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Land and the City

Edited by George W. McCarthy, Gregory K. Ingram, and Samuel A. Moody

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PREFACE

The majority of the world's population now lives in urban areas and depends on urban systems for housing and social and economic goods and services. This number will only increase as cities blossom and expand to accommodate new residents, particularly in developing nations. What remains unchanged, however, is the key role of cities as engines of economic growth, social activity, and cultural exchange. In an effort to support the success and sustainability of cities, this volume explores how policies regarding land use and taxation affect issues as diverse as the sustainability of local government revenues, the impacts of the foreclosure crisis, and urban resilience to climate change.

This collection, based on the Lincoln Institute of Land Policy's 2014 annual land policy conference, addresses the policies that underlie the organization, financing, and development of the world's cities. It is the final volume in the Institute's land policy conference series. Over the years, these meetings have addressed land policy as it relates to a range of topics, including local education, property rights, municipal revenues, climate change, and infrastructure.

We thank Armando Carbonell, Martim Smolka, and Joan Youngman for their advice on the selection of topics and on program design. The conference was organized by our exceptional event team, comprising Brooke Burgess, Sharon Novick, and Melissa Abraham. Our special thanks go to Emily McKeigue for her exemplary management of the production of this volume, to Peter Blaiwas for the cover design, to Nancy Benjamin for maintaining the publication schedule, and to Barbara Jatkola for her tireless and reliable copyediting.

George W. McCarthy
Gregory K. Ingram
Samuel A. Moody

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Socioeconomic Segregation Between Schools in the United States and Latin America, 1970–2012

Anna K. Chmielewski and Corey Savage

Residential segregation by income in the United States has risen dramatically since 1970 (Reardon and Bischoff 2011; Watson 2009). From 1970 to 2010, income segregation between school districts appears to have increased as well (Owens 2014). This raises the concern that the educational and life experiences of children from different economic backgrounds are becoming more divergent, which could erode equal opportunity. However, recently released data from the Programme for International Student Assessment (PISA) reveal that the level of segregation between schools by socioeconomic status (hereafter "school SES segregation") is far worse in Latin America than in the United States. Indeed, Latin American countries have among the highest levels of school SES segregation of all PISA countries, while school SES segregation in the United States is close to the international average.

The study reported in this chapter relied on data from PISA and other international large-scale assessments to compare school SES segregation across the United States and nine Latin American countries. First, it documents recent trends in school SES segregation since 2000 and longer-term trends since 1970. Second, it examines whether segregation is changing mainly at the top or at the bottom of the SES distribution by comparing the segregation of high-SES students and the segregation of low-SES students from their peers. This gives an international context to research in the United States showing that for both neighborhoods and school districts, income segregation is increasing primarily at the top of the income distribution, meaning that the affluent are becoming more isolated (Owens 2014; Reardon and Bischoff 2011). Third, this chapter explores a number of

possible explanations for greater segregation in Latin America, as well as explanations for changes in segregation over time. Previous research in the United States has tied increasing residential and school segregation to increasing income inequality (Owens 2014; Reardon and Bischoff 2011; Watson 2009), and also tied increasing school segregation to the fragmentation of school districts and the availability of private school options (Owens 2014). The chapter examines these phenomena, along with other issues relevant to the Latin American context, including urbanization, increasing access to secondary schools, and publicly funded voucher schools.

Factors Contributing to SES Segregation Between Schools

RESIDENTIAL SEGREGATION

An important contributor to school SES segregation is the SES segregation of neighborhoods. This is true both in systems where children attend schools strictly on the basis of where they live and, to a lesser degree, in systems with school choice, as location can be a factor in families' school attendance decisions (Denton 1995; Flores 2014). Thus, one explanation for higher levels of school SES segregation in Latin America compared with the United States may be higher levels of residential SES segregation in Latin America. Unfortunately, there is little information available comparing levels of neighborhood SES segregation either across Latin America or between Latin America and the United States. The only recent paper on the topic found that the residential segregation of low-income households in U.S. cities is much higher than in Mexican cities (Monkkonen 2010), which implies that the greater observed school SES segregation in Mexico compared with the United States may be the result of educational factors rather than neighborhood SES segregation. In the absence of further direct comparative evidence regarding neighborhood SES segregation, this study examined two conditions that may contribute to neighborhood SES segregation: urbanization and income inequality.

Researchers have found that U.S. cities with larger populations have higher levels of neighborhood income SES segregation and have seen greater increases in income segregation than cities with smaller populations (Reardon and Bischoff 2011; Watson 2009). Similarly, larger cities in both Brazil and Mexico appear to have higher levels of residential SES segregation (Monkkonen 2010; Telles 1995). Latin America is the most urbanized region in the world, with 80 percent of its population living in cities. Most Latin American countries are far more urbanized than the United States and the rest of the developed world (UN-Habitat 2012). Greater urbanization may be one explanation for higher levels of school SES segregation in Latin America compared with the United States. In addition, urban residential patterns differ between the United States and Latin America. Whereas U.S. metropolitan areas over the past 60 years have been characterized by a pattern of affluent suburbs and deteriorating urban centers (Dreier, Mollenkopf,

and Swanstrom 2001; Judd and Swanstrom 2011; Massey and Denton 2003), Latin American cities have been characterized by an elite urban residential sector surrounded by "concentric zones of decreasing residential quality" (Griffin and Ford 1980, 422). Both patterns may be changing, however, as the American professional class has been moving back to the urban core (Dreier, Mollenkopf, and Swanstrom 2001; Judd and Swanstrom 2011; Massey and Denton 2003), while since the 1980s Latin America has seen an influx of gated suburban communities set amid areas of extreme poverty (Coy 2002; Sabatini and Salcedo 2007) and small pockets of high- or low-SES neighborhoods in what seem to be homogeneous areas (Skop and Peters 2007). Even so, the predominant pattern of low-SES residents living on the periphery of cities persists in many Latin American countries, including Mexico (Monkkonen 2010), and some argue that the advent of gated communities has not necessarily increased social and residential segregation given that affluent residents were already highly segregated from the poor and working class (Álvarez-Rivadulla 2007). Despite these differences in urban residential segregation patterns, we nevertheless hypothesize that greater urbanization is associated with greater school SES segregation in both the United States and Latin America.

The second important factor contributing to neighborhood SES segregation is income inequality. In the United States, increasing income segregation is strongly related to increasing income inequality (Reardon and Bischoff 2011; Watson 2009). Although the United States has the highest income inequality in the developed world, inequality is considerably higher in Latin American countries (LIS 2014; World Bank 2014). Indeed, Latin America is the region with the highest levels of income inequality in the world, with the possible exception of Africa (Gasparini, Cruces, and Tornarolli 2011). Throughout the 1990s, income gaps across Latin America increased with the rise in income among the upper classes and the stagnation of income among the working classes (Gasparini 2003; Portes and Hoffman 2003; Portes and Roberts 2005). However, during the 2000s, income inequality has begun to decrease slightly across Latin America, even as it has continued to rise in the United States (Gasparini, Cruces, and Tornarolli 2011). This slight convergence in income inequality between the United States and Latin America could predict a convergence in neighborhood SES segregation as well. Income inequality is also connected to the patterns of urbanization described in the previous paragraph. Larger cities in the United States tend to have higher income inequality than smaller cities (Berube 2014). Similarly, in some Latin American countries, including Brazil, Chile, Colombia, and Peru, income inequality is higher in cities than in rural areas. In others, however, the reverse is true: rural areas have higher income inequality than cities in Bolivia, Guatemala, Honduras, and Nicaragua (UN-Habitat 2008). Greater income inequality in cities may be one mechanism through which urbanization affects neighborhood SES segregation.

An important contributor to neighborhood SES segregation in both the United States and Latin America is race (de Lima Amaral 2013; McEwan 2004).

The study described in this chapter focused exclusively on SES segregation rather than racial segregation because information on race was not available in the international assessment data used.

