

slow emergence of public schooling in BRIC offers a valuable contrast to works that focus on more advanced nations.

Collectively, these four countries enjoy recognition today for their common status as fast growing emerging economies. But their relevance for studying the origins of public primary education in the late 19th and early 20th century lies in their level of comparative economic *and* political underdevelopment, the large scale and variability of their politics and geography, and the availability of previously unexplored data on basic schooling. The main contribution of our paper lies in presenting an analytical framework to understand new empirical evidence on the variation of educational development within and between these four different societies. Investigating the heterogeneous experiences of the four countries is not useful because of the BRIC acronym's modern connotations, but because it broadens the discussion of Easterlin's important question. We also view the BRIC experiences as representative of the majority of the world that had limited publically provided schooling by the early 20th century.

Conditions in BRIC were fundamentally different from the more educationally advanced countries by the late 19th century. Clearly, high incomes and structural economic changes increased the demand for schooling in the United States and Germany, but broad political participation also played an important complementary role in these and other successful cases of early publicly financed primary education (Lindert, 2004; and Gallego 2010). In more advanced economies, the spread of primary education typically entailed a shift towards more progressive tax policies and away from the private provision of schooling. Granting larger shares of the population formal voice over education and fiscal policies prevented elites from blocking the expansion of publically funded mass schooling. The impact of democracy was also reinforced by the relative homogeneity of the populations (in terms of income, ethnicity and religion), which

enabled majorities to coalesce around support for public schools (Go and Lindert, 2010; and Goldin and Katz, 2008).

Unlike these successful cases, BRIC was less developed, had more restricted political participation, and, exhibited low levels of public schooling despite decentralized political structures of education financing. As with most of the world in the early 20th century, these developing economies exhibited low per capita incomes, which limited private and public funding for primary schooling. Although these primarily agrarian economies may have had limited demand for high skilled labor, and rural households may have faced substantial opportunity costs to educating their children, the returns to basic education may have been relatively high amidst technological changes in the agricultural sector.³ But even accounting for low incomes and potentially low demand for education, we argue that a political economy framework involving public sector capture by local elites helps explain not only the limited overall supply of schooling in BRIC but also the variation within and between the four countries.

In the face of weak central authorities, decentralization of education led to the capture of local public resources and political institutions by elites in all four societies. Resources were often funneled towards private or secondary education catering to the elites, and poor communities were forced to rely on scarce public funds or voluntary private contributions to finance primary schools. This only worsened the limited supply of public schools. But, we do not assume a unified elite was always trying to block expenditures on education because decentralization and subsequent local elite capture did not always constrain the development of primary schooling. In more commercial developed, higher-growth areas, where there was more

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³ Source limitations prevent us from identifying and comparing the returns to education in BRIC in our time period, but Schultz (1971 and 1983) and others have argued for relatively high returns to literacy and basic numeracy in developing agricultural economies. We acknowledge but do not take up the issue of child labor in our four societies.

demand for education, many elites supported the expansion of mass schooling because they needed skilled labor and could more easily afford the resulting taxes. In other areas, elites supported public education because they perceived direct political benefits. Finally, in all four cases, changes in the composition of, and mobility into and out of, the elites – whether defined by wealth, status, or political power – influenced the support for publically financed primary education.

The composition and policy preferences of local elite varied across and within BRIC according to economic conditions, barriers to entry into elite circles and the (endogenous) progressiveness of the fiscal structure. In applying a common political economy framework, a key contribution of our study is to characterize the heterogeneity of the elite (or in the economic and political conditions they faced) within and across each country and relate how such variation accounts for the differences in educational outcomes. We also show how the mechanisms of elite control of education were delineated by the structure of central – local government relations. From Brazil’s adoption of federalism in the 1891 Constitution, to the deterioration of central authority in China in the late-Qing and the Republican periods, to British colonialism in India, the national governments in our countries generally exhibited little substantive involvement in basic education. Only in the case of Tsarist and Soviet Russia after 1900 were central authorities directly active in subsidizing the local provision of primary schooling.

We develop our argument in three steps. First, we present and discuss data on primary school enrollment rates and expenditure levels for BRIC and a set of comparison countries, circa 1910. Drawing on a variety of unexplored contemporary publications and official sources, we move beyond simple cross-country comparisons to also report and comment upon within-country variation in BRIC. In the second step, we outline a simple theoretical framework explaining how

the provision of public education in developing societies might be subject to capture by local elites. A key insight is that heterogeneity among elites is an important factor behind variation in schooling, especially in the contexts of decentralized policymaking and imperfect local democracy that characterized all of our cases. The third step of the analysis applies this theoretical framework to analyze early development of public primary education in Brazil, Russia, India, and China, roughly over the period 1880-1930. While acknowledging the overall negative effects of low incomes, we show how variation in income, economic and political conditions, and the social status of the elites interacted with decentralized fiscal policies across the four countries to influence the provision of public primary education.

2. Comparative Perspective

In Table 1 we present data on primary education from BRIC and a set of comparison countries around 1910. We include high-income countries such as England, Germany, and the United States; middle-income European countries such as Italy and Spain; Japan – the leading economy in Asia at the time; other middle-income countries such as South Africa, Uruguay, Chile, and Mexico; and several low-income countries like Peru, Jamaica, and Sri Lanka. We derived the education data for BRIC from surveys, government reports, and other contemporary materials, while the data for the other countries come from a contemporary report by the Commissioner of the U.S. Department of Education (United States, 1910).⁴ We match these indicators to Maddison’s (2006) per capita income figures and to Lindert’s (2004) enrollment rates for comparison.

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⁴ There are a variety of other sources on education attainment and investments that cover our time period (e.g. Frankema, 2009; Lindert, 2004; and Morrison and Martin, 2009), but we focus on the sources and countries documented in Tables 1-3 because we view them to be representative. Extending the sample in Table 1 in different ways does not dramatically affect the points we are making here.

low levels of enrollment had comparable enrollment to the typical province in China. Yet provinces with above average enrollment in Brazil or India look more like Russia, which had a much higher GDP per capita. It is worth noting that these numbers are themselves averages over very large regions – in the Russian case, individual provinces had enrollment rates as low as 15 percent (Ufa) and as high as 58 percent (Petersburg).

[Insert Table 2 about here]

The substantial heterogeneity is also on display in Table 3, which shows the variation in elementary expenditures per children of school age within BRIC. In the richer regions of Russia, such as the Baltic and Capital (Moscow and Petersburg) provinces, spending was almost double the level in the less developed interior regions. In Brazil the variation was such that in rich states like São Paulo the level of expenditures per children was higher than in any province or region in Russia.¹⁰ Yet the poorest provinces in Brazil had expenditures of less than 30 cents per child. Although the mean level of spending is lower, the patterns are similar for China and India. Less developed parts of British India such as United Provinces were spending less than 10 cents of a dollar per child compared to 43 cents in Bombay. The variation is large for China: Henan province spent 7 cents per child compared to \$1.36 in Liaoning province.

