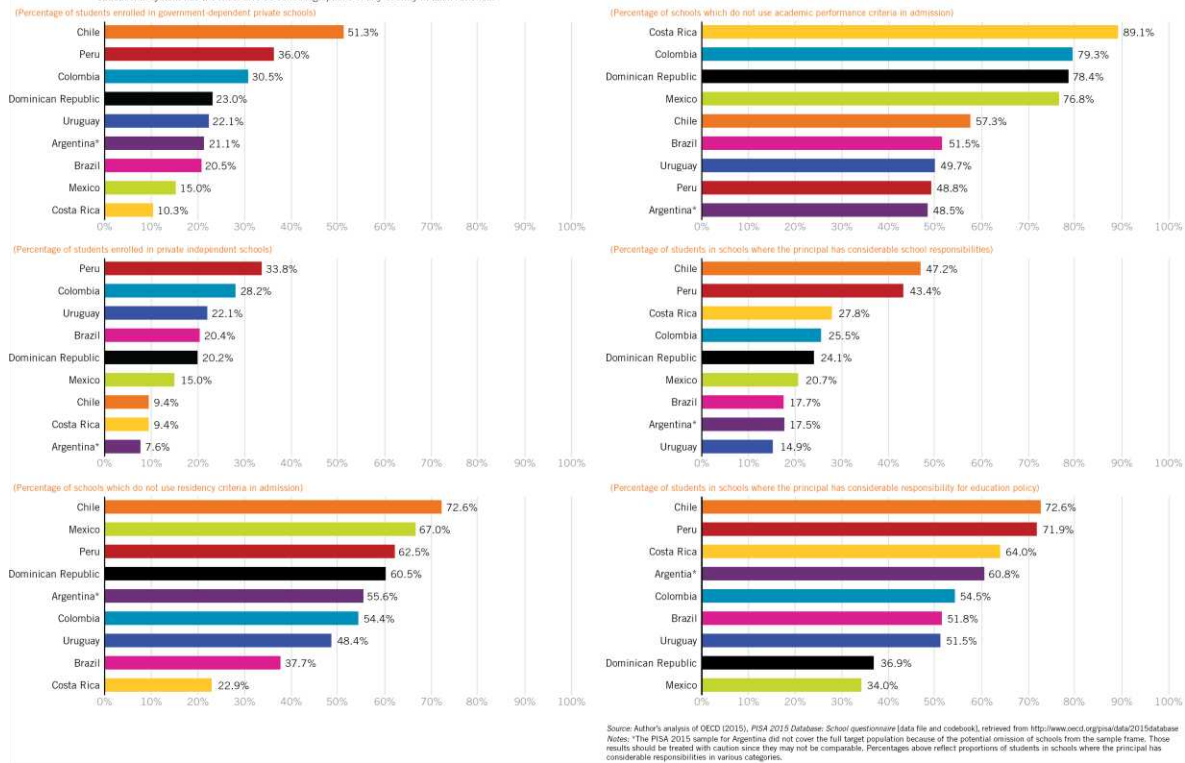
*Chile leads other Latin American countries in three of six autonomy-related education policy types, and is, all together, the country whose schools have the most capacity to make decisions on their educational projects.*

*(Percentage of students in schools where the principal has considerable responsibility)*



Source: Author's analysis of OECD (2015), *PISA 2015 Database: School questionnaire* [data file and codebook], retrieved from <http://www.oecd.org/pisa/data/2015database>  
 Note: Based on school principals' reports. \*The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable.

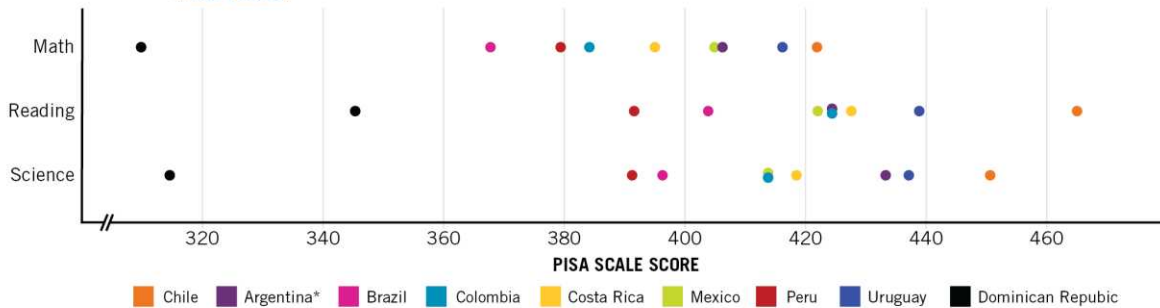
**FIGURE 3** Measures of Competition and Autonomy (PISA 2015)  
 As a result of school autonomy and the lack of restrictions for families to pick schools, the Chilean educational system has the most diverse schooling options of any country in Latin America.



**FIGURE 4** Academic Achievement Levels by Latin American Country (PISA 2015)

Based on 2015 PISA scores, Chile performed better than all other Latin American countries in mathematics, reading, and science.

(Mean Scores)



Source: Author's analysis of OECD (2015), PISA 2015 Database: School questionnaire [data file and codebook], retrieved from <http://www.oecd.org/pisa/data/2015database>  
 Note: \*The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable.

## Academic Performance in Latin America

According to the 2015 PISA report, Chile has the best academic results of the Latin American countries in the sample, leading the rankings in mathematics, science, and reading.<sup>37</sup>

Chilean students scored, on average, 423 in mathematics, 459 in reading, and 447 in science—higher than the high scores from students in Uruguay (the next highest of the Latin American countries). Uruguay students scored 418 in mathematics, 437 in reading, and 435 in science. Dominican Republic showed the worst academic performance in all areas with student scores of 328 in mathematics, 358 in reading, and 332 in science, followed by Peru and Brazil. The other countries obtained positions between these two extremes. On average, the rankings are as follows, in descending order of average test scores across subjects: 1) Chile, 2) Uruguay, 3) Argentina, 4) Costa Rica, 5) Mexico, 6) Colombia, 7) Brazil, 8) Peru, and 9) Dominican Republic.

Based on the last 15 years of PISA reports, one can see the progress of Chilean students both in mathematics and in reading and science. In 2000, the test scores for students in Chile were slightly inferior to those of students in Argentina and Mexico, but the academic results for Chile were better than for Peru and Brazil. As for science, in 2000, Chile showed higher average test scores than Argentina but worse than Mexico and performed better over time. Chile made larger gains over the period than both countries.

A few years later, in both 2012 and 2015, Chile had the highest results in the three subjects. In 2015, Peru continued to show poor results in education measures, but it experienced the largest gains in test scores, diminishing the education achievement gap between Peru and the other Latin American countries in the study. Chilean students experienced the second-largest gains. The case of Mexico is also worth mentioning because the academic results for their students remained constant between 2000 and 2015.

### **School Segregation**

The school system in Chile has been characterized by scholarly literature as highly segregated, which has increased in recent years.<sup>38</sup> According to Gregory Elacqua, Chilean secondary school segregation is not the same as that of developed countries, and in some cases, the schools are less segregated in Chile than elsewhere. Of the 65 countries that have participated in PISA, Latin American countries top the list of segregated schools. Although Argentina and Brazil showed evidence of improved heterogeneity, they retain the segregation pattern typical of the region.<sup>39</sup>

To confirm previous studies, I quantified the PISA database by different segregation indexes discussed in an earlier section. The estimations showed varied results according to the variable considered. For example, according to the analysis using the ESCS, the Chilean and Peruvian educational systems show higher school segregation, compared to the other countries and, according to the analysis undertaken with the Duncan dissimilarity or Gorard indexes, Chile showed the second highest segregation measures after Peru. The order is the same with the other indexes considered.

The other countries are associated with relatively low levels of segregation, and the ranking differs according to the index considered.

**TABLE 4** Four Indexes Show Varying Socioeconomic Segregation Levels in Latin American Countries

Disimilarity Index									Square Root Index								
	ESCS 50%	ESCS 25%	WEALTH 50%	WEALTH 25%	HOMEPOS 50%	HOMEPOS 25%	ECWEALTH 50%	ECWEALTH 25%		ESCS 50%	ESCS 25%	WEALTH 50%	WEALTH 25%	HOMEPOS 50%	HOMEPOS 25%	ECWEALTH 50%	ECWEALTH 25%
Argentina*	0.432	0.442	0.380	0.444	0.395	0.447	0.376	0.384	Argentina*	0.167	0.196	0.135	0.190	0.142	0.195	0.127	0.137
Brazil	0.398	0.437	0.424	0.469	0.419	0.449	0.446	0.461	Brazil	0.165	0.194	0.172	0.216	0.165	0.205	0.201	0.225
Chile	0.491	0.496	0.377	0.395	0.393	0.413	0.382	0.387	Chile	0.217	0.235	0.138	0.151	0.148	0.155	0.145	0.146
Colombia	0.444	0.468	0.496	0.511	0.487	0.489	0.507	0.498	Colombia	0.214	0.223	0.247	0.255	0.246	0.242	0.254	0.242
Costa Rica	0.424	0.414	0.426	0.457	0.431	0.440	0.418	0.441	Costa Rica	0.197	0.197	0.193	0.215	0.198	0.210	0.188	0.213
Mexico	0.460	0.525	0.467	0.501	0.470	0.491	0.464	0.495	Mexico	0.211	0.267	0.231	0.253	0.231	0.234	0.230	0.251
Peru	0.538	0.634	0.599	0.624	0.572	0.582	0.564	0.559	Peru	0.276	0.388	0.340	0.367	0.302	0.332	0.295	0.308
Uruguay	0.405	0.400	0.332	0.356	0.363	0.387	0.374	0.385	Uruguay	0.166	0.173	0.114	0.133	0.131	0.150	0.144	0.153
Dominican Republic	0.403	0.432	0.416	0.397	0.411	0.396	0.448	0.435	Dominican Republic	0.155	0.183	0.165	0.167	0.155	0.160	0.211	0.198

Gorard's Index									Isolation Index								
	ESCS 50%	ESCS 25%	WEALTH 50%	WEALTH 25%	HOMEPOS 50%	HOMEPOS 25%	ECWEALTH 50%	ECWEALTH 25%		ESCS 50%	ESCS 25%	WEALTH 50%	WEALTH 25%	HOMEPOS 50%	HOMEPOS 25%	ECWEALTH 50%	ECWEALTH 25%
Argentina*	0.216	0.331	0.197	0.335	0.190	0.333	0.165	0.255	Argentina*	0.630	0.407	0.606	0.424	0.612	0.425	0.659	0.450
Brazil	0.199	0.327	0.209	0.337	0.212	0.351	0.204	0.343	Brazil	0.621	0.414	0.651	0.429	0.659	0.460	0.671	0.489
Chile	0.245	0.372	0.197	0.310	0.188	0.296	0.163	0.287	Chile	0.656	0.448	0.631	0.441	0.625	0.425	0.677	0.391
Colombia	0.222	0.351	0.243	0.367	0.248	0.383	0.232	0.343	Colombia	0.649	0.435	0.605	0.383	0.612	0.389	0.710	0.504
Costa Rica	0.212	0.311	0.215	0.330	0.213	0.343	0.196	0.324	Costa Rica	0.636	0.408	0.671	0.463	0.669	0.454	0.646	0.468
Mexico	0.230	0.394	0.235	0.368	0.233	0.375	0.208	0.342	Mexico	0.649	0.489	0.637	0.428	0.639	0.420	0.702	0.512
Peru	0.269	0.475	0.286	0.436	0.299	0.468	0.242	0.412	Peru	0.692	0.567	0.626	0.381	0.620	0.375	0.719	0.515
Uruguay	0.202	0.300	0.181	0.290	0.166	0.267	0.141	0.276	Uruguay	0.623	0.375	0.659	0.478	0.659	0.457	0.634	0.411
Dominican Republic	0.201	0.324	0.206	0.297	0.208	0.298	0.212	0.313	Dominican Republic	0.618	0.397	0.727	0.552	0.709	0.518	0.690	0.425

Source: Author's analysis of OECD (2015), PISA 2015 Database: School questionnaire [data file and codebook], retrieved from <http://www.oecd.org/pisa/data/2015database>  
 Note: \*The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable.

