

Intranational Comparative Education: What State Differences in Student Achievement Can Teach Us about Improving Education—the Case of Brazil

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Implicit in much of comparative and international education research is that education is a creature of the nation-state, shaped largely by economic, political, and social forces defined by national boundaries. However, in federal nation-states, primary and secondary schooling is the juridical responsibility of the constituent states, not the national government. We make the case in this article that in comparative education analysis, there is persuasive support in political theory to consider subnational state comparisons in federalist nations and that such comparisons can yield valuable insights for improving education in the federal nation-state as a whole. We focus on one federal country, Brazil, and on the possible differences in the “effectiveness” of state education administrations in delivering education. We measure state effectiveness by students’ mathematics achievement gains on a national test in 1999–2013. We also examine the possible reasons why gains differ greatly in states with similar demographic characteristics.

Implicit in much of comparative and international education research is that education is a creature of the nation-state, shaped largely by economic, political, and social forces defined by national boundaries. Not surprising, then, that the varied contributions to theories of comparative education in the past 50 years have focused on educational changes at the national level and on how theories of the nation-state may explain the development of national educational systems.¹ Further, with increased economic globalization and the increased influence of global communication and media (Castells 1996), comparative analysis of national education has steadily shifted to situate the nation-state in a global economy and ideology (Carnoy 1999; Mundy and Murphy 2001; Carnoy and Rhoten 2002). Although an important part of the globalization discussion is whether in an increasingly globalized environment, the nation-state is ceasing to be the locus of educational policy (Green 1997), the prevailing global ideology is that the nation-state remains the locus of

¹ Weiler (1983); Carnoy and Levin (1985); Evans (1995); Meyer et al. (1997); Mundy and Murphy (2001); Phillips and Ochs (2003).

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educational change (OECD 2013). An example of the conflicting evidence regarding this discussion is, on the one hand, the increasing ideological influence of international testing agencies such as the OECD (PISA) or the IEA (TIMSS) on national views of educational quality (Carnoy 2014) and, on the other, the increased emphasis placed by the international testing agencies on the nation-state as the responsible entity for “improving” national education to achieve higher national economic growth (OECD 2011, 2013; Hanushek et al. 2013).

Is comparative and international education research correct in focusing so heavily on the nation-state as the relevant unit for analyzing education comparatively? Generally, yes. In most countries, major aspects of formal education are defined by nation-state economic and political histories. Educational change is typically played out in national political structures, and understanding how those changes occur typically requires a theory of the nation-state. It therefore usually makes sense to regard educational systems as “products” of nation-state political, economic, and social structures. Further, although many educational policy analyses tend to use schools or classrooms as their unit of comparison, arguing that school actors and individual teachers play a very influential role in organizing the educational process (e.g., Elmore 2000; Hanushek et al. 2011), others have pointed out that major educational decisions, such as curriculum, teacher pay/working conditions (hence who is recruited into teaching), teacher training, the length of the school day/year, class size, and school finance, are situated at higher levels of the political structure, outside the control of principals and teachers (Levin 1980).

However, the tendency to focus on comparative analysis at the national level has its challenges. As the extensive literature on centralization/decentralization implies (e.g., Behrman et al. 2002), the degree to which the national governments influence “national” education does vary from country to country, largely due to the way that nation-states define themselves politically and the role that this political definition has on shaping educational delivery. The most important instance of the nation-state that raises theoretical questions about focusing so heavily on national educational comparisons is the federal state. Federalism is the name given to a system of government in which sovereignty is shared between a central governing authority and constituent political units, such as states or provinces (Watts 1992). These political units are generally bound together by a constitution that spells out the rights and obligations of the constituent members. A typical reason that nation-states are federal is that, historically, regions found it in their interest to join together as a larger nation-state but agreed to do so under the condition that they retain considerable autonomy.²

² The advantage of federalist systems, particularly in spatially large countries, is that local governments are more likely to be in touch with their local constituencies and to be more effective in allocating resources for local needs. In turn, regions can benefit from belonging to a larger entity for

In every federal nation-state, primary and secondary schooling are the juridical responsibility of the constituent states, not the federal government. But the federal government is often the main source of revenue for education in the states and, in some countries, legislates education reforms that are subsequently implemented by the states. Yet even in federal countries with mainly central government financing, and even considering differences in economic development levels among states, federal countries are marked by considerable variation across constituent states in teacher labor markets, curriculum, evolution of access to schooling, and the politics and ideology of state bureaucracies (Carnoy et al. 2015). Thus, in terms of comparative education analysis, there is persuasive support in political theory to consider subnational state comparisons in federalist nations.³

The benefits of subnational state comparisons of educational performance in federalist countries extend beyond their theoretical logic. Although such comparisons have the disadvantage of working with smaller variations in student achievement, the quality of resources, and educational practices than international comparisons, they have the distinct advantage of greater contextual similarity in terms of identifying specific educational management differences and applying findings of successful policies from one subnational state to another. Analysts have long identified the difficulties of “educational borrowing” across national social and political contexts (Phillips and Ochs 2003). Educational policy borrowing is more likely to find smoother implementation across subnational states—particularly neighboring states with similar social conditions.

In this article, we make an argument for the value of subnational analyses of educational systems in federalist nation-states by showing how analyzing the comparative “effectiveness” of state education systems within one such federalist country, Brazil,⁴ in the first decade of the twenty-first century (1999–2013) can yield important insights into educational change. Estimating edu-

many possible reasons: economies of scale from larger markets, sharing the costs of the common defense, and, for poorer regions, from participating in the success of richer regions through the redistribution of central government revenues. There are also disadvantages: wealthy regions may not like sharing their success with less wealthy regions; and there may exist profound disagreements between some members of the Federation and the central government on the rights and obligations of regions versus the center

³ This does not preclude other kinds of sub-national comparisons, such as of big city school systems. But it would be important in such comparisons, to situate each of subsystems in the political organizational structures of educational delivery in their nation-states. For example, São Paulo, Buenos Aires, and Los Angeles are probably good cases for big-city educational comparisons because they are all rather autonomous from their state/national systems. But Paris or Santiago might not be appropriate to compare with Sao Paulo. At the least, the research would have to focus on the different national political administrative contexts as a major variable in such a comparison.

⁴ Federal states differ in how and why they took this national form, and, unlike the United States or Italy or Germany, when Brazil became a republic in the late nineteenth century, its previously centralized nation-state gave political power to the regions rather than autonomous regions agreeing to join a new nation-state. Nevertheless, Brazil’s federal form is typical in that its constituent states were given constitutional control over public primary and secondary education.

cational system “effectiveness” is one way to compare systems, and these estimates can form the basis for understanding why students who attend schools in some political units (in this case, states) perform better academically and may be making larger academic gains than in others. Our measure of educational effectiveness is student academic performance in each state on Brazil’s national test.

Thus, even as Brazil participates in international tests, such as the Program in International Student Assessment (PISA), and Brazilian policy makers often use the PISA to benchmark their students’ performance and seek lessons from other countries, both within Latin America and from those in Europe (Carnoy et al. 2007, 2015; Klein 2011), we argue that it is logical both theoretically and from a policy standpoint to compare education across Brazilian states. Specifically, we focus on a particular feature of the political organization of Brazilian education—the division between the state and municipalities in administering schooling—and how state policies mediating this division might have affected student performance in each state. Our basic premise is that in federal systems, the politics of education and the capacity to administer educational systems at the state level are key to how effectively education is delivered in the states, and that state-level management is an important element in understanding the quality of “national” education systems in federal countries (Rhoten 2000; Carnoy et al. 2015).

The Brazilian education system is particularly amenable to such an analysis because of the extensive student performance data available over time at the state level. Our study focuses on the gains during the past decade that Brazilian students made across states in mathematics skills, as measured by the Brazilian national test, the National Evaluation System of Basic Education (Sistema Nacional de Avaliação da Educação Básica [SAEB]), and on the possible reasons why gains differ so greatly in states with similar demographic characteristics. The advantages of using the SAEB test to compare student mathematics performance across states are that the SAEB student sample is very large, drawn randomly within each state, and covers a fairly long period, 1999–2013. In one part of our analysis—comparing student gains in capital cities of states—we also use data from the *Prova Brasil* test in 2007–13. Unlike the SAEB, the *Prova Brasil* is a censal test applied to all students in public schools with more than 20 students in the tested grades (fifth, ninth, and twelfth). In 2011 and 2013, the SAEB began incorporating the *Prova Brasil* results for public school students and added a sample of students in private schools.⁵ The SAEB and *Prova Brasil* tests are also much more aligned with the (highly variable) Brazilian mathematics curriculum than are other tests taken by Brazilian students, such as the PISA, also available by state for the period

⁵ For a description of the Brazilian national tests, see the website of the Brazilian statistical agency, INEP. <http://portal.inep.gov.br/web/saeb/aneb-e-anresc>.

2003–15.⁶ We focus on the ninth-grade SAEB and estimate ninth-grade students' test score gains in mathematics by state during this period.⁷

The administration of Brazil's education system, like many decentralized systems, is complex because local and state administrations share responsibility for education in the same state. In twenty-first century Brazil, a high percentage of children attend municipal schools at the public primary level; both municipal and state governments exert control over public middle schools, and most students attending upper secondary education do so in state-administered schools. The performance of ninth-grade students in a Brazilian state might therefore reflect the influence of the state's education policies, the policies of various municipal administrations within a state, or be the result of cooperation between state and municipalities. In a political organization of state education where many students who attend state-administered middle schools start out in municipal primary schools, it would seem logical that the state political and educational bureaucracy has a vested interest in working closely with municipalities to assure that students in municipal primary school are adequately prepared for middle school education. In this article, we exploit the variation in test score gains among state-administered educational systems and among each state's municipality-administered systems to explore this notion that the way states mediate the political organization of schooling can influence overall student academic performance in each state. Our results suggest that the degree to which state and municipalities collaborate may be associated with larger or smaller achievement gains across state and municipal schools.

In the next section we provide more details about the organization of Brazil's education system into state and municipal schools and the nationwide reforms that form the context of educational change for all Brazilian states and municipalities. In the second section, we describe our data and empirical strategy we use to estimate the relative success of each state's state and municipal systems. The third section presents the results of our analysis, and the fourth section discusses these results and concludes.

Background

Brazil has a highly decentralized educational system with 27 state-level systems and approximately 5,600 autonomous municipal systems. This large

⁶ We have analyzed the Brazilian PISA data by state for each of the years 2003–12 but do not present them here because there are many questions about the randomness of the PISA sample within states. For a general analysis of the PISA results in Brazil, see Carnoy et al. (2015).

