



ELSEVIER

www.elsevier.com/locate/worlddev

<http://dx.doi.org/10.1016/j.worlddev.2012.11.004>

# Electoral Competition and Local Government Responsiveness in Brazil

PAULO ROBERTO ARVATE\*

*School of Business, Center for Applied Microeconometrics (C-Micro),  
Getulio Vargas Foundation, São Paulo, Brazil*

**Summary.** — The empirical literature on the effects of competition on the supply of public goods shows controversial results at the local level. The main objective of this paper is to investigate this relationship in a federalist country (Brazil) where the political system places few barriers to the entry of competitors and local governments have the independence to establish their own public policy. We show that a higher effective number of candidates running for the executive branch increase the supply of local public goods (the number of student enrollments, teachers, and free immunizations).

© 2012 Elsevier Ltd. All rights reserved.

*Keywords* — Political competition, Supply of public goods, Local governments

## 1. INTRODUCTION

Political scientists and economists alike share the traditional view (model with two candidates) that electoral competition leads to an increased supply of public goods. However, empirical results for this relationship are controversial at the local level. Chhibber and Nooruddin (2004) assessed 15 Indian states and showed that two-party competition provides more public goods than in places where multiparty competition exists. Cleary (2007) investigated Mexican municipalities and showed that greater electoral competition does not lead to an increased supply of public goods. Besley, Persson, and Sturm (2007) argued that political competition is positively related to personal income growth, governance quality, lower overall state tax policies, more business-friendly labor regulations, and a larger share of manufacturing in state production in the South of the United States, but the evidence is nonconclusive with regard to government efficiency. Ashworth, Geys, Heyndels, and Wille (2010) analyzed the Flemish local government and concluded that political competition reduces government inefficiency (high levels of public goods).

Beyond the theoretical difficulty of treating this relationship considering the several factors involved (discussed in Section 3 of this work), these works deal with a specific institutional environment that may be influencing the results. Chhibber and Nooruddin (2004) investigated the issue in a federalist (unitary) country where the local government has relative autonomy to decide its own public policy (India).<sup>1</sup> Cleary (2007) and Ashworth et al. (2010) addressed this issue by studying countries where the party system is not favorable to the entry or exit of political competitors (Mexico and Belgium) and for all the mentioned works, including Besley et al. (2007), not all beneficiaries of public policy participate in the election process (the vote is not compulsory in these countries). Thus, we decided to test this relationship in a country where these characteristics have less effect on this relationship.

As Mainwaring (2002) classified Brazil as an example of a partisan system open to new competitors (like Peru and Russia), the 1988 Brazilian Constitution established that the local government has the status of a member of the federation (with authority to decide budget and policies) and the vote is compulsory for individuals between 18 and 70 years old (policy is evaluated by the beneficiaries themselves), we decided to use Brazilian local governments to test this relationship.

Besides the aforementioned characteristics, two other electoral rules are important in local elections and we decided to include them in our investigation, given that they can influence this relationship: the run-off rule for municipalities over 200,000 voters and the unique possibility of personal reelection for mayors (a rule established by Constitution after 1997).

Considering that the supply of public goods may also affect the entry of new competitors to the local election, it is necessary to correct the endogenous bias caused by this reverse causality. We use the (federal legislation) law, which establishes a fixed relationship between the number of seats on the local legislative branch and the size of the local population (the population changes every ten years following the census) for producing Instrumental Variables (IV).<sup>2</sup> Our idea behind the use of the IV is that more seats on the local legislative (and parties) is a good fit for future mayor candidates because it is a natural career path for councilors (councilors who wish to advance their career vertically: the number of seats in the 1996 election influences the number of mayoral candidates in the 2000 election). As the number of councilors for a group of municipalities depends on the size of the population (band widths), it is very difficult to believe that policies adopted for social areas (education and health) can be based on the same rule.<sup>3</sup>

Our robust results (corrected by the IV) indicate that electoral competition increases the supply of public goods in the Brazilian institutional environment. One effective candidate increases the number of student enrollments by 18.24 percentage points, the number of teachers by 0.90 percentage points (both per 10,000 inhabitants), and the number of free immunizations per 100,000 inhabitants by 20.47 percentage points. To avoid nonrepresentative variables for local government on the supply of public goods, we focused our investigation on proxies which represent important per capita social spending by municipalities; in this case, education and health.

\* Earlier version of this paper was presented at the 2010 Midwest Political Science Meeting. The author has benefited greatly from preliminary discussions with Carlos Pereira (MSU) and an extremely in-depth discussion with Marcos Mendes (senior economic adviser to *Brazil's Senate*). I would like to thank three anonymous referees. The author was supported by GVPesquisa, GVEconomics, and by the Ministry of Education (Brazil—CAPES). Final revision accepted: November 13, 2012.

Although the literature (as will be seen in Section 2—theoretic and empirical) developed arguments showing the importance either ex-ante or ex-post of the number of effective candidates as a measure of competition, in our investigation it is not very clear which measure is more important for technical reasons. Although for both cases, the correlation between the number of local legislative body (parties) in the election before and the number of effective candidates in the subsequent mayor election is positive, the IV was strong for the measure ex-ante and weak for a measure ex-post (with weak instruments, significance tests are incorrect in terms of size and confidence intervals are wrong). Thus, we choose to focus only on the result of the ex-ante number of effective candidates. Our results show the municipalities where the run-off rule is valid, the effective number of candidates is higher, and the supply of public goods is also higher for the public goods used as proxy when compared to the municipalities, which do not have this rule. Finally, the term limit rule (one personal reelection for all mayors) does not affect the results.