The results are noticeably different when the economic variable ECWEALTH is used instead of ESCS in the evaluation. According to all the indexes, Chile is not one of the most segregated countries and falls to second place of minor segregation in the list after Uruguay. In some cases, Argentina is better positioned but we decided not to consider it for the technical problems mentioned before. In fact, with 2012 data, Argentina has better results than Chile in terms of segregation.

The analysis uses reasonable measures for defining the vulnerable population. The data show the results based on the population falling below the second quartile for each variable (50th percentile) or the first quartile of the population (25th percentile). Based on these measures, Chile shows medium levels of segregation compared to its regional neighbors.

On the one hand, Chile tops the segregation indexes when the ESCS and the median vulnerability (second) quartile are considered. When other variables are used, other countries show a higher level of socioeconomic segregation than does Chile. On the other hand, when ESCS and ECWEALTH are used in the analysis, just Peru demonstrates hyper-segregation as defined by the study of Glaeser and Vigdor.<sup>40</sup> That is, it shows a dissimilarity index above 0.6.

Table 5 shows the correlation of the four measures used in the dissimilarity index. When the index is above 0.90, the same variables indicate different degrees of vulnerability. Therefore, the correlation between ECWEALTH when applied to vulnerable persons in the first quartile (ECWEALTH 25%) and the second quartile (ECWEALTH 50%) is 0.84.

Finally, Table 6 shows the correlation among the different segregation indexes for the ECWEALTH variable when the population identified in the first quartile is considered vulnerable. In all the cases the correlation is high (above 0.90).

In summary, school segregation measures are more sensitive to the variable used to differentiate social groups than they are to the segregation index.

The dynamic analysis conducted on data from 2000 to 2015 shows that, in general terms, school segregation decreased in Chile and Argentina but increased in Peru. For the other countries, results depend on the variable and index considered.

**TABLE 5** Correlations of Different Social Variables with the Dissimilarity Index

	ESCS (50%)	ESCS (25%)	ECWEALTH (50%)	ECWEALTH (25%)
ESCS (50%)	1.000			
ESCS (25%)	0.917	1.000		
ECWEALTH (50%)	0.656	0.658	1.000	
ECWEALTH (25%)	0.700	0.749	0.842	1.000

*Source:* Author's analysis of OECD (2015), *PISA 2015 Database: School questionnaire* [data file and codebook], retrieved from <http://www.oecd.org/pisa/data/2015database>  
*Note:* The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable.

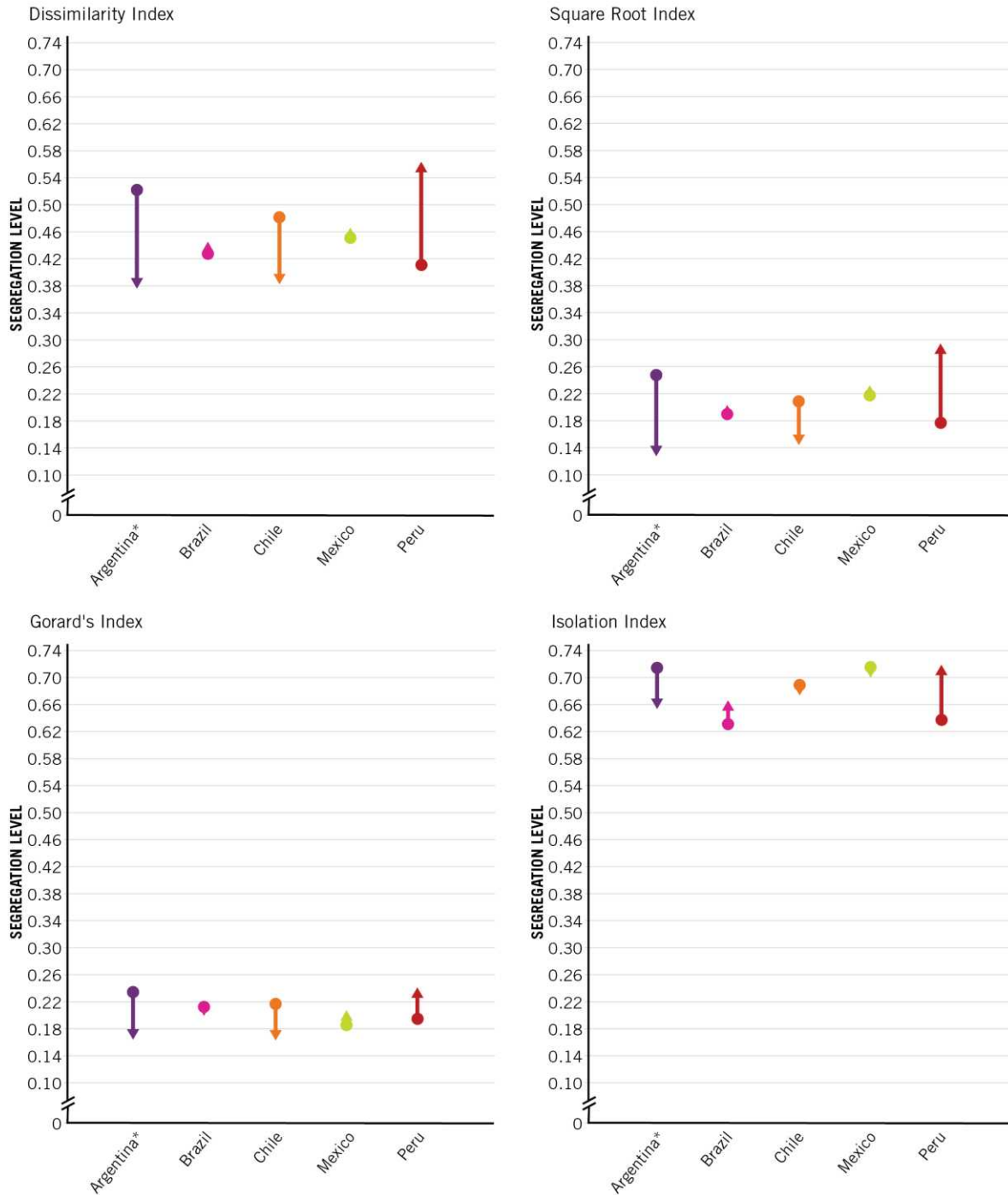
**TABLE 6** Correlations Between Different Segregation Indexes

	Dissimilarity	Gorard's Index	Square Roots	Isolation
Dissimilarity	1.000			
Gorard's Index	1.000	1.000		
Square Roots	0.936	0.936	1.000	
Isolation	0.987	0.987	0.954	1.000

*Source:* Author's analysis of OECD (2015), *PISA 2015 Database: School questionnaire* [data file and codebook], retrieved from <http://www.oecd.org/pisa/data/2015database>  
*Note:* The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable.

**FIGURE 6****Changes in Socioeconomic Segregation Levels in Latin American Countries Measured with an Index of Household Possessions (PISA)**

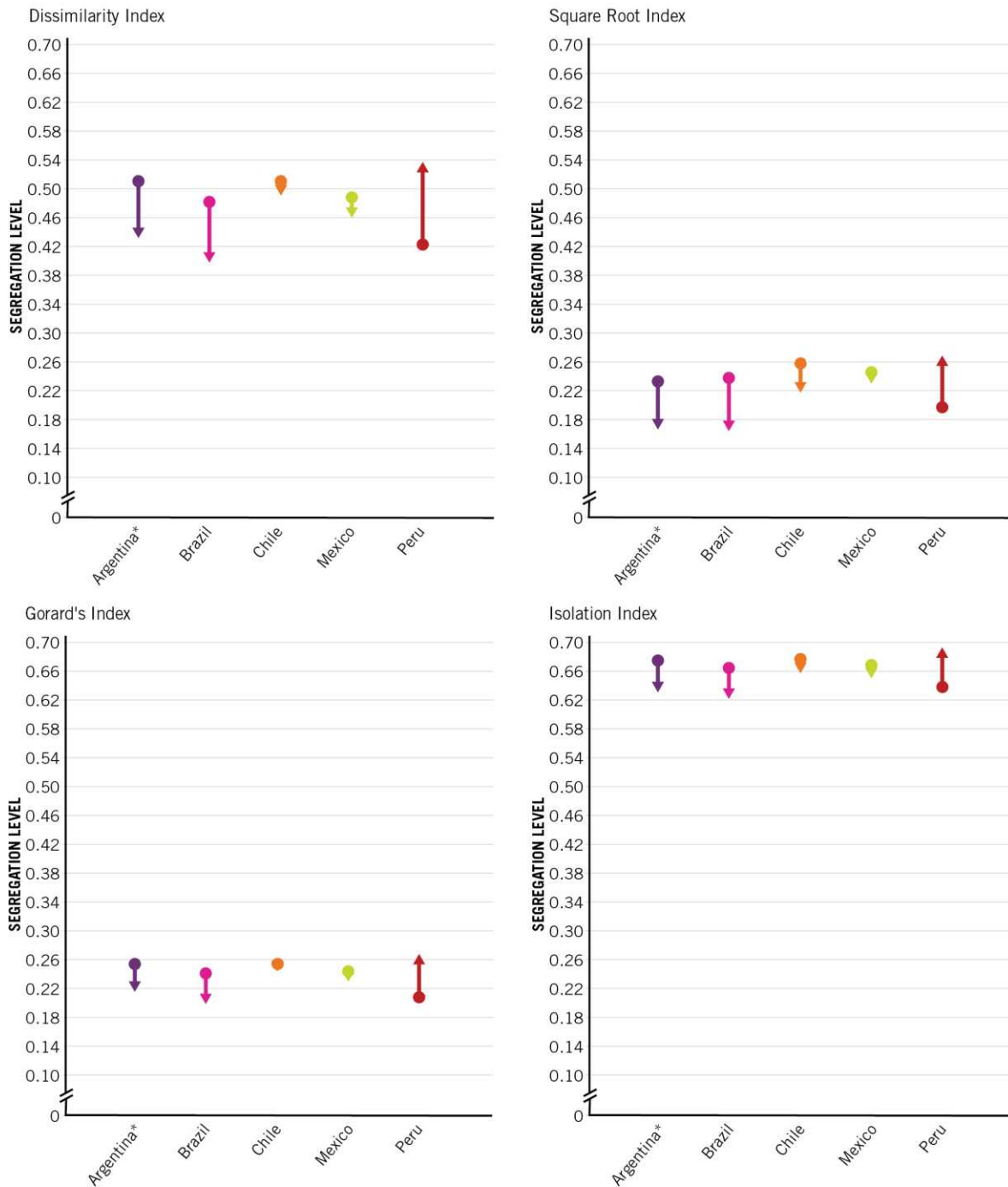
Between 2000 and 2015, the decline in socioeconomic segregation levels is observed again when applying a specific indicator linked to household possessions.



Source: Author's calculations of OECD (2000), *PISA 2000 Database: School questionnaire* [data file and codebook], retrieved from <http://www.oecd.org/pisa/data/database-pisa2000.htm>; OECD (2015), *PISA 2015 Database: School questionnaire* [data file and codebook], retrieved from <http://www.oecd.org/pisa/data/2015database>  
 Notes: Higher values indicate higher levels of segregation. \*The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable.

**FIGURE 7****Changes in Socioeconomic Segregation Levels in Latin American Countries Measured with the Index of Economic, Social, and Cultural Status (PISA)**

Between 2000 and 2015, Chile reduced levels of socioeconomic segregation slightly in each of four indexes. Some Latin American countries have exhibited even more decreases (Argentina), while others have shown increases (Peru).



Source: Author's calculations of OECD (2000), *PISA 2000 Database: School questionnaire* [data file and codebook], retrieved from <http://www.oecd.org/pisa/data/database-pisa2000.htm>; OECD (2015), *PISA 2015 Database: School questionnaire* [data file and codebook], retrieved from <http://www.oecd.org/pisa/data/2015database>  
 Notes: Higher values indicate higher levels of segregation. \*The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable.



## Determinants of School Segregation and Academic Achievement

The segregation measures are sensitive to both the variables considered to approximate the socioeconomic level of the students and to the measures used to define vulnerability. To a lesser degree, they are also sensitive to the segregation index used. As expected, the estimations that I used to explore the determinants for segregation also are sensitive.

To perform these estimates, a panel must be built with aggregate nation-level data for the six PISA surveys carried out between 2000 and 2015. The results of the estimations are shown for the variables ESCS and ECWEALTH for those below the second quartile (50% of the population) of the dissimilarity index. To corroborate the results, the results for all segregation indexes for both variables, as well as other measures of vulnerability (second and first quartile), for the analysis are shown in the Appendix. Also, to determine the consistency of the results, different models were considered, adding regressors in a progressive growth.