[Insert Table 3 about here]

Admittedly, such intra-country variation was not uncommon in the early 20th century. In 1907, spending per school-age child varied from less than \$5 in Mississippi and South Carolina to more than \$40 in Nevada and Washington (U.S., 1910). The coefficient of variation for state-level spending per capita on primary education in Mexico in 1907 was 0.73 (Mariscal and

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¹⁰ Note that while these expenditures are in comparable 1910 dollars, they do not take into account differences (across or even within countries) in the relative costs of educational inputs such as school buildings, instructional supplies, and teacher salaries. Incorporating such differences into cross-country comparisons is an important topic for future research.

qualifications and other voting restrictions were lifted, the political economy shifted in favor of more redistributive policies, including publically provided education.¹²

It was the decentralization of school policy and financing that enabled the early development of mass schooling in the 19th century in countries such as Prussia and the United States. In theory, decentralization allows for a tighter fit between local preferences and policies, and a closer monitoring of politicians by constituents.¹³ When decentralization includes the devolution of fiscal authority (i.e. by allowing for local taxes), this may ease the budget constraints of local governments. In both Prussia and the United States (as well as in Canada and, later, Japan, the United Kingdom, and elsewhere), the responsibility of financing public schooling was devolved to local authorities.¹⁴

While Prussia – and later Imperial Germany – retained central oversight of primary education, public schooling in the United States was entirely left to states and communities.¹⁵ The complete decentralization of schooling to local authorities meant that communities in the North and Midwest, with relatively representative politics, homogenous populations, and high incomes, were increasingly willing to finance public education through property taxes over the

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¹² Acemoglu and Robinson (2000) and Lizzeri and Persico (2004) study the expansion of the franchise in the 19th century. Aidt et al. (2006), Gallego (2010) and Lindert (2004) provide cross-country evidence of positive relationships between various measures of democratization and school enrollments and public spending on primary education in the long 19th century. Engerman, Mariscal and Sokoloff (2009) document how variation in the provision of schooling in late 19th early 20th century Latin America was related to the extent of voting rights. Stasavage (2005) provides modern empirical evidence for a link between democratization and primary school support across Africa.

¹³ On the various forms of decentralization and the costs and benefits that they entail in modern developing countries, see the chapters in Bardhan and Mookherjee, eds. (2006).

¹⁴ On public school provision in Prussia and the United States, see Lindert (2004) and Go and Lindert (2010).

¹⁵ From the 18th century onwards, the highly centralized Prussian state mandated that local governments provide public schools according to a national model, an approach that was strengthened after Napoleon and was eventually adopted in Meiji Japan (Duke, 2009). The decentralization of financial authority that this required – whether conducted through local governments or the church – was effective in generating relatively high enrollment rates by the mid-19th century (Herbst, 2002; and Lindert, 2004). Post-Napoleonic France enacted a strongly centralized school system that required departments and local communities to create and fund public schools. After Falloux's Law was passed in 1850, special education taxes were supposed to be enacted by each community, although central government subsidies were also available (Grew and Harrigan, 1991). Lindert (2004) notes the lagging education performance of the United Kingdom was due, in part, to the inadequacy of decentralized fiscal resources before the Fees Act of 1891.

19th century (Go and Lindert, 2010; and Goldin and Katz, 2008).¹⁶ In contrast, racial biases and unequal political rights in the South resulted in unequal local funding of schooling for African Americans and lower overall expenditures on public education (Margo, 1990; and Naidu, 2010).

This relates to the third element of our framework – the role played by elites in the functioning of local governments. Well-functioning local democracies can overcome elite resistance to decentralized and publically financed schooling via political channels.¹⁷ But decentralization does not always lead to more provision of public goods such as education when local institutions and hence policymaking are controlled by an elite minority with interests that possibly diverge from the majority (Bardhan, 2002).¹⁸ The availability of private schools combined with the necessary taxes to support public education would generally reduce elite support for mass education.¹⁹ Moreover, local elites may constrain educational opportunities to limit upward mobility into elite circles, allowing them to hold on to power, even if a broadening of education would fuel economic development (Acemoglu and Robinson, 2006).²⁰

At the same time, exactly who comprises the “local elite,” and their preferences regarding publically financed schooling, may be very different in different places and may change within a society over time. For example, commercial interests, civic involvement, fears of unrest, or other

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¹⁶ From private tuition and “rate bills” of the early 19th century, the decentralized provision of primary education in the United States increasingly became more “public” with the installation of state and local property taxes under the control of communities and local school boards.

¹⁷ Mariscal and Sokoloff (2000) and Engerman, Mariscal, and Sokoloff (2009) emphasize that the highly unequal societies of late 19th century Latin America led to elite capture of local and national governments and the formation of institutions – including school systems – that perpetuated the inequality. They contrast this with relatively equal societies of northern United States and Canada. The political economy model of Go and Lindert (2010) – which assumes a well-functioning local democracy – generates a positive relationship between inequality and support for public schooling in the 19th century U.S. because the wealthy, taxable elites were in the minority.

¹⁸ Wenegast (2010) argues that the traditional landed elite strongly resisted mass schooling in Imperial and Republican Brazil. As Bandiera and Levy (2010) have also recently pointed out, an elite may be able to take advantage of preference heterogeneity among the poor majority in a party-based democracy to shift policy outcomes in their favor.

¹⁹ For a formal model of how private school alternatives affordable only to the elite may limit public investments in schooling under imperfect democracy, see De la Croix and Doepke (2009).

²⁰ In this sense, local or national religious “elites” in many European countries may have resisted efforts at creating publically funded secular schooling in the late 19th century (West and Woessman, 2008).

highly circumscribed bodies gave little voice to the non-elites. Colonial India had no substantive elections before 1919, and British officials chaired provincial and local councils with some feedback from appointed locals. In Russia, while some provinces possessed quasi-representative local governments after 1864, and an elected national assembly existed after 1906, the nobility continued to hold sway in both institutions. After 1889, Brazil possessed national elections with a restricted and easily co-opted electorate dominated by various elite groups.

At the same time, central governments in all four countries largely absolved themselves from the direct provision of public education and substantial autonomy was devolved, formally or by default, to local government institutions. In post-1889 Brazil, a strong form of federalism entailed the devolution of fiscal authority – especially export tax revenues – to provinces, which contributed to extreme inter-regional disparities in education spending and outcomes. The creation of the *zemstvo* in much of European Russia transferred some property taxes and authority over how to spend them into local government hands. While central colonial authority was strong in British India, the provision of education was decentralized to local councils, but without any tax authority. In China, decentralization was more accidental than policy driven. Political instability in the late Qing and the Republic allowed local actors to take military or political power relative to the central authorities.