⁷ SAEB was historically given to fourth and eighth graders, but in 2007, Brazil implemented a major reform that changed the entrance age into primary school from 7 years old to 6 years old, increasing the length of primary school beginning with that first grade cohort from 4 to 5 years, and the total length of basic education (primary plus middle school) from 8 to 9 years. All schools completed this transition by 2010, so by 2019, all students taking SAEB will have completed 9 years of schooling. We use the current nomenclature of "ninth grade" to refer to the last year of middle school—eighth grade.

number of independent systems are responsible for administering almost 200,000 basic education schools, including hiring its teachers.⁸ Meanwhile, Brazil has both centralized legal and assessment systems to ensure—at all levels of government—equalization of educational funding and national assessment of student achievement in elementary, middle, and high school education.⁹

Changes in student performance at the end of middle school/beginning of secondary school across states in Brazil in the past 10–15 years have been influenced by a variety of important factors: the continued incorporation of more students at these schooling levels (Carnoy et al. 2015; Fonseca 2015); the increased municipalization of primary and middle schooling with considerable variation across states (Dantas 2016); nationwide reforms to equalize education funding between poorer and wealthier municipalities (Cruz 2015); and reforms such as literacy programs and adding a year of primary schooling to improve the quality of education, both of which were initiated by particular states (Costa and Carnoy 2015; Martins et al. 2016).¹⁰

State and Municipal Administration of Education in Brazil

Elementary and middle schools have been allocated between states and their municipalities through a constitutional agreement called *regime de colaboração* or collaboration regime (Abrúcio 2010b). The Brazilian constitution of 1988 specifies that each state must take the lead in this collaboration with its municipalities (Senado Federal do Brasil 1988—Brazil Constitution, art. 211, sec. 1–4). According to Cury, this has created an educational federalism that gives the federal government the responsibility of creating the guidelines and goals for Brazilian education; however, the actual obligation of providing basic schooling is given to the states and municipalities (Cury 2010). In practical terms, states define how to collaborate with their municipalities under very loose federal guidelines. This implies different levels of collaboration between the municipal and state schools in each state. In many, if not most states, the degree of collaboration is low, with state schools administered by the state secretary of education and the municipal schools by each municipality's educational administrative apparatus (Segatto 2015).

⁸ Federal high schools and basic education schools attached to federal universities are exceptions to this rule. They are usually selective and represent 2 percent of enrollment at the high school level.

⁹ Brazilian education is divided into early childhood education (day care for ages 0–3 and preschool for ages 4–5), fundamental education (first to ninth grades), and high school (tenth to twelfth grades). Starting in 2016, a Constitutional amendment established compulsory schooling for every children ages 4–17.

¹⁰ Further, the intensification of educational accountability, primarily through the expansion of educational testing and using test scores to rate the educational performance of schools, municipalities and states, and a greater emphasis on educational management may also have improved educational outcomes, but there is no evidence for their impact.

The agreement also influences the share of basic education students attending each type of school. Although the share has been largely determined historically, since decentralization has been on the Brazilian education agenda since the 1920s, the 1990s were marked by the federal government promoting a shift of elementary and middle school education from state administration to municipalities (Costa 2009). Yet in the South and South Central regions, middle schools in 2013 were still as likely or more likely to be run by the states, and states in the Northeast had more students in municipal schools (see figs. 1 and 2).

In addition, there is a large system of independently run private schools at all levels; particularly at the secondary level, private schools still serve about one-seventh of all students.¹¹ The fraction of students in private schools in a number of states, such as Pernambuco, Rio de Janeiro, São Paulo, and Distrito Federal, is much higher than the 12 percent average private school students in middle school (fig. 2).

Educational Reforms and State Management Policies

Important for our analysis of inter-state differences is that a main focus of national educational reforms in Brazil since the 1990s has been to attempt to reduce regional disparities and to make states and municipalities more accountable for student performance. One way that the federal government addressed inequalities in educational access and performance was to reform education finances. FUNDEF, the National Fund for Fundamental Education Development and for Enhancing the Value of the Teaching Profession and its successor, the Fund for the Development of Basic Education and Enhancing the Value of the Teaching Profession (FUNDEB), shifted resources and responsibility for the first 8 (now 9) years of basic education from the state to the municipal level.

A second major reform was to introduce national testing (SAEB) in 1995, and, in 2007, the Index of the Quality of Basic Education (IDEB). IDEB is an index that combines student test performance and school completion rates. It serves as a low stakes accountability evaluation for schools, municipalities and states (Soares and Xavier 2013). With the creation of IDEB, improving the quality of educational processes and outcomes became increasingly important policy issues. Most empirical studies on Brazilian (and other countries') education focus on improving classroom processes, with good reason (Carnoy et al. 2007; Bruns et al. 2012; Bruns and Luque 2014). The studies generally posit that student achievement is a function of the quality of the family academic resources they bring to school and the quality of the teaching and other classroom resources (Rothstein 2005). The results of this body

¹¹ UNESCOSTAT: <http://data.uis.unesco.org>.

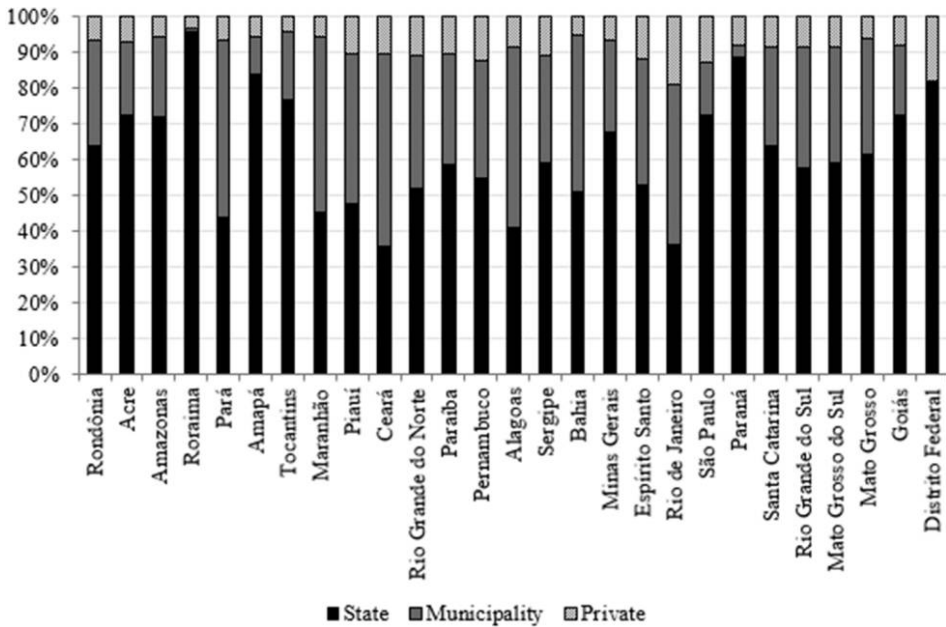


FIG. 1.—Proportion of ninth-grade students attending state, municipal, and private schools, by state, 2001. Source.—INEP, *Censo Escolar*, 2001. *Censo Escolar*, 2001. Regions: North—Rondônia, Acre, Amazonas, Roraima, Pará, Amapá, Tocantins; Northeast—Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia; Southeast—Minas Gerais, Espírito Santo, Rio de Janeiro, São Paulo; South—Paraná, Santa Catarina, Rio Grande do Sul; Central-West—Mato Grosso do Sul, Mato Grosso, Goiás, Distrito Federal.

of research suggest that the process of student learning in schools is extremely complex, and modeling it is not easy (Levin 1980).

This article attempts to go beyond the impact of these various student and school level characteristics in order to assess the probable influence that broader organizational policies have on student ninth-grade mathematics achievement in Brazil. We do not pretend to measure this influence in a causal fashion but rather try to make an empirical case that the management politics of state administrative units appear to be associated with how well students attending schools in different state and municipal systems performed over a 14-year period. We make this case through a general analysis of state differences in student outcomes and several comparisons between neighboring states of educational policies in this same period.

There is a long history of educational management studies, almost entirely focused on the school and district level. At the school level, the best known of these are the “effective schools” studies (e.g., Levin and Lockheed 1993; Sammons et al. 1995; Elmore 2000). In the United States, school districts have also been the subject of many effectiveness studies (e.g., Fuhrman

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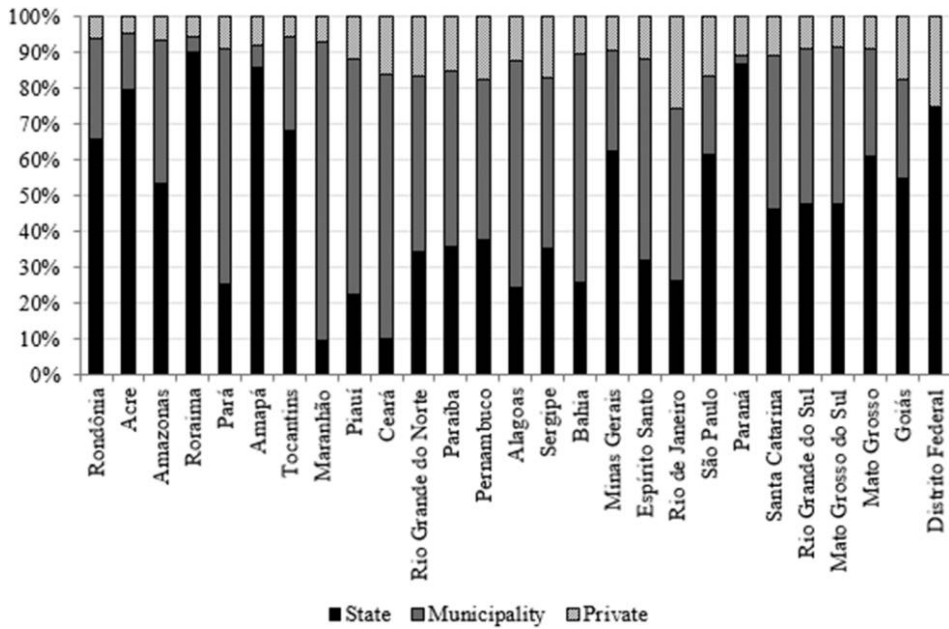


FIG. 2.—Proportion of ninth-grade students attending state, municipal, and private schools, by state, 2013. Source: INEP, *Censo Escolar*, 2013. For states by region, see fig. 1.

1993). In Brazil, this research tradition is fairly recent and its focus has been on measuring the effects of different types of schools on student achievement, specifically searching for school factors associated with differential effectiveness.¹²

More recent research has associated different municipal and state policies to student achievement, particularly the relationship between municipal spending in education and student achievement (do Amaral and Menezes-Filho 2008; Zoghbi et al. 2009; Diniz 2012). Other studies have examined the impact of municipalization on Brazilian education¹³ and found mixed results (Leme et al. 2009; Ceneviva 2011; Becskeházy 2014). Using *Prova Brasil* data from 2005 to 2011, Soares and Alves (2013) compared student performance in state and municipal schools within each municipality by region. They argue that substantial differences (up to 20 points in the SAEB scale) between state and municipal schools in Brazilian municipalities may reflect differences in the management of state and municipal school systems.

¹² Barbosa and Fernandes (2001); Albernaz et al. (2002); Ferreira and Dentzein (2003); Soares (2003); Franco and Bonamino (2006); Louzano (2007); Alves and Soares (2013).

¹³ Municipalization refers to the shift of fiscal responsibility and educational decision making for elementary and middle school education from states to municipalities.

In Brazil, there are few studies that analyze the role of state governments in the context of Brazilian federalism, especially the relationship between states and municipalities.¹⁴ Gomes (2009) studied differences in the patterns of municipalization of elementary and middle schools across states in Brazil. He shows that state governments can push or slow down the implementation of national policies such as FUNDEF and FUNDEB, impacting the share of students in state and municipal school systems. Segatto (2015) analyzed cooperation among Brazilian states and their municipalities and created a typology with five categories, ranging from strong cooperation to conflict. In our analysis, we place particular emphasis on Segatto's typology to help explain why students in some states may have made much more academic progress than students in other states.