First, inequality was determined through a constructed Gini index of the variables analyzed (ESCS) and the socioeconomic level (ESCS or ECWEALTH in absolute terms).<sup>41</sup> In general terms, both were significant and with the expected sign: positive for inequality and negative for socioeconomic level.

The next variable entered was RURALITY to account for the smaller population of nonurban areas where there would be fewer school choice options and, therefore, less segregation. When segregation was measured using the ESCS variable, the coefficient was not significant, but in the cases in which it was significant, RURALITY had the expected negative sign. On the other hand, when it was measured with the ECWEALTH variable, RURALITY was significant and positive. This may be due to the fact that relatively rich countries tend to have low levels of rurality and low segregation.

The COVERAGE level was, in general, insignificant, but in some cases was significant and positive.<sup>42</sup> (See Appendix.) In principle, it explains that when the coverage of the educational system is low, the children that do not attend school are not part of the estimation of segregation in the school system. Therefore, a high value for COVERAGE indicates that many children living in poor economic conditions are incorporated into the school, which could increase the measure of segregation.

The PRIVATE variable represents the proportion of private schools over total schools. This variable was significant, and its sign was positive when segregation was measured with the ESCS variable. Private schools perceived by some families to offer better education or a differentiated pedagogy, may lead to increased segregation. In many areas within Latin American countries, access to private schools remains restricted to those who can pay fees, so that the most vulnerable populations are excluded. However, in the case of private schools with state funding (e.g., those in Chile and Argentina), students probably pay some contribution to attend a preferred school.

In addition, I used four variables to evaluate the mechanisms that tend to foster competition among schools and affect their autonomy. Two variables address school enrollments pursued through student recruitment. One variable accounts for selection requirements determined by residential area. In this situation, which is attributed to lack of choice (ADMIS\_RESIDENCE), prospective students must live close to the school. In another requirement, academic achievement is considered to offer schools a choice in admissions (ADMISION\_COMP). Only the ADMIS\_RESIDENCE was significant, and the sign was negative. A higher share of schools with residence-based admissions requirements is associated with less segregation. This does not necessarily mean that in the absence of school choice, school segregation could decrease. In effect, very urban segregated populations will necessarily register a greater school segregation. Unfortunately, PISA does not quantify urban segregation, and therefore such effect cannot be taken into account. Additionally, this conclusion covers the average of the entire PISA sample, which does not imply that this can be extrapolated to the Chilean case.

Two other variables were built to reflect the autonomy for management of school resources (AUTON\_RESOURCE) and the establishment of educational policies (AUTON\_ASSESS). When segregation was measured with ESCS variable, the impact of these variables on school segregation cannot be affirmed, but when ECWEALTH was used both variables AUTON\_RESOURCE and AUTON\_ASSESS were significant and showed a negative sign, which shows that school autonomy is negatively related to school segregation.

**TABLE 7**

Regression on the Dissimilarity Index with ESCS Variable and 50 Percent Vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.243* (0.12)	0.306** (0.14)	0.350** (0.14)	0.357** (0.14)	0.374*** (0.13)	0.378*** (0.13)
ESCS	-0.039*** (0.01)	-0.042*** (0.01)	-0.044*** (0.01)	-0.044*** (0.01)	-0.045*** (0.01)	-0.046*** (0.01)
RURAL		-0.04 (0.02)	-0.036 (0.02)	-0.014 (0.02)	-0.022 (0.02)	-0.009 (0.02)
COVERAGE		-0.002 (0.03)	0.01 (0.03)	0.017 (0.03)	0.014 (0.03)	0.019 (0.03)
PRIVATE			0.053*** (0.02)	0.040** (0.02)	0.045** (0.02)	0.034* (0.02)
ADMISSION_COMP				0.003 (0.01)		0.002 (0.01)
ADMISSION_RESIDENCE				-0.067*** (0.02)		-0.061*** (0.02)
AUTON_RESOURCE					-0.014 (0.02)	-0.021 (0.02)
AUTON_ASSESS					0.038 (0.02)	0.039 (0.02)
Constant	0.345*** (0.01)	0.350*** (0.03)	0.324*** (0.03)	0.349*** (0.03)	0.297*** (0.03)	0.326*** (0.04)
R Square						
Overall	0.053	0.072	0.104	0.154	0.107	0.143
Within	0.376	0.411	0.434	0.46	0.451	0.469
Between	0.283	0.318	0.368	0.398	0.387	0.414
Observations	346	323	318	318	316	316
Groups	82	79	79	79	79	79

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

As for the segregation case, regarding the determinants of academic achievement, a panel was built with nation-level aggregate data for the PISA evaluations carried out between 2000 and 2015.<sup>43</sup> The new variables entered accounted for school inputs: an index constructed by PISA that synthesizes the quality of educational resources (SCMATEDU), the quantity of students per teacher (STRATIO), and the proportion of certified teachers (PROPCERT).

**TABLE 8**

Regression on the Dissimilarity Index with ECWEALTH Variable and 50 Percent Vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.489*** (0.08)	0.512*** (0.09)	0.536*** (0.09)	0.521*** (0.09)	0.444*** (0.10)	0.426*** (0.09)
ECWEALTH	-0.045*** (0.01)	-0.043*** (0.01)	-0.043*** (0.01)	-0.043*** (0.01)	-0.030** (0.01)	-0.027** (0.01)
RURAL		0.021 (0.03)	0.042 (0.03)	0.052* (0.03)	0.078*** (0.03)	0.095*** (0.03)
COVERAGE		-0.016 (0.04)	-0.009 (0.04)	-0.008 (0.04)	0.007 (0.04)	0.008 (0.04)
PRIVATE			0.058** (0.03)	0.044 (0.03)	0.089*** (0.02)	0.073*** (0.02)
ADMISSION_COMP				0.005 (0.02)		0.001 (0.02)
ADMISSION_RESIDENCE				-0.052** (0.02)		-0.084*** (0.03)
AUTON_RESOURCE					-0.059** (0.02)	-0.071*** (0.02)
AUTON_ASSESS					-0.075*** (0.03)	-0.083*** (0.03)
Constant	0.202*** (0.01)	0.211*** (0.04)	0.185*** (0.04)	0.212*** (0.05)	0.257*** (0.04)	0.317*** (0.05)
R Square						
Overall	0.48	0.517	0.545	0.551	0.547	0.569
Within	0.017	0.029	0.023	0.033	0.108	0.134
Between	0.55	0.581	0.632	0.63	0.616	0.632
Observations	277	258	255	255	254	254
Groups	81	78	78	78	78	78

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

As in the analysis of academic achievement, the variables served as measures of inequality (GINI) and others describe the socioeconomic level of the students (ECWEALTH). In general terms, both variables were significant and with the expected sign: The higher the inequality, the lower the academic marks, and the higher the socioeconomic level, the higher the academic marks. This result indicates that the relative importance of the economic characteristics of the population is great regardless of whether those data are represented directly by the ECWEALTH variable or indirectly by the GINI variable.

TABLE 9

Regression on Academic Achievement (PISA Average of Math, Reading, and Science)

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	-95.6*** (27.55)	-94.3*** (25.83)	-85.9*** (27.19)	-96.5*** (24.86)	-97.8*** (28.12)	-94.8*** (28.04)
ESCS	21.6*** (5.92)	22.6*** (6.14)	23.9*** (7.05)	22.9*** (5.98)	20.4*** (6.20)	21.2*** (7.11)
ECWEALTH	1.2* (0.66)	1.0 (0.62)	1.2* (0.69)	1.1* (0.62)	0.7 (0.65)	0.8 (0.75)
RURAL		13.6 (15.43)	13.6 (16.67)	17 (15.81)	3.7 (17.82)	6.6 (19.55)
COVERAGE		29.6** (14.56)	32.5* (17.04)	28.1* (14.38)	34.9** (15.03)	38.1** (18.36)
PRIVATE		-0.2 (9.47)	-1.5 (9.52)	-1.5 (9.46)	-5.4 (9.76)	-10.7 (10.03)
SCMATEDU			3.7* (1.95)			4.5** (2.17)
STRATIO			-0.3 (0.78)			-0.4 (0.83)
PROPCERT			0.9 (10.53)			-2.3 (10.10)
ADMISSION_COMP				12.9*** (3.98)		10.9** (4.49)
ADMISSION_RESIDENCE				-1.1 (9.26)		-4.1 (9.63)
AUTON_RESOURCE					9.6 (11.62)	9 (11.92)
AUTON_ASSESS					14.1 (12.09)	18.9* (11.12)
Constant	469.2*** (14.00)	442.9*** (17.90)	443.1*** (24.81)	433.3*** (17.99)	430.2*** (20.15)	426.4*** (28.31)
R Square						
Overall	0.422	0.388	0.403	0.389	0.44	0.455
Within	0.093	0.161	0.175	0.183	0.145	0.174
Between	0.373	0.302	0.302	0.295	0.352	0.343
Observations	304	281	262	281	279	260
Groups	81	78	76	78	78	76

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

Among the variables of the school inputs, only SCMATEDU was significant, but the impact of it is relatively low. Another statistically significant variable was COVERAGE, positively related to the academic level. This may be due to the fact that, in general, countries with high performance also have high coverage, although a causal relationship between the two variables can hardly be identified.

Finally, regarding the autonomy of the schools, the significant variable that showed the most robustness was AUTON\_ASSESS, the variable that explains the autonomy to determine educational policies.

## **DISCUSSION**

### **The Chilean Voucher System and Quasi-Monopolies**

The evidence presented shows the differences in the organization of the educational systems as well as the differences that set Chile apart from other Latin American countries. These findings should be considered as a whole and not separately.

For example, Chile has the system with the largest share of private educational options among the group of countries studied in this paper, but Argentina and Peru also show similar percentages of educational options to those of Chile. However, the differences that matter relate to more than the proportion and size of the private sector. The mode of organization is also important.

Both Chile and Argentina provide state funding to the private sector, but in Chile, it is directed to the demand and not to the supply. On one hand, the data provided by PISA show that Argentina, which uses supply-side funding, has a smaller percentage of private schools without state funding than Chile. On the other hand, Argentina and Peru show a comparable share of private enrollments but the funding mechanisms are organized differently than in Chile. State funds are allocated to Chilean students, but in Argentina they are directed to the schools through subsidies that are allotted by the state bureaucracy. In addition, this subsidy is part of the educational budget (teachers' salaries) and found in variable proportions (40% to 100%). Furthermore, in all cases, schools can charge fees such that the subsidies reduce the fees for attending private schools, which also enjoy more flexibility for pedagogic and administrative decisions.<sup>44</sup>

Peru, in contrast to Chile or Argentina, directs virtually no state funds to private schools, so the high proportion of private schools suggests an exit of those in social sectors with the personal financial capacity to leave public schools. As in the Argentinean case, Peruvian schools have relative autonomy, and certain private schools serve high income social sectors.

This situation puts into question the linear correspondence between an educational system with vouchers and an increase in private school enrollment. The correspondence is less obvious and more complex than it first appears because educational systems with no free school choice programs can also experience important growth in private school enrollments without loss of monopolistic control over public schools and without competition among schools. Furthermore, the public money directed to the private sector is not exclusively from a voucher system. In fact, in the Argentinean quasi monopoly, funds are ultimately directed to private education as in Chile.

Regardless of the origin of the funds, in Chile the important mechanisms promote competition among schools and their autonomy for both decision making regarding school resources and educational policies. The residence and data related to the admission of students confirm competition among Chilean schools. Schools also have more autonomy in determining teachers' labor conditions and formulation of educational budgets in Chile than in the other Latin American countries in the study. Likewise, administrators in Chilean schools have greater capacity for disciplinary decision making and establishment of evaluation criteria, including admission of students, selection of school textbooks, and determination of course or syllabus content than do educators in other countries.

The differences between Chile and the other Latin American countries (considered as a group) that emerge from the PISA data confirm the hypothesis that Chile forms an educational quasi-market that largely comports to the characteristics described by the theory that undergirds the study: demandside subsidy, free school choice, administrative and pedagogic school autonomy, and competition among schools. The other Latin American countries studied seem to form quasi-monopolies of educational systems that differ structurally from the Chilean system: some provide suppside subsidies (to private school) and others grant more autonomy in one form or another (pedagogic, administrative, or both); in some cases, schools compete and school choice is available for those families with the financial capacity to afford the school fees. The contraposition of the Chilean educational quasi-market and the quasi-monopoly of the other countries is clear.