In such decentralized polities with little or limited democracy, elites were able to capture local governments and influence education policy. With relatively low per capita incomes, the unwillingness of most elites to engage in redistributive policymaking led to low public financing of primary education, as most models of the political economy of education would suggest (e.g. Ansell, 2010). But variation in local economic and social conditions, as well as heterogeneity within the elite, meant that the willingness (or ability) to fund mass schooling differed from place

introduced direct elections for the president and governors. The income requirement to vote was eliminated and replaced with a stricter literacy requirement.²⁹ The first elections in 1890 were for a Constitutional Congress, which drafted a federalist constitution that dramatically changed the relationship between central and local governments.

After 1889, political participation increased as the income requirement to vote was lifted. States with a larger number of per capita voters saw higher education expenditures (Martinez-Fritscher et al., 2010), suggesting a positive relationship between political voice and education. But this is not the whole story, as not all of the increase in education was the direct result of demands expressed by a wider electorate.³⁰

Rather, in order to increase the number of voters that they could mobilize in national elections, we argue that local (state and municipal) politicians increased education spending to expand the number of white males who were literate and, therefore, eligible to vote. The incentive to do this emerged because the federal executive and the ruling coalition in Congress during the Republic were under the control of the Republican parties of the states of São Paulo and Minas Gerais. Elites and their political allies in these and other states used their capacity to mobilize voters in presidential elections as a bargaining chip with this dominant coalition in the federal government. In exchange, they received transfers, less political or military intervention,

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²⁹ After 1889, voters had to write their names and birthdates to get a voter registry card.

³⁰ The demand for skilled labor by industrialists or the demand for schools by immigrants may have also increased demand for education in particular locations (i.e. São Paulo). These pressures, however, were not that important in Brazil as a whole because industrialization did not occur with technology that was especially complementary with skilled labor (Goldin and Katz, 1998). Moreover, the bulk of immigrants that went to Brazil between 1889 and 1930 came from Italy, Spain, and Portugal (with Germans only in fourth place). de Carvalho Filho and Colistete (2010) find evidence that the presence of more foreign-born farm workers was associated with greater municipal spending on education in São Paulo at the turn of the century, but the local demand for these workers was closely tied to the presence of coffee production. Finally, the abolition of slavery in 1888, which may have changed incentives for investments in human capital, likely affected sugar-producing areas more than elsewhere. For more on the determinants of changes in state education expenditures, see Martinez-Fritscher et al., 2010.

gap between Brazil and countries with comparable GDP per capita. Rather, these changes accentuated regional differences in enrollments and literacy within Brazil.³⁵

4.2 Russia

Between serf emancipation in 1861 and the Bolshevik Revolution of 1917, the share of the school-age population enrolled in formally recognized primary institutions in European Russia rose from less than 5 percent to roughly 25 percent (Nafziger, “Financing,” 2011).³⁶ To some extent, this came at the expense of informal and unregulated schools, especially among ethnic and religious minorities. Literacy rates did slowly increase, but by World War I, just slightly more than 40 percent of the population older than 9 years old could read.³⁷ This record placed Russia near the bottom in Europe, with schooling outcomes that looked much more like those in BRIC than in the West.

As in the other BRIC, the primary explanation for the low provision of basic schooling is that Tsarist Russia was poor, and both private and public funding for education were limited as a result. Per capita income levels in the countryside or among the urban working classes were quite low (Table 1), while the corresponding demand for skilled labor and returns to education were likely small.³⁸ Until the last decades of the period, the central government, primarily through the Ministry of Education (the MNP) and the state-sponsored Orthodox leadership (the Holy Synod), provided limited funding for primary schooling.

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³⁵ This divergence was somewhat reversed with the centralization of Brazilian politics under the Vargas regime.

³⁶ School enrollments actually decreased in the chaotic early 1920s before recovering by the end of the decade (Holmes, 1989). Soviet authorities then passed compulsory schooling laws, which led to near universal primary enrollment by the mid-1930s .

³⁷ On pre-1917 literacy, see Mironov (1991). Over 50 percent of the population older than 9 years old was recorded as literate in the 1926 census (Perrie and Davies, 1991).

³⁸ Tables 2 and 3 show that the richer Baltic, Capital, Central Industrial, and “New” Russian provinces exhibited higher expenditures per school-age child and greater enrollment rates. At the district level, a greater share of agricultural employment was associated with lower investments in schooling (Nafziger, “Financing,” 2011).

nobility), owners of urban property, and peasant communes. These new bodies were granted the power to levy property taxes on *all* local land and fixed capital owners. Moreover, the *zemstvo* was explicitly called on to engage in programs encouraging local economic development, a calling that quickly came to include education.

The *zemstvo* was characterized by a system of representation biased in favor of the local non-peasant elite. Peasants were allocated few seats relative to their population shares, and the elections that did occur frequently attracted little interest or simply reinforced the existing structure of political power. Therefore, the policies enacted by a given *zemstvo* were frequently dictated by the composition of the private propertied elite that formed the assembly majority (Nafziger, “Did,” 2011). The resulting heterogeneity of this form of local “elite democracy,” coupled with the absence of the *zemstvo* in 16 provinces of European Russia, helps explain the variation in expenditures on education evident in Table 3.⁴⁴

In the *zemstvo* region, funds for primary schooling came from property taxes assessed by special commissions of *zemstvo* assemblymen.⁴⁵ Over the period, *zemstvo* funds came to supplant financing from rural communities. Between 1880 and 1894, the share of total expenditures on rural primary schools (in European Russia) undertaken by village communities – either directly or through the local Orthodox parish – fell from 36 to 18 percent. In provinces that did not possess *zemstvo*, village (and township) and town governments held almost all responsibility for school funding. In these provinces, not only was spending on primary

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⁴⁴ Other factors – religion, economic structure, etc. – contributed to this variation beyond income differences and the *zemstva* (ibid.). The interaction between communal villages, township authorities, and district and provincial administrators varied substantially across European Russia, even within the non-*zemstvo* region. In the Baltics, all education finance came from township governments.

⁴⁵ As early as 1879, over 40 percent of funds allocated to rural primary education in European Russia came from *zemstvo* budgets. By 1894, this share had reached 54 percent. These and other numbers on rural primary school expenditures are taken from Nafziger (ibid.). By 1905, provincial and district *zemstvo* were spending approximately 25 million rubles on education, or about 4 times the expenditures of all townships and rural societies together (Russia, Statisticheskoe, *Dokhody*, 1909). Expenditures on primary education occasionally took the form of loans to communities; but, more often, spending involved grants and the direct hiring of teachers as *zemstvo* employees.

education per capita less (about 10 percent lower in 1911), but enrollments and the growth in the number of formal schools per 1000 people were also lower. This variation is reflected in Tables 2 and 3, where the non-*zemstvo* right-bank Ukraine and Byelorussian provinces exhibited lower spending and lower enrollments.⁴⁶

The decentralized “democracy” of the *zemstvo* seemed to have supported greater investments in public education. Those districts where the *zemstvo* assemblies included relatively more representatives from peasant communities exhibited greater spending on primary schools that catered to the rural majority. But this correlation was most evident in those districts that also possessed a greater number of nobles with small-sized holdings.⁴⁷ In contrast to the traditional large landed gentry, these nobles were more likely to be involved in commercial activities and hold civil service positions obtained through merit. They formed the basis for a movement that historians have labeled “*zemstvo* liberalism,” which supported broader schooling for the masses. Therefore, the imperfect democracy embedded in the *zemstvo* meant that the composition of the local property-owning elite was critical in determining the level of decentralized school provision (Nafziger, “Did,” 2011).