NONRESIDENTIAL FACTORS

Beyond cross-national differences in residential SES segregation, there are some key differences in the structure of educational systems between Latin America and the United States that might also explain higher levels of school SES segregation in Latin America. Specifically, very high and increasing rates of school choice and private schooling in most Latin American countries could elevate school SES segregation to levels beyond those directly caused by residential SES segregation. Whereas approximately 26 percent of secondary schools in the United States are schools of choice, in the sense that they do not take residence into consideration for admission, the share of schools of choice in Latin America ranges from 34 percent in Mexico to 93 percent in Peru (authors' calculations using PISA 2012 data). Many of these Latin American schools of choice are private schools. While the share of students attending private schools in the United States has generally remained below 10 percent, the share in many Latin American countries is closer to 15 percent, and as high as 32 percent in Argentina and 63 percent in Chile (authors' calculations using PISA 2012 data). The vast majority of the private schools in those two countries are publicly funded through voucher programs. Although voucher schools were originally intended to combat school SES segregation by breaking the link between segregated neighborhoods and school attendance, evidence from Chile shows that school SES segregation has increased since the implementation of the voucher program (Elacqua 2012; Hsieh and Urquiola 2006; Torche 2005) and that ultimately schools have become more socioeconomically segregated than neighborhoods (Valenzuela, Bellei, and de los Ríos 2014). This is largely because low-income families in Chile are less likely than higher-income families to take advantage of school vouchers, for several reasons: many voucher schools continue to charge additional fees; many voucher schools are academically selective, which disproportionately favors middle- and high-income students; and travel to distant schools is burdensome for low-income families in terms of cost and safety concerns, particularly for younger children (Flores 2014).

Aside from school choice, three additional educational factors could contribute to higher levels of school SES segregation in Latin America than in the United States. First, in Latin America access to secondary education has expanded dramatically over recent decades. While as recently as 2000, secondary school enrollment rates for the eligible age cohort were under 50 percent in many Latin American countries, rates are now closer to 70 percent in most countries, and in Argentina and Chile they are approaching the U.S. rate of 89 percent (World Bank 2014). These newly enrolled students are likely to be low-SES and low-achieving, meaning the educational system must deal with increasingly diverse student populations. If these students tend to enter schools that are isolated from

their high-SES peers—perhaps because they are located in remote rural areas or because high-SES families are exiting the public educational system for private or selective schools—this could result in increasing segregation between schools. Depending on the mechanism, expansion of secondary schooling could result in levels of school SES segregation that more closely approximate those of neighborhood SES segregation, because a greater proportion of the population is included in schools, or it could cause school segregation to be higher than neighborhood segregation if it prompts high-income families to self-segregate.

A second factor that could contribute to school SES segregation is school size. Researchers have found that in the United States, fragmentation into smaller educational units (in this case, school districts) tends to correspond to higher levels of both SES and racial segregation (Bischoff 2008; Owens 2014). If this pattern holds with schools as the educational unit, we might expect smaller schools to predict higher levels of segregation. According to PISA 2012 principal questionnaires, secondary schools in Latin America tend to be smaller than U.S. high schools. While U.S. high schools average around 1,400 students, Latin American secondary schools tend to be under 1,000 students (and as small as 500 students in Argentina); the only exception is Colombian secondary schools, which are similar in size to U.S. high schools (authors' calculations using PISA 2012 data). Not only are Latin American secondary schools smaller than U.S. high schools on average, but they also seem to be getting smaller over time. Between 2000 and 2012, school size appears to have decreased in nearly all Latin American countries, including dramatic declines of about 40 percent in Peru and Brazil. The one exception is Uruguay, which has nearly doubled its average school size (authors' calculations using PISA 2000–2012 data). Although we generally expect decreasing school size to be associated with rising school SES segregation, the underlying reasons could depend on the level of school choice in the system. In the absence of school choice, smaller schools correspond to smaller residential catchment areas, meaning school SES segregation would increase as it came to resemble more closely neighborhood SES segregation. In a system with school choice, declining school size may reflect a growing private school sector, as private schools tend to be smaller than public schools. A growing private school sector could in turn increase school SES segregation for reasons discussed previously.

The third factor that could contribute to school SES segregation is academic versus vocational tracking. It is a well-known finding from PISA that the countries that track students early into separate academic and vocational schools tend to have some of the highest levels of school SES segregation (Willms 2006). However, this type of tracking is practiced mainly in Western Europe, while tracking appears different in the United States and Latin America. The United States and Latin America both have relatively low rates of vocational tracking, ranging from 0 percent in the United States and Peru to 23 percent in Chile (World Bank 2014). Additionally, much of this tracking occurs only among older students at the upper secondary level (Castro, Carnoy, and Wolff 2000) and thus would not be captured in the data used in the current study. The slightly higher rates of voca-

tional tracking in Latin America could be another small contributor to higher levels of school SES segregation; however, based on the low rates overall, tracking was not expected to be a major factor predicting school SES segregation in the United States or Latin America.

In sum, the higher levels of school SES segregation in Latin America compared with the United States may not be attributable to residential SES segregation at all, but instead to the nonresidential, educational factors reviewed above. Latin America has dramatically higher levels of school choice and privatization, increasing access to secondary schooling, smaller school size, and slightly higher levels of vocational tracking, all of which are expected to be associated with higher school SES segregation. In order to evaluate the extent to which school SES segregation is a function of residential SES segregation, in the absence of neighborhood data, we examined elementary schools. We hypothesized that Latin American elementary schools are less affected by school choice than secondary schools, as parents of young children might be less likely to exercise school choice, or if they do, they might choose schools closer to home (Flores 2014). Still, it should be noted that elementary school segregation is far from an ideal measure of neighborhood segregation in Latin America, as the rate of private schooling is only slightly lower in elementary than in secondary schools (around 23 percent for elementary versus 26 percent for secondary) (World Bank 2014). Furthermore, in many Latin American countries, large numbers of students attend schools serving the first through twelfth grades. Whereas only around 6 percent of high school students in the United States attend schools containing elementary school grades, on average around 40 percent of Latin American students, and up to 87 percent of students in Colombia, attend such schools (authors' calculations using PISA 2009 data). Thus, elementary schools and secondary schools are often not separate systems in Latin America. Nevertheless, we examined elementary school data as the best available evidence on the relationship between school segregation and residential segregation.

Research Questions

- Which countries in Latin America and the United States have the highest and lowest levels of SES segregation between schools?
- In which countries is school SES segregation primarily concentrated at the top or the bottom of the SES distribution? In other words, which countries have the highest levels of segregation of wealthy or poor students?
- How do secondary school segregation levels compare with elementary school segregation levels?
- Has SES segregation between schools increased or decreased in recent years (2000–2012) and over the long term (since 1970)?
- Are differences in SES segregation across countries and changes in SES segregation within countries associated with social conditions (income inequality, urbanization) and/or with educational conditions and policies

(secondary school access, school size, vocational tracking, school choice, private schooling)?

Data

The data for the main analyses of this study came from PISA 2000, 2003, 2006, 2009, and 2012. PISA is a repeated cross-sectional study conducted by the Organisation for Economic Co-operation and Development (OECD) to test nationally representative samples of 15-year-old students, regardless of grade, in reading, math, and science. PISA uses a two-stage sampling design in which (1) schools are sampled with probabilities proportional to their enrollment of 15-year-olds; and (2) about 35 students are sampled within each school. The number of countries participating in PISA ranged from 45 in 2000 to 66 in 2012. The United States and two Latin American countries (Brazil and Mexico) participated in all five years of the study. Seven more Latin American countries (Argentina, Chile, Colombia, Costa Rica, Panama, Peru, and Uruguay) participated in at least one year of the study, for a total sample of 10 countries and 36 country-years.

For comparisons between secondary school and elementary school SES segregation, we use data from two years of the Progress in International Reading Literacy Study (PIRLS), 2001 and 2011. PIRLS is also a repeated cross-sectional study, but unlike PISA, it is conducted by the International Association for the Evaluation of Educational Achievement (IEA), and it tests nationally representative samples of fourth-grade students in reading. PIRLS uses two-stage sampling. The study samples schools with probabilities proportional to size, and then samples intact classrooms rather than students from across the entire school. The number of classrooms sampled was either one or two, depending on the country, but in all of the Latin American countries participating in PIRLS, only one classroom was sampled in all or almost all schools. Therefore, we interpreted SES segregation estimates between elementary schools with caution, as they may partially reflect SES segregation between classrooms and may therefore overestimate SES segregation between schools. Four Latin American countries participated in at least one year of PIRLS; we used PIRLS 2001 data for Argentina and Belize, and PIRLS 2011 data for Colombia and Honduras.