There has also been a relative dearth of studies that focus on describing and explaining state differences in educational outcomes. In the United States, with accountability reforms in the 1990s, some research did focus on states' educational performance (e.g., Grissmer and Flanagan 1998; Grissmer et al. 2000). However, similar studies have not until now appeared in Brazil. We aim to fill this gap in the literature by showing the variation in state achievement gains over time and discuss how differences in performance may reflect different organizational arrangements between states and municipalities.

Data and Method

Data

Our data sources for interstate and municipal comparisons are Brazil's two national assessment tests, the SAEB, for which we have state level and student level public and private school sample data with similar control variables since 1999, and the *Prova Brasil*, a censal test of all students in public schools with more than 20 students in the tested grades for the period 2007–13. In 2011 and 2013, the *Prova Brasil* served as the public school portion of the SAEB. The SAEB and *Prova Brasil* were applied to students in specific grades, and we focus on the ninth-grade results in mathematics. The SAEB individual level microdata are available for 1995–2013, and the *Prova Brasil* microdata, for 2007–13. These rich data sets provide information about students' mathematics and reading (Portuguese) exam scores and the socio-economic background of students, teachers, and principals. The exam scores in each grade are comparable over time and permit comparison of results between grades. That is, we can follow the performance of grade cohorts, schools, networks, and the system as a whole (but not of individual students, since we do not have matchable student identifiers across grades and years).

¹⁴ Tandler (1998); Abrucio and Gaetani (2006); Gomes (2009); Abrucio (2010a); Segatto (2015).

Student performance on the SAEB and *Prova Brasil* vary considerably across states in each year that the tests were given. In ninth-grade mathematics in the SAEB 2011, for example, students in the lowest performing states, Maranhao and Alagoas, averaged mathematics scale scores of 224 and 227, respectively. At the top of the spectrum, students in Minas Gerais scored 269, and students in Distrito Federal scored 265. According to our estimates using individual student data, this represents a spread of about one standard deviation in average scores. However, in terms of unweighted interstate variation, it represents a spread of more than three standard deviations.

Empirical Strategy

The main goal of our empirical strategy is to estimate that part of Brazilian ninth-grade students' academic performance that reflect differences in how well states and municipalities within states are managing their education systems. To get at these estimates of the influence that the politics of educational management might have on student achievement in state and municipal schools in each Brazilian state, we attempt to adjust average student achievement scores across Brazilian states for the many possible observable factors at the family and school level that have been shown to influence student achievement but are probably external to the effectiveness of state or municipal administrations in educational delivery.

There are many reasons why average test scores can differ between states. An important one is demographics. In states with a higher percentage of students from low academic resource families, average scores would tend to be lower (Rothstein 2005). In states with a higher percentage of minorities such as African-Brazilians or indigenous peoples—groups that for “historical reasons” traditionally do less well on such tests—the averages would tend to be lower. The part of the lower scores resulting from differences in the composition of students' characteristics, including gender, race/ethnicity, and age, or differences in the composition of students with different levels of family resources, including (in the SAEB) mother's education, and home wealth (articles in the home), cannot reasonably be attributed to poorly performing educational systems. Finally, in states where students drop out before the ninth grade (SAEB), we have to be concerned about possible selection bias in who attends school, particularly those students who have low levels of family resources. The higher the percentage of students who do not appear in the samples, the more likely that there will be an upward bias to the scores compared to states where enrollment is universal. As we estimate changes in test scores over time, the nature of the biases become even more complex, since part of the test score trajectory in higher initial dropout states is affected by declining dropouts, whereas that may not be the case for low initial dropout states.

Most analyses of test score differences using student level data focus on how students' socioeconomic background influence their performance (Chudgar et al. 2012) or, controlling for student background, how school inputs influence student performance (e.g., Clotfelter et al. 2007). Our analysis, however, focuses on state differences (state fixed effects) in test scores, controlling for student demographic and school resource differences.

In our first model, we estimate state fixed effects, only controlling for a series of individual student characteristics within schools and peer effects at the level of the school.¹⁵ We estimated students' ninth-grade SAEB scores for each test year from 1999 to 2013 as a function of individual student characteristics (student gender, race, whether a student is older than 16 years old in ninth grade, whether the student failed once or twice, student's mother's education, whether the student worked, and an index of the articles in the student's home), average mother's education of students in the school, and the state fixed effects. These estimates allow us to compare the average mathematics scores of students in the ninth grade in each state, with the scores adjusted for demographic differences between the states. These estimated adjusted scores for each state tell us how students in each state perform on the ninth-grade SAEB mathematics test assuming that the students (and schools) in each state had a similar set of characteristics as the mean for Brazil.

In the second model, we include teacher characteristics in the ninth grade at the school level (teacher SES, gender, race, experience, and education), the number of jobs the teacher has, and the percentage of the curriculum covered as reported by the teacher.

Students attend schools that are under municipal, state, or private jurisdiction. The public school sample is large enough in each state in each year during this period that we can estimate SAEB scores separately for state and municipal public schools. In this way, we compare students in municipal systems in different states and students in the state system in each state. State policy reforms are most likely to affect students primarily in state schools, and municipal reforms would affect students in the municipal system. However, given the characteristics of Brazilian federalism, where states are responsible to coordinate collaboration with municipal systems within its territory, many states' policy may also affect municipal schools. We do not analyze SAEB scores for students in private schools, since the sample of private schools is small in many states, and public policies are only indirectly related to private school management.

¹⁵ Our regression estimates show that student characteristics and peer effects are significant covariates of ninth-grade mathematics test score. Female students score significantly lower than males, black and "brown" students score significantly lower than whites, students with mothers who are more highly educated score significantly higher than students with less educated mothers, and students living in homes with more expensive "articles" have significantly higher mathematics scores. Students attending schools with a higher percentage of students who have higher educated mothers (school composition or peer effect) score much higher than students attending schools with a lower percentage of such students. To conserve space, we do not show these results, but they are available to interested readers on request.

Models 1 and 2 for each year of the SAEB test can be represented as follows:

$$A_{ijs} = a + \beta X_i + \phi P_j + \lambda \text{State}_s + \epsilon_{ijs}, \quad (1)$$

$$A'_{ijs} = \alpha' + \beta' X_i + \phi' P_j + \delta' T_j + \lambda' \text{State}_s + \epsilon'_{ijs}, \quad (2)$$

where A_{ijs} is achievement on SAEB mathematics test of student i in the ninth grade in school j in State s ; X_i is a vector of student characteristics; P_j is average mother's education of students in school j ; T_j is a vector of teacher characteristics in school j ; State_s are state dummies; and ϵ_{ijs} is an error term.

In this analysis, the parameters of interest are the λ values. These represent the residual effect of each state relative to the reference state (left out dummy) when we control student mathematics performance in model 1 for X and P and in model 2 for X , P , and T . We posit that the λ for each state are an approximate estimate of the influence on student achievement in each state of variables other than those we have been able to measure (student gender, race, SES, average student SES of the students tested in each school, and teacher characteristics). These "other" effects in each state, we assume, are correlated with the quality of educational delivery, particularly if the residuals change in a state in a systematic way over the 14-year period for SAEB, 1999–2013.

Thus, the state differences from the mean SAEB score for all states have been adjusted for differences in the student gender, race, other individual student characteristics, and for average student SES in the school attended by the student. We also estimate a model in which we control for teacher characteristics, including teacher reports on how much of the curriculum they completed in the academic year (opportunity to learn [OTL]). We can argue that if a state's residual is increasing, something probably happened in a broader set of educational policies at the state or municipal level within a state that has contributed to higher student performance.

There is some issue about whether we should adjust for teacher variables (model 2) if we are attempting to hone in on the possible relation of state education politics and policies to student mathematics gains in this period. The argument in favor of such an adjustment is that changes in teacher resources and practices could be exogenous to state level reforms. The argument against is that teacher resources and practices are probably endogenous to state politics and policies. In our estimates, most teacher characteristics were not consistently significant across different years, and the variable with the most consistent statistical significance was teachers' reported coverage of the required curriculum over the course of the school year. Only two states' student mathematics performance trajectories changed somewhat from model 1 to model 2 estimates. For the sake of space, we therefore limit the presentation of results to estimated state fixed effects of model 1. Interested readers should

contact the authors for model 2 results and the regression estimates on which these average state score estimates are based.

Results

Researchers have previously done intercohort analyses of the SAEB data (Soares and Gonzaga Alves 2003; Fonseca 2015) but only at the national level. The results of these studies show that the performance of Brazilian students on the SAEB declined in 2000–2005 as access to upper middle school expanded. After 2005, however, SAEB scores rise (Carnoy et al. 2015).

Comparing State SAEB Trajectories, 1999–2013

Table 1 shows the absolute adjusted average scores for ninth graders in state schools in each state. We estimate these adjusted scores by first estimating the score for São Paulo state (the reference state), assuming that students and schools in the sample have the same distribution of characteristics as the mean

TABLE 1
BRAZIL NINTH-GRADE SAEB: STATE ADMINISTERED SCHOOLS, ESTIMATED STATE MATHEMATICS
SCORES ADJUSTED FOR STUDENT CHARACTERISTICS AND SCHOOL AVERAGE
MOTHER'S EDUCATION, BY STATE, 1999–2013

State	1999	2001	2003	2005	2011	2013
Acre	225.8	219.7	226.0	223.4	236.3	237.3
Alagoas	233.7	230.0	238.2	232.2	235.0	236.8
Amapá	237.6	227.9	228.6	227.9	224.7	220.5
Amazonas	239.3	227.7	228.8	222.1	238.6	238.9
Bahia	243.4	234.9	237.5	236.0	240.6	237.9
Ceará	238.3	230.1	230.4	224.5	245.1	251.3
Distrito Federal	249.2	244.1	247.5	249.7	250.5	247.2
Espírito Santo	242.4	234.4	234.0	243.9	247.5	251.3
Goiás	243.7	237.3	235.7	230.1	248.6	251.4
Maranhão	230.8	222.6	228.3	224.2	227.4	228.1
Mato Grosso	239.9	234.2	236.0	231.2	237.4	232.5
Mato Grosso do Sul	245.9	239.7	241.5	237.5	257.2	253.1
Minas Gerais	246.0	247.4	243.4	250.6	261.3	259.0
Pará	237.2	235.7	236.1	230.6	243.7	234.5
Paraíba	232.6	231.7	228.6	224.6	236.8	238.6
Paraná	238.3	237.8	246.9	235.4	249.5	248.0
Pernambuco	231.0	224.6	229.0	227.9	238.7	238.7
Piauí	233.4	235.7	236.8	225.3	245.8	239.5
Rio de Janeiro	248.3	235.5	237.7	228.6	243.6	242.9
Rio Grande do Norte	234.0	231.3	236.0	223.0	242.9	241.6
Rio Grande do Sul	246.1	247.9	251.6	243.0	254.3	252.5
Rondônia	235.9	233.1	226.6	230.4	247.0	245.2
Roraima	235.6	225.0	234.8	217.0	230.0	227.3
Santa Catarina	251.4	246.8	245.7	239.7	248.6	242.1
São Paulo	232.9	231.8	238.6	224.6	239.2	241.3
Sergipe	239.1	229.0	235.0	239.7	245.9	244.3
Tocantins	223.8	222.8	224.8	217.4	237.3	237.2

Source.—INEP, SAEB microdata, 1999, 2001, 2003, 2005, 2011, 2013.