### **Superior Academic Achievement Under the Voucher System?**

The evidence presented shows the considerable higher academic achievement of Chilean students, which has improved in recent years. According to each test and the results emerging over time, it is possible that the Chilean educational model seems to explain the student success.

The proposed model shows that, although the impact differs according to the inputs, the SCMATÉDU variable explains the performance seen from PISA data. This result comports with other studies on the determinants of academic achievement.<sup>45</sup>

Finally, in the latter years analyzed, the literature gives considerable attention to school autonomy and competition in measures of academic achievement, and these concerns have been important in the analysis undertaken for this study.<sup>46</sup> Among the variables associated with school autonomy is AUTON\_ASSESS. Although it shows a weak relationship, it is statistically significant, which explains the role of school autonomy in making educational policy decisions as a positive correlation to academic results.

### **Is There a Tradeoff Between Segregation and Education Quality?**

School segregation created by residence requirements, as described by PISA reports, was statistically significant and carried a negative sign, suggesting that the recruitment of students by

proximity to the school is correlated with more school segregation. This finding places the explanation for segregation not on the school system, but on the composition of the social fabric, especially in urban areas. In light of the findings that the characteristics of the populations are more critical than the model of the school, others should be inspired to examine the effects of urban segregation on school segregation.<sup>47</sup>

With regard to the variables that, contrary to the findings from PISA data, show that two characteristics of the school system organizations are relevant: autonomy for decision making in the management of school resources and schools' ability to determine their own policies. The overall results show that these autonomy variables do not correlate with school segregation. However, in some cases, both variables were significant and negative, indicating that greater autonomy could be associated with low levels of segregation.

As for the inequality (GINI) and socioeconomic (ECWEALTH and ESCS) variables, higher measures of inequality were associated with lower academic achievement, and higher socioeconomic levels were associated with better academic performance. Therefore, the socioeconomic variables unassociated with the school are better predictors of school segregation than are intraschool variables. The data provided a specific comparison among countries (including Chile with the voucher system) in cases in which the socioeconomic variables are determinant.

The evidence shows that Chile's higher levels of school segregation change considerably when the variable used as a reference is changed. In fact, if a social and cultural index of the population is considered instead of a socioeconomic index of students, then school segregation levels are at a medium level, rather than a high level. This sensitivity to the measurement instruments, especially when added to the weight of the out-of-school variables, suggests that high levels of school segregation are an avoidable destiny for those participating in a voucher system and that quasi-monopolistic educational models result in greater segregation. For instance, in the 2000–2015 period, Chile experienced a strong fall in school segregation, especially in the most recent years, but the academic level of the students increased remarkably. The improvement in the academic performance has not been sacrificed for an increase in segregation.

## CONCLUSION

The analysis of the evidence provided by PISA shows a scenario that makes it possible to confront the usual arguments in the global debate (and especially in the United States) in relation to the Chilean school choice system. The negative critiques of the Chilean voucher proposal are covered by two dimensions of analysis: (a) educational quality due to ineffectiveness of the voucher system and (b) school segregation as a consequence of the quasi-market system. New York University Professor Dianne Ravitch's blog post is typical of the opposition to "the Chilean experiment."<sup>48</sup> MacLeod and Urquiola, who studied various instances of school competition in underdeveloped countries, offer a structure on which to explain the most common critiques found in academic literature:



“If there exists a substantial private productivity advantage, then one would expect Chile’s relative performance on national and international tests to have improved over the years in which large numbers of children were transferred into the private sector. Furthermore, one would expect Chile to outperform other countries with similar levels of gross domestic product per capita. Neither of these predictions receives much support in the data. Other than a recent improvement in PISA test scores, 14 national test scores in Chile have been largely stagnant even as educational spending has increased substantially.”<sup>49</sup>

However, the analysis carried out in this study provides evidence that counters the claims made by critics of Chile’s voucher system. To begin with, there are data indicating that, in addition to their comparable social, political, and educational history, countries in the region also show relatively equivalent economic performances. As for the GDP per capita, in the year 2000, the countries studied in this work (except Peru) were in the same range: between \$3,500 (Brazil) and \$7,700 (Argentina). In 2015, after a decade of economic growth in the region, the Latin American countries remained in the same range but their relative positions were changed. In 2000, Chile had the fourth highest GDP, after Argentina, Uruguay, and México. In 2015, Chile was ranked first in GDP.

Despite the similarities mentioned above, the analysis of the 2000–2015 PISA series shows that Chile is one of the Latin American countries with the most improved test scores. This comparative study suggests that the characteristics of the Chilean school model may help to explain academic achievement. In other words, Chile is more effective than its neighboring countries, and the voucher system cannot be excluded as a reason for the relatively high Chilean ranking.

In the 15 years of PISA reports, Chile not only progressed in educational achievement, it also grew economically, as demonstrated through GDP per capita, while countries, such as Mexico, have remained stagnant, or like Argentina, have grown less. Some research shows the relation between economic development and the organization of the school system.<sup>50</sup>

Regarding the issues related to socioeconomic segregation, MacLeod and Urquiola conclude their literature review:

“There is robust evidence that competition resulted in increased stratification by family background and ability. These results are generally consistent with the consensus within Chile (as articulated recently by the country’s conservative President Piñera) that the school choice system “perpetuates inequality,” and has not done enough to raise learning.”<sup>51</sup>

In this comparative analysis, the evidence shows that the characteristics of school segregation are not unique to the Chilean free school choice model. Most Latin American countries have similar

levels of segregation but with a very different organization of school systems. The variation verified when measuring dynamic school segregation counters the argument that segregation is the price to pay for better education quality; other countries have more segregation and relatively poor education quality (Peru), but the Chilean education voucher system does not worsen segregation levels and is associated with relatively high education quality.

In resuming the comparative analysis, the results of this relatively short-term study do not affirm the contention that increased social stratification stems automatically from a voucher system in education. In fact, the evidence suggests that processes of socioeconomic segregation are characteristic of the region and may precede the establishment of the respective national educational systems examined in this study. As stated by Goldring and Hausman, “Research comparing the distribution of students by social class in a system of choice to the social class distribution that would have existed based solely on neighborhood school assignment is clearly needed.”<sup>52</sup>

In response to claims that the Chilean free school choice system has not done enough to raise learning, one can argue that Chile has the highest performance and better improvement, according to the 2000 to 2105 PISA reports, than others in the region. What would have happened if Chile had not implemented a voucher system with performance, equality, and segregation indicators? What would have happened if one of the democratic presidents would have taken measures to return to a model without free school choice for families, administrative autonomy, and competition among schools? If Chile had not kept its model of free school choice, would it have emerged as the educational leader of the region?

The counterfactual questions lead to logically inconsistent answers. However, the comparative analysis offers some provisional evidence: Latin American countries that did not implement promarket reform (Argentina and Uruguay) show worse outcomes than Chile and have become stagnant over time. The Argentinean case is interesting because, like Chile, state-funded private education increased remarkably, but with supply-side not demand-side state awards, and the results are inferior to those obtained by Chile; that is, Argentina shows relatively poor performance and maintains the Latin American pattern of segregation.

MacLeod and Urquiola stated, “The impact of competition has proven to be more mixed and modest than expected.”<sup>53</sup> The impact of free school choice on an entire educational system is affected by the value added by the implemented reform and therefore comparative studies are necessary. The evidence seems conclusive regarding the impact of the Chilean model (granting some modesty in terms of the highest expectations), which is greater than that of the traditional quasi-monopolies of educational systems, some of which not only show lack of improvement but also remarkable stagnation.

The scenario depicted through this study allows stakeholders in the United States (and others across the globe) to engage in debate over school choice with a deeper understanding of the limits and possibilities of its application in a country with a history of school choice over the past

several years. In fact, the educational leadership in the region, to a certain degree, stems from the voucher model.

As stated by MacLeod and Urquiola,

“Given the numerous reforms that have occurred in Chile over the past two decades (e.g., compensatory funding for schools with low income students, accountability initiatives, teacher pay reform, early childhood programs etc.) it is difficult to attribute this change to a particular intervention, let alone to the introduction of school choice three decades back.”<sup>54</sup>

However, a review of the literature about recent educational reform in Latin America shows that in all countries reforms were directed to compensatory funding for schools with low-income students and early childhood programs, and very few (including Chile) implemented accountability initiatives and teacher pay reforms.<sup>55</sup> However, in the Chilean case, these reforms seem to follow the rules of a quasi-market, while the other Latin American countries perpetuated the quasi-monopoly of their educational systems.

Do the previous conclusions merit a generalized recommendation for the implementation of education policies based on a free school choice model? The stance of Verger and Zancajo for moderation is quite appropriate.<sup>56</sup> The model used in this work tends to exclude variables (usually, related to individual, institutional, and/ or contextual characteristics) that are not easily measurable or for which no data are available. This is a technical issue but creates serious implications because the unmeasured characteristics affect the analysis.

Those with experience in educational research will recognize that many variables were considered in this study. Issues related to the cultural identities of the families, the pedagogic behaviors of the schools, the use of information to choose schools, among others, were not taken into account, and as proven in previous works, the qualitative methodologies can be of great help.

Another central national characteristic that was not analyzed and that could possibly show another advantage of free school choice: The cultural, religious, and pedagogical diversity of schools is enhanced when schools are granted wider margin for implementing institutional projects. A quasi-monopoly offers no institutional incentives for favoring diversity, but instead exacts a homogeneous profile in the public schools, leaving additional possibilities in private schools only for those families who can afford to enroll. Furthermore, voucher systems tend to increase the possibility of a diverse school through the respectful consideration of the interests of the people, as demonstrated in a democratic society.<sup>57</sup>

As per the recommendations of Verger and Zancajo, stakeholders must proceed carefully from evidence-based to evidence-informed policy; politics and principled beliefs need to complement evidence-based policy.<sup>58</sup> In the case presented in this work, the evidence shows that many negative explanations regarding a voucher system actually become prejudices when comparing

Chile with similar countries. This bias calls for a rational and unprejudiced debate on the advantages and achievements of an educational organization in operation for more than 30 years that shows benefits over those found in the prevailing quasimonopolies of most Latin American countries.

## APPENDIX

### Regression Tables

**TABLE A1** Regression Dissimilarity Index with ESCS variable and 50 percent vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.243* (0.12)	0.306** (0.14)	0.350** (0.14)	0.357** (0.14)	0.374*** (0.13)	0.378*** (0.13)
ESCS	-0.039*** (0.01)	-0.042*** (0.01)	-0.044*** (0.01)	-0.044*** (0.01)	-0.045*** (0.01)	-0.046*** (0.01)
RURAL		-0.04 (0.02)	-0.036 (0.02)	-0.014 (0.02)	-0.022 (0.02)	-0.009 (0.02)
COVERAGE		-0.002 (0.03)	0.01 (0.03)	0.017 (0.03)	0.014 (0.03)	0.019 (0.03)
PRIVATE			0.053*** (0.02)	0.040** (0.02)	0.045** (0.02)	0.034* (0.02)
ADMISSION_COMP				0.003 (0.01)		0.002 (0.01)
ADMISSION_RESIDENCE				-0.067*** (0.02)		-0.061*** (0.02)
AUTON_RESOURCE					-0.014 (0.02)	-0.021 (0.02)
AUTON_ASSESS					0.038 (0.02)	0.039 (0.02)
Constant	0.345*** (0.01)	0.350*** (0.03)	0.324*** (0.03)	0.349*** (0.03)	0.297*** (0.03)	0.326*** (0.04)
R Square						
Overall	0.053	0.072	0.104	0.154	0.107	0.143
Within	0.376	0.411	0.434	0.46	0.451	0.469
Between	0.283	0.318	0.368	0.398	0.387	0.414
Observations	346	323	318	318	316	316
Groups	82	79	79	79	79	79