In peripheral areas where the *zemstvo* did not exist, the greater heterogeneity of the population limited the development of public schooling. Peasants in these areas maintained informal or confessional schools that relied exclusively on community contributions were often of poor quality.⁴⁸ In contrast, the consolidation of local fiscal authority in the *zemstvo* enabled

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⁴⁶ In 1911, enrollment rates (out of the school age population) were 3.5 percent higher (32.9 versus 29.4) in *zemstvo* provinces. Between 1860 and 1911, the annualized rate of growth in the number of formal schools was 6.5 percent in non-*zemstvo* and 7.5 percent in *zemstvo* provinces. See Nafziger, “Financing,” 2011.

⁴⁷ Higher spending on education was also evident in those few districts with very few private landholders where, by default, the peasant communes held the majority of assembly seats (Pape, 1979).

⁴⁸ This was especially true among Jewish and Muslim communities, which preferred to maintain informal schools rather than give up any authority over education. By 1894, there were still 16779 informal literacy schools, 5949 Jewish kheders, and 11589 Islamic madrases in the Empire. Comparing the 1894 and 1911 data for peripheral provinces in European Russia suggests that despite aggressive efforts by the MNP, many informal religious schools

Within this institutional framework, colonial policies had a marked influence on regional public spending patterns, exacerbating pre-existing economic differences between provinces. Both enrollment and literacy rates were twice as high in the coastal provinces of Bengal, Bombay and Madras (7.1 percent literacy in 1911) compared to the interior provinces of Central Provinces and United Provinces (3.5 percent in 1911). The coastal provinces had big urban centers with larger bureaucracies such as Bombay and Calcutta that offered more opportunities for educated workers. This likely increased the private demand for education and led to subsequent improvement in outcomes. Nonetheless there were regional differences even among the coastal provinces. From 1881 to 1931, Bombay led the way in public education expenditures and in developing a large network of public schools. But, public spending in Bengal, Bihar and Orissa lagged behind both Bombay and Madras.

Much of the difference in public expenditures was due to heterogeneity of land tax revenues. Bombay and Madras had higher land revenues on average, and hence, they had more public money available to spend on education (and other local services) when compared to Bengal, where land revenues were lower on account of the Permanent Settlement. The Settlement was a contract between the English East India Company and the landlords of Bengal and Bihar whereby the revenue demand on land (land tax) was fixed in cash for perpetuity in 1793. In comparison, Temporary Settlement areas such as Bombay and Madras were assessed land taxes at higher rates that were periodically adjusted to account for changes in price levels and productivity. Thus, public education spending varied with the land tax regime and, along with private spending on education, jointly influenced the development of mass schooling.⁵⁶ Roughly, land revenues explain approximately 32 percent of the district-level variation in total

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⁵⁶ Private revenue sources accounted for a larger share of total spending (40 percent) in Bengal than in Bombay (20 percent). On the sources of the numbers provided here, see Chaudhary (2009 and 2010).

on The Report of the Royal Commission upon Decentralization in India in 1908 that, “The Local Boards represent the monied, educated and land-owning classes; they are not really in favor of increased primary education, because it makes labor more difficult to handle; they are not in favor of a reduction of lower secondary education because they like to have the lower secondary schools to which men of their type send their children.” While the initial emphasis on English medium secondary education was due to colonial policies, many upper caste Indians actively embraced English instruction and became the chief promoters of secondary education.⁶⁰

The influence of elites is also visible in the provision of private aided schools receiving public subsidies. Despite public subsidies, the Government had limited control over these schools because private individuals pooled the necessary resources, set up the school, applied for a grant, and managed the school. Chaudhary (2009) finds that characteristics of the local elite strongly influenced the provision of the different types of primary schools. Brahmans and other educated upper castes successfully directed private and, to a smaller extent, public resources toward establishing secondary schools for their children. Districts with a larger share of Brahmans, the traditional elite caste of Hindus, had more public and private secondary schools plus a smaller ratio of primary to secondary schools. However, upper castes were unable to completely co-opt the public policy-making process because districts with larger proportions of lower castes and Muslims also had more public secondary schools.⁶¹

Colonial and elite-dictated policies occurred amidst hierarchical divisions among Hindu castes that further constrained the provision of mass primary education. Districts with high levels

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⁶⁰ See Nurullah and Naik, 1951 and Basu, 1974. For example, according to Basu (1974), the number of English secondary schools and arts colleges more than doubled from 1881/82 to 1921/22 from 2,133 to 4,904, while the number of pupils more than quintupled from 149,233 to 823,416 (p. 105). Most of this increase was in private aided (private schools that received some funds from public revenues) and unaided schools.

⁶¹ This was a misguided outcome of colonial policy, which set up these schools (as opposed to primary schools) in educationally backward districts hoping they would increase literacy in these districts.

of caste and religious diversity had fewer private aided and unaided primary schools as well as a smaller ratio of primary to secondary private schools. The presence of many religions with heterogeneous preferences over public and private education compounded the situation. For example, Muslims in heavily Muslim dominant districts had worse literacy outcomes because the Muslim religious schools were less effective at the margin at promoting literacy compared to secular colonial schools (Chaudhary and Rubin, 2011).

While colonial rule did not create the divisions in Indian society, colonial policies did not ameliorate the situation. Overall, public spending was low and susceptible to elite capture at the local level. Lower castes and the aboriginal tribes were rarely represented on the councils. Hence, they had limited political voice to influence local education policy. In contrast, landed and educated elites – defined by caste, wealth, and profession – did hold positions on district councils and utilized these to influence local spending.⁶² Colonial attempts to secure greater representation for marginalized groups and improve educational outcomes for the non-elites were generally insubstantial and weakly implemented.⁶³

India’s experience both parallels and contrasts with the other BRIC countries. Similar to China, there were big differences in spending and enrollments between the coastal and interior provinces linked to commercial developments and new types of economic activity. However, the size of the colonial bureaucracy and potential for educated employment were perhaps more

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⁶² For example, in Bengal Brahmins and other upper castes comprised over 80 percent of lawyers and almost 75 percent of landowners, the two most common occupations of district council members.