The remainder of the paper is organized as follows: Section 2 shows the advantages of Brazilian local governments as an important case study for testing the relationship between political competition and the supply of public goods. Section 3 presents the theoretical literature on the relationship between political competition and the supply of public goods. We show in this section the set of hypotheses which we tested. Since our work is basically an empirical investigation, we decided to add the empirical results found in the literature on the discussion of hypotheses which are tested. We also try to focus our development more carefully on theoretical literature, which considers electoral competition based on the number of candidates, since this is our main empirical variable. Section 4 presents the data used in our investigation, including the way in which the variables are constructed. Section 5 explains the empirical strategy. Section 6 shows the results of our investigation and the last section presents the summary of our investigation.

## 2. THE INSTITUTIONAL ADVANTAGES OF THE BRAZILIAN CASE

Brazil is a federalist country with three government levels: federal, 27 state governments, one of which is a Federal District (the national capital), and almost 5700 municipalities. Unlike Mexico, which went through a long period of single-party dominance (Hecock, 2006 and Cleary, 2007), but similar to other Latin American countries, such as Argentina, Uruguay, and Chile that lived under dictatorships, Brazil states in its Constitution of 1988 that municipalities enjoy the status of federation members (not subordinated to states or to the federal government). On budgetary matters it states that the local executive formulates its own budget proposals (including tax and expenditure),<sup>4</sup> and the local legislative branch approves them and checks where expenditure occurs. Unlike Indian sub-national governments, for instance, Brazilian local governments, with their executive and legislative branches have sufficient independence over their actions.<sup>5,6</sup> There is strong evidence that public policy determination is concentrated in the hands of local executives (Samuels, 1997). Countries where the local government does not enjoy such autonomy, or has it only partially, may affect investigations into the relationship between competition and the supply of public goods.

Following the line of budget autonomy, mayors and council members in municipalities are chosen by local voters simultaneously for a four-year (fixed) term. The New Constitutional

rules establish that mayors are chosen in one round (majority system) for municipalities with fewer than 200,000 registered voters and in two rounds for municipalities over 200,000 registered voters, if no mayoral candidate achieves a majority of valid votes in the first-round (50% plus one). A constitutional amendment of 1997 defines that mayors can be reelected (personal reelection establishes a new term limit rule). Local legislators are elected through an open-list proportional representation system (voters can order the list of either candidates or parties).<sup>7</sup> The open-list ensures that individual candidate strategies are dominant and that party coalitions are difficult to achieve (Samuels, 1997). Countries where local leaders are not evaluated by local voters may complicate this type of investigation.

Besides both local budgetary autonomy and choice of leader, another important characteristic of the Brazilian political system is the mobility of local politicians (horizontally and vertically), which can be correlated with the level of competition in each municipality.<sup>8</sup> A good example for understanding this situation is to observe the career possibilities of a mayor at the end of his/her term. He/she has the following choices:<sup>9</sup>

- (1) Giving up their political career altogether;
- (2) Running for councilor (a municipal role of lesser importance);
- (3) Running for mayor in another municipality;<sup>10</sup>
- (4) Running for reelection;
- (5) Spending two years without a mandate, while awaiting the opportunity to run for a different position at the state or federal level.

It is clear that choice #5 will be deemed subordinate to choice #3 and #4 and, therefore, disregarded. This is because incumbent mayors can run for a different office at any time. For a politician who is aiming to advance his or her career by attempting state or federal office, the best choice is to run either for reelection as mayor or for election as mayor in another municipality (choice #3 and #4) and, two years later, use their status as mayor (media exposure, administrative accomplishments, public funds) to launch a more ambitious candidature with higher stakes involved. Spending two years in limbo to then return to the political scene in pursuit of a higher position is not common practice in Brazilian politics. In the same way, choice #2, in turn, is practically equivalent to giving up the political career (choice #1), due to the great difference in status between the office of mayor and that of councilor. This choice, besides being statistically irrelevant (only 12 cases in a universe of over 5000 observations), indicates that the individual has a very poor chance of reelection and advancement as a politician. Thus, choices #3 and #4 are the most practicable for mayors and, with this example, it is possible to understand why the mobility of a local politician cannot be ignored in our investigation.

However, without a system which allows for the choice of politicians to be individually satisfied, their wishes could be blocked. The fact is this does not occur. The other face of mobility corresponds to an open and individualistic political system. There is a large number of parties and weak control by parties over their members.<sup>11,12</sup> Our sample does not contradict this statement. The Table 1 below shows the names of 23 parties as well as the number of municipalities each party occupied in the 2001–04 term.

In the full sample, five parties (PMDB, PFL, PSDB, PPB and PT) held 75.14% of the local executive branches, while the effective number of candidates in the 2000 elections was 2.21.