To examine long-term trends in school SES segregation, we used data from the First International Science Study (FISS), which was conducted in 1970. FISS tested nationally representative samples of 14-year-old students, regardless of grade, in science and sampled students from across the school rather than as intact classrooms, similar to PISA. Only two of the countries in the current study participated in FISS: Chile and the United States.

VARIABLES

Socioeconomic Status For the main analyses of this study, we calculated segregation based on the PISA "index of economic, social, and cultural status"

(ESCS), an OECD-developed index that combines the higher of student-reported mother's and father's educational attainment, the higher of the mother's and father's occupational status, as well as a list of household possessions, such as books, computers, and the student's own bedroom. For PISA 2000, 2003, 2006, and 2009, we used the ESCS index rescaled by the OECD for trend analyses with PISA 2012 data. The continuous index has a mean of 0 and a standard deviation of 1 across all OECD countries (32 relatively high income countries); the mean was below 0 in the Latin American countries in our sample. When calculating segregation, we converted the index into country-year–specific percentiles, which are described further in the methods section. For clarity and consistency of terminology, the ESCS index is hereafter referred to as the "SES index."

Parental Occupation Since the SES index is available only in the PISA data, for analyses using data from the other studies (PIRLS and FISS), we calculated segregation based on parental occupation. In PISA, parental occupation (which is also a component of the SES index) is reported by students and is classified by the OECD into four-digit International Standard Classification of Occupations (ISCO) codes. For comparability with the PIRLS and FISS occupational data, we took the first digit of each ISCO code, resulting in nine categories, and ordered the categories from lowest to highest average occupational status based on the International Socio-Economic Index of Occupational Status (ISEI). We then took the higher of the mother's and father's occupational categories. In PIRLS, parental occupation is reported by parents in ten categories, which we also reordered according to average occupational status and then took the higher of the mother's and father's occupational categories. In FISS, parental occupation was reported by students only for the father, and the categories varied slightly across countries; there were nine categories in Chile and ten in the United States. The categories of parental occupation for each study are listed in table A12.1. When calculating segregation, we converted parental occupation to country-year–specific percentiles.

Income Inequality We measured income inequality using the Gini index, which we obtained from the World Bank (2014) for Latin American countries and from the Luxembourg Income Study (LIS 2014) for the United States. The Gini index ranges from 0 (perfect equality) to 1 (perfect inequality). In 2010, the Gini index for the countries in the current study ranged from 0.37 for the United States to 0.56 for Colombia. We interpolated the Gini index within countries for missing years. Descriptive statistics for this and all other country covariates are displayed in table A12.2.

Urbanization We measured urbanization using school location from PISA principal questionnaires. We classified as urban any school located in a city (population 100,000 to 1 million) or large city (population greater than 1 million).

In 2012, the sample-weighted proportion of students attending urban schools ranged from 0.15 in Costa Rica to 0.58 in Chile.

Proportion of Cohort Enrolled in School We measured the proportion of the cohort enrolled in school using each country's net enrollment rate of children of the official secondary school age in secondary schools, obtained from the World Bank (2014). In 2011, the proportion of the secondary school–aged cohort enrolled in school ranged from 0.68 in Panama to 0.85 in Chile. We interpolated the enrollment rate within countries for missing years.

School Size We measured school size using school enrollments from PISA principal questionnaires. We took the sample-weighted mean across all schools in each country-year. In 2012, mean school size ranged from 519 in Argentina to 1,455 in Colombia. We divided mean school size by 1,000.

Vocational Tracking We measured vocational tracking using the total enrollment in public and private secondary school technical/vocational programs as a proportion of the total secondary school enrollment, obtained from the World Bank (2014). In 2010, the proportion of secondary school students in vocational programs ranged from 0 in the United States to 0.31 in Chile. We interpolated vocational enrollment within countries for missing years.

School Choice We used PISA principal questionnaires to determine which schools did not consider residence as a factor in school admissions. In 2000, 2009, and 2012, principals reported how often residence in a particular area was considered when students were admitted to their schools. We classified schools whose principals responded "never" or "sometimes" as schools of choice. In 2003 and 2006, principals reported how much consideration was given to residence in a particular area when students were admitted to their schools. We classified schools whose principals responded "not considered" or "considered" (as opposed to "high priority" or "prerequisite") as schools of choice. In 2012, the sample-weighted proportion of students attending schools of choice ranged from 0.26 in the United States to 0.93 in Peru.

Private Schooling We used principal-reported school management from PISA principal questionnaires to classify schools controlled by nongovernment organizations as private schools. In 2012, the sample-weighted proportion of students attending private schools ranged from 0.05 in the United States to 0.63 in Chile. The OECD further classifies private schools into independent schools receiving less than 50 percent of their core funding from government sources and government-supported private schools receiving 50 percent or more of their core funding from government sources (such as voucher schools). In 2012, the proportion of students attending independent private schools ranged from 0.05

in the United States to 0.17 in Uruguay. The proportion of students attending government-supported private schools ranged from 0 in the United States, Mexico, Peru, and Uruguay to 0.48 in Chile.

Methods

MEASURING SCHOOL SES SEGREGATION

We measured school SES segregation using the rank-order information theory index (H^R). This segregation index ranges from 0 (complete integration) to 1 (complete segregation). It was developed by Reardon et al. (2006) for use with variables measured in ordered categories, and it can be interpreted as how much less variation in SES there is within schools compared with the variation in SES in the overall student population. H^R was used in Reardon and Bischoff (2011), a study that examined neighborhood income segregation in the 100 largest metropolitan areas in the United States using family income data from the U.S. census, which is measured in 15 categories. For comparability with Reardon and Bischoff's study, we divided the SES index (converted to percentiles) described in the variables section into 15 evenly spaced categories in each PISA country-year, bounded by 14 percentile thresholds: the 6.6th percentile, 13.3th percentile, etc. We estimated the information theory segregation index of students at each SES percentile threshold *H(p)* as the segregation of students above that threshold from students below that threshold. We estimated the overall SES segregation in a country-year via the rank order information theory index (H^R) by fitting a fourth-order polynomial function through the 14 thresholds via weighted least squares and calculating the weighted average of the values of the fitted line over all SES percentiles from 0 to 1 (weighted by entropy at each SES percentile, which is maximized at the 50th percentile, meaning the middle of the SES distribution is given more weight). Although segregation between units based on a continuous variable such as this SES index could be computed using a simpler measure, such as intraclass correlation, the advantage of H^R is not only that the results are in a comparable metric to those of Reardon and Bischoff but also that this measure allows one to examine the level of segregation (*H(p)*) at any point across the SES percentile distribution. Thus, we also estimated the segregation of low-SES students as *H(10)*, the value of the fitted line at the 10th percentile, and the segregation of high-SES students as *H(90)*, the value at the 90th percentile.

For school segregation based on parental occupation, H^R cannot be estimated as precisely because there are fewer categories and they are not evenly spaced. Thus, after converting these categories into percentiles, we fitted a lower-order polynomial function (quadratic rather than fourth-order) and estimated segregation simply as the value of the fitted line at the 50th percentile—that is, the segregation of students above and below the median parental occupation.

With H^R (and many other similar measures), segregation will be biased upward when samples within units (e.g., schools) are small, which could confound

comparisons if school sample sizes differ across years or countries. Following Reardon and Bischoff (2011), we checked the robustness of our results by randomly sampling 10 students per school before calculating H^R. This robustness check did not affect the PISA results appreciably because PISA sample sizes are relatively consistent across years and countries. Therefore, we used full PISA samples for our PISA results. Sample sizes do vary across the different studies (PISA, PIRLS, and FISS), however, so we used the sampled data for the elementary school and long-term trend analyses, which drew data from multiple studies. This procedure resulted in final segregation estimates that are likely elevated for these analyses, but comparisons across countries, years, and studies should be more accurate.

MISSING DATA

Missing SES data were imputed using multiple imputation by iterative chained equations and creating five imputed data sets for each country-year. Each year of segregation was estimated five times and averaged, and standard errors were calculated to reflect uncertainty due to imputation.