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

TABLE A2

Regression Duncan Index with ESCS variable and 50 percent vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.117* (0.06)	0.149** (0.07)	0.170** (0.07)	0.174** (0.07)	0.183*** (0.07)	0.185*** (0.07)
ESCS	-0.020*** (0.00)	-0.021*** (0.01)	-0.022*** (0.01)	-0.022*** (0.01)	-0.023*** (0.01)	-0.023*** (0.00)
RURAL		-0.020* (0.01)	-0.018 (0.01)	-0.007 (0.01)	-0.011 (0.01)	-0.005 (0.01)
COVERAGE		-0.001 (0.01)	0.005 (0.01)	0.008 (0.01)	0.007 (0.01)	0.01 (0.01)
PRIVATE			0.026*** (0.01)	0.020** (0.01)	0.022** (0.01)	0.016* (0.01)
ADMISSION_COMP				0.002 (0.00)		0.001 (0.00)
ADMISSION_RESIDENCE				-0.034*** (0.01)		-0.031*** (0.01)
AUTON_RESOURCE					-0.007 (0.01)	-0.011 (0.01)
AUTON_ASSESS					0.020 (0.01)	0.020 (0.01)
Constant	0.173*** (0.01)	0.175*** (0.02)	0.162*** (0.02)	0.175*** (0.02)	0.148*** (0.02)	0.163*** (0.02)
R Square						
Overall	0.376	0.411	0.434	0.46	0.451	0.469
Within	0.051	0.07	0.1	0.151	0.104	0.141
Between	0.282	0.318	0.368	0.398	0.386	0.414
Observations	346	323	318	318	316	316
Groups	82	79	79	79	79	79

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

TABLE A3

Regression Square Root Index with ESCS variable and 50 percent vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.198* (0.11)	0.217* (0.12)	0.249** (0.11)	0.247** (0.11)	0.277** (0.11)	0.276** (0.11)
ESCS	-0.038*** (0.01)	-0.038*** (0.01)	-0.039*** (0.01)	-0.040*** (0.01)	-0.041*** (0.01)	-0.042*** (0.01)
RURAL		-0.012 (0.02)	-0.008 (0.02)	0.009 (0.01)	0 (0.02)	0.011 (0.02)
COVERAGE		-0.014 (0.02)	-0.005 (0.02)	-0.001 (0.02)	-0.002 (0.02)	0.002 (0.02)
PRIVATE			0.041*** (0.02)	0.031** (0.02)	0.032** (0.02)	0.023 (0.01)
ADMISSION_COMP				-0.001 (0.01)		-0.001 (0.01)
ADMISSION_RESIDENCE				-0.055*** (0.01)		-0.052*** (0.01)
AUTON_RESOURCE					-0.013 (0.01)	-0.019 (0.01)
AUTON_ASSESS					0.039 (0.02)	0.039 (0.02)
Constant	0.103*** (0.01)	0.117*** (0.02)	0.097*** (0.02)	0.122*** (0.02)	0.070*** (0.02)	0.097*** (0.02)
R Square						
Overall	0.481	0.495	0.514	0.548	0.529	0.554
Within	0.087	0.105	0.137	0.196	0.164	0.211
Between	0.388	0.39	0.439	0.477	0.456	0.49
Observations	346	323	318	318	316	316
Groups	82	79	79	79	79	79

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

TABLE A4

Regression Isolation Index with ESCS variable and 50 percent vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.140** (0.06)	0.166** (0.07)	0.186*** (0.07)	0.187*** (0.07)	0.200*** (0.07)	0.199*** (0.07)
ESCS	-0.022*** (0.00)	-0.022*** (0.00)	-0.023*** (0.00)	-0.023*** (0.00)	-0.024*** (0.00)	-0.024*** (0.00)
RURAL		-0.014 (0.01)	-0.011 (0.01)	-0.001 (0.01)	-0.004 (0.01)	0.003 (0.01)
COVERAGE		-0.003 (0.01)	0.002 (0.01)	0.005 (0.01)	0.005 (0.01)	0.007 (0.01)
PRIVATE			0.028*** (0.01)	0.022** (0.01)	0.023** (0.01)	0.018* (0.01)
ADMISSION_COMP				0.000 (0.00)		0.000 (0.00)
ADMISSION_RESIDENCE				-0.033*** (0.01)		-0.030*** (0.01)
AUTON_RESOURCE					-0.01 (0.01)	-0.013 (0.01)
AUTON_ASSESS					0.022 (0.01)	0.023 (0.01)
Constant	0.587*** (0.01)	0.591*** (0.01)	0.578*** (0.01)	0.592*** (0.02)	0.563*** (0.01)	0.579*** (0.02)
R Square						
Overall	0.433	0.453	0.475	0.504	0.493	0.514
Within	0.076	0.094	0.131	0.182	0.144	0.181
Between	0.333	0.351	0.401	0.432	0.421	0.45
Observations	346	323	318	318	316	316
Groups	82	79	79	79	79	79

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.



**TABLE A5**

Regression Dissimilarity Index with ESCS variable and 25 percent vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.153 (0.12)	0.134 (0.14)	0.146 (0.15)	0.158 (0.14)	0.167 (0.14)	0.174 (0.14)
ESCS	-0.044*** (0.01)	-0.045*** (0.01)	-0.046*** (0.01)	-0.046*** (0.01)	-0.048*** (0.01)	-0.048*** (0.01)
RURAL		-0.017 (0.03)	-0.013 (0.03)	0.004 (0.03)	-0.003 (0.03)	0.005 (0.03)
COVERAGE		-0.02 (0.03)	-0.014 (0.03)	-0.009 (0.03)	-0.012 (0.03)	-0.009 (0.03)
PRIVATE			0.039** (0.02)	0.030 (0.02)	0.030 (0.02)	0.023 (0.02)
ADMISSION_COMP				0.005 (0.01)		0.002 (0.01)
ADMISSION_RESIDENCE				-0.048** (0.02)		-0.039* (0.02)
AUTON_RESOURCE					0.011 (0.02)	0.006 (0.02)
AUTON_ASSESS					0.026 (0.02)	0.027 (0.02)
Constant	0.366*** (0.01)	0.389*** (0.03)	0.374*** (0.03)	0.389*** (0.04)	0.346*** (0.03)	0.363*** (0.04)
R Square						
Overall	0.32	0.339	0.334	0.364	0.331	0.354
Within	0.059	0.062	0.074	0.09	0.087	0.094
Between	0.234	0.246	0.265	0.294	0.259	0.283
Observations	346	323	318	318	316	316
Groups	82	79	79	79	79	79

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

**TABLE A6**

Regression Gorard Index with ESCS variable and 25 percent vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.106 (0.09)	0.094 (0.10)	0.103 (0.11)	0.112 (0.11)	0.119 (0.11)	0.124 (0.10)
ESCS	-0.033*** (0.01)	-0.034*** (0.01)	-0.035*** (0.01)	-0.035*** (0.01)	-0.036*** (0.01)	-0.036*** (0.01)
RURAL		-0.013 (0.02)	-0.01 (0.02)	0.003 (0.02)	-0.003 (0.02)	0.004 (0.02)
COVERAGE		-0.014 (0.02)	-0.009 (0.02)	-0.005 (0.02)	-0.008 (0.02)	-0.005 (0.02)
PRIVATE			0.030** (0.01)	0.023 (0.01)	0.023 (0.01)	0.017 (0.01)
ADMISSION_COMP				0.004 (0.01)		0.002 (0.01)
ADMISSION_RESIDENCE				-0.037** (0.02)		-0.030* (0.02)
AUTON_RESOURCE					0.009 (0.02)	0.005 (0.02)
AUTON_ASSESS					0.02 (0.02)	0.021 (0.02)
Constant	0.274*** (0.01)	0.291*** (0.02)	0.279*** (0.02)	0.291*** (0.03)	0.258*** (0.03)	0.271*** (0.03)
R Square						
Overall	0.318	0.337	0.331	0.362	0.328	0.351
Within	0.058	0.061	0.073	0.091	0.087	0.095
Between	0.232	0.245	0.264	0.292	0.256	0.281
Observations	346	323	318	318	316	316
Groups	82	79	79	79	79	79

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

**TABLE A7**

Regression Square Root Index with ESCS variable and 25 percent vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.127 (0.10)	0.12 (0.11)	0.137 (0.12)	0.131 (0.11)	0.157 (0.11)	0.146 (0.11)
ESCS	-0.043*** (0.01)	-0.041*** (0.01)	-0.041*** (0.01)	-0.042*** (0.01)	-0.043*** (0.01)	-0.044*** (0.01)
RURAL		-0.001 (0.02)	-0.002 (0.02)	0.013 (0.02)	0.005 (0.02)	0.014 (0.02)
COVERAGE		-0.02 (0.02)	-0.015 (0.02)	-0.012 (0.02)	-0.014 (0.02)	-0.012 (0.02)
PRIVATE			0.027* (0.01)	0.019 (0.01)	0.019 (0.02)	0.012 (0.01)
ADMISSION_COMP				-0.003 (0.01)		-0.005 (0.01)
ADMISSION_RESIDENCE				-0.048*** (0.02)		-0.042*** (0.02)
AUTON_RESOURCE					0.004 (0.02)	-0.001 (0.02)
AUTON_ASSESS					0.026 (0.02)	0.027 (0.02)
Constant	0.127*** (0.01)	0.146*** (0.02)	0.135*** (0.02)	0.159*** (0.03)	0.111*** (0.02)	0.137*** (0.03)
R Square						
Overall	0.387	0.397	0.402	0.445	0.409	0.442
Within	0.084	0.089	0.093	0.125	0.11	0.131
Between	0.301	0.298	0.324	0.363	0.325	0.359
Observations	346	323	318	318	316	316
Groups	82	79	79	79	79	79

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

**TABLE A8**

Regression Isolation Index with ESCS variable and 25 percent vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.123 (0.08)	0.088 (0.08)	0.106 (0.09)	0.092 (0.09)	0.119 (0.08)	0.099 (0.08)
ESCS	-0.033*** (0.01)	-0.032*** (0.01)	-0.032*** (0.01)	-0.033*** (0.01)	-0.034*** (0.01)	-0.035*** (0.01)
RURAL		-0.003 (0.02)	-0.004 (0.02)	0.003 (0.02)	0.001 (0.02)	0.004 (0.02)
COVERAGE		-0.022 (0.02)	-0.019 (0.02)	-0.018 (0.02)	-0.018 (0.02)	-0.019 (0.02)
PRIVATE			0.016 (0.01)	0.012 (0.01)	0.01 (0.01)	0.008 (0.01)
ADMISSION_COMP				-0.006 (0.01)		-0.008 (0.01)
ADMISSION_RESIDENCE				-0.026* (0.01)		-0.019 (0.01)
AUTON_RESOURCE					0.013 (0.02)	0.009 (0.02)
AUTON_ASSESS					0.015 (0.01)	0.015 (0.01)
Constant	0.362*** (0.01)	0.386*** (0.02)	0.379*** (0.02)	0.397*** (0.02)	0.360*** (0.02)	0.380*** (0.02)
R Square						
Overall	0.342	0.355	0.353	0.39	0.36	0.385
Within	0.091	0.1	0.104	0.116	0.119	0.126
Between	0.253	0.26	0.272	0.305	0.271	0.296
Observations	346	323	318	318	316	316
Groups	82	79	79	79	79	79

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

**TABLE A9**

Regression Dissimilarity Index with ECWEALTH variable and 50 percent vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.489*** (0.08)	0.512*** (0.09)	0.536*** (0.09)	0.521*** (0.09)	0.444*** (0.10)	0.426*** (0.09)
ECWEALTH	-0.045*** (0.01)	-0.043*** (0.01)	-0.043*** (0.01)	-0.043*** (0.01)	-0.030** (0.01)	-0.027** (0.01)
RURAL		0.021 (0.03)	0.042 (0.03)	0.052* (0.03)	0.078*** (0.03)	0.095*** (0.03)
COVERAGE		-0.016 (0.04)	-0.009 (0.04)	-0.008 (0.04)	0.007 (0.04)	0.008 (0.04)
PRIVATE			0.058** (0.03)	0.044 (0.03)	0.089*** (0.02)	0.073*** (0.02)
ADMISSION_COMP				0.005 (0.02)		0.001 (0.02)
ADMISSION_RESIDENCE				-0.052** (0.02)		-0.084*** (0.03)
AUTON_RESOURCE					-0.059** (0.02)	-0.071*** (0.02)
AUTON_ASSESS					-0.075*** (0.03)	-0.083*** (0.03)
Constant	0.202*** (0.01)	0.211*** (0.04)	0.185*** (0.04)	0.212*** (0.05)	0.257*** (0.04)	0.317*** (0.05)
R Square						
Overall	0.48	0.517	0.545	0.551	0.547	0.569
Within	0.017	0.029	0.023	0.033	0.108	0.134
Between	0.55	0.581	0.632	0.63	0.616	0.632
Observations	277	258	255	255	254	254
Groups	81	78	78	78	78	78