Unlike Mexico, India, Belgium, and the United States, it is not possible to forget that the principal beneficiaries of public

Table 1. Names of the parties and the number of municipalities which the party held in the initial sample Source: IPEA ([www.ipeadata.gov.br](http://www.ipeadata.gov.br))

Party		Party		Party		Party		Party	
PMDB	1245	PTB	397	PSD	119	PMN	14	PRN	3
PFL	1024	PDT	282	PSC	33	PHS	6	PC DO B	2
PSDB	980	PL	233	PSL	25	PT do B	6	PAN	1
PPB	601	PPS	164	PRP	16	PRTB	4	Total	5910
PT	591	PSB	133	PST	15	PTN	3		

policy actually participate in the elections. Voting is compulsory in Brazil for all individuals between the ages of 18 and 70 years.<sup>13</sup> In countries without the formal obligation to vote, politicians might not take into account the preferences of voters who decided not to participate in the democratic game.<sup>14</sup> Running for executive (local) mayor is also a natural path for councilors' career wishes.

Thus, autonomy regarding budgetary decisions, the autonomy of choice of their leaders, a political system which permits the mobility that politicians wish for and compulsory participation in the election of valid voters make Brazilian local governments an important place for testing the relationship between political competition and the supply of public goods.

### 3. THE RELATIONSHIP BETWEEN POLITICAL COMPETITION AND THE SUPPLY OF PUBLIC GOODS

It is no easy task finding a direct relationship between electoral competition and the supply of public goods in theoretical literature because this relationship can be influenced by several factors, such as information about candidates (a popularity bias, for instance, showing in [Polo, 1998](#)), problems of commitment between the electoral platform of candidates, and their achievements as incumbents ([Polo, 1998](#); [Svensson, 2005](#)), rules of the electoral system (plurality and run-off rules: [Amorim Neto & Cox, 1997](#); [Benoit, 2002](#); [Cox, 1997](#); [Osborne & Slivinsky, 1996](#); [Taagepera & Shugart, 1993](#)), interest groups ([Grossman & Helpman, 1996](#); [Lizzeri & Persico, 2005](#); [Svensson, 2005](#)), number of candidates (multiparty) involved on the electoral process ([Besley & Coates, 1997](#); [Lindbeck & Weibull, 1988](#); [Osborne & Slivinsky, 1996](#); [Polo, 1998](#)), and the institutional environment ([Besley et al., 2007](#)).<sup>15</sup>

Considering the Brazilian institutional characteristics shown in the section before, we decided to develop our investigation based on four hypotheses. The first discusses the direct effect of political competition (considering that our measure of competition is the number of candidates) on the supply of public goods. The second shows the necessity of discussing the "temporal nature" of competition on the supply of public goods: present or future. The third and fourth highlight the possible effect of two specific electoral rules (the rules of plurality vs. run-off rule and the term limit) on our main relationship.

**Hypothesis 1.** Electoral competition increases the supply of public goods. In the theoretical literature we observe that the effect of the number of candidates on the definition of policy (the supply of public goods) is controversial.

The most traditional model of political competition on the definition of policy occurs within the context of spatial voting models (with two parties). [Downs \(1957\)](#) and [Lindbeck and Weibull \(1988\)](#) show that when there is competition the parties announce their electoral platform of public policy simultaneously and noncooperatively to the voters (the second article

works with swing voters), and the winner is the competitor who offers socially optimal public policies (the weighted sum of voter's preferences in the first case or groups that differ in voting behavior in the second case).<sup>16, 17, 18</sup> Therefore, there is no rent for the winner in the office.

Following the tradition of the Chicago School (the tradition of treating political markets as competitive economic markets where the larger number of candidates can reduce the rent of politicians in office and increase the supply of public goods),<sup>19</sup> [Polo \(1998\)](#) builds a model showing that the number of competitors can be beneficial to the supply of public goods. The main idea is that the higher number of competitors increases the supply of public goods because they reduce the rent that the candidates expect to obtain when someone is in office. Unlike [Downs \(1957\)](#) and [Lindbeck and Weibull's \(1988\)](#) models, rent is possible for the candidates in the electoral process because the popularity of candidates with voters is not known. A popularity bias of candidates (a distribution function of candidates' attributes) permits the existence of rent. In this uncertain environment, this distribution function is fundamental for establishing the relationship between the number of candidates and the amount of public goods offered. If it is normally distributed, a higher number of candidates ( $n$  candidates) contributes to dissipating the rents totally and the elected candidates will offer the maximum public goods. On the other hand, if the distribution of the biases of personal popularity is more dispersed, like a double exponential distribution, rent may persist even with a great number of candidates. In this case, the supply of public goods offered will be lower.<sup>20</sup>

[Lizzeri and Persico \(2005\)](#) are not convinced of the benefits of the number of parties on the supply of public goods. They resort to [Myerson's idea \(1993\)](#) about parties (the expansion of political parties leads to policies that are exclusive to each group in society), emphasizing the concept of inefficiency associated with the type of government expenditure (the inefficiency is associated with, for instance, pork barrel projects).<sup>21</sup> Equilibrium depends on the relationship between the number of parties and expenditure ("when there are many competing parties, the electoral base of each party tends to be smaller. To cater to their narrow support base, politicians will find it expedient to promise pork-barrel policies with narrow appeal rather than policies which benefit the electorate at large; the resulting policies will benefit the supporters of the winning politician, but will not maximize aggregate welfare," page 1319). If the result means that the number of parties converge to infinite, the public good (a good with diffuse benefits) is never offered.