Note.—Estimated coefficients represent the difference of each state's ninth-grade test scores from the national average for state administered schools, adjusted for student characteristics. SAEB = National Evaluation System of Basic Education.

for all ninth-grade students attending state schools in Brazil. This gives us the value for São Paulo students, and we then add each state coefficient (the estimated coefficients in our regression estimates $[\lambda]$, available by request) to the São Paulo score to get the score in the other states. We chose São Paulo as the reference state because it is the largest in Brazil and scores near the middle of the distribution of state scores. The distance between the highest scoring state (adjusted score) in 1999 (Santa Catarina, with 252 points) and the lowest scoring state, Tocantins, with 224 points, is 28 points. In 2001, the difference is 27 points (Acre, lowest, Rio Grande do Sul, highest); in 2003, 27 points (Tocantins and Rio Grande do Sul), and in 2011 and 2013, increased to 36 and 38 points (Amapa, lowest, and Minas Gerais, highest). The increasing spread suggests that the overall gains in SAEB mathematics scores were not equal among states.

In table 2, we estimate the absolute adjusted mathematics performance of ninth-grade students attending municipal schools in each state. The method is the same as in table 1. Again, the reference state is Sao Paulo—that is, the

TABLE 2
BRAZIL NINTH-GRADE SAEB MATHEMATICS: MUNICIPAL ADMINISTERED SCHOOLS, STATE ABSOLUTE
AVERAGE SCORES ADJUSTED FOR STUDENT INDIVIDUAL AND SCHOOL AVERAGE
MOTHER'S EDUCATION, BY STATE, 1999–2013

State	1999	2001	2003	2005	2011	2013
Acre	226.7	219.8	220.4	215.2	233.7	228.0
Alagoas	235.7	230.0	229.2	216.9	228.1	230.4
Amapá	220.5	217.3	227.2	214.0	222.5	221.3
Amazonas	238.3	232.3	222.3	215.7	230.5	231.7
Bahia	232.9	231.3	231.8	221.1	235.2	231.7
Ceará	237.8	226.8	224.9	223.1	237.6	244.7
Espírito Santo	246.1	238.8	234.0	228.9	251.4	248.9
Goiás	243.3	238.1	237.4	226.0	241.3	241.6
Maranhão	225.2	227.8	217.9	214.8	222.5	219.3
Mato Grosso	234.8	235.2	227.1	225.5	242.3	237.6
Mato Grosso do Sul	236.5	241.7	240.5	238.4	250.2	249.0
Minas Gerais	250.4	241.2	245.0	237.4	258.1	255.8
Pará	234.0	231.2	225.7	228.4	232.4	231.2
Paraíba	232.9	227.9	229.8	222.7	234.8	235.5
Paraná	253.4	249.1	244.2	244.2	252.0	249.6
Pernambuco	224.7	220.1	222.4	221.6	231.5	232.7
Piauí	240.5	234.6	230.9	224.2	238.7	233.8
Rio de Janeiro	243.4	243.6	240.4	239.6	249.4	246.2
Rio Grande do Norte	228.9	223.8	223.2	219.7	236.7	235.3
Rio Grande do Sul	250.2	247.7	241.1	241.7	250.3	249.0
Rondônia	234.5	233.3	227.7	228.9	248.5	246.3
Roraima					231.2	225.4
Santa Catarina	256.8	254.7	246.8	236.6	250.9	247.4
São Paulo	236.2	231.4	231.0	229.1	241.0	241.5
Sergipe	242.6	237.3	234.8	231.4	238.9	237.9
Tocantins	229.9	223.5	223.9	214.6	237.9	238.6

Source.—INEP, SAEB microdata, 1999, 2001, 2003, 2005, 2011, 2013.

Note.—Estimated scores represent the ninth-grade math test scores of students in each state's municipal schools adjusted for differences among states of municipal students' demographic characteristics and schools' average mothers' education. Distrito Federal has no municipal schools. Roraima did not have municipal middle schools until 2011. SAEB = National Evaluation System of Basic Education.

municipal students and schools in the state of São Paulo. The performance of ninth-grade municipal students in Brazilian states generally follows the pattern of student in state schools, with municipal school students in Santa Catarina, Rio Grande do Sul, and Minas Gerais scoring highest initially in 1999, and Tocantins and Acre municipal students among the lowest scoring. Paraná is an exception since its state school students did not do as well as its municipal students in 1999. However, contrary to state schools, the difference between the average adjusted scores of municipal school students in the lowest and highest scoring states declined somewhat from about 38 points in 1999 and 2001 to 36 and 34 points in 2011 and 2013.

From tables 1 and 2, we can estimate the gains in SAEB mathematics scores in each state of students in state and municipal schools in the periods 2001–13 and 2003–13. We selected 2001 and 2003 as base years because these mark the general end of the decline in SAEB scores associated with major expansion in Brazilian middle school enrollment in the 1990s. These gains are shown in table 3 for state schools and table 4 for municipal schools in each state.

TABLE 3
BRAZIL SAEB: STATE SCHOOLS: GAINS IN NINTH GRADE OF STATE FIXED EFFECTS,
ADJUSTING FOR STUDENT CHARACTERISTICS

State	Gain 2001–13	State	Gain 2003–13
Ceará	21.1	Ceará	20.9
Acre	17.6	Rondônia	18.6
Espírito Santo	16.9	Espírito Santo	17.3
Sergipe	15.2	Goiás	15.7
Tocantins	14.4	Minas Gerais	15.6
Goiás	14.1	Tocantins	12.4
Pernambuco	14.1	Mato Grosso do Sul	11.7
Mato Grosso do Sul	13.5	Acre	11.3
Rondônia	12.0	Amazonas	10.1
Minas Gerais	11.6	Paraíba	10.0
Amazonas	11.2	Pernambuco	9.7
Rio Grande do Norte	10.3	Sergipe	9.2
Paraná	10.2	Rio Grande do Norte	5.6
São Paulo	9.5	Rio de Janeiro	5.2
Rio de Janeiro	7.4	Piauí	2.8
Paraíba	6.9	São Paulo	2.7
Alagoas	6.8	Paraná	1.1
Maranhão	5.5	Rio Grande do Sul	.9
Rio Grande do Sul	4.6	Bahia	.3
Piauí	3.8	Maranhão	–.2
Distrito Federal	3.1	Distrito Federal	–.3
Bahia	3.0	Alagoas	–1.4
Roraima	2.2	Pará	–1.6
Pará	–.2	Mato Grosso	–3.6
Mato Grosso	–.7	Santa Catarina	–3.6
Santa Catarina	–.7	Roraima	–7.5
Amapá	–7.4	Amapá	–8.2

Source.—INEP, SAEB microdata, 1999, 2001, 2003, 2005, 2011, 2013.

Note.—Estimates represent the average gain in adjusted mathematics scores for each state's ninth graders in state administered schools. The scores are those estimated in table 1. SAEB = National Evaluation System of Basic Education.

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TABLE 4
BRAZIL SAEB, MUNICIPAL SCHOOLS: GAINS IN NINTH GRADE OF STATE FIXED EFFECTS,
ADJUSTING FOR STUDENT CHARACTERISTICS

State	Gain 2001–13	State	Gain 2003–13
Ceará	17.9	Ceará	19.8
Tocantins	15.1	Rondônia	18.6
Minas Gerais	14.6	Espírito Santo	14.9
Rondônia	12.9	Tocantins	14.7
Pernambuco	12.7	Rio Grande do Norte	12.1
Rio Grande do Norte	11.6	Minas Gerais	10.8
São Paulo	10.1	São Paulo	10.5
Espírito Santo	10.0	Mato Grosso	10.5
Acre	8.1	Pernambuco	10.4
Paraíba	7.6	Amazonas	9.4
Mato Grosso do Sul	7.4	Mato Grosso do Sul	8.6
Amapá	4.0	Rio Grande do Sul	7.9
Goiás	3.5	Acre	7.6
Rio de Janeiro	2.6	Rio de Janeiro	5.8
Mato Grosso	2.3	Paraíba	5.7
Rio Grande do Sul	1.3	Pará	5.5
Sergipe	.7	Paraná	5.4
Paraná	.5	Goiás	4.2
Bahia	.4	Sergipe	3.2
Alagoas	.4	Piauí	2.8
Pará	.0	Maranhão	1.4
Amazonas	−.6	Alagoas	1.2
Piauí	−.9	Santa Catarina	.6
Santa Catarina	−7.3	Bahia	−.1
Maranhão	−8.5	Amapá	−5.9
Roraima	N/A	Roraima	N/A

Source.—INEP, SAEB microdata, 1999, 2001, 2003, 2005, 2011, 2013; table 7.

Note.—Estimates represent the average gain in adjusted mathematics scores for each state's ninth graders in municipal-administered schools. The scores used to calculate gains are those estimated in table 2. Distrito Federal has no municipal schools. Roraima did not have municipal middle schools until 2011. SAEB = National Evaluation System of Basic Education.

There are six states in which adjusted mathematics gains were high in these periods for students in both state and municipal schools. The states are Ceara, Rondonia, Espirito Santo, Minas Gerais, Tocantins, and Pernambuco (in the period 2001–13). There are four states where mathematics gains were very low for students in both state and municipal schools: Bahia, Amapa, Piauí, and Santa Caterina. Another two low scoring states, Alagoas and Maranhão, also made low or negative gains across state and municipal schools in their states in all but one measure of gains (state schools in 2001–13). Two of the remaining 15 states, Distrito Federal and Roraima, did not have ninth graders in municipal schools, and in three states Acre, Mato Grosso do Sul, and Paraíba, students in both state and municipal schools made at least midlevel gains. The other 10 states had inconsistent municipal and state school gains in each state, or had very inconsistent gains across the two time periods (2001–13 and 2003–13).

The six consistent high gaining states and the six generally consistent low gaining states provide potentially interesting comparisons in terms of

particular educational policies or state leadership patterns that may have contributed to high or low gains. Below we discuss evidence that at least some of the high gaining states had state governments that actively promoted reforms involving both state and municipal schools, whereas several of the low gain states did little or nothing to develop such cohesive reform policies.

Trajectories in Capital City Municipal Schools

Policies in municipalities can also impact educational achievement positively or negatively. We attempted to isolate the possible impact of municipal educational reform on student achievement gains, as distinct from state educational policies, by additionally analyzing mathematics test score gains of students attending schools in the capital city municipality in each state. We cannot identify capital city schools in the SAEB, only in the *Prova Brasil* of 2007, 2009, 2011, and 2013. As noted earlier, the *Prova Brasil* was only applied in public schools, so this analysis applies only to public sector education.