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

**TABLE A10**

Regression Gorard Index with ECWEALTH variable and 50 percent vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.400*** (0.06)	0.401*** (0.06)	0.407*** (0.06)	0.401*** (0.06)	0.335*** (0.06)	0.325*** (0.06)
ECWEALTH	-0.012** (0.01)	-0.020*** (0.01)	-0.020*** (0.01)	-0.020*** (0.01)	-0.013** (0.01)	-0.012** (0.01)
RURAL		0.012 (0.01)	0.018 (0.01)	0.021 (0.01)	0.044*** (0.01)	0.052*** (0.02)
COVERAGE		0.062** (0.03)	0.064** (0.03)	0.065*** (0.03)	0.079*** (0.02)	0.081*** (0.02)
PRIVATE			0.016 (0.01)	0.012 (0.01)	0.036*** (0.01)	0.029** (0.01)
ADMISSION_COMP				0.004 (0.01)		0.005 (0.01)
ADMISSION_RESIDENCE				-0.016 (0.01)		-0.036** (0.02)
AUTON_RESOURCE					-0.051*** (0.01)	-0.057*** (0.01)
AUTON_ASSESS					-0.031** (0.01)	-0.034** (0.01)
Constant	0.048*** (0.01)	-0.011 (0.02)	-0.018 (0.03)	-0.012 (0.03)	0.018 (0.03)	0.04 (0.03)
R Square						
Overall	0.433	0.455	0.459	0.459	0.479	0.489
Within	0.062	0.111	0.108	0.116	0.226	0.244
Between	0.582	0.581	0.597	0.591	0.575	0.58
Observations	277	258	255	255	254	254
Groups	81	78	78	78	78	78

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

TABLE A11

Regression Square Root Index with ECWEALTH variable and 50 percent vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.334*** (0.07)	0.343*** (0.08)	0.357*** (0.08)	0.350*** (0.07)	0.309*** (0.08)	0.299*** (0.08)
ECWEALTH	-0.027*** (0.01)	-0.027*** (0.01)	-0.026*** (0.01)	-0.026*** (0.01)	-0.019** (0.01)	-0.018** (0.01)
RURAL		0.025 (0.02)	0.036** (0.02)	0.042** (0.02)	0.055*** (0.02)	0.065*** (0.02)
COVERAGE		-0.002 (0.03)	0.001 (0.03)	0.001 (0.03)	0.01 (0.03)	0.01 (0.03)
PRIVATE			0.031* (0.02)	0.022 (0.02)	0.048*** (0.02)	0.038** (0.02)
ADMISSION_COMP				0 (0.01)		-0.001 (0.01)
ADMISSION_RESIDENCE				-0.035** (0.02)		-0.053*** (0.02)
AUTON_RESOURCE					-0.028* (0.02)	-0.036** (0.02)
AUTON_ASSESS					-0.045** (0.02)	-0.049*** (0.02)
Constant	0.026*** (0.01)	0.022 (0.03)	0.009 (0.03)	0.029 (0.04)	0.048 (0.03)	0.087** (0.04)
R Square						
Overall	0.487	0.515	0.534	0.545	0.531	0.558
Within	0.035	0.043	0.036	0.043	0.103	0.119
Between	0.543	0.573	0.615	0.623	0.592	0.617
Observations	277	258	255	255	254	254
Groups	81	78	78	78	78	78

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

**TABLE A12**

Regression Isolation Index with ECWEALTH variable and 50 percent vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.123 (0.08)	0.088 (0.08)	0.106 (0.09)	0.092 (0.09)	0.119 (0.08)	0.099 (0.08)
ECWEALTH	-0.033*** (0.01)	-0.032*** (0.01)	-0.032*** (0.01)	-0.033*** (0.01)	-0.034*** (0.01)	-0.035*** (0.01)
RURAL		-0.003 (0.02)	-0.004 (0.02)	0.003 (0.02)	0.001 (0.02)	0.004 (0.02)
COVERAGE		-0.022 (0.02)	-0.019 (0.02)	-0.018 (0.02)	-0.018 (0.02)	-0.019 (0.02)
PRIVATE			0.016 (0.01)	0.012 (0.01)	0.01 (0.01)	0.008 (0.01)
ADMISSION_COMP				-0.006 (0.01)		-0.008 (0.01)
ADMISSION_RESIDENCE				-0.026* (0.01)		-0.019 (0.01)
AUTON_RESOURCE					0.013 (0.02)	0.009 (0.02)
AUTON_ASSESS					0.015 (0.01)	0.015 (0.01)
Constant	0.362*** (0.01)	0.386*** (0.02)	0.379*** (0.02)	0.397*** (0.02)	0.360*** (0.02)	0.380*** (0.02)
R Square						
Overall	0.342	0.355	0.353	0.39	0.36	0.385
Within	0.091	0.1	0.104	0.116	0.119	0.126
Between	0.253	0.26	0.272	0.305	0.271	0.296
Observations	346	323	318	318	316	316
Groups	82	79	79	79	79	79

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.



**TABLE A13**

Regression Dissimilarity Index with ECWEALTH variable and 25 percent vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.155*** (0.05)	0.146** (0.06)	0.153** (0.06)	0.141** (0.06)	0.131** (0.06)	0.126** (0.06)
ECWEALTH	-0.065*** (0.01)	-0.052*** (0.01)	-0.053*** (0.01)	-0.052*** (0.01)	-0.046*** (0.01)	-0.045*** (0.01)
RURAL		0.068** (0.03)	0.078** (0.03)	0.092*** (0.03)	0.100*** (0.03)	0.110*** (0.03)
COVERAGE		-0.05 (0.04)	-0.044 (0.04)	-0.042 (0.04)	-0.037 (0.04)	-0.037 (0.04)
PRIVATE			0.061*** (0.02)	0.053** (0.02)	0.073*** (0.02)	0.065*** (0.02)
ADMISSION_COMP				0.008 (0.01)		0.002 (0.02)
ADMISSION_RESIDENCE				-0.042* (0.02)		-0.043* (0.03)
AUTON_RESOURCE					-0.045** (0.02)	-0.050** (0.02)
AUTON_ASSESS					-0.017 (0.03)	-0.017 (0.03)
Constant	0.280*** (0.01)	0.315*** (0.03)	0.294*** (0.04)	0.310*** (0.04)	0.320*** (0.04)	0.345*** (0.04)
R Square						
Overall	0.434	0.472	0.495	0.492	0.516	0.527
Within	0.019	0.033	0.033	0.044	0.046	0.051
Between	0.411	0.433	0.474	0.469	0.498	0.51
Observations	305	285	282	282	280	280
Groups	81	78	78	78	78	78

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

**TABLE A14**

Regression Gorard Index with ECWEALTH variable and 25 percent vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.127*** (0.05)	0.114** (0.05)	0.120** (0.05)	0.111** (0.05)	0.093* (0.05)	0.090* (0.05)
ECWEALTH	-0.045*** (0.01)	-0.037*** (0.01)	-0.037*** (0.01)	-0.036*** (0.01)	-0.029*** (0.01)	-0.028*** (0.01)
RURAL		0.049* (0.03)	0.059** (0.03)	0.068** (0.03)	0.082*** (0.03)	0.089*** (0.03)
COVERAGE		-0.031 (0.03)	-0.027 (0.03)	-0.026 (0.03)	-0.019 (0.03)	-0.019 (0.03)
PRIVATE			0.049*** (0.02)	0.043** (0.02)	0.064*** (0.02)	0.058*** (0.02)
ADMISSION_COMP				0.005 (0.01)		-0.001 (0.02)
ADMISSION_RESIDENCE				-0.028 (0.02)		-0.03 (0.02)
AUTON_RESOURCE					-0.040** (0.02)	-0.043** (0.02)
AUTON_ASSESS					-0.028 (0.02)	-0.029 (0.02)
Constant	0.193*** (0.01)	0.215*** (0.03)	0.198*** (0.03)	0.210*** (0.03)	0.228*** (0.03)	0.248*** (0.03)
R Square						
Overall	0.396	0.421	0.446	0.443	0.471	0.482
Within	0.005	0.011	0.01	0.015	0.035	0.037
Between	0.397	0.402	0.447	0.444	0.474	0.489
Observations	305	285	282	282	280	280
Groups	81	78	78	78	78	78

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

TABLE A15

Regression Square Root Index with ECWEALTH variable and 25 percent vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.108*** (0.04)	0.091** (0.04)	0.097** (0.04)	0.084* (0.04)	0.081* (0.05)	0.074 (0.05)
ECWEALTH	-0.050*** (0.01)	-0.039*** (0.01)	-0.039*** (0.01)	-0.038*** (0.01)	-0.035*** (0.01)	-0.034*** (0.01)
RURAL		0.060*** (0.02)	0.066*** (0.02)	0.080*** (0.02)	0.081*** (0.02)	0.092*** (0.02)
COVERAGE		-0.033 (0.03)	-0.029 (0.03)	-0.028 (0.03)	-0.025 (0.03)	-0.025 (0.03)
PRIVATE			0.036** (0.02)	0.027* (0.02)	0.042** (0.02)	0.034** (0.02)
ADMISSION_COMP				0.009 (0.01)		0.007 (0.01)
ADMISSION_RESIDENCE				-0.041** (0.02)		-0.043** (0.02)
AUTON_RESOURCE					-0.033** (0.01)	-0.037** (0.02)
AUTON_ASSESS					-0.006 (0.02)	-0.005 (0.02)
Constant	0.074*** (0.01)	0.096*** (0.03)	0.084*** (0.03)	0.099*** (0.03)	0.099*** (0.03)	0.120*** (0.03)
R Square						
Overall	0.457	0.49	0.511	0.506	0.526	0.539
Within	0.029	0.046	0.04	0.063	0.057	0.073
Between	0.424	0.434	0.472	0.464	0.485	0.497
Observations	305	285	282	282	280	280
Groups	81	78	78	78	78	78

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

**TABLE A16** Regression Isolation Index with ECWEALTH variable and 25 percent vulnerability

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	0.149** (0.06)	0.145** (0.06)	0.151** (0.06)	0.157*** (0.06)	0.162*** (0.06)	0.162*** (0.06)
ECWEALTH	-0.038*** (0.01)	-0.029*** (0.01)	-0.029*** (0.01)	-0.029*** (0.01)	-0.029*** (0.01)	-0.027*** (0.01)
RURAL		0.042** (0.02)	0.050*** (0.02)	0.051*** (0.02)	0.045** (0.02)	0.050** (0.02)
COVERAGE		-0.054 (0.03)	-0.051 (0.03)	-0.053 (0.03)	-0.055 (0.04)	-0.055 (0.04)
PRIVATE			0.021 (0.02)	0.016 (0.02)	0.017 (0.02)	0.012 (0.02)
ADMISSION_COMP				-0.018 (0.02)		-0.013 (0.02)
ADMISSION_RESIDENCE				-0.023 (0.02)		-0.033 (0.02)
AUTON_RESOURCE					-0.012 (0.02)	-0.017 (0.02)
AUTON_ASSESS					0.017 (0.03)	0.013 (0.03)
Constant	0.369*** (0.01)	0.411*** (0.03)	0.402*** (0.03)	0.429*** (0.04)	0.399*** (0.04)	0.433*** (0.04)
R Square						
Overall	0.324	0.377	0.379	0.4	0.388	0.408
Within	0.023	0.022	0.022	0.022	0.021	0.024
Between	0.363	0.461	0.474	0.493	0.486	0.503
Observations	305	285	282	282	280	280
Groups	81	78	78	78	78	78