If there is theoretical controversy on the issue of the number of candidates and the supply of public goods, the empirical literature is not different on studies between countries (taking advantage of using institutional difference as being characteristic of electoral competition) and in countries (local governments). The works between countries use social spending as the best "proxy" for public goods because it is very difficult

to find a “good variable” to represent them (expenditure is not a good proxy because spending can have built-in rents). *Brown and Hunter (2004)* and *Stasavage (2005)* are good examples of this type of investigation. *Brown and Hunter (2004)* show that the better democracies (higher levels of political competitiveness and openness, embodied in elections and a free press) in Latin American countries devote a higher % of their educational resources to primary education, while maintaining the same absolute spending levels on education in the aggregate. *Stasavage (2005)* shows that governments democratically elected in the multiparty competition system in African countries spend more on primary education, while their spending on universities appears to be unaffected. On the other hand, *Svensson (2005)* also uses public goods in his empirical investigation of countries. He presented evidence showing that polarized countries (ethno-linguistic fractionalization) have higher government spending. The effect of spending on outcome is conditional on the degree of polarization. For highly polarized countries (politically less competitive), the results suggest that there is no significant relationship between health expenditure and health outcomes. Thus, more spending does not seem to imply more productive output. For example, health expenditure leads to a smaller reduction in infant mortality rates only in highly polarized (politically less competitive) countries.

Although it is easier to find public goods to test the relationship between political competition and the supply of public goods, the difference in results on the effect of electoral competition is maintained. *Chhibber and Nooruddin (2004)*, *Besley et al. (2007)*, *Cleary (2007)*, and *Ashworth et al. (2010)* are good examples of local investigation.

*Chhibber and Nooruddin (2004)*, investigating 15 Indian states, point out that states with two-party competition provide more public goods (public perception of the delivery of public goods by the state—electricity supply and access to potable water) than states with multiparty competition (an institutional difference). This result reflects a difference in a party’s strategy for winning. In two-party systems, political parties require support from many social groups and therefore provide more public goods in order to win the elections. In multiparty systems, as only a plurality of votes is necessary for winning, parties use club, rather than public goods, to mobilize smaller segments of the population.

*Besley et al. (2007)* argue that the increase in political competition in the South of the United States after the ban on literacy tests and poll taxes (1965 Voting Rights Act was an important institutional change) was significantly and positively related to personal income growth and governance quality (an institutional difference). Stronger political competition leads to lower overall state tax policies and more business-friendly labor regulation, and to a larger share of manufacturing in state production. While these facts appear to support the idea that political competition affects government efficiency, the evidence is not conclusive.

Using Mexico’s 2400 municipalities during 1989–2000, *Cleary (2007)* shows that the quality of the local government in Mexico (sewer and water coverage as proxies for public goods) depends on an engaged citizenry and cooperation between political leaders and their constituents, rather than on the threat of electoral punishment. The Mexican system is quite closed to new competitors.<sup>22</sup>

*Ashworth et al. (2010)*, in assessing Flemish local government efficiency ratings, show that political competition (number of parties that participate in the elections) reduces rent extraction and government inefficiency.<sup>23</sup> High (low) efficiency indicates that the government generates high (low) levels of

public goods with limited (high) spending. As such, it reveals how effective local government is at translating public spending into public goods, or, conversely, how strongly it indulges in rent-seeking or inefficient behavior.<sup>24</sup> Belgium has considerable autonomy to pursue its own policies, although the political system is relatively closed to new competitors when compared to Brazil, Russia and Peru. In fact, as long as the initiatives they propose are not prohibited explicitly by federal legislation (e.g. because they are beyond the responsibilities outlined for municipalities), local governments can initiate any policy that promotes the interests of their constituents and independently determine how they finance these policies.

**Hypothesis 2.** Electoral (either ex-ante or ex-post) competition affects the supply of public goods.

Although the theoretical models developed in Hypothesis 1 work with the effect of political (electoral) competition on the supply of public goods,<sup>25</sup> *Ferejohn (1986)* argued about the possibility of incumbent governments providing the supply of public goods because they are afraid of being replaced at the next election (future competition also affects the supply of public goods). As will be made clear in the description of our Instrumental Variable (IV), the development of *Ferejohn (1986)* combined with the arguments developed in Hypothesis 1 may be an indication of reverse causality between variables. Electoral competition observed at any given moment in time has an influence on the future supply of public goods (Hypothesis 1) and is influenced by the past supply of public goods, including *Ferejohn’s (1986)* argument.

