



# Accountability and yardstick competition in the public provision of education



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## ABSTRACT

This paper explores the institutional change introduced by the public disclosure of an education development index (IDEB, Basic Education Development Index) in 2007 to identify the effect of education accountability on yardstick competition in educational spending among Brazilian municipalities. An exploratory analysis of the data shows a minor reduction (20%) in spatial interaction in public educational spending after IDEB disclosure—compared with the spatial correlation before disclosure of the index. Our main results explore a discontinuity around the cutoff of 30 students enrolled in the grade under assessment after IDEB disclosure. The estimates suggest that the spatial autocorrelation—and, thus, yardstick competition—is reduced by 52%. Falsification and robustness tests were performed and suggest that we can claim causality around small bandwidths of the cutoff. This finding suggests that the public release of information may decrease the importance of neighbors' information on voters' decisions.

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## 1. Introduction

Information asymmetry between voters and politicians is known to be a building block of well-established models of political agency.<sup>1</sup> In this framework, voters do their best to find ways to improve their information about the incumbent. One possibility for determining the quality of incumbents (agents) consists of voters (principals) evaluating the incumbent's performance in terms of tax levels and amount (and/or quality) of public services by comparing them to those of neighboring jurisdictions, where information can be accessed more easily. In turn, the better-informed party—i.e., the incumbents—then engage in yardstick competition to signal their quality to voters (Salmon, 1987).<sup>2,3</sup>

A large body of empirical literature interested in testing the nature of strategic interactions between jurisdictions (in cases of

expenditure and tax setting) has been produced.<sup>4</sup> Most of these studies relate the degree of yardstick competition to a range of political and institutional incentives.<sup>5</sup> However, exogenous changes to information asymmetry are much less explored, and to the best of our knowledge, no empirical study has explicitly investigated yardstick competition in the context of education expenditures or verified the effect of reinforcing educational accountability on the strategic choice of this type of expenditure. Revelli (2006) is the first to exploit an institutional reform in the UK to address the fact that the spatial pattern observed in welfare policy is at least partially driven by yardstick competition. Our work contributes to the literature by providing additional evidence on the role that the national disclosure of local governments' performance ratings plays in the relative quality of public service provision, with a focus on basic education.

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<sup>1</sup> See Ferejohn (1986), Alesina and Cukierman (1990), and Persson et al. (1997).

<sup>2</sup> See the principal-agent model of Besley and Case (1995a) and the bureaucracy agency-model of Revelli and Tovmo (2007). See Bordignon et al. (2004) and Besley and Smart (2007) on the limits and welfare properties of yardstick competition models.

<sup>3</sup> Case et al. (1993) stress that voters and incumbents may also compare their jurisdiction's performance to that of similar jurisdictions in terms of population, income and ethnic composition. See Ferraz and Finan (2008), Strömberg (2004) and Revelli (2008) on the role of the media in providing voters with information.

<sup>4</sup> For studies on strategic spending setting, see Revelli (2006), Elhorst and Fréret (2009), Case et al. (1993) and Bivand and Szymanski (2000). For studies on strategic tax setting, see Besley and Case (1995a), Bordignon et al. (2003), Revelli (2008), Allers and Elhorst (2005), Solé-Ollé (2003), Revelli (2002), Ladd (1992) and Revelli (2001). Geys (2006) notes that voters may care about efficiency in the production of local public services. Rincke (2009) observes that voters may also value the adoption of new technologies for the provision of public services.

<sup>5</sup> Lamé duck status (Besley and Case, 1995a), size of the majority at the city council (Allers and Elhorst, 2005; Elhorst and Fréret, 2009), votes received in the most recent election (Besley and Case, 1995a; Solé-Ollé, 2003), existence of coalitions (Geys, 2006) and ideology (Allers and Elhorst, 2005; Solé-Ollé, 2003) are all potential determinants of yardstick competition.

This paper uses data from Brazilian municipalities to test whether the local-level disclosure of the Brazilian Basic Education Development Index (IDEB, its Portuguese acronym) in mid-2007 diminished spatial interaction among jurisdictions in terms of educational spending. Such a reduction in spatial interaction could be attributed to reduced information asymmetry regarding the quality of education after the IDEB became public. However, in principle, the effects of disclosing standardized test results on spending interaction patterns are unclear. First, as noted by Revelli (2006), once a national public services performance ranking is available, a decrease in local spatial interaction would be expected from yardstick competition but an increase would be expected from welfare competition. Second, the relationship between educational spending and education quality (as measured by student achievement) remains largely unknown to voters, public officials and even academics. As noted by Hanushek (1986, 1996, 2006), the lack of information about the educational production function causes officials to employ financial resources for inputs that have little or no role in determining educational output. Unsurprisingly, educational spending and student performance are not necessarily related.<sup>6</sup>

It is likely that prior to the disclosure of student achievement, incumbents did not pay much attention to educational quality because it was not objectively measured. Officeholders may have changed their attitudes after student performance was made public at the local level. Indeed, Firpo et al. (2011) find evidence that in the context of Brazilian municipalities, higher average students' achievement increases the odds of incumbent reelection. Thus, once school and local school system performance was made public, one could ask whether incumbents changed educational spending patterns—as though there were a deterministic relationship between student achievement and expenditures—or did nothing because they lacked knowledge about how to effectively improve education quality.