⁶³ Ghurye (1961) discusses this issue. For example, as early as 1856, a court case was filed in the district of Dharwar of Bombay where a lower caste boy was denied admission to the government school. In 1858 the courts released the following press-note “Although the Governor-in-Council does not contemplate the introduction of low caste pupils into schools, the expenses of which are shared with Government by local contributors and patrons who object to such a measure, he reserves to himself the full right to refusing the support of Government to any partially aided school in which the benefits of education are withheld from any class of persons on account of caste or race, and further resolved that all schools maintained at the sole cost of Government shall be open to all classes of its subjects without distinction.” This stated policy was not seriously implemented. Schools that relied on government aid continued to receive grants regardless of their policy towards lower castes (Nurullah & Naik, 1951). It was not until 1923 that a government resolution was passed stipulating that government grants would be unavailable to any schools that denied admission to the lower castes.

important in accounting for these differences than income and economic development—urbanization rates in the coastal and interior provinces were similar, and the pattern of spending on education is not fully explained by differences in income levels (Chaudhary, 2009 and 2010). Like Brazil and Russia, the extent of political participation did influence public spending, but since political representation was generally limited to land and caste based elites public spending was targeted to secondary education and away from mass primary education. Nonetheless, colonial policies and the associated fiscal system were important drivers of inter-regional differences. The decentralization of primary education to local district councils made the distribution of public funds a function of the preferences and ethnic, religious, and socioeconomic composition of the elites who sat on these councils.

4.4 China

With the lowest per capita income among the BRIC countries, it is not surprising that China possessed the lowest enrollment rates and one of the lowest levels of expenditures on education per school-aged child among our sample countries (Table 1). However, certain areas (the lower Yangzi; coastal regions – see Ma, 2008; and Mitchener and Yan, 2010) did experience some hints of industrial development and higher economic growth in the late 19th and early 20th centuries, which contributed to the heterogeneity in educational outcomes in the late-Qing and Republican periods (Tables 2 and 3). But we argue that differences in schooling across China were also a product of policies enacted by heterogeneous local elites, who acquired considerable power in the face of Qing decline and the weak central governments of the Republican era.

China experienced a structural break in education in 1905. Before that, the primary education system was based upon Confucian classics and aimed at success in the Imperial Civil

Service Exam (ICSE).⁶⁴ The rewards to high achievement on this exam generated considerable demand for privately provided traditional schooling (*sishu*) throughout the country. Such schools were frequently financed by contributions from wealthy households, lineages, or local voluntary associations such as guilds. As a result, these schools catered to the children of local elites, and county quotas on the number of passing exam grades capped the returns to such human capital investment.⁶⁵ In the wake of the Taiping rebellion of the 1850s and 1860s, the Qing dynasty expanded these quotas and encouraged the development of additional classical academies (Woodside and Elman, 1994; and Keenan, 1994). There was some slow growth in the number of “community” or charitable schools catering to the non-elite, but these were generally funded by contributions of local elites through lineage or clan wealth. Overall, not only was there little publically financed mass schooling, but the particular structure of the exam system, although avowedly meritocratic, limited entry into the bureaucratic elite.⁶⁶ While as many as 40 percent of males attended *sishu* for at least a few years by the end of the 19th century, many students achieved only limited literacy and gained few applied skills (Borthwick, 1983; and Yuchtman, 2010).

Growing economic openness and industrialization in the late nineteenth century generated rising demand for modern education, particularly in science, technology, and other applied topics (Yan, 2008; and Yuchtman, 2010). Although attempts to build modern schools

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⁶⁴ The ICSE was the main avenue to wealth and power in late imperial China. In the words of Ping-ti Ho’s, the exam was “the ladder to success” (1955), while a Chinese proverb called it “the gate that fishes jump through and become dragons.”

⁶⁵ In the traditional education system, the initial stages of training and preparing a son for the civil service was the private responsibility of families seeking to attain or maintain elite status as “official” families. Clans and families had, whenever possible, mobilized their financial and cultural resources to provide young boys with the tools of classical literacy. The government, central or local, maintained a hands-off approach towards funding mass primary education.

⁶⁶ Under the Qing, provincial civil servants and county magistrates were rotated frequently, which made them somewhat distinct from traditional local elite, often defined as those achieving the lowest exam rank of *sheng-yuan*. On the exam system and the perpetuation of an elite class across Qing China, see Elman (1991).

lineages, specific endowments, or associations of local elites continued to be important sources of school finance, especially in less developed, more isolated areas.⁷¹ Whether funded from public, private, or a mix of courses, the initiative to build new schools in the last decades of the Qing era generally resided with local elites who either possessed the necessary wealth or held positions of authority in public or quasi-public institutions.

Despite limited central sources of school funding, the administrative and fiscal reforms of the late Qing did generate some growth in the provision of public primary schooling. By 1909, roughly 51,700 modern primary schools catered to over 1.5 million students, and by 1912, over 86000 schools enrolled roughly 2.8 million students (Abe, 1987; and *First Education Yearbook of China*, 1934).⁷² These developments in primary education, however, did not put China in a favorable position when compared to other BRICs. China still had the worst education indicators when the Qing Empire fell in 1911. Moreover, there was considerable provincial variation in the pace of new school formation and in the share of education funding dedicated to primary education.⁷³ This carried over into the Republican period.

While the structure of local school finance remained relatively constant after China became a republic in 1912, decentralization and local capture by elites continued to influence the provision of mass schooling. All funding for primary education in the Republican period came

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⁷¹ Rankin (1986) and Chen (2007) discuss the growing importance of formal and informal elite institutions for the provision of local public services in the late Qing and early Republican periods. In the treaty ports (which were mostly located along the coast), rising entrepreneurs were one of the major patrons financing primary education. According to the *First Education Yearbook of China*, the total amount of education donations from private parties amounted to 11,414,253 Yuan in the first twenty years of the Republic, and the leading two provinces in private donation were Jiangsu and Zhejiang, where modern industry and commerce were most prevalent.

⁷² This movement towards school building and modernization far exceeded the few thousand schools (with no more than 100,000 students) founded by Christian missionaries in the late 19th and early 20th centuries that Bai and Kung (2011) focus on.