In eight states and the federal district (DF had no municipal school students), students attending municipal public schools in the ninth grade represent 15 percent or less of students in capital city schools. Even though we estimated trends in the scores of students in these much smaller groups of municipal schools we did not include them in our analytical comparisons.¹⁶ Of the 18 remaining state capital municipalities, students in three—Palmas (Tocantins) Rio de Janeiro, and Belo Horizonte (Minas Gerais)—made substantial gains relative to the mean gain among capital city municipalities (table 5). Eighth- and ninth-grade students in six capital city municipalities—Sao Luis (Maranhão), Natal (Rio Grande do Norte), Florianopolis (Santa Catarina), Salvador (Bahia), Maceio (Alagoas), and Campo Grande (Mato Grosso Sul)—had substantial declines in their mathematics scores relative to the average gain among capital city municipalities. Two of these—Natal and Campo Grande—are surprises because they are in states whose municipal school students made rather large gains over the decade, 2003–13 (see table 2). Students in the other nine capital city municipalities made either small relative gains in the 6 years or small relative losses, and in many of these the level of the scores were not far from the adjusted mean scores of all the capital city municipalities. However, students in one of these—Recife (Pernambuco)—maintained very low relative scores on the *Prova Brasil*, with little change in 2007–13 (table 5). An important question for future research is whether Palmas, Rio, and Belo Horizonte took particular actions to raise student math performance in ninth grade, and

¹⁶ We chose the figure of 15 percent somewhat arbitrarily, but the percentage in four of the eight capital cities we omitted was considerably below that figure (table 5). With fewer than 15 percent of students in municipal schools, the results could be subject to significant test score fluctuations based on small movements of students into or out of municipal schools, subjecting any inferences about municipal management in these cities for considerable error.

TABLE 5
 BRAZIL, *PROVA BRASIL*: MUNICIPALITY ADMINISTERED SCHOOLS, CAPITAL CITIES, ESTIMATED
 STATE MATHEMATICS SCORES ADJUSTED FOR STUDENT CHARACTERISTICS AND
 SCHOOL AVERAGE MOTHER'S EDUCATION, BY STATE, 2007–13

State	Capital City	State Fixed Effects on the Achievement of Municipal School Students				Percentage of Students in the Capital Attending State Schools			
		2007	2009	2011	2013	2007	2009	2011	2013
Rondônia	Porto Velho	1.05	-6.45	-4.45	-5.83	.98	.89	.92	.91
Acre	Rio Branco			-16.41	-17.78	1.00	1.00	.99	.99
Amazonas	Manaus	-7.72	-8.55	-10.86	-5.89	.71	.67	.67	.67
Roraima	Boa Vista	-4.67				.98	1.00	1.00	1.00
Pará	Belém	-5.50	-7.41	-8.06	-4.47	.87	.88	.87	.86
Amapá	Macapá	-7.78	-16.91	-14.16	-14.38	.95	.93	.96	.97
Tocantins	Palmas	9.79	24.93	16.83	20.12	.60	.57	.49	.43
Maranhão	São Luís	-.17	-6.39	-13.35	-19.96	.69	.57	.58	.59
Piauí	Teresina	7.66	11.14	5.56	5.68	.48	.45	.42	.42
Ceará	Fortaleza	-1.96	-1.53	1.50	2.50	.72	.70	.74	.73
Rio Grande do Norte	Natal	11.06	5.30	5.38	-.93	.71	.72	.67	.62
Paraíba	João Pessoa	.04	-1.99	-.02	-3.65	.55	.49	.56	.50
Pernambuco	Recife	-21.21	-25.04	-27.77	-20.99	.79	.83	.85	.86
Alagoas	Maceió	-.61	-2.81	-4.30		.77	.75	.78	1.00
Sergipe	Aracaju	2.98	-2.18	-8.28	-3.81	.74	.81	.79	.79
Bahia	Salvador	2.07	-3.28	-6.45	-8.76	.89	.92	.94	.89
Minas Gerais	Belo Horizonte	2.66	3.95	15.42	13.05	.56	.47	.55	.54
Espírito Santo	Vitória	9.53	8.26	9.99	11.33	.04	.05	.10	.19
Rio de Janeiro	Rio de Janeiro	2.32	4.65	8.35	7.81	.09	.10	.11	.05
São Paulo	São Paulo	-3.52	-6.91	-8.44	-6.35	.64	.63	.63	.63
Paraná	Curitiba	16.74	17.51	18.13	17.31	.92	.93	.93	.93
Santa Catarina	Florianópolis	10.38	12.56	6.36	-9.22	.57	.57	.54	.50
Rio Grande do Sul	Porto Alegre	-6.92	-2.49	-2.19	-2.87	.73	.73	.73	.73
Mato Grosso do Sul	Campo Grande	27.23	24.28	19.81	11.99	.54	.50	.46	.42
Mato Grosso	Cuiabá	-1.75	-1.25	.41	-8.63	.83	.86	.85	.89
Goiás	Goiânia	-2.11	2.13	-4.15	-4.25	.65	.57	.54	.58
Distrito Federal	Brasília					1.00	1.00	1.00	1.00

Source.—INEP, *Prova Brasil*, microdata, 2007, 2009, 2011, 2012.

whether Sao Luis, Natal, Florianopolis, and Campo Grande took actions that led to declines in student scores.

State Pairings

Another useful way to study the policies at the state level that may have had positive and significant impact on increases in mathematics scores in state and municipal schools is to compare states where students in both state and municipal schools had large increases in mathematics scores in the period 2001–3 to 2013 to neighboring states where students in both state and municipal schools made low (or negative) gain during this period. In those pairings of states in which most students attend municipal schools, we compared their adjusted municipal school scores; in those states in which most students attend state schools, we compared state school scores.

Figure 3 shows a grouping of high scoring states—Minas Gerais, Santa Catarina, Rio Grande do Sul, and Paraná—with a considerable proportion of state school students in ninth grade (see fig. 1). For that reason, we used the state school adjusted mathematics scores from 2001 to 2013 for our comparison. Students in Minas Gerais made large adjusted mathematics gains in this period, students in Paraná and Rio Grande do Sul made small gains, and students in Santa Catarina lost ground. Since these are gains adjusted for student and school demographics, it is likely that state officials in Minas Gerais implemented some kind of administrative or educational policies that helped student increase their math performance more than students did in the three Southern states.

Figure 4 shows a similar comparison among Northeastern states—Ceará, Maranhão, Piauí, and Alagoas. Alagoas and Maranhão do not make gains in this period, although both rise in 2005–13. This is similar to the PISA trajectory for Maranhão but not for Alagoas. Students in Ceará make a very large gain on the SAEB, and students in Piauí make moderate gains—the trajectory of SAEB scores for these two states in 2006–12 is not consistent with the trajectory of PISA scores in the period 2005–12.

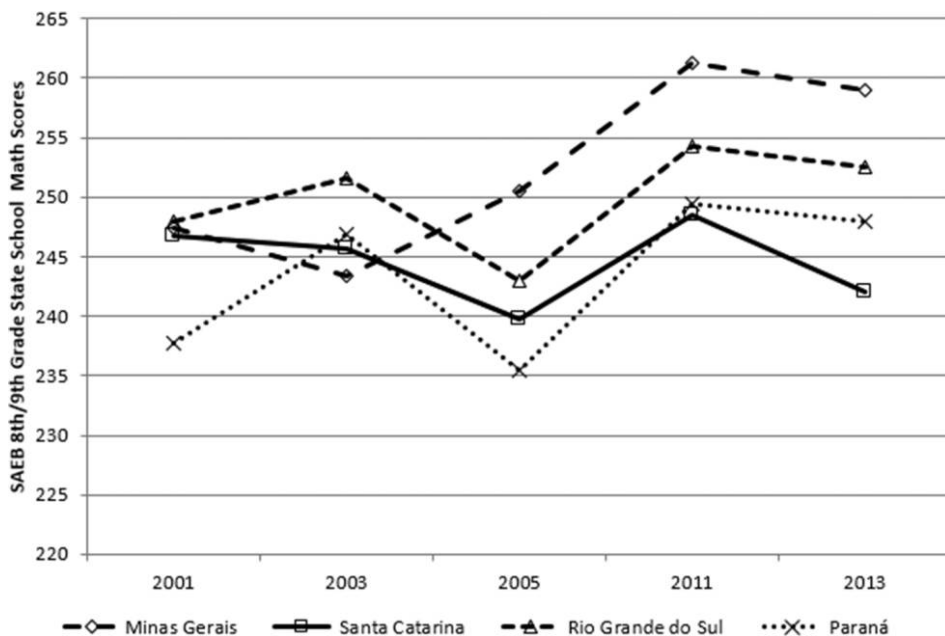


FIG. 3.—Brazil SAEB: State school students' adjusted mathematics scores in ninth grade, Minas Gerais, Santa Catarina, Rio Grande do Sul, and Paraná, 2001–13. Source.—SAEB microdata, 2001, 2003, 2005, 2011, 2013.

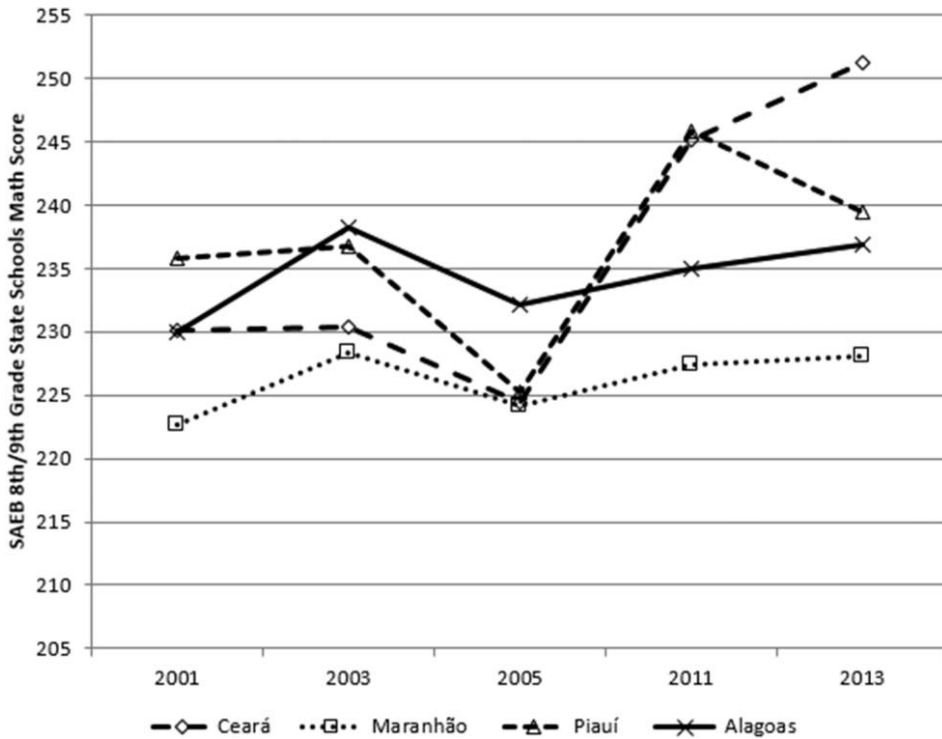


FIG. 4.—Brazil SAEB: Municipal school students' adjusted mathematics scores in ninth grade, Ceara, Maranhão, Piauí, and Alagoas, 2001–13. Source.—SAEB microdata, 2001, 2003, 2005, 2011, 2013.

Figure 5 compares Espírito Santo, Tocantins, and Bahia. Espírito Santo and Tocantins students made large gains on the SAEB mathematics in 2001–13. Students in Bahia made no gain. Students in Espírito Santo and Bahia made gains in 2005–13 that are consistent with the trajectory of their PISA scores, but not in Tocantins, where students made no gains on the PISA in 2006–12.

In figure 6, we compare state school student performance in three states in the Amazon region—Acre, Pará, and Rondonia. Acre and Rondonia clearly outperform students in Pará, even though students in Pará began higher. All three states' education is marked by schools spread over large areas. Were there policies that worked better in Acre and Rondonia than the policies implemented in Pará?