Although *Ferejohn (1986)* was not thinking about this issue from our perspective, there are several cases in literature where the causality between variables is not clearly defined (for instance, the development of *Angrist & Evans, 1998*). Along the same lines, we have observed in empirical literature a tendency to assume either an ex-ante or ex-post measure of competition. *Besley et al. (2007)* use the party-neutral measure of the dominance of either the Democratic or Republican party in state-wide elections as a measure of competition (ex-ante),<sup>26</sup> *Chhibber and Nooruddin (2004)* use a measure of competition during the term, considering the legislative branch (the effective number of parties based on seats held in the assembly). *Ashworth, Geys, Heyndels and Wille (2010)*, on the other hand, work with both measures of competition: at the time of the election (ex-ante) and during the term, considering the legislative branch (with a vector of variables also reflecting different aspects of political competition within the municipality).

As in technical terms using an IV to correct reverse causality of either the ex-ante or ex-post competition variable makes no difference, and out of respect for the literature, we decided to check which time is more appropriate for measuring the effect competition has on the supply of public goods.

**Hypothesis 3.** The electoral rule (either run-off rule or simple majority rule) affects the number of competitors and the supply of public goods.

There is a relevant number of works showing the influence of both electoral rules and social cleavages influencing the number of candidates in the electoral process (*Amorim Neto & Cox, 1997*; *Benoit, 2002*; *Cox, 1997*; *Ordeshook & Shvetsova, 1994*; *Taagepera & Shugart, 1993*). Among the different electoral rules which can affect the number of candidates, *Jones (1994)* and *Wright and Riker (1989)* investigated how

the choice of either the run-off rule or the simple majority rule affects the number of candidates. Using presidential elections in 33 countries over a 50-year period, Jones (1994) showed that the run-off rule increases the number of parties (candidates) when compared to the majority rule. Wright and Riker (1989) got a similar result with data from Democratic primaries held in southern United States during 1950–82. The fundamental difference in the final number of candidates between the two rules, following Wright and Riker (1989), is that in the run-off rule the number of candidates is higher because aspiring candidates want to be only one of the top two finishers and they have not been previously discouraged by the parties. In the plurality rule, pre-election negotiations and calculations tend to discourage candidates who fear they may not pass the first-round.<sup>27</sup>

Taking advantage of the accumulated knowledge of these investigations, Chamon, De Mello, and Firpo (2009) and Bordignon and Tabellini (2009) extend their initial investigation between electoral rules (specifically, run-off elections) and the number of candidates to include fiscal results at the local level. Chamon et al. (2010) show that the possibility of run-off elections increasing political competition (the number of effective candidates) and inducing more investment and less current expenditure, particularly personnel expenditure (payment of public salaries). They use Brazilian municipalities over 150,000 inhabitants (a local result using the rule as cut-off) in three elections (1996, 2000, and 2004). Bordignon and Tabellini (2009) demonstrate that the number of parties separately running for election is larger under the run-off rule than with a majority rule. Municipalities with just over 15,000 inhabitants (that rely on the run-off rule) have a larger number of parties and less volatile tax rates than municipalities just below 15,000 inhabitants (that have majority rule).

Considering that a group of municipalities is subject to the run-off rule in Brazil, we will test whether there are differences in the results in our main investigation when the run-off rule is possible (municipalities over 200,000 voters).

**Hypothesis 4.** The term limit (second-term) for the same mayor (reelection) reduces the effect of electoral competition on the supply of public goods.

Literature does not mention whether the electoral term limit rule (second-term of the same mayor in Brazilian municipalities) influences the effects of electoral competition on the supply of public goods. Finan and Ferraz (2007) show that Brazilian municipal mayors with incentives for reelection appropriate fewer resources than those not in this situation (term limit). Mayors refrain from rent-extraction when faced with reelection incentives. The prospect of a future political career can condition the rent extracted.<sup>28</sup> Underlying this interpretation is the premise that term limits shorten the political horizon of mayors. One potential concern with this mechanism is the fact that second-term mayors can run for other

political offices in the future (or even run again for mayor after a one-term hiatus). In this case, second-term mayors would also have incentives to refrain from corruption in the present and behave in a similar way to first-term mayors.

Considering this argument and the channels mentioned by the literature before, we decided to investigate whether with a mayor who is on a term limit (considering a higher level of corruption), the effects of political competition on the supply of public goods are different from those on one who is not.

#### 4. DATA

Our investigation is centralized during the years 2000–04 (one term of mayor and two elections in Brazil—2000 and 2004). Two reasons determine our choice. First, the *Tribunal Superior Eleitoral* (TSE) only published election results electronically after 1996.<sup>29</sup> Second, the data for local economic controls are based on Brazilian censuses (2000).

It is very difficult to find any justification for the choice of variables used as public goods in empirical literature (whether the public good chosen is important or not to the local government or if federal legislation determines that the public good is the sole responsibility of local government, etc.). In order to avoid nonrepresentative results for public goods in Brazilian municipalities, we focused our investigation on proxies of public goods, which represent important *per capita* social spending for municipalities. Table 2 shows social expenditure in local governments.