MODELS

To examine relationships between SES segregation and country covariates, we estimated hierarchical growth models as follows:

$$(1) \qquad \hat{S}_{ij} = \gamma_{00} + (X_{ij} - \bar{X}_j)\mathrm{B} + \bar{X}_j\Gamma + \upsilon_j + u_{ij} + \in_{ij},$$

$$\upsilon_j \sim N(0, \tau_{00});\ u_{ij} \sim N(0, \sigma^2);\ \in_{ij} \sim N(0, \omega_{ij}),$$

where $\hat{S}_{ij}$ is the estimated segregation in country j in year i;

X_{ij} is a country-level covariate in year i;

$\bar{X}_j$ is the average of X_{ij} within country j;

B is the coefficient for the within-country covariate;

Γ is the coefficient for the country-average covariate;

τ_{00} is the between-country variance of the true segregation;

σ^2 is the true within-country variance of segregation; and

$\omega_{ij} = [s.e.\ (\hat{S}_{ij})]^2$ is the sampling variance of $\hat{S}_{ij}$.

We estimated equation 1 using a variance-known model in HLM 7.0, which gave greater weight to years in which segregation was more precisely estimated (i.e., where ω_{ij} was smaller).[1] We estimated models predicting overall SES segrega-

1. Models also were run without precision weighting; the results were similar.

tion, segregation of low-SES students (below the 10th percentile), and segregation of high-SES students (above the 90th percentile). Since we had a very small sample size of 10 countries and 36 country-years, we estimated nine separate models, one for each pair of between-country/within-country covariates.

Results

OVERALL SCHOOL SES SEGREGATION

In terms of overall levels of SES segregation between schools, the Latin American countries were substantially more segregated than the United States. Table 12.1 presents all the countries in PISA 2012, sorted from most to least segregated. SES segregation in the United States was estimated at $H^R = 0.17$. This is slightly higher than the estimated residential income segregation (0.157) in the 100 largest U.S. metropolitan areas in 2000 (Reardon and Bischoff 2011) and nearly twice as high as the estimated between-school district income segregation of public school families (0.09) (Owens 2014). (Keep in mind that not only do these estimates based on PISA refer to between-school segregation, but also the SES index used here includes parental education, occupation, and household possessions, but not income.) While SES segregation in the United States was very close to the international average of 0.19, the Latin American countries were dramatically more

Table 12.1
Estimated Socioeconomic Status (SES) Segregation Between Schools, 2012

Country	School SES Segregation	Country	School SES Segregation
Chile	**0.34**	Romania	0.22
Peru	**0.32**	**Argentina**	**0.22**
Mexico	**0.30**	Tunisia	0.21
Panama[a]	**0.30**	Latvia	0.21
Vietnam	0.28	Shanghai-China	0.21
Costa Rica	**0.26**	Slovenia	0.21
Hungary	0.26	Hong Kong	0.21
Brazil	**0.26**	Austria	0.21
Bulgaria	0.26	France	0.21
Thailand	0.25	Belgium-French	0.20
Colombia	**0.25**	Czech Republic	0.20
Uruguay	**0.25**	Portugal	0.20
Slovak Republic	0.24	United Arab Emirates	0.19
Indonesia	0.23	Malaysia	0.19

(continued)

Table 12.1 *(continued)*

Country	School SES Segregation	Country	School SES Segregation
Greece	0.19	England	0.15
Russia	0.19	Qatar	0.15
PISA 2012 Average	*0.19*	Japan	0.15
Turkey	0.18	Denmark	0.15
Australia	0.18	Serbia	0.15
Germany	0.18	Korea	0.15
Italy	0.18	Ireland	0.15
Israel	0.18	Jordan	0.14
United States	**0.17**	Switzerland	0.14
Belgium-Flanders	0.17	Netherlands	0.14
Spain	0.17	Macao-China	0.14
Lithuania	0.17	Canada	0.14
Luxembourg	0.17	Sweden	0.12
Poland	0.17	Montenegro	0.12
New Zealand	0.17	Liechtenstein	0.12
Kazakhstan	0.16	Scotland	0.11
Singapore	0.16	Iceland	0.11
Estonia	0.16	Norway	0.10
Croatia	0.16	Finland	0.09
Chinese Taipei	0.16	Albania	0.08

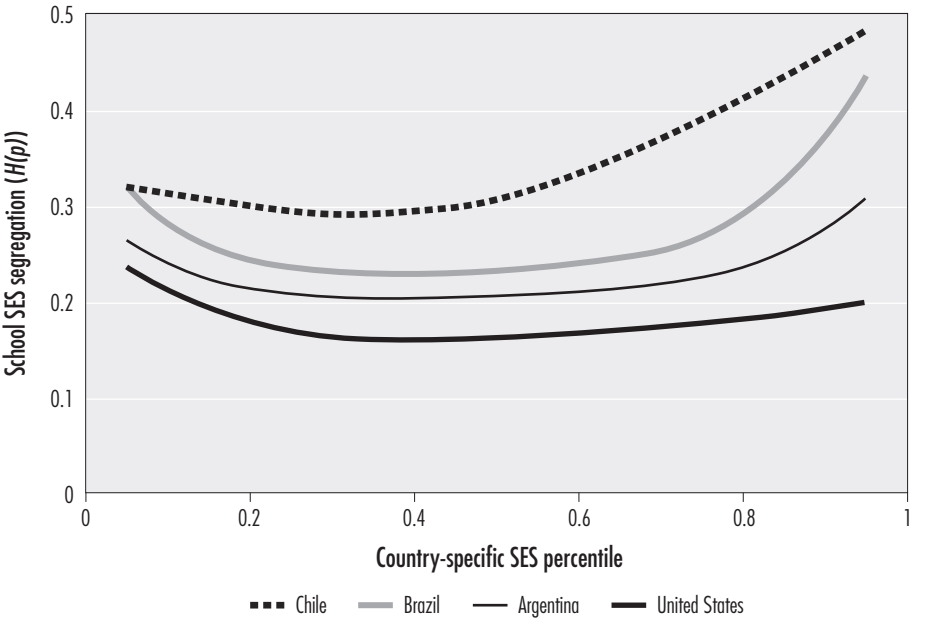
[a]Panama data from PISA 2009.
Notes: Segregation calculated using rank-order information theory index (H^R); see methods section in text for details. Countries sorted from highest to lowest level of between-school segregation. Boldface indicates countries in the current study.
Source: Authors' calculations using PISA 2012 data.

segregated than the average, with H^R ranging from 0.34 in Chile to 0.22 in Argentina. Nine of the sixteen most segregated participating countries are located in Latin America. Among the Latin American countries, Chile, Peru, Mexico, and Panama had the highest levels of between-school SES segregation, with H^R greater than or equal to 0.30. Costa Rica, Brazil, Colombia, Uruguay, and Argentina had somewhat lower but still quite high levels of segregation, with H^R greater than 0.20 but less than 0.30.

SEGREGATION OF WEALTHY AND POOR STUDENTS

Figures 12.1–12.3 show estimated segregation *H(p)* by country-specific SES percentiles for the Latin American countries and the United States, allowing us to

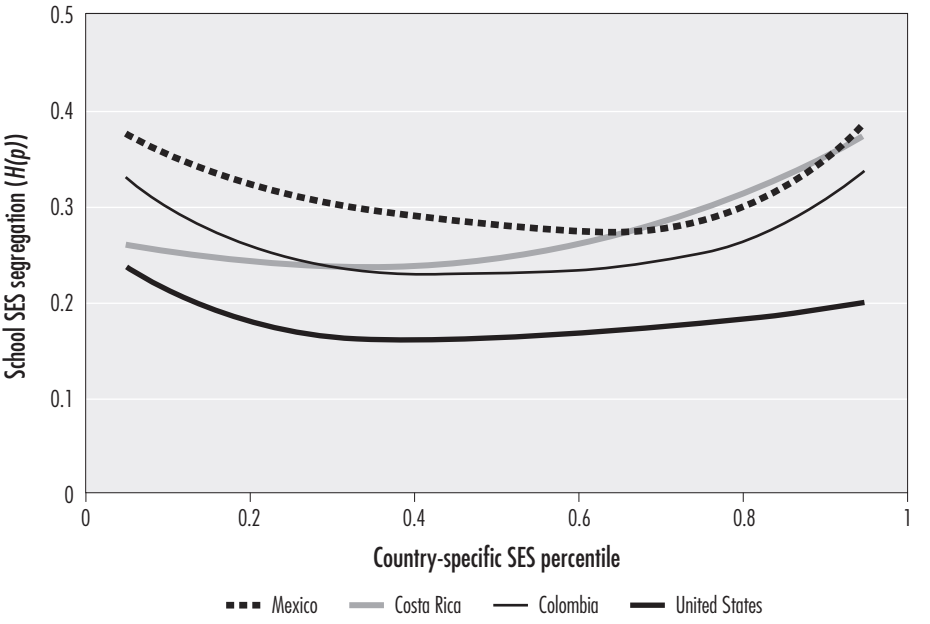
Figure 12.1
Estimated Socioeconomic Segregation Between Schools by SES Percentile: Argentina, Brazil, Chile, and United States, 2012