Discussion and Conclusions

The results of our analysis show that Brazilian students' achievement in the ninth grade adjusted for student and school socioeconomic differences, as well as some key school resource differences, varies considerably across

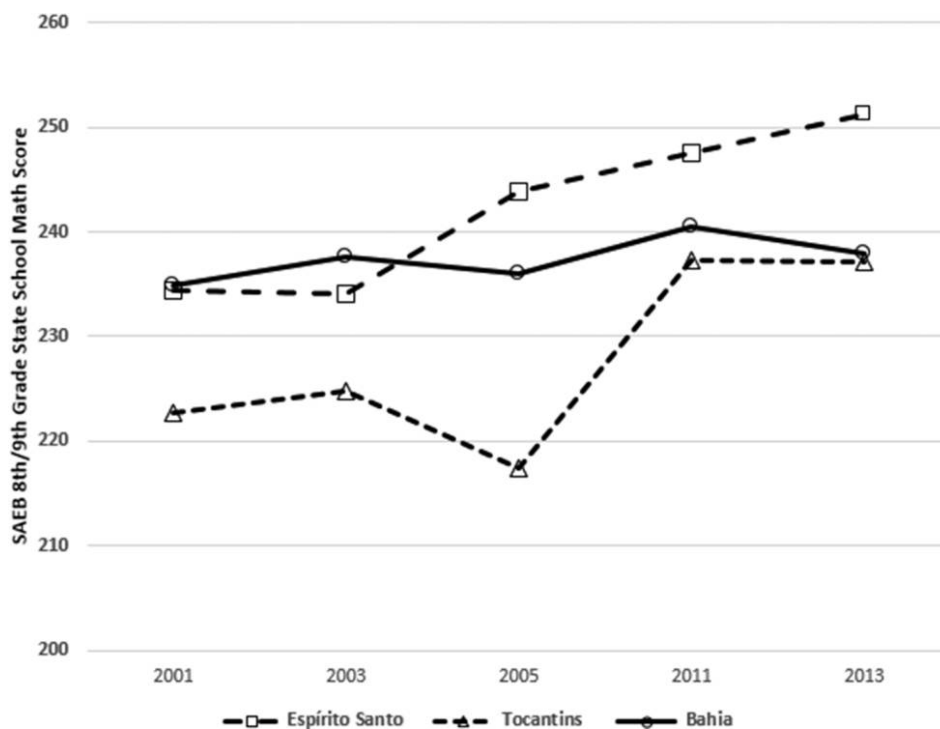


FIG. 5.—Brazil SAEB: Municipal school students' adjusted mathematics scores in ninth grade, Espirito Santo, Tocantins, and Bahia, 2001–13. Source.—SAEB microdata, 2001, 2003, 2005, 2011, 2013.

states and, within some states, across the separate state and municipal school systems. Successive cohorts of students in a number of states have greatly increased their mathematics scores on the national SAEB test in 2001–13 and 2003–13. At the same time, successive cohorts of students in other states' state and municipal systems have seen their adjusted scores stay level or decline.

Students in states such as Ceará, Rondonia, Tocantins, Minas Gerais, Espirito Santo, and Pernambuco, whether in municipal or state schools, made large gains in this period on the SAEB ninth-grade mathematics test. Students in states such as Bahia, Piaui, Alagoas, Amapá, Santa Catarina, and Maranhão made small or negative gains on the same test in this period across municipal and state schools. Thus, there are clear differences in the achievement gains made in mathematics by students at the end of middle school in almost half of the Brazilian states.¹⁷

¹⁷ One possible explanation for the pattern of these changes is interstate migration. We would argue that this is probably not the case. First, net interstate migration in Brazil was only 2 percent of the population annually during the past decade, and more important, migration flows have not been consistently to the same states as in the previous decade (Lima et al. 2015). Second, our analysis controls for students' socioeconomic characteristics, so any advantage to net immigration states of receiving typically higher educated families and

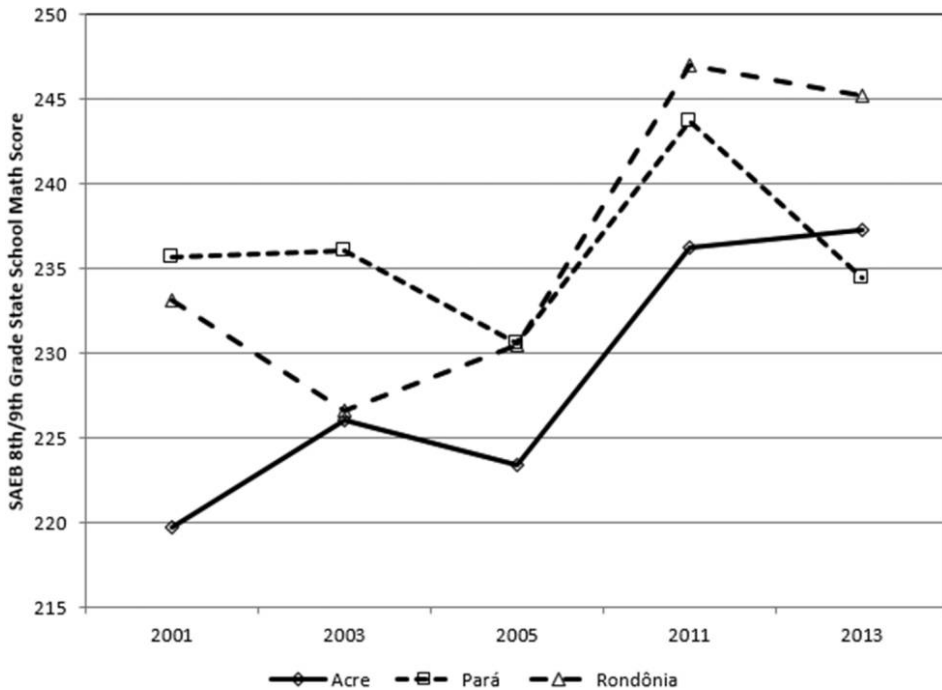


FIG. 6.—Brazil SAEB: State school students' adjusted mathematics scores in ninth grade, Acre, Rondonia, and Para, 2001–13. Source.—SAEB microdata, 2001, 2003, 2005, 2011, 2013.

Educational Politics and Policies in States May Have Contributed to Higher and Lower Student Gains

We have suggested that constituent states within a federalist country can have very different political approaches to education and very different motivation and capacity to implement educational reforms, and that this could help explain variation in the effectiveness of education across these states. We have cited examples of the considerable literature showing that administrative effectiveness can have a significant influence on student educational performance in the political units delivering schooling. Studies show that providing a coherent approach to curriculum, teaching practices, professional development, and the implementation of change in these educational inputs in administrative units such as schools and districts increase student achievement

their children should not have influenced our results. Third, although we cannot account for the possibility that migrants' children might be more able academically than nonmigrants, the "development attractiveness index" for migrants of many of our estimated high academic gain states appears to have been negative and declining in the 1980–2010 period, and for some of our estimated low-gain states has been positive and increased (Lima et al. 2015). This makes it unlikely that the gains result from more academically talented pupils immigrating to these high gain states. As far as differences between municipal and state schools, without data on which students migrated and which state or municipality they came from, we have no way of knowing whether and how interstate or intrastate migration patterns might affect gains between municipal and state schools within the same state.

(e.g., Fuhrman 1993). Studies of states' roles are more rare. Although we need to be sensitive to the methodological criticisms leveled at post hoc explanations of education effectiveness (see the international school effectiveness literature; e.g., Levin and Lockheed 1993), our comparisons of student performance in Brazilian states open the door to at least discussing the educational system conditions in which states influence improvements in student learning.

We show that in about two-thirds of Brazilian states, ninth-grade students in municipal schools and state schools make similar gains in the past 10–12 years, but in about a third of the states, the gains of students in municipal and state schools are different. In most of these cases, students in state schools make larger gains than students in municipal schools. Because test scores move together in such a high fraction of states, we could conclude that whether or not a state develops specific educational policies meant to increase student achievement, it appears that, generally, conditions in the state seem to affect both state and municipal educational systems in a similar way. This suggests that state educational political/policy conditions are likely to influence both state and municipal schools.

What are the political/policy conditions in high gaining states that may have contributed to large improvements in middle school students' learning during the period analyzed in this study? Similarly, what might have contributed in some states to the small or negative gains on the same test and same period across municipal and state schools? Given the nature of Brazilian federalism, which imposes interdependence between state and municipal schools in compulsory schooling, the degree to which state and municipalities collaborate might be one possible explanation for these results.

Segatto (2015) analyzed cooperation among Brazilian states and their municipalities and created a typology with five categories, ranging from strong cooperation to conflict. Ceará is ranked in the highest category of cooperation. Tocantins, Minas Gerais, and Pernambuco—states that we estimate as having high and consistent gains over time—are also examples of a more formal cooperation between the states and municipalities, as well as examples of some redistribution of material and human resources among their municipalities. However, different from Ceará, cooperation is the result of ongoing negotiations between state educational administrators and municipalities, which leads to a variation in the institutionalization and formality of this relationship and in the type of collaboration taking place.

Ceará is among the poorest states in Brazil but, according to our estimates, has the greatest adjusted gains in mathematics in both periods (2001–13 and 2003–13) for state and municipal schools (tables 3 and 4). According to Segatto (2015), Ceará stands out in Brazil because of the relationship between its state and municipal governments in education. That relationship can be characterized as “state coordination,” that is, “an institutionalized cooperation among the state and municipalities with a more vertical character. In this

sense, the state strongly induces cooperation. Furthermore, it involves the redistribution of financial, material and human resources” (Segatto 2015, 84).

Tendler (1998) observed this characteristic in Ceará policy making almost 20 years ago. She showed the success of three policies implemented by the state government in the 1990s. Although none of them were in the area of education, the one related to preventive medicine turned into a federal program by that time, as in the case of Ceará’s literacy program (PAIC) turned recently into a national policy. In fact, PAIC Literacy Program might also be part of explanation for Ceará’s result. The program created in 2007 was inspired by a literacy program implemented first in Sobral, an important municipality in Ceará run by the same political group as the state government. The program, implemented in all municipalities across the state for almost 10 years, has been praised for Ceará’s good results in the math and language literacy survey (ANA) administered by the Brazilian statistical and testing agency, INEP. In the 2014 edition of the ANA test, only 15 percent of students in Ceará are below grade level in reading and 18 percent in math, whereas in the Northeast the figures are 36 and 40 percent. On the other hand, at the end of third grade, Ceará has 16 percent of its students above grade level in reading and 30 percent in math. In the Northeast, only 6 and 13 percent are above grade level in language and math, respectively. But beyond that, the “spirit of Sobral,” a low-income municipality with some of the highest academic achievement in Brazil, has been spread into the educational politics and policies of the state administration—a politics of using effective implementation policies to reach municipalities across the state and applied to state administered schools as well.

Although collaboration in Minas Gerais is more recent and less institutionalized than in Ceará, it encompasses a large number of policies and programs to be implemented both at the state and municipal levels. Also, different from Ceará, it involves implementing at municipal level programs that have already been put in place at the state level and were considered successful. This is the case of the Educational Intervention Program (PIP), implemented in state schools since 2006, which was implemented in municipal schools beginning in 2012. The program aims to improve student achievement through educational interventions in schools lead by a team from the State Department of Education. In this case, the state assists municipalities in structuring and training their own teams and offers support materials. In Minas Gerais municipalities are also invited to participate in state assessments without having to pay for it.