Looking at these results, as expenditure on education and health are the most important, we choose two public education goods and one public health good. In the educational area, we choose the number of student enrollments in municipal elementary schools and the number of teachers in municipal elementary schools per 10,000 inhabitants.<sup>30</sup> Educational data are the responsibility of the Ministry of Education (National Institute for Research in Education—*INEP*).<sup>31</sup> The Elementary School Census (*Censo da Educação Básica*) is carried out annually. In the health area, we use the number of free immunizations per 100,000 inhabitants (one of the measures of health service coverage established by the World Health Organization).<sup>32, 33</sup> Health data are the responsibility of the Ministry of Health (Department of Information of the Unified Health System—*Sistema Unico de Saude*).<sup>34</sup>

There are different forms of capturing competition (our main variable of investigation) as a measure in the literature. Chhibber and Nooruddin (2004) use the institutional difference as a measure considering that India is simultaneously a two-party and multiparty system. Besley et al. (2007) take the advantage of a change in rules as a measure of competition. Ashworth et al. (2010) use the number of effective candidates and finally, Cleary (2007) shows that neither the number of effective candidates nor the margin of victory between the first and second candidate (long-run measures) are important measures for determining public goods (the participatory measure is more important).

Considering the literature shown and the limitation of our data, we have two options of a measure of competition. First, through the number of effective candidates.<sup>35</sup> Second, through the margin of victory. In order to observe the possible advantages of both measures, including differences from both the short-run and long-run on variables as Cleary (2007) shown for the Mexican case (another Latin-American country), we re-did his estimate using Brazilian municipal data, with the same technique (Log-Odds OLS Regressions), almost the same control variables, and with one of the variable depen-

Table 2. Social expenditure in the 2001–04 term considering all municipalities in Brazil Source: FINBRA

Average Social expenditure (Brazilian currency—Reais per capita)	2001–04
Education	122.02
Health	85.36
Transportation	22.23
Housing	39.66
Public order and safety	0.76

Table 3. *Cleary's work recalculated, using Brazilian local data*

Mexico—Cleary (2007)		Brazil				
Independent variables	[1]	Independent variables	[2]	[3]	[4]	[5]
<i>Lagged Utility Score</i> % access to utility (1990)	4.17*** (0.11)	<i>Lagged Utility Score</i> % access to utility (1991)	0.09 (0.42)	0.01 (0.42)	0.07 (0.42)	0.08 (0.42)
Margin of Victory (10-year avg.)	−0.07 (0.10)	Political Influence Margin of Victory (1996–2000 avg.)	−1.44 (1.44)		−1.07 (1.38)	0.38 (0.61)
		Effective Number of Candidates (1996–2000 avg.)		1.12*** (0.26)	1.21*** (0.28)	0.66*** (0.21)
Literacy (1990 % literate)	1.78*** (0.27)	Literacy (1991 % literate)	1.29 (1.36)	2.28* (1.28)	1.21 (1.39)	1.22 (1.38)
Turnout (10-year avg.)	0.40** (0.18)	Turnout (1996–2000 avg.)	−2.72 (2.39)	0.10 (1.07)	−3.09 (2.44)	−2.70 (2.39)
Poverty (% below m.w.)	−1.30*** (0.28)	Poverty (% below—poor line—2000)	−1.67 (1.34)	−2.25* (1.28)	−1.92 (1.36)	−1.68 (1.36)
Indigenous Muni. (dummy)	−0.19*** (0.06)	% Black population (2000)	0.28 (2.34)	1.60 (2.24)	−0.04 (2.37)	0.12 (2.34)
		<i>Additional Controls</i>				
Municipal Budget (per cap, thousands)	0.07 (0.07)	Per capita municipal tax revenue (1997–2004 avg.)	−0.006* (0.003)	−0.006** (0.003)	−0.006** (0.003)	−0.006** (0.002)
PRONASOL (total per cap)	0.04** (0.02)	Per capita municipal transfers from federal and state Gov. (1997–2004 avg.)	0.00003 (0.0007)	0.00006 (0.0007)	0.00008 (0.0007)	−0.0001 (0.0006)
PAN Control (dummy)	−0.06 (0.05)	PSDB Control (1997–2000—dummy)	0.89** (0.46)	0.85** (0.43)	0.92** (0.46)	0.86* (0.46)
PRD Control (dummy)	−0.04 (0.08)	PMDB Control (1997–2000—dummy)	−0.14 (0.31)	−0.13 (0.31)	−0.09 (0.32)	−0.13 (0.31)
PRI Control (dummy)	−0.13** (0.06)	PT Control (1997–2000—dummy)	−0.11 (0.71)	−0.14 (0.71)	−0.08 (0.72)	−0.21 (0.70)
Divided Gov't. (dummy)	−0.10** (0.05)	Divided Gov't. (1994–2000—dummy)	0.07 (0.31)	0.09 (0.31)	0.09 (0.31)	0.07 (0.31)
Municipal Size (logged pop.)	−0.06*** (0.02)	Municipal Size (2000, logged pop.)	1.20*** (0.34)	1.33*** (0.33)	1.06*** (0.35)	1.10*** (0.34)
Population Growth (% , 1990–2000)	−0.18* (0.10)	Population Growth (% , 1991–2000)	0.14 (0.46)	0.01 (0.43)	0.13 (0.46)	0.16 (0.46)
Population Density (logged pop/km <sup>2</sup> )	0.11*** (0.02)	Population Density (2000, logged pop/km <sup>2</sup> )	−0.59** (0.26)	−0.56** (0.25)	−0.63** (0.26)	−0.55** (0.26)
Constant	−2.16*** (0.39)	Constant	−1.50 (2.86)	−8.07*** (2.05)	−4.05 (2.95)	−3.33 (2.94)
Valid N	1953	Valid N	2979	3045	2978	2978
R <sup>2</sup>	0.86	R <sup>2</sup>	0.22	0.24	0.24	0.24

*Note:* Each model also includes dummy variables for each state (save one), coefficients not reported. The results are the same, excluding Brazilian municipalities over 200,000 voters (where it is possible to hold a second-round). The table reports Huber–White standard errors in parentheses. Statistical significance is noted with the conventional.