⁷³ Between 1907 and 1909, the number of official lower primary schools in Shandong province increased by nine times, from 3200 to over 31500, while in Guangxi and inland Xinjiang, the number actually declined. While some provinces dedicated a considerable share of total education funding from the provincial treasury to primary schools (e.g. Guangdong or Liaoning) in 1909, others favored more advanced or specialized education (e.g. Gansu or Shanxi). See Bailly (1990, pps. 44-45; from official Board of Education statistics).

from provincial and, especially, district or local sources,⁷⁴ Much of the administrative system of the late Qing period continued as before, including the new Ministry of Education and various provincial and county-level bodies.⁷⁵ But political instability grew as the death of President and self-proclaimed emperor Yuan Shikai in 1916 initiated a period of internal conflict, when local and regional elites fought to expand their holdings and take control the central government. During the “warlord” period (1916-1927), and under the Nationalist regime (1927-1937), the basic administrative and fiscal structure of the Republic persisted but military expenditures frequently siphoned resources away from local public services such as schooling. The geography of military conflict and heterogeneity in local-central government relations perpetuated the already substantial variation in basic education across Republican China.⁷⁶

Throughout the Republican period, traditional and new types of elites controlled local institutions responsible education (Chauncey, 1992). Government and other local institutions rarely offered political voice to the masses. There were few, if any, democratic effects on local public policy.⁷⁷ But the “policy” preferences of the local elites, and the particular institutions through which they were exercised, varied considerably from place to place. In some areas, the more traditional landed elite with ties to the old exam-based system of education tended to

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⁷⁴ In the 1910s and 1920s, education accounted for less than 3 percent of the Republic’s central budget, out of which primary education was 64.3 percent, secondary education 21.4 percent and tertiary education 14.3 percent (calculated from *The First Education Yearbook of China*, 1934; also see Bailey, 1990; and Buck, 1974).

⁷⁵ The education promotion bureaus, elite education associations, and pronial-level education administrations initially set up in the late Qing continued to operate during much of the Republican period. The division of responsibilities between them and various other local government appointees continued to differ from province to province (Baily, 1990). The new Republican government did initiate a new national school system (lasting from 1912 to 1922), but it was essentially identical to the multi-tiered structure set up in the late Qing. The national, provincial, and country-level elected assemblies had elections and, in many cases, began conducting business in 1912 and 1913. The were abolished by Yuan Shikai in 1914, although some coninued to meet after his death.

⁷⁶ For discussions of the heterogeneity of local-center relations under the Qing and the Republic, see Wong (2000) and Zhang (2000).

⁷⁷ Chang and Nathan (1978) summarize the electoral processes for the National Assembly of 1913. They also provide provincial data on the share of the population with voting rights in the Assembly election. These data are completely uncorrelated with the variation in school expenditures per school-age child (Table 3), suggesting that, unsurprisingly, this national and quasi-representative structure played almost no role in education decisions.

commercially developed and politically stable areas did this process take place. When compared to other BRICs in and around 1911, China's political situation was the least settled, least "democratic," and most beholden to provincial and local elites who had little interest in supporting mass education.

5. Conclusion

Our study sheds new light on the comparative experiences of BRIC during the formative years of their primary education systems. Brazil, Russia, India, and China were among the largest and poorest states in the world in the early 20th century. Their low level of development limited investments in mass schooling and central authorities in each country absolved themselves of the responsibility of providing primary education. As a result, the provision of education was frequently decentralized to lower levels of government, where the absence of accountable and representative democracy allowed local elites to capture political institutions, limit redistributive tax policies, and dictate how local public resources were allocated. However, variation among elites or in the political and economics conditions they faced (whether across space or over time) generated multiple schooling equilibriums across and within BRIC.

In India and China, the lack of functional democracy and weak central authorities meant that elites were able to fully capture the local government institutions responsible for public funding of education. Colonial restrictions on fiscal resources and caste and religious divisions among local elite limited the spending of public sector revenues on primary schooling in India. In China, the devolution of political and fiscal authority in the late-Qing and Republican eras was associated with the collapse of central authority, growing local political involvement by old and new elites, and rising social and military conflict. There was a shift towards modern forms of

primary education supported by public funds, but elite-control of school policies and limited local fiscal resources constrained this development. Only more commercially developed areas and places where the traditional elite had given way to one interested in modern education saw any substantive investments in mass public schooling.

Brazil and Russia – marginally richer and possessing slightly broader forms of elite democracy – saw greater investments in public primary schooling than India and China. In Brazil, fiscal federalism and literacy restrictions on voting after 1891 increased elite support for education in states and municipalities that had high export tax revenues or where the elite required greater voter turnout to maintain political power. Until the 1900s, variation in the support for mass public education in Russia was driven by differences in who controlled political institutions at the local level. The *zemstvo* offered some channels for the expression of broad popular interest in schooling, but elite control of this and other local institutions meant that it was generally those districts with more liberal nobility that invested more in public education. The founding of a national assembly in 1906 with some popular representation coincided with more funding for basic education from the central government, but it took the Soviet Union’s centralized policies to push the country towards universal primary education.

New data and detailed analyses of the political economy of schooling in the early 20th century BRIC countries lend support for the basic framework we laid out in Section 3. Decentralization in the face of weak or absent democratic mechanisms led to local elite capture of political institutions, compounding the constraints of low income, high opportunity costs, and limited public funds. This meant that little was spent on mass schooling, as the elites tended to utilize private education and saw little need to engage in redistributive policies that might have brought challenges to their political and economic control (as described for Latin America in

It is evident from the case studies that there was persistent variation in the extent to which primary education was “public,” (i.e., financed with some form of tax revenue and open to the majority of the population) or “private” (supported by endowments, student fees, and religious organizations and exclusive in some respect). An important topic that demands more attention is the extent to which private education for elites crowded out spending on public schooling à la De la Croix and Doepke (2009). Furthermore, we have focused on public primary schooling, mostly as a compromise over data availability and the scope of the paper. But the allocation of resources by governments and elites also took place between different levels of education. In terms of the returns to public spending, each of our countries likely overcommitted funds to secondary and tertiary schooling at the expense of primary education. To fully evaluate the costs of such misallocation, comparable data on upper levels of schooling are necessary.

Finally, we have limited our analysis to the decades around 1910. This covers the consolidation of mass public financed education in much of the developed world, but developments in the BRIC countries took very different trajectories. The Soviet Union quickly moved towards universal schooling, but India, China, and Brazil continued to provide limited basic education well into the 20th century. Only in the last 30 years have these three countries made substantial inroads in primary education. It is worth considering whether the recent advances of education in these countries – which some scholars have linked to decentralized policymaking – have historical roots, and if regional variation today is similar to what we find a century ago.