Note: Segregation calculated using information theory index for each percentile threshold ($H(p)$).
Source: Authors' calculations using PISA 2012 data.

observe the level of segregation at points all along the SES distribution. In comparing the segregation of low-SES and high-SES students from their peers, an interesting pattern emerged in Latin America. Whereas in the United States, high- and low-SES students tended to be about equally segregated from the rest of the distribution—or low-SES students might be slightly more segregated—in many Latin American countries, it was *high*-SES students who were especially segregated from their middle- and low-SES peers. This pattern was particularly evident in two of the most segregated countries overall, Chile and Panama. Their segregation profiles, in figures 12.1 and 12.3, respectively, slope steeply upward from low- to high-SES percentiles. Among the participating Latin American countries, high-SES students were more segregated than low-SES students in Panama, Chile, Uruguay, Brazil, and Costa Rica, while high- and low-SES students were approximately equally segregated in Mexico, Peru, Colombia, and Argentina.

Figure 12.2
Estimated Socioeconomic Segregation Between Schools by SES Percentile: Colombia, Costa Rica, Mexico, and the United States, 2012



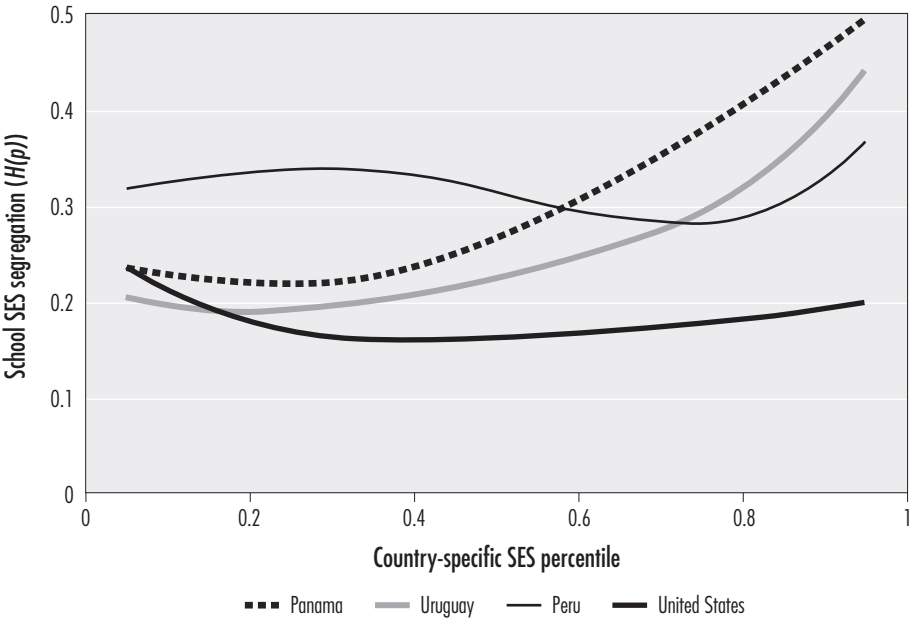
Note: Segregation calculated using information theory index for each percentile threshold (*H(p)*).
Source: Authors' calculations using PISA 2012 data.

ELEMENTARY SCHOOL SES SEGREGATION

The PISA data reflect the educational experiences of 15-year-old students, who are typically in secondary school. In the United States, elementary schools are generally more segregated than high schools because elementary schools have smaller enrollments and therefore draw from smaller catchment areas (meaning elementary schools more closely reflect residential patterns). In Latin America, in contrast, if elementary schools reflect residential patterns more closely than do secondary schools, this could make them *less* segregated than secondary schools, since high levels of school choice may make secondary schools more segregated than neighborhoods (Flores 2014; Valenzuela, Bellei, and de los Ríos 2014). Table 12.2 displays the results for elementary school segregation using data from PIRLS 2001 and 2011 for fourth-grade students and from PISA 2012 for secondary school students.

For both data sets, we calculated segregation based on parental occupation, which generally resulted in slightly lower segregation levels than when using the

Figure 12.3
Estimated Socioeconomic Segregation Between Schools by SES Percentile: Panama, Peru, Uruguay, and the United States, 2012



Note: Segregation calculated using information theory index for each percentile threshold ($H(p)$).
Source: Authors' calculations using PISA 2012 data.

PISA SES index. This analysis showed that, as expected, the typical U.S. pattern of elementary schools being more segregated than secondary schools did not appear to hold in Latin America. Whereas the average level of segregation by parental occupation was 0.23 across the Latin American countries for secondary school (PISA), the average level was only 0.17 across the Latin American countries for elementary school (PIRLS). However, different sets of countries participated in the two studies. When we compared Argentina and Colombia, the only two countries that participated in both studies, we found that SES segregation was very similar across elementary and secondary schools in both countries. Argentina had slightly lower segregation between elementary schools (0.16) than between secondary schools (0.18), while Colombia had slightly higher segregation between elementary schools (0.21) than between secondary schools (0.19). The similar levels of segregation for elementary and secondary schools in these two countries could be due to similar amounts of school choice in elementary

Table 12.2
Estimated Segregation Between Schools by Parental Occupation, Elementary and Secondary Schools

Country	Elementary School (PIRLS)	Secondary School (PISA)
Peru		0.31
Chile		0.30
Mexico		0.24
Panama		0.23
Costa Rica		0.22
Uruguay		0.22
Brazil		0.20
Colombia	0.21	0.19
Argentina	0.16	0.18
Belize	0.17	
Honduras	0.14	
United States		0.15

Notes: Segregation calculated using the rank-order information theory index (H^R) by parental occupation after sampling 10 students within each school; see methods section in text for details. See table A12.1 for categories of parental occupation by study. Countries sorted from highest to lowest level of between-school segregation in secondary schools.
Sources: Elementary school data from PIRLS 2001 for Argentina and Belize; PIRLS 2011 for Colombia and Honduras. Secondary school data from PISA 2012 for all countries except Panama; PISA 2009 for Panama.