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

**TABLE A17** Math Regression

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	-103.1*** (29.51)	-98.5*** (26.87)	-92.0*** (27.56)	-99.5*** (25.72)	-100.3*** (29.43)	-97.6*** (28.65)
ESCS	25.9*** (6.39)	27.6*** (6.80)	29.0*** (7.49)	27.7*** (6.67)	25.5*** (6.80)	26.5*** (7.45)
ECWEALTH	0.7 (0.73)	0.4 (0.67)	0.5 (0.76)	0.6 (0.66)	0.1 (0.66)	0.2 (0.78)
RURAL		28.0* (16.34)	19.7 (18.41)	29.4* (16.72)	17.4 (18.36)	10.5 (20.53)
COVERAGE		33.5** (13.49)	34.0** (16.95)	32.7** (13.62)	38.2*** (14.36)	38.5** (18.55)
PRIVATE		-2.9 (9.70)	-3.5 (9.97)	-3.3 (9.59)	-7.5 (10.32)	-10.6 (10.72)
SCMATEDU			2.3 (2.21)			2.6 (2.59)
STRATIO			-0.7 (0.78)			-0.8 (0.82)
PROPCERT			2.9 (12.34)			-0.1 (11.84)
ADMISSION_COMP				13.7*** (4.77)		16.3*** (5.54)
ADMISSION_RESIDENCE				4 (9.92)		-0.2 (10.86)
AUTON_RESOURCE					12.7 (11.25)	12.1 (12.43)
AUTON_ASSESS					9.8 (13.22)	11.2 (12.77)
Constant	478.2*** (14.89)	446.5*** (15.94)	454.7*** (23.57)	432.8*** (16.15)	435.5*** (18.94)	435.7*** (26.97)
R Square						
Overall	0.407	0.351	0.377	0.358	0.397	0.424
Within	0.057	0.141	0.144	0.163	0.119	0.145
Between	0.353	0.258	0.283	0.26	0.304	0.32
Observations	305	282	263	282	280	261
Groups	81	78	76	78	78	76

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

**TABLE A18** Reading Regression

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	-125.3*** (31.10)	-120.6*** (30.55)	-108.6*** (32.54)	-125.0*** (29.67)	-126.8*** (32.26)	-120.9*** (33.45)
ESCS	18.6*** (6.40)	17.8*** (6.54)	17.8** (7.35)	18.4*** (6.44)	15.9** (6.75)	15.7** (7.69)
ECWEALTH	1.6** (0.73)	1.5** (0.68)	1.7** (0.74)	1.7** (0.69)	1.2* (0.74)	1.4* (0.84)
RURAL		5.8 (17.82)	11.8 (18.60)	12.6 (18.98)	-3.2 (21.02)	8.4 (23.08)
COVERAGE		29 (21.05)	34.1 (22.56)	26.2 (20.31)	34.8* (20.98)	38.8* (23.21)
PRIVATE		3.4 (11.79)	2.3 (11.74)	0.6 (11.84)	-1.7 (11.82)	-7.5 (11.77)
SCMATEDU			5.1* (2.97)			5.9* (3.06)
STRATIO			0 (0.91)			-0.1 (0.99)
PROPCERT			2.3 (11.32)			-0.1 (11.10)
ADMISSION_COMP				15.6*** (5.11)		10.2* (5.20)
ADMISSION_RESIDENCE				-8.5 (10.32)		-11 (10.67)
AUTON_RESOURCE					-9.4 (14.16)	-7.7 (13.48)
AUTON_ASSESS					23.7* (12.96)	27.3** (11.43)
Constant	463.4*** (15.39)	436.2*** (25.71)	426.3*** (34.02)	429.4*** (25.46)	425.1*** (26.81)	415.6*** (37.13)
R Square						
Overall	0.428	0.405	0.422	0.398	0.455	0.469
Within	0.112	0.154	0.157	0.181	0.138	0.155
Between	0.393	0.336	0.332	0.317	0.385	0.368
Observations	304	281	262	281	279	260
Groups	81	78	76	78	78	76

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

**TABLE A19** Science Regression

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	-70.4** (28.23)	-74.4*** (27.80)	-65.9** (28.35)	-75.1*** (27.09)	-77.4** (30.08)	-75.3*** (28.93)
ESCS	22.5*** (6.40)	22.9*** (6.74)	24.1*** (7.45)	22.9*** (6.54)	19.8*** (6.75)	20.5*** (7.48)
ECWEALTH	1.3* (0.66)	1.1 (0.66)	1.4** (0.70)	1.2* (0.66)	0.7 (0.68)	0.9 (0.77)
RURAL		-2.6 (16.07)	0.3 (16.62)	-1.5 (16.39)	-15 (17.98)	-8.9 (18.99)
COVERAGE		26.7* (16.09)	29.5 (18.91)	26 (16.13)	32.3* (16.51)	37.2* (20.23)
PRIVATE		-0.1 (8.64)	-2.4 (8.90)	-0.4 (8.67)	-7 (8.84)	-14 (9.93)
SCMATEDU			4.2** (1.84)			5.4*** (1.93)
STRATIO			-0.3 (0.72)			-0.3 (0.76)
PROPCERT			0.3 (10.39)			-4.1 (9.79)
ADMISSION_COMP				9.2** (4.39)		7.4 (5.11)
ADMISSION_RESIDENCE				2.1 (9.96)		-3.4 (10.54)
AUTON_RESOURCE					19.4* (11.33)	16.7 (11.90)
AUTON_ASSESS					14 (12.65)	22.5* (11.75)
Constant	468.4*** (13.45)	449.2*** (19.15)	448.1*** (24.13)	440.3*** (19.52)	432.7*** (21.23)	427.6*** (27.46)
R Square						
Overall	0.398	0.39	0.403	0.391	0.451	0.469
Within	0.076	0.122	0.162	0.133	0.133	0.181
Between	0.349	0.312	0.306	0.311	0.37	0.357
Observations	305	282	263	282	280	261
Groups	81	78	76	78	78	76

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.

**TABLE A20** Regression Average Math, Reading, and Science

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Gini	-95.6*** (27.55)	-94.3*** (25.83)	-85.9*** (27.19)	-96.5*** (24.86)	-97.8*** (28.12)	-94.8*** (28.04)
ESCS	21.6*** (5.92)	22.6*** (6.14)	23.9*** (7.05)	22.9*** (5.98)	20.4*** (6.20)	21.2*** (7.11)
ECWEALTH	1.2* (0.66)	1.0 (0.62)	1.2* (0.69)	1.1* (0.62)	0.7 (0.65)	0.8 (0.75)
RURAL		13.6 (15.43)	13.6 (16.67)	17 (15.81)	3.7 (17.82)	6.6 (19.55)
COVERAGE		29.6** (14.56)	32.5* (17.04)	28.1* (14.38)	34.9** (15.03)	38.1** (18.36)
PRIVATE		-0.2 (9.47)	-1.5 (9.52)	-1.5 (9.46)	-5.4 (9.76)	-10.7 (10.03)
SCMATEDU			3.7* (1.95)			4.5** (2.17)
STRATIO			-0.3 (0.78)			-0.4 (0.83)
PROPCERT			0.9 (10.53)			-2.3 (10.10)
ADMISSION_COMP				12.9*** (3.98)		10.9** (4.49)
ADMISSION_RESIDENCE				-1.1 (9.26)		-4.1 (9.63)
AUTON_RESOURCE					9.6 (11.62)	9 (11.92)
AUTON_ASSESS					14.1 (12.09)	18.9* (11.12)
Constant	469.2*** (14.00)	442.9*** (17.90)	443.1*** (24.81)	433.3*** (17.99)	430.2*** (20.15)	426.4*** (28.31)
R Square						
Overall	0.422	0.388	0.403	0.389	0.44	0.455
Within	0.093	0.161	0.175	0.183	0.145	0.174
Between	0.373	0.302	0.302	0.295	0.352	0.343
Observations	304	281	262	281	279	260
Groups	81	78	76	78	78	76

Source: Author's calculations. See Note 33.

Notes: The PISA 2015 sample for Argentina did not cover the full target population because of the potential omission of schools from the sample frame. Those results should be treated with caution since they may not be comparable. Robust z-statistics are reported in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 99 percent, 95 percent, and 90 percent levels, respectively, in a two-tailed test.



**TABLE A21** Glossary of Variables

ESCS	Index of families' economic, social, and cultural status based on parents' occupation and home possessions formed by three other compound variables:		
	HISEI	Highest occupational status of parents	
	PARED	Highest parental occupation	
	HOMEPOSS	Home possessions formed by a composite of two variables:	
		CULTPOS	Cultural possessions
	HEDRES	Home education resources	
ECWEALTH	Families' wealth, based primarily on home possessions, such as a private bedroom for study, educational software, internet access, cell phones, television, cars, and access to a bathroom		
AUTON_RESOURCE	A school's autonomy over its own resources, such as hiring, firing, wage setting, and budgets		
AUTON_ASSESS	A school's autonomy over its decision making, such as discipline, student assessment, admissions, curriculum		
RURALITY	Whether a school is located in a rural area		
COVERAGE	A measure of how many students living in poor economic conditions are zoned to a certain public school		
PRIVATE	The proportion of private schools in the market		
ADMISSION_RESIDENCE	Schools that require students to live in residence zones to attend		
ADMISSION_COMP	Schools that have control over their own admissions processes		
SCMATEDU	Schools' quality of educational resources		
STRATIO	Schools' student-teacher ratio		
PROPCERT	The number of certified teachers a school has		

## Notes

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<sup>1</sup> Milton Friedman and Rose D. Friedman (1990), *Free to Choose: A Personal Statement*.

<sup>2</sup> Mariano Narodowski and Mauro Moschetti (2016, March), *Providing Balanced Evidence-Based Policy Measures: School Segregation Reduction and the Chilean Educational Reform*, paper presented at the 60th Annual Conference of the Comparative and International Education Society, Vancouver, BC.

<sup>3</sup> Eric A. Hanushek and Ludger Woessmann (2012), *Schooling, Educational Achievement, and the Latin American Growth Puzzle*, *Journal of Development Economics*, 99(2), pp. 497–512, <http://dx.doi.org/10.1016/j.jdeveco.2012.06.004>

<sup>4</sup> Moritz Bilagher (2014), *Compared Achievements SERCETERCE (UNESCO Regional Bureau for Education in Latin America and the Caribbean, Santiago, presentation)*, retrieved from <http://www.unesco.org/new/en/santiago/education/education-assessment-llece/terce/events/first-release-of-terce-results-december-2014>

<sup>5</sup> Eric A. Hanushek, Paul E. Peterson, and Ludger Woessmann (2012), *Achievement Growth: International and U.S. State Trends in Student Performance (PEPG Report No. 12-03)*, retrieved from Harvard Kennedy School website: [https://sites.hks.harvard.edu/pepg/PDF/Papers/PEPG12-03\\_CatchingUp.pdf](https://sites.hks.harvard.edu/pepg/PDF/Papers/PEPG12-03_CatchingUp.pdf)

<sup>6</sup> OECD (2014), *PISA 2012 Results: What Students Know and Can Do – Student Performance in Mathematics, Reading and Science (Volume 1, Revised Edition, February 2014)*, retrieved from <https://www.oecd.org/pisa/keyfindings/pisa2012-results-volume-I.pdf>; OECD (2015), *PISA 2015 Results (Volume I): Excellence and Equity in Education*, <http://dx.doi.org/10.1787/9789264266490-en>

<sup>7</sup> José L. Drago and Ricardo D. Paredes (2011), *The Quality Gap in Chile’s Education System*, *CEPAL Review*, 104, pp. 161–74, retrieved from [http://repositorio.cepal.org/bitstream/handle/11362/11508/104161174I\\_en.pdf](http://repositorio.cepal.org/bitstream/handle/11362/11508/104161174I_en.pdf); Gregory Elacqua (2012), *The Impact of School Choice and Public Policy on Segregation: Evidence from Chile*, *International Journal of Educational Development*, 32(3), pp. 444–53, <http://dx.doi.org/10.1016/j.ijedudev.2011.08.003>; Juan Pablo Valenzuela, Cristian Bellei, and Danae de los Ríos (2014), *Socioeconomic School Segregation in a Market-Oriented Educational System: The Case of Chile*, *Journal of Education Policy*, 29(2), pp. 217–41, <http://dx.doi.org/10.1080/02680939.2013.806995>; Diane Ravitch, (2015, March 27), *The Disaster of Free-Market Reform in Chile: Is This Our Model?* [blog post], retrieved from <http://dianeravitch.net/2015/03/27/the-disaster-of-free-market-reform-in-chile-is-this-our-model>