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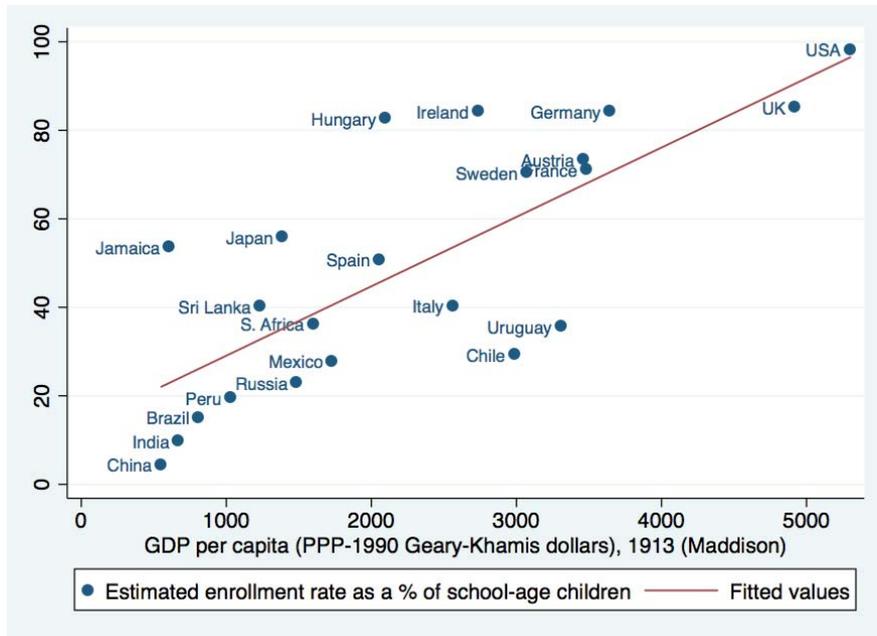
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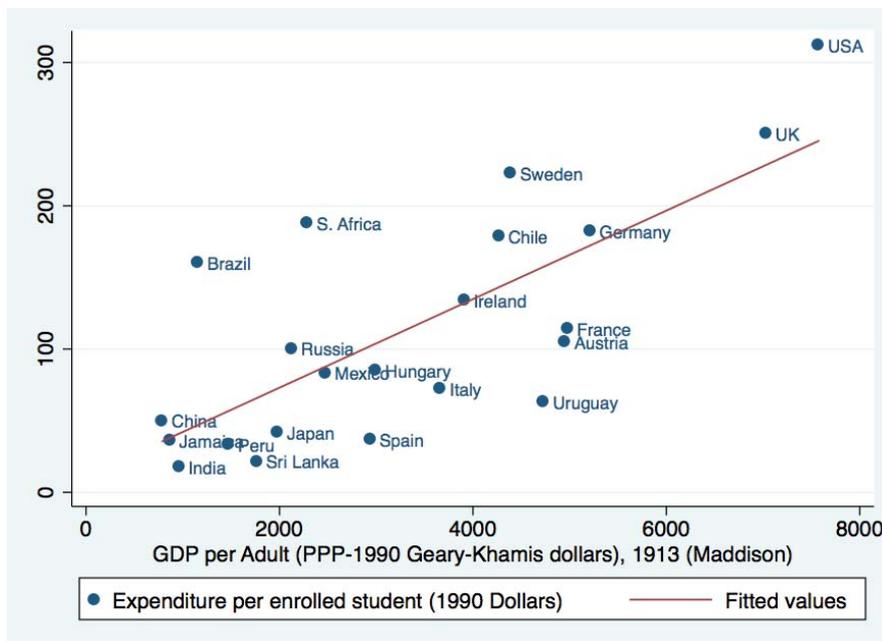
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Figure 1: BRIC Primary School Enrollments in Comparative Perspective, c. 1910



Note: The data underlying this Figure are taken from Table 1. The share of the school-age population is assumed to be 20 percent. It is worth noting that all the BRIC country observations lie below the fitted line for assumed shares of school-age children as low as 15 percent.

Figure 2: Unpacking the “Support Ratio” for Primary Education, c. 1910



Note: The sources for these data are the same as in Table 1. Expenditures per enrolled student are denoted in 1990 Geary-Khamis dollars. “Adults” are defined to be 70 percent of the total population for simplicity.

Table 1: Expenditures on elementary education per enrolled student and per school age population, various countries, c. 1910

Country	GDP per capita in 1913 (PPP-1990 Geary-Khamis dollars)	Expenditures per school age population (1990 Dollars)	Primary school expenditures per school age population as a % of GDP per capita	Expenditure per enrolled student (1990 Dollars)	Expenditures per enrolled student as % of GDP per adult (the “support ratio”)	Pupil-teacher ratio (total enrollment / total teachers)	Estimated enrollment rate as a % of school age children	Lindert's Public School Enrollment Rate of 5-14 year-olds (1910 or Year)
Brazil	811	24.13	2.98%	160.0	13.8%	42	15.08%	12.3%
Russia (area of U.S.S.R. for GDP)	1488	22.89	1.54%	100.3	4.7%	28	22.84%	13.9% (1900)
India	673	1.74	0.26%	17.8	1.8%	29	9.77%	6.5%
China	552	2.20	0.40%	49.9	6.3%	n/a	4.41%	4.5% (1920)
BRIC (weighted averages)	762	6.20	0.81%	63.51	4.7%	31	9.77%	n/a
United States	5301	306.63	5.78%	312.3	4.1%	34	98.20%	89.6%
Austria	3465	77.17	2.23%	105.1	2.1%	44	73.41%	68.0%
Hungary	2098	70.08	3.34%	84.8	2.8%	104	82.68%	52.6%
France	3485	81.01	2.32%	113.9	2.3%	37	71.14%	84.8%
German Empire/Prussia	3648	153.80	4.22%	182.5	3.5%	61	84.30%	72.0%
England and Wales (UK for GDP)	4921	213.23	4.33%	250.6	3.6%	34	85.10%	72.9%
Ireland	2736	112.66	4.12%	133.9	3.4%	50	84.16%	57.4%
Italy	2564	29.20	1.14%	72.5	2.0%	41	40.30%	44.6%
Spain	2056	18.60	0.90%	36.7	1.2%	n/a	50.73%	47.3%
Sweden	3073	156.41	5.09%	222.4	5.1%	41	70.33%	69.9%
Japan	1387	23.42	1.69%	41.9	2.1%	48	55.94%	59.9%
South Africa (Cape of Good Hope)	1602	68.00	4.24%	187.9	8.2%	26	36.19%	21.0%
Mexico	1732	23.14	1.34%	83.3	3.4%	n/a	27.79%	18.6%
Chile	2988	52.24	1.75%	178.6	4.2%	44	29.24%	43.1%
Uruguay	3310	22.57	0.68%	63.2	1.3%	40	35.69%	29.2%
Bolivia	n/a	10.23	n/a	82.4	n/a	43	12.43%	13.6% (1900)
Peru	1032	6.47	0.63%	33.2	2.2%	49	19.50%	15.3%
Jamaica	608	19.45	3.20%	36.3	4.2%	n/a	53.51%	44.9%
Sri Lanka	1234	8.61	0.70%	21.5	1.2%	n/a	40.12%	30.2%

Note: The expenditure and enrollment data come from United States (1910) and, for BRIC countries, the sources cited in Tables 2 and 3. They relate to various school years between 1904 and 1911 – we convert all dollar amounts to constant 1990 units. All GDP per capita data comes from Maddison (2006). We assume that the school-age population is 20% of the total population in each country (a rough average) – this number represents an overestimate for some countries (e.g. France) and an underestimate for others (e.g. Brazil). “Adults” are defined to be 70 percent of the total population (taking into account very young children) – similar caveats apply. The enrollment rates from Lindert (2004) are based on census population figures and, occasionally, different geographic units. This explains the sometimes large differences between our rates and his.