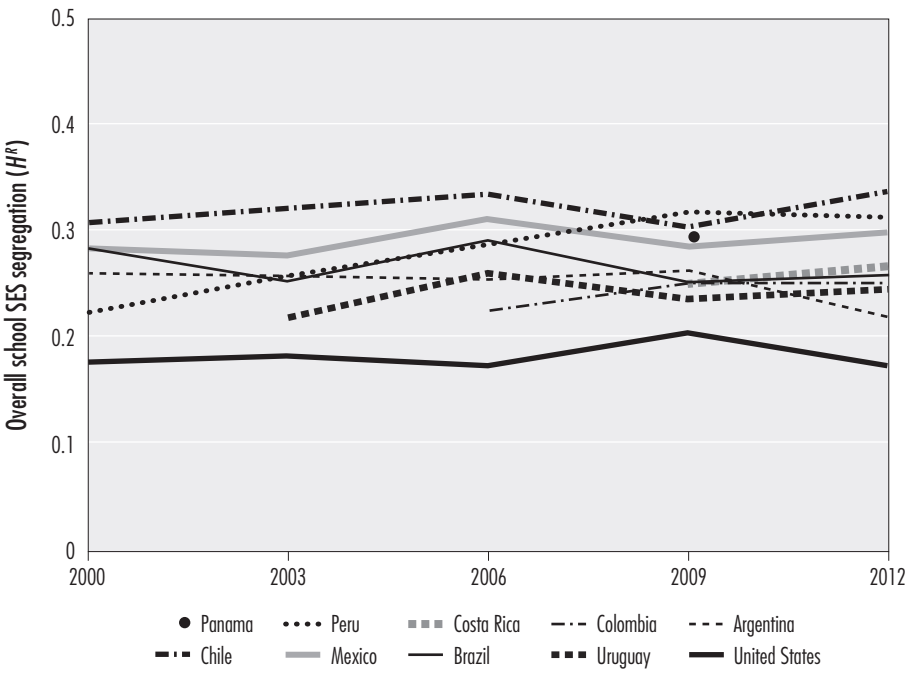
and secondary schools. The rates for private schooling are only slightly higher in secondary schools in both countries—25 percent in elementary and 28 percent in secondary schools in Argentina; 19 percent in elementary and 20 percent in secondary schools in Colombia (World Bank 2014). Additionally, as mentioned previously, relatively large numbers of secondary school students attend schools containing elementary school grades in Argentina (19 percent) and particularly in Colombia (87 percent). Thus, we would not expect very discrepant levels of elementary and secondary school segregation, as these are often not separate schools. The best explanation for slightly higher secondary school segregation in Argentina and slightly higher elementary school segregation in Colombia may be the countries' differences in school size. Based on principal questionnaires from PISA and PIRLS, Argentina's elementary schools are slightly larger than its secondary schools (around 640 students per elementary school versus 520 students per secondary school), while Colombia's elementary schools are considerably smaller than its secondary schools (around 950 students per elementary school versus 1,460 students per secondary school). Note also that since PIRLS sampled a single

intact classroom per school in all participating Latin American countries, while PISA sampled students from across the school, our elementary school estimates may conflate segregation between schools and segregation between classrooms, thus overestimating elementary school SES segregation.

CHANGES IN SCHOOL SES SEGREGATION OVER TIME

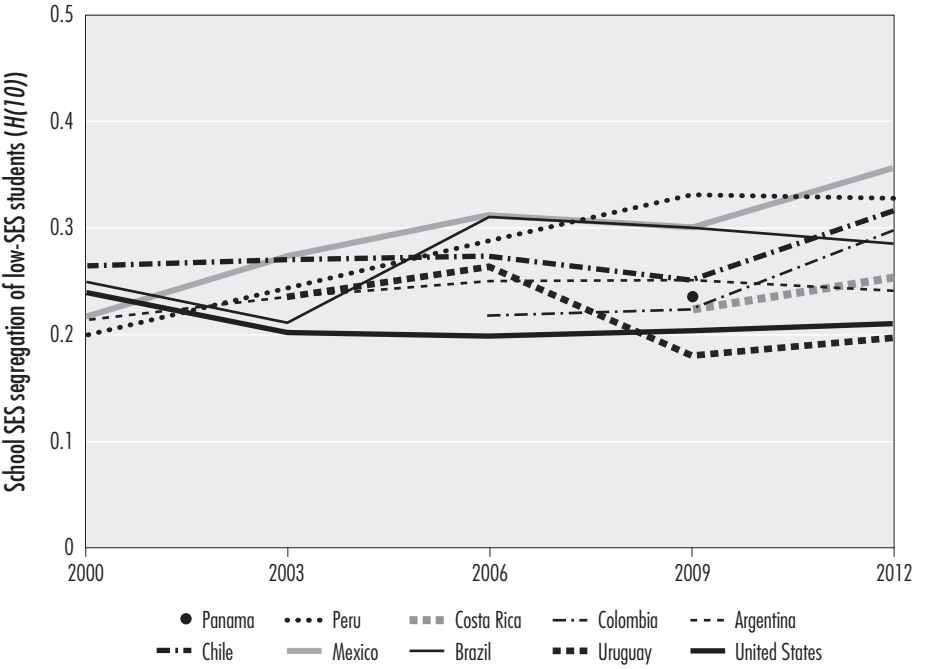
Next, we used the five repeated cross-sectional waves of PISA from 2000, 2003, 2006, 2009, and 2012 to examine national trends in SES segregation. Figure 12.4 shows estimated between-school SES segregation for each year across all the countries in our sample. Overall, segregation appears to have remained stable or increased slightly in most of the countries. In the United States, SES segregation remained around 0.17 throughout the period, except for a slight increase to 0.20 in 2009. Among the Latin American countries, segregation appears to have increased dramatically in Peru; to have increased somewhat in Costa Rica,

Figure 12.4
Trends in Overall Socioeconomic Segregation Between Schools, 2000–2012



Note: Segregation calculated using rank-order information theory index (H^R).
Source: Authors' calculations using data from PISA 2000, 2003, 2006, 2009, and 2012.

Figure 12.5
Trends in Socioeconomic Segregation Between Schools for Low-SES Students, 2000–2012



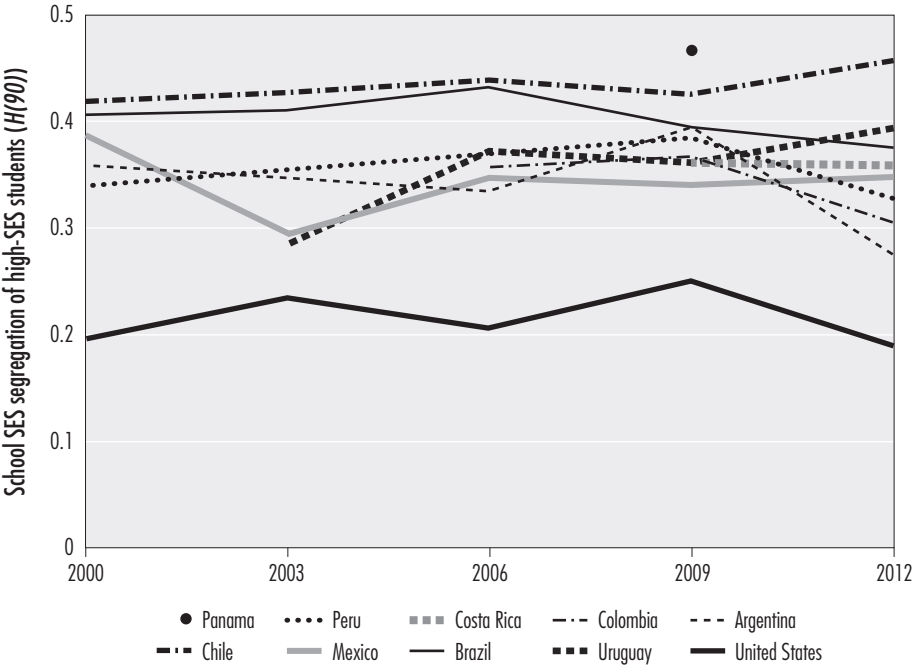
Notes: Low-SES students were defined as those below the 10th percentile. Segregation calculated using information theory index for students above and below the 10th percentile (*H(10)*).
Source: Authors' calculations using data from PISA 2000, 2003, 2006, 2009, and 2012.

Colombia, Uruguay, Chile, and Mexico; and to have decreased in Brazil and Argentina.

Figures 12.5 and 12.6 show trends in segregation from 2000 to 2012 for low-SES and high-SES students, respectively. The segregation of low-SES students increased more than the segregation of high-SES students in most of the countries. Although we observed above that in 2012, high-SES students were more segregated than low-SES students in many Latin American countries, this pattern was even more pronounced 12 years earlier in 2000, when low-SES students were less segregated than in 2012. The segregation of low-SES students increased in Colombia, Peru, Costa Rica, Mexico, Brazil, Chile, and Argentina, while the segregation of high-SES students increased substantially only in Uruguay and Chile.

Table 12.3 displays long-term trends in school SES segregation since 1970 for the two countries in our sample that participated in FISS, the United States

Figure 12.6
Trends in Socioeconomic Segregation Between Schools for High-SES Students, 2000–2012



Notes: High-SES students were defined as those above the 90th percentile. Segregation calculated using information theory index for students above and below the 90th percentile (*H(90)*).
Source: Authors' calculations using data from PISA 2000, 2003, 2006, 2009, and 2012.