An exploratory panel data analysis compares the spatial correlation in education spending before and after the index was disclosed and finds a reduction in spatial interaction. This paper's main empirical strategy consists of estimating the effects of IDEB disclosure on spatial interaction—and hence on yardstick competition—exploiting a rule defined by the Ministry of Education that prevents local school systems with fewer than 30 students enrolled in the grade under evaluation from participating in the Brazil Exam (*Prova Brasil* in Portuguese), a test that measures the proficiency levels that comprise the IDEB. This approach directly addresses the possibility that IDEB disclosure may not be exogenous because jurisdictions are free to decide whether to participate (although the vast majority do participate). We estimate local regression discontinuity (RD) models in which our interest lies mainly in shifts in the spatial correlation coefficient around the cutoff of 30 students instead of in the intercept.<sup>7</sup>

Our main results indicate a higher spatial correlation in education spending between municipalities to the left of the cutoff, i.e., where IDEB was not disclosed. We evaluate several bandwidths, and the results suggest causal relationships for bandwidths closer to the cutoff. Finally, a series of robustness and sensitivity tests are mentioned throughout the results section and presented in the online appendix.

This paper is organized as follows. Section 2 describes the educational accountability system in Brazil. Section 3 presents the data set description. Section 4 presents the panel estimation

strategy and the exploratory results. Section 5 presents the RD strategy and the corresponding results. Section 6 concludes.

## 2. The educational accountability system in Brazil

Educational accountability is a relatively new concept in Brazil. Only after 1995, with the implementation of the National System of Basic Education Assessment (known by its Portuguese acronym, SAEB), could we track educational quality, albeit only at the state level. It was only after the creation of the IDEB—based on student performance on the Brazil Exam—that we could track educational quality at the school or municipality level.

The IDEB is an index that measures the overall quality of education in public schools and municipalities school systems in an intelligible and direct manner. The index is defined as  $IDEB_{ijt} = P_{ijt}A_{ijt}$ , where subscript  $i$  denotes the school or local school system;  $j$  denotes one of the two stages of education, the First Cycle, which includes students from 1st to 5th grades of basic education, and the Second Cycle, with students from 6th to 9th grades; and  $t$  denotes the period.  $P_{ijt}$  stands for average performance on the math and reading portions of the Brazil Exam.<sup>8</sup> The term  $A_{ijt}$  reflects the school's pass rate and varies between 0 and 100%.<sup>9</sup> The index has been standardized to lie in the interval between 0 and 10, wherein 6 corresponds to the average achievement of OECD students (based on the results of the 2003 edition of PISA).

The index was first released on April 26, 2007, by Presidential Decree no. 6094, which is known as the “Plan of Goals All Committed to Education”.<sup>10</sup> This decree established goals for each school and municipality's IDEB scores. The plan envisaged sub-national governments voluntarily signing an agreement in which they would commit themselves to achieving gradually increasing goals. In exchange, the federal government provides municipalities with technical support and guidance on best practices for increasing student achievement. The idea is to encourage society to monitor its accomplishment of the goals, reinforcing a sense of accountability for local educational quality and diminishing information asymmetry related to the quality of incumbents. The federal government's final goal is to achieve an average IDEB score of 6.0 by 2021, i.e., the average performance of OECD students.<sup>11</sup>

These goals were the government's response to a discussion with civil society actors represented by the non-governmental organization (NGO) “All Committed to Education”, founded in 2006 with support from major Brazilian companies—whose budgets together add up to tens of billions of dollars.<sup>12</sup> The NGO sets similar goals in terms of literacy rates, student attendance, reading and math learning, graduation rates and education investment. The NGO also works with state and local governments, helping

<sup>8</sup> First Cycle student performance on the exam is measured by the performance of 5th graders, whereas Second Cycle student performance is measured by that of 9th graders (or 4th and 8th graders, respectively, if the school system has not made the transition to a nine-year fundamental education system).

<sup>9</sup> Note that there is a tradeoff between the performance and the pass rate. Artificially increasing pass rates to obtain a higher IDEB score will cause less-prepared students to be promoted to the next grade, thus reducing the component of the IDEB that measures performance on standardized exams. The methodology used to build the index (combining achievement and passing rate) intended to prevent that—i.e., intended to simultaneously improve student achievement and reduce grade retention.

<sup>10</sup> The IDEB has been disclosed every two years since 2007.

<sup>11</sup> Voluntary participation in the “Plan of Goals” fits perfectly with the objectives of this paper. If participation were legally enforced, jurisdictions could still reduce their interactions related to the provision of public education, although less because of the incumbents' need to signal their type to voters and more because non-compliance with the law could result in legal consequences.

<sup>12</sup> “Todos pela Educação” in Portuguese. In fact, the Plan of Goals was named after the NGO initiative.

<sup>6</sup> See Menezes-Filho and Pazzello (2007), Card and Payne (2002), Leuven et al. (2007) and Revelli (2009).

<sup>7</sup> Unlike traditional RD, we parametrize our model's functional form with a spatial lag that has to be instrumented with the average regressors of neighboring municipalities.

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