In Tocantins, the Assistance to Municipal Systems of Education was established in 2004. This policy is based on a collaborative arrangement and joint actions between the state and municipalities, which involves evaluation, inspection services of municipal school units, school management system with computerized registration, and also an agreement between state gov-

ernment, municipalities and department of justice to fight dropout, age-grade and school absenteeism.

In Pernambuco, a lower-income high academic gain state, there is collaboration among the state and municipalities in several policies and programs, such as the development of curricular standards with the participation of the municipalities. In mid-2016, the state also launched a pilot program designed to enhance the management capacity of the Municipal Departments of Education. In our recent visit to Pernambuco, the state Secretary of Education, Frederico Amâncio, described this initiative, in which 15 municipalities spread throughout the state were selected to participate in several activities coordinated by the state government, such as the training of teaching and administrative staff and the improvement of school infrastructure.

Espirito Santo is the only state among the ones that made larger gains in both municipal and state administered schools that does not fit exactly this model of collaboration. In Espirito Santo, existing forms of cooperation are different between municipalities. For example, joint registration is restricted to the Metropolitan Region of Vitória, thus it is considered by Segatto (2015) a hybrid model of collaboration.¹⁸

At the other end of the spectrum, Segatto (2015) ranks Santa Catarina, Maranhão and Amapá (states that we estimate made small or negative adjusted gains across municipal and state schools during the same period) as having the lowest level of collaboration between state and municipalities, thus being characterized as having “independent policies” between them. This means that there is no significant collaboration between states and municipalities in education policy and sometimes conflict among them.

Although states such as Maranhão are among the poorest states in Brazil, Amapá is a low-middle income state, and Santa Catarina is one of the highest per capita income states in Brazil. Thus, the argument that the way states organize themselves to deliver education and improve it through closer links and reform efforts among administrative entities seems to be associated with lower academic gains even in higher income, initially higher scoring states, such as Santa Catarina.

Threats to the Validity of Our Argument

Our analysis argues that the state fixed effect trajectories of student test scores we estimate over more than a decade of major educational change represent the effectiveness of educational politics and policies in the states. Yet there are other possible explanations for a state’s adjusted student per-

¹⁸ Another piece of evidence that may be related to these higher levels of cooperation, is that in his analysis of the relationship between expenditure and quality of education across states in Brazil, Zoghbi et al (2009) found that Ceará, Espírito Santo, and Minas Gerais are among the states that not only are efficient in the expenditure of basic education but also have higher levels of education achievement relative to other states.

formance increasing more or less rapidly. These other explanations could threaten our argument that adjusted state differences represent more or less effective state education politics and policies.

One threat to our argument we have alluded to is that even controlling for individual socioeconomic background and the average socioeconomic background of students in schools, students in states with higher proportions of families in poverty (family income less than one minimum wage) may average lower scores than students attending state and municipal schools in states with lower levels of poverty. Thus, in addition to the negative effect on student academic performance of living in a family with few academic resources and the negative effect on performance of students attending schools with students that also have low levels of family resources, students of all social classes may be affected academically by living in states with higher levels of poverty.

We call this the “league effect.” Students and schools situated in an educational system composed of generally low or high performing schools could have lower or higher performance because of lower or higher expectations, and fewer or more overall resources to invest in education (although the federal government in Brazil acted in the late 1990s to equalize funding across states and municipalities). This does not mean that students in poor leagues (states) cannot greatly improve nor, that students in good leagues (states) cannot decline (Ceará is an example of the first and Santa Catarina of the second). However, our results suggest that even when poor leagues do better and good leagues do worse, the latter still have higher performance overall.

A second factor that would undermine our case is the possible effect on test scores of municipalization—a national policy that pushed states to expand enrollment in middle schools in municipal schools and reduce enrollment in state schools. Municipalization has varied greatly from state to state. If much of the increased proportion of middle school students attending municipal schools came from less academically prepared students from similar social class backgrounds, as we would expect in an expansionary period, municipal schools may have made lower gains in the period covered, and states that had a greater increase in the proportion of students attending municipal schools may have made lower gains in municipal schools, and higher gains in state schools even when we control for students’ (and schools) social class background.

A third possible explanation that might weaken our argument is days lost in teachers’ strikes, under the assumption that teacher strikes are exogenous to the effectiveness of state educational policies. Teacher strikes are fairly common in Brazil, typically with many school days lost because of strikes, and this may negatively influence student performance more in some states than others. The number of days lost varies considerably across states and years, and whether the strikes are in state or municipal schools. Because teacher

strikes in a single municipality have considerably less effect on overall average municipal scores in a state than a strike in the state's school system would have on student performance in the state schools, we focus on estimating this effect for strikes in state school systems.

Using our student and school adjusted residuals (state fixed effects), we estimated (a) whether state scores already adjusted for individual and school level measures of family academic resources were related to state level poverty, as measured by the percent of families with income less than one minimum wage lagged five years (when ninth graders were in fourth grade); (b) whether states with decreasing proportions of state school students increased their adjusted test scores as municipalization progressed; (c) whether states with increasing (progressively higher) proportions of students in municipal schools saw lower and decreasing test scores in municipal schools; and (d) whether school hours lost to teacher strikes over the period 2000–2013 in state schools influenced mathematics test score gains in ninth grade in each state.

We found that state level poverty is negatively and significantly related to mathematics scores, even already controlled for individual and school level indicators of socioeconomic background. This suggests that an average student in states with a higher percentage of poor people gets lower scores than an average student in states with a lower percentage of poor people. Fifteen percentage points more poverty in a state (the difference between the southern states and the Northeast) means about 5 points fewer in the average state SAEB mathematics test score. Yet because poverty levels changed rather similarly over time in Brazilian states, and because we found that poverty levels in states did not have a significant effect on the rate of increase of student performance in a state, accounting for state poverty level does not alter the patterns of change in the high and low gaining states.

We found no relation between test scores and the proportion of students in state schools but did find a negative and significant relation between our adjusted municipal school scores over time and the proportion of ninth-grade students in municipal schools. This suggests that in states with higher and increasing proportions of students in municipal schools, students in municipal schools scored lower compared to municipal students in states with lower shifts to municipal schools.

The number of hours lost did vary greatly among states—for example, hours lost range from 5,000 hours in the state of Rio de Janeiro down to 16 hours in the state of Roraima. We would expect that states with more hours lost in teacher strikes would be negatively affected in the gains they would make during that period. Indeed, the estimated relationship between the gain in SAEB ninth-grade mathematics scores students made in the 2001–13 and the 2003–13 period and the number of hours lost in strikes during that period is negative, as expected, but it is not statistically significant. Neither are

strike hours lost significantly related to the initial level of student performance in states, although the estimated coefficient is positive (the higher the initial SAEB score in the state, the more hours lost to strikes in 2001–13).¹⁹ For example, Santa Catarina had relatively very few hours lost to strikes and Minas Gerais lost many hours—yet students in Minas made big gains in this period, and students in Santa Catarina did not. Lack of data on the proportion of teachers actually on strike in each given period might explain this result.

Conclusion

In making the case that differences in mathematics gains by students in different Brazilian states over a 14-year period are associated with how effectively states are able to work across administrative entities, we argue that in federalist states, consistent with what we would expect on theoretical grounds, the politics of educational change in states are associated with how effectively educational systems are able to deliver tested mathematics knowledge to students in school. We have used only one indicator of such educational politics—the degree of cooperation between states and municipalities in educational improvement policies—but this indicator probably reflects the broader nature of educational politics and educational administrative effectiveness in each state.

Our research has important implications for comparative education research. It suggests that in searching for the reasons that students in some political entities (such as nation-states) score higher on tests than in others, it is crucial to provide a political/administrative justification for comparing students across such entities, whether nations or school districts. Intranational comparisons in federalist countries make theoretical sense, since subnational political units have major juridical responsibility for delivering education. Our research also suggests that there are important benefits of intranational comparisons. A main one is that they can be less concerned with differences in overall educational systems and their subcomponents, such as teacher labor markets, financing arrangements, and educational culture inside and outside schools, since these are much more similar in intranational comparisons than in international comparisons of national educational systems. Intranational comparisons can therefore focus more on educational management issues or particular subnational state led interventions, since these still tend to vary considerably among subnational units in federal systems. Methodologically, it is thus easier to identify effective educational policies

¹⁹ We estimated that strike hours in municipal schools in each state are not significantly related to ninth-grade student achievement as well. However, because we cannot identify strikes with particular municipalities in each state, it makes less sense to focus on the effect of time lost from strikes in municipal schools. Rather, in the case of this variable, we restrict our analysis to state schools.

and practices when the contextual variations in which those policies and practices occur are greatly reduced.

Further, at least for countries with federal systems, researching subnational state differences in educational reforms and the organization of state educational delivery is as relevant to deriving general insights into improving student learning across nations as research from international comparisons. Our finding on the probable effect on student achievement of state cooperative arrangements with municipalities is important not only for Brazilian educational policy but also for the countries such as the United States, where some states have managed to develop close policy relations with school districts, and others have not (Elmore and Fuhrman 1995; Carnoy et al. 2015).

To be clear, we have not delved into the underlying theories of why some states have followed more cooperation with municipalities or not. As we noted at the beginning of this article, there are many such competing theories. Why political entities do what they do is important for understanding how the differences we observe occur or not in Brazilian states, but they need to wait for the next phase of our comparative analysis. For now, our case is that units below the level of the nation-state can be extremely relevant to that comparison.

References

- Abrucio, Fernando Luiz. 2010a. "Reforma da gestão pública nos estados: avanços e desafios na institucionalização de uma agenda." Paper presented at Conselho Nacional de Secretários de Estado de Administração (CONSAD). Brasília: CONSAD.
- Abrucio, Fernando Luiz. 2010b. "A dinâmica federativa da educação brasileira: diagnóstico e propostas de aperfeiçoamento." In *Educação e federalismo no Brasil: combater as desigualdades, garantir a diversidade*, ed. R. P. Oliveira and W. Santana. Brasília: UNESCO.
- Abrucio, Fernando Luiz, and Francisco Gaetani. 2006. "Avanços e perspectivas da gestão pública nos estados: agenda, aprendizado e coalizão." Paper presented at Conselho Nacional de Secretários de Estado de Administração (CONSAD). Brasília: CONSAD.
- Albernaz, Ângela, Francisco H. G. Ferreira, and Creso Franco. 2002. "Qualidade e equidade na educação fundamental brasileira." *Pesquisa e Planejamento Econômico* 32, no. 3.
- Alves, Maria Teresa Gonzaga, and José Francisco Soares. 2013. "Contexto escolar e indicadores educacionais: condições desiguais para a efetivação de uma política de avaliação educacional." *Educação e Pesquisa* 39, no. 1. São Paulo: Universidade de São Paulo.
- Barbosa, Maria Eugênia, Barbosa Ferrão, and Cristiano Fernandes. 2001. "A escola brasileira faz a diferença? Uma investigação dos efeitos da escola na proficiência dos alunos de 4ª série." In *Promoção, Ciclos e Avaliação Educacional*, ed. Franco C. Curitiba, Brazil: Artmed.