Table 2. Variation in Enrollment Rates within BRICs (Primary Enrollment / Children of School Age), c. 1910

Brazil (states)	1914-15	European Russia (regions)	1910-11	British India (provinces)	1911-12	China (provinces)	1912
Alagoas	7.0	Northern Provinces	24.1	Bengal	11.0	Jiangsu	7.4
Amazonas	8.5	Ural Provinces	19.6	Bombay	14.0	Zhejiang	9.4
Bahia	7.9	Central Industrial Region	27.5	Burma	7.5	Anhui	1.7
Ceará	7.3	Central Agricultural Region	22.2	Central Provinces and Berar	8.2	Jiangxi	3.4
Federal District	32.7	Volga/Don Region	21.6	Coorg	16.4	Hubei	4.6
Espírito Santo	10.8	Left-Bank Ukraine	23.3	Eastern Bengal and Assam	11.8	Hunan	5.0
Góias	7.8	Right-Bank Ukraine	19.2	Madras	12.5	Sichuan	3.0
Maranhão	8.6	"New" Russian Provinces	25.7	North-West Frontier Province	3.7	Fujian	3.1
Minas Gerais	11.5	Belorussian Provinces	20.2	Punjab	5.3	Yunan	10.3
Mato Grosso	15.1	Baltic Provinces	31.3	United Provinces	5.4	Guizhou	1.9
Pará	16.6	Capital Provinces	25.8			Guangdong	3.0
Parafba	6.3					Guangxi	5.3
Pernambuco	8.1					Shaanxi	3.9
Piauí	7.1					Shanxi	8.2
Paraná	13.3					Henan	2.5
Rio de Janeiro	9.7					Hebei	6.6
Rio Grande do Norte	9.4					Shandong	2.2
Rio Grande do Sul	21.3					Gansu	3.6
Santa Catarina	20.0					Xinjiang	0.5
Sergipe	10.6					Liaoning	13.0
São Paulo	13.8					Jilin	1.9
						Heilongjiang	3.4
Mean (Pop. weighted)	12.0	Mean (Pop. weighted)	22.8	Mean (Pop. weighted)	9.8	Mean (Pop. weighted)	4.4
Coeff. of Variation	0.53	Coeff. of Variation	0.16	Coeff. of Variation	0.4	Coeff. of Variation	0.73

Sources by country: Brazil: Education and population data from Brazil (1917, 1923, and 1926). The population of children in school age is estimated using the population pyramids of the 1900 census. Russia: Enrollment rates come from Pokrovskii, V.I., ed. (1916). Population totals come from Russia. Tsentral'nyi (1912). India: Government of India, *Progress* (1907-1912). Enrollment and population data for Bengal, Bihar and Orissa are from the Statistical Abstracts for 1911/12. China: Education data come from Republic of China (1934); and population figures are from the Census of 1910 (as reproduced in Wilcox, 1928). For Russia, India, and China, we assume the school-age population was 20% of the total population. The census-based Brazilian school-age population totals are close to this share. Applying the 1897 Russian census or 1911 Indian census age structures instead of the 20 percent slightly affects the levels but not the amount of variation in Table 3. For more detail on the underlying sources for India, Brazil, and Russia, see Chaudhary (2009), Martinez et al. (2010), and Nafziger ("Financing," 2011), respectively.

Table 3. Variation in Expenditures on Elementary Education within BRICs (US\$ per Children of School Age), c. 1910

Brazil	1914-15	Regions (European Russia)	1910-11	British India	1911-12	China	1912
Alagoas	0.63	Northern Provinces	1.93	Bengal	0.09	Jiangsu	0.32
Amazonas	2.80	Ural Provinces	1.43	Bombay	0.32	Zhejiang	0.35
Bahia	0.33	Central Industrial Region	1.93	Burma	0.09	Anhui	0.08
Ceará	0.93	Central Agricultural Region	1.30	Central Provinces and Berar	0.11	Jiangxi	0.14
Distrito Federal	2.86	Volga/Don Region	1.42	Coorg	0.27	Hubei	0.09
Espírito Santo	1.79	Left-Bank Ukraine	1.48	Eastern Bengal and Assam	0.09	Hunan	0.15
Góias	0.15	Right-Bank Ukraine	1.02	Madras	0.17	Sichuan	0.06
Maranhão	0.45	"New" Russian Provinces	2.19	North-West Frontier Province	0.05	Fujian	0.15
Minas Gerais	1.64	Belorussian Provinces	1.13	Punjab	0.08	Yunan	0.21
Mato Grosso	4.07	Baltic Provinces	2.40	United Provinces	0.06	Guizhou	0.06
Pará	1.60	Capital Provinces	4.12			Guangdong	0.17
Paraíba	0.81					Guangxi	0.19
Pernambuco	0.88					Shaanxi	0.09
Piauí	0.27					Shanxi	0.17
Paraná	2.73					Henan	0.05
Rio de Janeiro	1.99					Hebei	0.21
Rio Grande do Norte	0.91					Shandong	0.08
Rio Grande do Sul	2.49					Gansu	0.05
Santa Catarina	1.41					Xinjiang	0.08
Sergipe	1.70					Liaoning	1.02
São Paulo	6.88					Jilin	0.19
						Heilongjiang	0.36
Mean (Pop. weighted)	1.86	Mean (Pop. Weighted)	1.64	Mean (Pop. weighted)	0.12	Mean (Pop. weighted)	0.15
Coeff. of Variation	0.84	Coeff. of Variation	0.53	Coeff. of Variation	0.77	Coeff. of Variation	1.38

Note: Local currencies were first deflated to 1910/11 using local price indices and then converted to US\$ using 1910 exchange rates. To roughly convert these values to 1990 U.S. dollars, multiply by 14.

Sources by country: Brazil: Expenditures per children estimated using the average total expenditures on education by state for 1914-1915 (except for the Distrito Federal for which we used the expenditure data for 1906) divided over our estimates of population in school age. Data for expenditures comes from Brazil (1926) and from Wileman (1909). Data for Brazil assumes that half of the federal budget was spent on elementary education in the Federal District. Russia: Information on expenditures from Pokrovskii, V.I., ed. (1916). Population totals come from Russia. Tsentral'nyi (1912). India: Expenditures on primary education and population are from Government of India, *Progress*, (1907-1912, Vol. II-Appendices and Tables, Supplemental Tables, 1 and 22). China: Expenditures on primary education come from Republic of China (1934), and population numbers are taken from Wilcox (1928). For more information on the sources, see the notes on Table 2.