Table 12.3
Long-Term Trends in Estimated Segregation Between Schools by Parent Occupation: Chile and the United States, 1970–2012

	1970	…	2000	2003	2006	2009	2012
Chile	0.29	…	0.26		0.29	0.23	0.30
United States	0.21	…	0.11	0.11	0.14	0.19	0.15

Notes: Data for 1970 are for segregation based on father's occupation. Data for 2000–2012 are for SES segregation based on the higher of the mother and father's occupational categories. Segregation calculated using rank-order information theory index (H^R) by parental education after sampling 10 students within each school; see methods section in text for details. See table A12.1 for categories of parental occupation by study.
Source: Data for 1970 from FISS; data for 2000–2012 from PISA 2000, 2003, 2006, 2009, and 2012.

and Chile. For these comparisons, we used segregation based on parental occupation, which is available in both FISS and PISA. We found that segregation based on parental occupation was very high in the United States in 1970 (H^R = 0.21), decreased to 0.11 by 2000, and then increased somewhat after that. In Chile, segregation based on parental occupation was extremely high in 1970 (0.29), decreased somewhat by 2000 to 0.26, but then increased to 0.30 by 2012.

ASSOCIATIONS BETWEEN SCHOOL SES SEGREGATION AND SOCIAL AND EDUCATIONAL POLICIES

Finally, we examined possible explanations for differences in school SES segregation across countries and across years within countries. The results of this analysis are shown in table 12.4. For each country covariate, we first discuss its association with differences across countries in average SES segregation (the "Between Countries" portion of the table) and then its association with changes in segregation over time (the "Within Countries" portion of the table). We also note differences in results for overall SES segregation versus the segregation of

Table 12.4
Coefficients from Hierarchical Growth Models Predicting Socioeconomic Segregation Between Schools from Country Covariates: United States and Latin America, 2000–2012

	School SES Segregation		
	Overall	Low-SES Students	High-SES Students
Within Countries			
Income inequality	–0.06	–1.27**	0.54
	(0.26)	(0.41)	(0.39)
Proportion urban	0.06	0.003	–0.12
	(0.08)	(0.18)	(0.17)
Proportion of cohort enrolled	0.28**	0.62***	0.002
	(0.10)	(0.16)	(0.18)
School size/1,000	–0.03	–0.14**	0.04
	(0.03)	(0.04)	(0.04)
Proportion vocational	0.11	–0.13	0.28
	(0.15)	(0.28)	(0.23)
Proportion choice	0.04	–0.08	0.12
	(0.06)	(0.11)	(0.09)
Proportion private	0.26*	0.06	0.35†
	(0.11)	(0.23)	(0.18)

(continued)

Table 12.4 *(continued)*

	School SES Segregation		
	Overall	Low-SES Students	High-SES Students
Proportion independent private	0.28*	0.06	0.41*
	(0.12)	(0.25)	(0.19)
Proportion government-supported private	0.02	0.01	–0.004
	(0.14)	(0.25)	(0.21)
Between Countries			
Mean income inequality	0.71**	0.44*	1.20***
	(0.14)	(0.14)	(0.21)
Mean proportion urban	0.11	0.12	0.15
	(0.11)	(0.09)	(0.17)
Mean proportion of cohort enrolled	–0.06	–0.02	–0.14
	(0.09)	(0.08)	(0.15)
Mean school size/1,000	–0.04	–0.01	–0.03
	(0.04)	(0.03)	(0.07)
Mean proportion vocational	0.30†	0.06	0.52*
	(0.13)	(0.13)	(0.22)
Mean proportion choice	0.17**	0.11*	0.22*
	(0.04)	(0.04)	(0.09)
Mean proportion private	0.14†	0.04	0.21
	(0.07)	(0.07)	(0.13)
Mean proportion independent private	0.51	0.14	1.19†
	(0.35)	(0.32)	(0.54)
Mean proportion government-supported private	0.11	0.03	0.14
	(0.08)	(0.06)	(0.13)
Number of observations (country-years)[a]	36	36	36
Number of countries[a]	10	10	10

[a] Exceptions: sample size for urban schools—35 observations, 10 countries; sample size for cohort enrolled—31 observations, 9 countries.

Notes: Overall segregation calculated using rank-order information theory index (H^R). Segregation of low-SES and high-SES students calculated using information theory index for students above and below the 10th percentile (*H(10)*) and the 90th percentile (*H(90)*), respectively. Each pair of within-country/between-country covariates comes from a separate model with no other controls (nine models per outcome). Therefore, the variables related to choice and private schools are not collinear, even though they are subsets of each other, as they come from separate models. Sample size varies slightly across models (see footnote a).

†, *, **, *** = statistically significant at <0.10, <0.05, <0.01, and <0.001 levels.

Sources: Authors' calculations using data from PISA 2000, 2003, 2006, 2009, and 2012. See Table A12.2 and text for sources of country covariates.

low-SES and high-SES students. As expected, countries with higher income inequality tended to have more socioeconomically segregated schools ($p = 0.001$). Over time, however, the relationship between increasing income inequality and increasing segregation appears to be close to 0 and was not statistically significant ($p = 0.82$). Income inequality appears particularly strongly associated with the segregation of high-SES rather than low-SES students. Between countries, income inequality was positively and significantly associated with the segregation of both low- and high-SES students, but it was more strongly associated with high-SES segregation. Within countries, increasing income inequality was significantly associated with *decreasing* low-SES segregation ($p = 0.005$) but was positively—though not significantly—associated with increasing high-SES segregation ($p = 0.18$). Also as expected, urbanization (i.e., a greater proportion of students enrolled in urban schools) generally predicted greater SES segregation, although these associations were never statistically significant.

Turning to educational factors predicting segregation, contrary to expectations, countries with higher proportions of their youth cohort enrolled in secondary school tended to have less segregated schools, although these associations were never significant. Over time, however, countries with increasing proportions of their youth cohort enrolled in school had increasing segregation ($p = 0.008$), as expected. This pattern appears to be dominated by the segregation of low-SES rather than high-SES students, suggesting that these new students entering the system, who were likely to be low-SES, tended to enter schools that were separate from those attended by their middle- and high-SES peers. As expected, larger school size tended to be associated with lower SES segregation between schools, although this association was significant only when predicting changes in low-SES segregation over time ($p = 0.001$). Aligned with our predictions, countries with greater proportions of secondary school students enrolled in vocational tracks had somewhat more segregated schools, and countries with increasing proportions of students in vocational tracks may have had slightly increasing segregation, associations that were marginally significant between countries ($p = 0.06$) but not significant within countries ($p = 0.47$). This finding appears to be driven mainly by the segregation of high-SES students, suggesting that in countries with more vocational education, high-SES students tended to be segregated into academic-track schools.

In regard to educational policies related to school choice and private schooling, as expected countries with a higher proportion of students enrolled in schools of choice (rather than schools with residence-based admissions) tended to have significantly higher levels of segregation ($p = 0.001$). Over time, however, countries with increasing amounts of school choice experienced only slightly increasing levels of segregation, an association that was not statistically significant ($p = 0.52$). Looking specifically at schools of choice that were in the private sector, countries with higher proportions of students enrolled in private schools tended to have somewhat higher segregation, although this association was only marginally significant ($p = 0.09$). Over time, countries with increasing proportions

of students in private schools tended to have significantly increasing segregation ($p = 0.03$), a pattern that appears to be explained mostly by the increasing segregation of high-SES students ($p = 0.07$). Further dividing private schools into those that were independent and privately funded (typically through tuition) versus those that were mostly government supported (such as through vouchers), we found that it was the proportion of students in independent private schools that was most strongly associated with segregation, and particularly with the segregation of high-SES students (presumably those whose families were able to pay tuition). The proportion of students in private government-supported schools was positively but not significantly associated with segregation.

Discussion

This study found that school SES segregation was substantially higher in Latin America than in the United States, a pattern that was largely driven by very high segregation of high-SES students in many Latin American countries, while the segregation of low-SES students in those countries was more similar to that in the United States. However, between 2000 and 2012, the segregation of low-SES students increased more in Latin America than in the United States. The countries with the highest segregation of high-SES students tended to be those with the highest income inequality and/or the largest private school sectors, including Chile, Panama, Uruguay, and Brazil. Countries with the greatest increases in the segregation of low-SES students tended to be those with increasing secondary school access and/or decreasing school size, including Mexico, Peru, and Colombia.