- Becskeházy, Ilona. 2014. "A formação de redes escolares no estado de São Paulo: em busca de padrões de qualidade e equidade." Master's thesis, Pontifícia Universidade Católica do Rio de Janeiro.
- Behrman, Jere, Anil Deolaliker, and Lee-Ying Soon. 2002. *Conceptual Issues in the Role of Education Decentralization in Promoting Effective Schooling in Asian Developing Countries*. Manila: Asian Development Bank.
- Bruns, Barbara, David Evans, and Javier Luque. 2012. *Achieving World Class Education in Brazil: The Next Agenda*. Washington, DC: World Bank.
- Bruns, Barbara, and Javier Luque. 2014. *Better Teachers for Latin America and the Caribbean: New Evidence on How to Raise Teacher Quality and Student Learning*. Washington, DC: World Bank.
- Carnoy, Martin. 1999. *Globalization and Education Reform: What Planners Need to Know*. Paris: International Institute of Educational Planning, UNESCO.
- Carnoy, Martin. 2014. "Globalization, Educational Change, and the National State." In *Globalization and Education*, ed. Nelly Stromquist and Karen Monkman. Lanham, MD: Bowman and Littlefield.
- Carnoy, Martin, Emma Garcia, and Tatiana Khavenson. 2015. *Bringing It Back Home*. Washington, DC: Economic Policy Institute.
- Carnoy, Martin, Amber Gove, and Jeffery Marshall. 2007. *Cuba's Academic Advantage*. Stanford, CA: Stanford University Press.
- Carnoy, Martin, Tatiana Khavenson, Izabel Fonseca, Leandro Costa, and Luana Marotta. 2015. "Is Brazilian Education Improving? Evidence from PISA and SAEB." *Cadernos de Pesquisa (Brazil)*, 45 (157): 450–85.
- Carnoy, Martin, and Henry Levin. 1985. *Schooling and Work in the Democratic State*. Stanford, CA: Stanford University Press.
- Carnoy, Martin, and Diana Rhoten. 2002. "What Does Globalization Mean for Educational Change: A Comparative Approach." *Comparative Education Review* 46 (1): 1–9.
- Castells, Manuel. 1996. *The Rise of the Network Society*. Oxford: Blackwell.
- Ceneviva, Ricardo. 2011. "O nível de governo importa para a qualidade da política pública? O caso da educação fundamental no Brasil." Unpublished PhD diss., Universidade de São Paulo.
- Chudgar, A., T. Luschei, L. Fagioli, and C. Lee. 2012. Socio-Economic Status (SES) Measures Using the Trends in International Mathematics and Science Studies (TIMSS) Data. Michigan State University (mimeo).
- Clotfelter, C. T., H. F. Ladd, and J. L. Vigdor. 2007. "Teacher Credentials and Student Achievement: Longitudinal Analysis with Student Fixed Effects." *Economics of Education Review*, 26 (6): 673–82.
- Costa, Juan Mário Araújo. 2009. "A proposta de municipalização do ensino nos anos 1990 e seus impactos nas relações entre entes federados." In *Gestão Educacional nos Municípios: entraves e perspectivas*, ed. M. C. Cunha. Salvador: EDUFBA.
- Costa, Leandro Oliveira, and Martin Carnoy. 2015. "The Effectiveness of an Early-Grade Literacy Intervention on the Cognitive Achievement of Brazilian Students." *Educational Evaluation and Policy Analysis* 37 (4): 567–90.
- Cruz, Tassia. 2015. "The Teacher Labor Market in Brazil." Unpublished PhD diss., Stanford University Graduate School of Education.

- Cury, Carlos Roberto Jamil. 2010. "A questão federativa e a educação escolar." In *Educação e federalismo no Brasil: Combater as desigualdades, garantir a diversidade*, ed. R.P. Oliveira. and W. Santana. Brasília: UNESCO.
- Dantas, Pedro Gomes. 2016. "A Difference-in-Differences Analysis of the Aggregate and Heterogeneous Effects of School Decentralization in Brazil." Unpublished master's thesis, Stanford University Graduate School of Education.
- Diniz, Josedilton Alves. 2012. "Eficiência das transferências intergovernamentais para a educação fundamental de municípios brasileiros." PhD diss., Universidade de São Paulo.
- do Amaral, Luiz Felipe Leite Estanislau, and Naércio Menezes-Filho. 2008. "A relação entre gastos educacionais e desempenho escolar." In *Anais do XXXVI Encontro Nacional de Economia [Proceedings of the 36th Brazilian Economics Meeting]*, no. 200807201800160. ANPEC-Associação Nacional dos Centros de Pósgraduação em Economia [Brazilian Association of Graduate Programs in Economics].
- Elmore, Richard. 2000. *Building a New Structure for School Leadership*. New York: Albert Shanker Institute.
- Elmore, Richard, and Susan Fuhrman. 1995. "Opportunity to Learn and the State Role in Education." *Teachers College Record* 96 (3): 432–57.
- Evans, Peter. 1995. *Embedded Autonomy*. Princeton, NJ: Princeton University Press.
- Ferreira, Clécio, and Plínio Dentzein. 2003. "O modelo multinível: uma aplicação aos dados do SAEB, com enfoque em aspectos de infraestrutura e condições sócio-econômicas das escolas." Paper presented at Estatística na Educação e Educação em Estatística. Congresso IASI ABE, Rio de Janeiro, Brazil.
- Fonseca, Izabel. 2015. "Achievement Gaps by Race and Parents' Education in Brazilian Schools." Stanford University Graduate School of Education (mimeo).
- Franco, Creso, and Bonamino, Alicia. 2006. *Projeto GERES: Principais características e resultados parciais*. Rio de Janeiro: Laboratório de Avaliação da PUC.
- Fuhrman, Susan H, ed. 1993. *Designing Coherent Education Policy*. San Francisco: Jossey-Bass.
- Gomes, Sandra. 2009. "Políticas Nacionais e Implementação Subnacional: Uma Revisão da Descentralização Pós-Fundef." *Dados* 52 (3): 659–90.
- Green, Andy. 1997. *Education, Globalization, and the Nation-State*. London: Palgrave-Macmillan.
- Grissmer, David, and Ann Flanagan. 1998. *Exploring Rapid Achievement Gains in North Carolina and Texas*. Washington, DC: National Education Goals Panel.
- Grissmer, David, Ann Flanagan, Jennifer Kawata, and Stephanie Williamson. 2000. *Improving Student Achievement*. Santa Monica, CA: Rand.
- Hanushek, Eric, Stephen Machin, and Ludgar Woessmann. 2011. *Handbook of the Economic of Education*. Amsterdam: North Holland.
- Hanushek, Eric, Paul Peterson, and Ludgar Woessmann. 2013. "Endangering Prosperity: A Global View of the American School." Washington, DC: Brookings Institution.
- Klein, Ruben. 2011. "A Reanalysis of PISA Results: Comparability Problems." *Ensaio: Avaliação e Políticas Públicas em Educação* 19 (73): 717–68.
- Leme, Maria Carolina, Ricardo Paredes, and André Portela Souza. 2009. "A Municipalização do Ensino Fundamental e seu Impacto sobre a Proficiência no Brasil." *Educação Básica no Brasil: construindo o país do futuro*. Rio de Janeiro: Elsevier.

- Levin, Henry. 1980. "Education Production Theory and Teacher Inputs." In *The Analysis of Educational Productivity*, Vol. 2, ed. C. Bidwell and D. Windham. Cambridge, MA: Balinger.
- Levin, Henry, and Marlaine Lockheed, eds. 1993. *Effective Schools in Developing Countries*. Washington, DC: World Bank.
- Lima, Ana Carolina, Ricardo Simões, and Ana Maria Hermetto. 2015. "Privação relativa e os deslocamentos da mão de obra no Brasil entre 1980 e 2010: evolução das interações entre pobreza, desigualdade de renda e migração." *Pesquisa e Planejamento Econômico* (Rio de Janeiro), 45:7–36.
- Louzano, Paula. 2007. "Do Schools Matter in Brazil? Excellence and Equity in Brazilian Primary Education." Unpublished PhD diss., Harvard University Graduate School of Education.
- Martins, Marcelo, Leonardo Rosa, and Martin Carnoy. 2016. "The 'Quality of Quantity': Achievement Gains from Adding a Year to Brazilian Primary Schooling." Mimeograph, Stanford University Graduate School of Education.
- Meyer, John, John Boli, George Thomas, and Francisco Ramirez. 1997. "World Society and the Nation-State." *American Journal of Sociology* 103 (1): 144–81.
- Mundy, Karen, and Lynn Murphy. 2001. "Transnational Advocacy, Global Civil Society: Evidence from the Field of Education." *Comparative Education Review* 45 (1): 85–126.
- Organization of Economic Cooperation and Development. 2011. *Lessons from PISA for the United States: Strong Performers and Successful Reformers in Education*. Paris: OECD.
- Organization of Economic Cooperation and Development. 2013. *PISA 2012 Results: What Students Know and Can Do: Student Performance in Mathematics, Reading and Science*, Vol. 1. Paris: OECD.
- Phillips, David, and Kimberly Ochs. 2003. "Processes of Policy Borrowing in Education: Some Explanatory and Analytical Devices." *Comparative Education* 39 (4): 451–61.
- Rhoten, Diana. 2000. "Education Decentralization in Argentina: A 'global-Local Conditions of Possibility' Approach to State, Market, and Society Change." *Journal of Education Policy* 15 (6): 593–619.
- Rothstein, Richard. 2005. *Class and Schools*. New York: Teachers College Press.
- Sammons, Pam, Josh Hillman, and Peter Mortimore. 1995. *Key Characteristics of Effective Schools*. London: University of London, Institute of Education.
- Segatto, Catarina. 2015. "O papel dos governos estaduais nas políticas municipais de educação: Uma análise dos modelos de cooperação intergovernamental." PhD diss., Administração Pública e Governo, Fundação Getúlio Vargas.
- Senado Federal do Brasil. 1988. *Constituição da República Federativa do Brasil*. Brasília, DF: Senado Federal: Centro Gráfico.
- Soares, José F. 2003. "Quality and Equity in Brazilian Basic Education: Facts and Possibilities." Paper presented at Seminar on Education in Brazil, Department of Educational Studies and Center for Brazilian Studies, Oxford University.
- Soares, José F., and Maria T. G. Alves. 2013. "Efeitos de escolas e municípios na qualidade do ensino fundamental." *Cadernos de Pesquisa* 43 (149): 492–517.
- Soares, José F., and Flavia P. Xavier. 2013. "Pressupostos educacionais e estatísticos do Ideb." *Educação and Sociedade* 34 (124): 903–23.

- Tendler, Judy. 1998. *Good Government in the Tropics*. Baltimore: John Hopkins University Press.
- Watts, Ronald. 1992. "The Federal Context for Higher Education." In *Higher Education in Federal Systems: Proceedings of an International Colloquium Held at Queen's University, May 1991*, ed. Douglas Brown, Pierre Cazalis, and Gilles Cazalis. Ottawa: Renouf.
- Weiler, Hans. 1983. "Legalization, Expertise, and Participation: Strategies of Compensatory Legitimation in Educational Policy." *Comparative Education Review* 27 (2): 259–77.
- Zoghbi, Ana C. P., Enlisson H. C. Mattos, Fabiana Rocha, and Paulo R. Arvate. 2009. "Mensurando o desempenho e a eficiência dos gastos estaduais em educação fundamental e média." *Estudos Econômicos* 39 (4): 785–809.