\*  $p < 0.10$ .

\*\*  $p < 0.05$ .

\*\*\*  $p < 0.01$ .

dents used by him (sewer coverage). Table 3 shows Cleary's result (2007) and our results.

Column [1] shows the results obtained by Cleary (2007). He used the average margin of victory (10-years) between the first and second candidates and, with that nonsignificant result, he argues that competition is not important for defining the supply of public goods in Mexican municipalities (his argument is that the supply of public goods depends on engaged citizenry and cooperation between political leaders and their constituents). The next columns show local municipality results in Brazil. Column [2] highlights that the average margin of victory (two elections, considering that we do not have electronic data for the 1992 election to complete a decade of local elections) is also not significant, as was also found in Mexico. Column [3] shows that with a change in measure (average margin of victory to the effective average number of candidates for the same period) the measure of competition becomes significant. In Column [4] we included both variables (margin of victory and effective number of candidates). The result obtained does not change: the effective number of candidates remains significant and positive and the margin of victory remains nonsignificant. Finally, Column [5] shows the same procedure as the previous column, but with a short-run measure for both variables (the margin of victory and the effective number of candidates, considering only the last election—1996). The results are similar to those found in Column [4].<sup>36</sup> Therefore, in the Brazilian local government it seems that the most suitable result is to use the effective number of candidates regardless of time (short-run and long-run). We decided to use the effective number of candidates as the main measure of competition and to control all results with the margin of victory, considering both variables in the short-run.

As we showed that institutional difference is very important in this type of investigation, it is also important to mention that the nonsignificant result of the variable (electoral) Turnout all the time in Brazilian data may be the result of the rule that determines that the vote is compulsory. As Mexico does not have this rule, this variable was significant and important in Cleary's argumentation (2007).

We try to use the same (and significant) control variables as in Cleary's exercise (2007). *Per capita* municipal tax revenue was changed for *per capita* municipal transfers received from state and federal governments. As was mentioned (footnote), transfers are much more important than tax revenue for local governments in terms of total revenue.<sup>37, 38</sup> The transfer variable was constructed considering an average of two terms in the municipal government: 1997–2000 and 2001–04. The data are from the National Treasury Secretariat (*Finanças do Brasil—FINBRA—Dados Contabeis dos Municípios*).<sup>39</sup> The municipal size variable (log of population) was excluded because it is highly correlated with the log of population density (population/km<sup>2</sup>) variable. The log of population density (population/km<sup>2</sup>) was included as control because Oates (1999) argued that gains from economies of scale are lost when smaller jurisdictions are in charge of providing public services whose production costs decline with scale. Each local government needs to implement its economic growth agenda independent of other local governments in a decentralized system and then it might end up spending more per unit of service/output because it would be operating on a smaller scale. Svensson (2005) and Ashworth et al. (2010) also used total population as control. This variable was built up from the 2000 census.

We added other variables as controls too. One dummy variable for controlling the cooperation between the president and the local mayor, which can influence the local supply of

public goods, in the 1997–2000 term (with a value equal to one if the municipal party elected—the mayor's party—is PSDB and zero otherwise). Cleary (2007) used the biggest party in Mexico (PAN, PRD, and PRI) as control considering their dominance in the country. In spite of this approach, it is very common to find works in literature that explore the strategic cooperation between parties of different levels of government using the allocation of resources (Calvo & Murillo, 2004; Chen, 2008; Dahlberg & Johansson, 2002; Herron & Theodos, 2004). Our information for constructing this variable comes from *Tribunal Superior Eleitoral* (TSE). The per capita GDP (calculated from the 2000 census) was included as control because the wealth of residents may be very important if there is some aspect of provision that requires that provision efficiency entails a significant investment of resources (Ashworth et al., 2010).

The proportion of the population below 15 years (or below 18 years not included here but the results can be requested from the author) was included because this proportion of the population can influence the supply of public goods (for instance, the municipality is legally responsible for elementary education—children aged between 7 and 14 years old—in compliance with article 211 of the 1988 Constitution).

The proportion of the population over 65 years was included because the literature indicates that the elderly prefer not to spend more on education because they do not receive any short-run benefit from this expenditure (Arvate & Zoghbi, 2010; Button, 1992; Ladd & Murray, 2001; Poterba, 1997, 1998) and this should be an important interest group in determining public health goods. Finally, we also included the proportion of the rural population on the total municipal population, because developed urban areas can have better social infrastructure and more competitive politics than poor rural areas. All data from populations come from the Census (2000).

The Table 4 below shows the descriptive statistics of all the variables used in our main investigation (including the variable used in re-constructing Cleary's work).

Our sample is important in that it shows that the mean of the effective number of candidates is around two and, considering the standard deviation, the maximum is three.