The data available for Chile and the United States in 1970 suggest that there may be a long history of higher school SES segregation in Latin America than in the United States. However, the pattern of particularly high segregation of high-SES students from their middle- and low-SES peers that was very pronounced in the most recent Chilean data was not yet evident in 1970. In fact, our estimates of the segregation of high- and low-SES students based on parental occupation (not reported in the results) show slightly higher segregation for *low*-SES than for high-SES students in Chile in 1970. Between 1970 and 2000, overall school segregation decreased in Chile, but the decline occurred only for low-SES students, while high-SES students became more segregated. This could be due to Chile's sharp rise in private schooling during that period. In 1970, only 21 percent of students were enrolled in private schools; by 2000 that proportion had increased to 46 percent, and by 2012 it had risen to 63 percent (authors' calculations using FISS 1970, PISA 2000, and PISA 2012, respectively). It is important to keep in mind that nearly all of that increase was due to the explosion of government-supported voucher schools following the school privatization reform of 1981. Government-supported private schools existed before the implementation of universal vouchers that year; indeed, they constituted the majority of private schools (authors' calculations using FISS 1970 data). However, those private schools were

very different from the new voucher schools founded after the reform by for-profit organizations to cater to middle-income families who could not afford independent, tuition-supported private schools (Torche 2005). Meanwhile, the number of tuition-supported private schools remained relatively constant and continued to enroll the highest-income students (Torche 2005). Based on Torche's finding that high-income students were most concentrated in tuition-supported private schools and middle-income students were most concentrated in government-supported voucher schools, one would expect that independent private schools would be most associated with the segregation of high-SES students, and that is in fact what we found, both between countries and within countries over time. At the same time, one would also expect that government-supported voucher schools would be most associated with the segregation of low-SES students. We did not find strong evidence for that expectation, however. Although within countries, an increasing proportion of voucher schools was slightly more strongly associated with the segregation of low-SES than of high-SES students, both relationships were close to 0 and not statistically significant.

Thus, when examining change within countries over time, the rise of government-supported voucher schools does not have much explanatory power—perhaps because of limited data, since voucher schools are prevalent only in Chile and Argentina. Increases in tuition-supported private schools were associated with increasing segregation of high-SES students, but recall that the larger change in most Latin American countries since 2000 was the increasing segregation of *low*-SES students. Our models showed that increasing low-SES segregation was related to increasing secondary school access and decreasing average school size. Indeed, both increasing access and decreasing school size are patterns found in most Latin American countries. Two extreme examples are Peru and Mexico. In Peru between 2000 and 2012, secondary school enrollments increased from 66 percent to 78 percent, and the segregation of low-SES students increased from 0.20 to 0.33. In Mexico during the same period, secondary school enrollments increased from 57 percent to 73 percent, and the segregation of low-SES students increased from 0.21 to 0.35. Also during this period, average school size in Peru decreased from about 1,000 students to fewer than 700 students. Average school size did not change appreciably in Mexico, but in another country, Brazil, it decreased from about 1,600 to about 1,000 students, and the segregation of low-SES students increased from 0.25 to 0.28.

Increasing secondary school enrollment and decreasing average school size could be related trends if new schools are opening to accommodate newly enrolled students and these schools tend to be located in remote rural areas and therefore have small enrollments. This might be the case in Peru and Mexico, for example, two of the countries in our sample that have more rural schools and where low-SES students generally attend smaller schools. We could not examine this question directly with the available data, as PISA does not follow schools longitudinally over time or collect information on school founding dates. In ad-

dition, declining school size in Latin America could be related to the expansion of private schooling, as private schools are noticeably smaller than public schools in nearly all Latin American countries. Yet in most countries in our sample, average enrollments have declined within school sectors as well, and declines are even larger in public schools than in private schools. This could potentially be the result of the exodus of high- and middle-SES families from public schools to private schools. Finally, the recent decreases in income inequality seen in much of Latin America do not appear to correspond to lower levels of segregation for low-SES students. On the contrary, low-SES segregation appears to have increased significantly more in countries where income inequality has declined the most.

Overall, the results of this study corroborate earlier findings that school SES segregation is higher in Latin America than in the United States. To this we add that the disparity appears to be growing. By 2012, high-SES students were dramatically more segregated in Latin America than in the United States, but low-SES students were slightly less segregated. If the segregation of low-SES students in Latin America continues to grow, however, the picture for the most disadvantaged students may be the most discouraging. It is difficult to predict the degree to which the current findings regarding school SES segregation reflect differences in residential SES segregation. Because Latin America has such high rates of school choice, school segregation may correspond much less closely to neighborhood segregation in these countries than in the United States. Elementary school segregation, compared with secondary school segregation, might more closely approximate neighborhood segregation, because even in systems of school choice, families tend to prefer to send their younger children to schools closer to home (Flores 2014). Although the current study did not find dramatically different levels of elementary and secondary school SES segregation, no elementary school data were available for the countries with the highest levels of secondary school SES segregation, including Chile, Peru, Mexico, and Panama. In those countries, the contrast between school and neighborhood SES segregation may be particularly stark. The only evidence from previous research comparing residential segregation in the United States and a Latin American country (Mexico) shows that the segregation of low-income households in U.S. cities is much higher than in Mexican cities (Monkkonen 2010). If this finding holds across other Latin American countries, it could be that the reason the between-school segregation of low-SES students is nearly as high in the United States as in Latin America is that low-SES children in the United States actually live in more segregated neighborhoods.

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Table A12.1
Categories of Parental Occupation by Study

PISA 2000–2012		PIRLS 2001, 2011		FISS 1970: Chile		FISS 1970: United States	
1	Elementary Occupations	1	Laborers	1	Unskilled Workers	1	Laborers
2	Skilled Agricultural & Fishery Workers	2	Agricultural	2	Laborers in Agriculture, Forestry, and Fishing	2	Domestic and Personal Service Workers
3	Plant & Machine Operators & Assemblers	3	Plant Operators	3	Semiskilled Workers	3	Farm, Fishery, and Forestry Workers
4	Craft Etc. Trades Workers	4	Craft/Trade	4	Skilled Workers	4	Semiskilled Workers
5	Service Workers & Shop & Market Sales Workers	5	Service	5	Clerical and Sales Workers	5	Skilled Workers
6	Clerks	6	Clerk	6	Policemen and Armed Services	6	White Collar Workers
7	Technicians and Associate Professionals	7	Business	7	Subprofessional and Technical	7	Managers, Officials, and Proprietors
8	Legislators, Senior Officials & Managers	8	Technician	8	Higher Professionals	8	Professional and Technical
9	Professionals	9	Manager	9	Administrators, Executives, Proprietors and Managers		
		10	Professional				

Categories ordered from lowest to highest average occupational status based on the International Socio-Economic Index of Occupational Status (ISEI).
Sources: PISA 2000, 2003, 2006, 2009, 2012; PIRLS 2001, 2011; FISS 1970.

Table A12.2
Descriptive Statistics for Country Covariates

Variable	Source	Mean	Standard Deviation	Number of Country-Years
Income inequality (Gini index)	World Bank (2014), LIS (2014)	0.46	0.04	36
Proportion of students enrolled in urban schools	PISA 2000–2012 principal questionnaires	0.42	0.11	35
Proportion of age cohort enrolled in secondary school	World Bank (2014)	0.74	0.12	31
Average school size/1,000	PISA 2000–2012 principal questionnaires	1.00	0.32	36
Proportion of secondary students enrolled in vocational programs	World Bank (2014)	0.10	0.08	36
Proportion of students enrolled in schools of choice	PISA 2000–2012 principal questionnaires	0.51	0.20	36
Proportion of students enrolled in private schools	PISA 2000–2012 principal questionnaires	0.19	0.15	36
Proportion of students enrolled in independent private schools	PISA 2000–2012 principal questionnaires	0.11	0.04	36
Proportion of students enrolled in government-supported private schools	PISA 2000–2012 principal questionnaires	0.08	0.15	36