<sup>8</sup> Mariano Narodowski and Milagros Nores (2012), *Socioeconomic Segregation with (without) Competitive Education Policies: A Comparative Analysis of Argentina and Chile*, *Comparative Education*, 38(4), pp. 429–51, <http://dx.doi.org/10.1080/0305006022000030720>; Mariano Narodowski and Milagros Nores (2003), *Searching for ‘Neoliberal’ Education Policies: A Comparative Analysis of Argentina and Chile*, in Stephen J. Ball, Gustavo E. Fischman, and Silvina Gvirtz (Eds.), *Crisis and Hope: The Educational Hopscootch of Latin America* (pp. 143–62)

<sup>9</sup> Ruth Aedo-Richmond (2013), *Private Education in Chile: A Historical-Analytical Study from the Colonial Period to 1990*

<sup>10</sup> Julian Le Grand (2009), *The other invisible hand: Delivering public services through choice and competition*

<sup>11</sup> Gregory Elacqua (2012), *The Impact of School Choice and Public Policy on Segregation: Evidence from Chile*, *International Journal of Educational Development*, 32(3), p. 447, <http://dx.doi.org/10.1016/j.ijedudev.2011.08.003>

<sup>12</sup> Geoff Whitty, Sally Power, and David Halpin, (1998), *Devolution and Choice in Education: The School, the State, and the Market*

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- <sup>14</sup> Herbert Gintis (1995), The Political Economy of School Choice, *Teachers College Record* 96(3), pp. 492–511, retrieved from <http://www.tcrecord.org/Content.asp?ContentId=30>; Henry Brighthouse (2003), School Choice and Social Justice, <http://dx.doi.org/10.1093/0199257876.001.0001>; Terry M. Moe (2008), Beyond the Free Market: The Structure of School Choice, *BYU Law Review*, 2008(2), pp. 557–92, retrieved from <http://digitalcommons.law.byu.edu/cgi/viewcontent.cgi?article=2406&context=lawreview>.
- <sup>15</sup> Mariano Narodowski (2008), School Choice and Quasi-State Monopoly Education Systems in Latin America: The Case of Argentina, in Martin Forsey, Scott Davies, and Geoffrey Walford (eds.), *The Globalisation of School Choice?*, pp. 131–44.
- <sup>16</sup> Albert O. Hirschman (1970), Exit, Voice, and Loyalty: Responses to Decline in Firms, Organizations, and States. For Hirschman's concepts in the Latin American education systems, see Johnathan Di John (2007), Albert Hirschman's Exit-voice Framework and its Relevance to Problems of Public Education Performance in Latin America, *Oxford Development Studies*, 35(3), pp. 295–327, <http://dx.doi.org/10.1080/13600810701514860>
- <sup>17</sup> Claude D'Aspremont and Jean J. Gabszewicz (1985), Quasimonopolies?, *Economica*, 52(206) pp. 141–51, <https://www.jstor.org/stable/2554416>. For the quasi-monopoly of the education system in Argentina, see note 15 above.
- <sup>18</sup> Mauro C. Moschetti (2005), Private Education Supply in Disadvantaged Areas of the City of Buenos Aires and “Low-fee Private Schooling”: Comparisons, Contexts and Implications, *Education Policy Analysis Archives*, 23(126), <http://dx.doi.org/10.14507/epaa.v23.1981>; Mariano Narodowski and Mauro C. Moschetti (2015), The Growth of Private Education in Argentina: Evidence and Explanations, *Compare: A Journal of Comparative and International Education*, 45(1), pp. 47–69, <http://dx.doi.org/10.1080/03057925.2013.829348>
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- <sup>20</sup> Mariano Narodowski and Mauro Moschetti (2015), Why Does Private School Enrollment Grow? Evidence from Argentina, *Cogent Education*, 2(1), (2015), pp. 1–15, <http://dx.doi.org/10.1080/2331186X.2015.1077604>
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- <sup>22</sup> OECD, PISA 2012 Technical Report, retrieved from <http://www.oecd.org/pisa/data/pisa2012technicalreport.htm>; OECD, PISA 2015 Technical Report, retrieved from <http://www.oecd.org/pisa/data/2015-technical-report>
- <sup>23</sup> See Annex A4 of OECD, PISA 2015 Results (Volume I): Excellence and Equity in Education, PISA, <http://dx.doi.org/10.1787/9789264266490-en>: "In Argentina, the PISA (2015) assessment was conducted in accordance with the operational standards and guidelines of the OECD. However, there was a significant decline in the proportion of 15-year-olds who were covered by the test, both in absolute and relative numbers. There had been a re-structuring of Argentina's secondary schools, except for those in the adjudicated region of the Autonomous City of Buenos Aires (CABA), which is likely to have affected the coverage of eligible schools listed in the sampling frame. As a result,

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Argentina's results may not be comparable to those of other countries or to results for Argentina from previous years." See OECD (2016), PISA 2015 Results (Volume I): Excellence and Equity in Education, p. 304, <http://dx.doi.org/10.1787/9789264266490-en A4>

<sup>24</sup> Karl E. Taeuber and David R. James (1982), Racial Segregation among Public and Private School, *Sociology of Education*, 55(2), pp. 133–43, <http://www.jstor.org/stable/2112293>

<sup>25</sup> These indicators were first developed to quantify residential segregation among regions. Otis D. Duncan and Beverly Duncan (1955), A Methodological Analysis of Segregation Indexes, *American Sociological Review*, 20(2), pp. 210–17, <http://www.jstor.org/stable/2088328>; Otis D. Duncan and Beverly Duncan (1955), Residential Distribution and Occupational Stratification, *American Journal of Sociology*, 60(5), pp. 493–503, <http://www.jstor.org/stable/2772537>; Robert Hutchens (2004), One Measure of Segregation, *International Economic Review*, 45(2), pp. 555–78, <http://dx.doi.org/10.1111/j.1468-2354.2004.00136.x>; Tara Watson (2009), Inequality and the Measurement of Residential Segregation by Income in American Neighborhoods, *Review of Income and Wealth*, 53(3), pp. 820–44, <http://dx.doi.org/10.1111/j.1475-4991.2009.00346.x>. Later they were used to measure school segregation among schools (Stephen Gorard and John Fitz (1998), The More Things Change ... The Missing Impact of Marketisation?, *British Journal of Sociology of Education*, 19(3), pp. 365–78, <http://dx.doi.org/10.1080/0142569980190306>; Stephen P. Jenkins, John Micklewright, and Sylke V. Schnepf (2008), Social Segregation in Secondary Schools: How Does England Compare with Other Countries?, *Oxford Review of Education*, 34(1), pp. 21–38, <http://dx.doi.org/10.1080/03054980701542039>) or the types of schools (Leandro Gasparini, David Jaume, Monserrat Serio, and Emmanuel J. Vazquez (2011), School Segregation in Argentina (CEDLAS Working Paper 123), Center for Distributive, Labor and Social Studies Universidad Nacional De La Plata, retrieved from <http://sedici.unlp.edu.ar/handle/10915/3705>).

<sup>26</sup> Robert Hutchens, One Measure of Segregation (2004), *International Economic Review*, 45(2), p. 555, <http://dx.doi.org/10.1111/j.1468-2354.2004.00136.x>

<sup>27</sup> Stephen Gorard and John Fitz (1998), The More Things Change ... The Missing Impact of Marketisation?, *British Journal of Sociology of Education*, 19(3), p. 365, <http://dx.doi.org/10.1080/0142569980190306>

<sup>28</sup> Douglas Massey and Nancy Denton (1988), The dimensions of racial segregation, *Social Forces*, 67(2), pp. 281–315, <http://dx.doi.org/10.1093/sf/67.2.281>

<sup>29</sup> Juan Pablo Valenzuela, Cristian Bellei, and Danae de los Ríos (2014), Socioeconomic School Segregation in a MarketOriented Educational System: The Case of Chile, *Journal of Education Policy*, 29(2), p. 217 <http://dx.doi.org/10.1080/02680939.2013.806995>

<sup>30</sup> Stephen Gorard and John Fitz (2000), Investigating the determinants of segregation between schools, *Research Papers in Education*, 15(2), pp. 115–132, <http://dx.doi.org/10.1080/026715200402452>

<sup>31</sup> 1 See Stephen P. Jenkins, John Micklewright, and Sylke V. Schnepf (2008), Social Segregation in Secondary Schools: How Does England Compare with Other Countries?, *Oxford Review of Education*, 34(1), p. 21, <https://dx.doi.org/10.1080/03054980701542039> and Emanuel Vázquez (2012), School segregation by socioeconomic level. Measuring the phenomenon and exploring its determinants (Working Paper 128, Centro de Estudios Distributivos, Laborales y Sociales), Universidad Nacional de La Plata, retrieved from [http://www.cedlas.econo.unlp.edu.ar/wp/wp-content/uploads/doc\\_cedlas128.pdf](http://www.cedlas.econo.unlp.edu.ar/wp/wp-content/uploads/doc_cedlas128.pdf)

<sup>32</sup> Programme of International Student Assessment, PISA 2014 Technical Report, p. 49–90

<sup>33</sup> Programme of International Student Assessment (2002), PISA 2000 Technical Report, retrieved from OECD website: <http://www.oecd.org/edu/school/programmeforinternationalstudentassessmentpisa/33688233.pdf>; Programme of International Student Assessment (2005), PISA 2003 Technical Report, retrieved from OECD website: <https://www.oecd.org/edu/school/programmeforinternationalstudentassessmentpisa/35188570.pdf>; Programme of International Student Assessment (2009), PISA 2006 Technical Report, retrieved from OECD website:

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<sup>34</sup> In addition, to make efficient use of the information, a Hausman test is performed to account for the use of random effect models instead of fixed-effect models.

<sup>35</sup> Eric Hanushek (1979), Conceptual and empirical issues in the estimation of educational production functions, *Journal of Human Resources*, 14(3), pp. 351–388, [http://www.jstor.org/stable/145575?seq=1#page\\_scan\\_tab\\_contents](http://www.jstor.org/stable/145575?seq=1#page_scan_tab_contents)

<sup>36</sup> Jaap Dronkers and Silvia Avram (2015), What can international comparisons teach us about school choice and non-governmental schools in Europe?, *Comparative Education*, 51(1), pp. 118–132, <http://dx.doi.org/10.1080/03050068.2014.935583>

<sup>37</sup> OECD, PISA 2015 Results (Volume I): Excellence and Equity in Education, <http://dx.doi.org/10.1787/9789264266490-en>

<sup>38</sup> See Chang-Tai Hsieh and Miguel Urquiola (2006), The effects of generalized school choice on achievement and stratification: Evidence from Chile's voucher program, *Journal of Public Economics*, 90(8), pp. 1477–1503, <http://dx.doi.org/10.1016/j.jpubeco.2005.11.002> and María Alejandra Mizala and Florencia Torche (2012), Bringing the schools back in: the stratification of educational achievement in the Chilean voucher system, *International Journal of Educational Development*, 32(1), pp. 132–144, <http://dx.doi.org/10.1016/j.ijedudev.2010.09.004>

<sup>39</sup> Gregory Elacqua (2012), The Impact of School Choice and Public Policy on Segregation: Evidence from Chile, *International Journal of Educational Development*, 32(3), p. 375, <http://dx.doi.org/10.1016/j.ijedudev.2011.08.003>. See also Mariano Narodowski and Mauro Moschetti, The growth of private education, p. 11.

<sup>40</sup> Edward Glaeser and Jacob Vigdor (2003), Racial segregation: Promising News. Redefining Urban & Suburban America: Evidence from Census, Center for Urban and Metropolitan Policy, retrieved from Brookings Institution: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.471.9031&rep=rep1&type=pdf>

<sup>41</sup> Because the ESCS index constructed by PISA is negative in various cases, the construction of GINI coefficients was impossible, so the ESCS index was rescaled in such a way that it did not modify the variability.

<sup>42</sup> This variable, even if it is part of the PISA database, was obtained from technical reports of the studies which, among others, have this information on school populations.

<sup>43</sup> The dependent variables consisted of the averages of the values of the scores in mathematics, reading, and science, and the average of the sum of the three. Although only the sum of averages is addressed in the results, the appendix shows all the models for the tests on individual academic subjects.

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<sup>45</sup> Eric Hanushek (2003), The failure of input-based schooling policies, *The Economic Journal*, 11(3), pp. 64–98, <http://dx.doi.org/10.1111/1468-0297.00099>

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