## 5. EMPIRICAL STRATEGY

### 5.1 Empirical model

The equation below is used to test whether electoral competition affects the supply of public goods:

$$y_i = \beta_0 + \beta_1 ENC_i + X_i \Psi + u_i \quad (1)$$

where  $y_i$  are the public goods available in municipality  $i$ ;  $ENC_i$  is the effective number of candidates in the elections in municipality  $i$ ;  $X_i$  is a line vector of covariates for municipalities  $i$ ;  $\Psi$  is a column vector of these parameters; and  $u_i$  is the random term with a zero mean and a normal distribution.

Considering the institutional description, we show that there is the possibility of an endogenous bias (a violation of one of the key assumptions of OLS in obtaining unbiased estimates) because there is a correlation between the effective number of candidates ( $ENC_i$ ) and the error ( $u_i$ ):  $cov(ENC_i, u_i) \neq 0$ . Investigating some politicians in our sample, we perceive that the supply of public goods can also influence the choice of candidates as competitors in a specific municipality. However, this influence can be ambiguous. In the open political systems, like the Brazilian system, where candidates choose the municipali-

Table 4. Descriptive statistics of all variables used

Name of Variables	Obs.	Average	Std. Dev.	Min	Max
Number of student enrollments in municipal elementary schools Per thousand inhabitants <sub>2001–04</sub>	4958	0.38	1.81	0.0006	59.64
Number of teachers in municipal elementary schools Per thousand inhabitants <sub>2001–04</sub>	4930	0.01	0.07	0.0001	2.74
Number of free immunizations—Per thousand inhabitants <sub>2001–04</sub>	5593	3.45	20.68	0.07	866.98
Effective number of candidates <sub>2000</sub>	5453	2.21	0.57	1	5.89
Effective number of candidates <sub>1996–2000</sub>	5559	2.19	0.45	1	5.23
Margin of victory <sub>2000</sub>	5013	0.20	0.14	0.0004	1
Margin of victory <sub>1996–2000</sub>	5453	0.37	0.08	0	0.49
Medium Size District <sub>during 1993–2004</sub>	5591	0.43	0.49	0	1
Larger District <sub>during 1993–2004</sub>	5591	0.004	0.06	0	1
Literacy <sub>1991</sub>	5647	0.35	0.18	0	0.87
Turnout <sub>1996–2000</sub>	5561	0.86	0.06	0	0.99
Poverty (% below poor line) <sub>2000</sub>	5647	0.24	0.18	0	0.81
% Female population <sub>2000</sub>	5265	0.49	0.01	0.39	0.54
% Black population <sub>2000</sub>	5265	0.05	0.04	0	0.61
Per capita municipal tax revenue <sub>1997–2004</sub>	5562	0.24	2.42	0	178.49
Per capita municipal transfers from state and federal government <sub>1997–2004</sub>	5562	37.26	72.05	0	537.44
PMDB <sub>1997–2000</sub>	5647	0.09	0.29	0	1
PSDB <sub>1997–2000</sub>	5647	0.06	0.24	0	1
PT <sub>1997–2000</sub>	5647	0.01	0.10	0	1
Divided government <sub>1994–2000</sub>	5647	0.11	0.31	0	1
Log population <sub>2000</sub>	5562	40.07	0.50	0.2	7.02
Population growth (% 1991–2000)	5027	0.08	0.22	−0.73	2.28
Population density <sub>2000</sub> (logged pop/km <sup>2</sup> )	5562	1.37	0.62	−2.81	4.11
Population below 15 years old <sub>2000</sub> (%)	5594	0.33	0.05	0.18	0.56
Population over 65 years old <sub>2000</sub> (%)	5594	0.06	0.01	0.007	0.16
Rural population <sub>2000</sub> (%)	5594	0.41	0.23	0	1
Per capita Municipal GDP <sub>2000</sub>	5593	4.47	5.74	0.46	184.97

ties in which to compete with a view to bettering their career prospects, a higher supply of public goods can reduce the entrance of new competitors to the local electoral dispute because they may feel that their chances of victory are reduced. This is the most common case. On the other hand, it is also possible that this same (elevated) supply may attract more competitors to the dispute given that a victory in that municipality can represent greater visibility for continuing with their careers. Often a new competitor is an ex-mayor (an example was given in footnote 10) from a closed municipality (may be a mayor with a high reputation, considering the previous government) searching for a municipality that gives them greater visibility. In other words, in a municipality where the supply of public goods is elevated, a politician with a reputation for good government in a closed municipality can feel attracted by this municipality which can give more visibility for their career when trying to achieve vertical ascendancy (for instance, a federal deputy who needs votes from a region and not only from a small municipality). Thus, they are a strong candidate and there is the possibility of more public goods attracting new competitors.<sup>40</sup> The opposite argument may be development with a lower supply of public goods. A lower supply of public goods can attract competitors, as in the first situation, or not, as in the second situation.

Thus, we decided to find an IV to produce a consistent estimate of the relationship between electoral competition and the supply of public goods. The conditions for a good IV candidate ( $Z_i$ ) is that it is correlated to the effective number of candidates in the election ( $ENC_i$ ) and that it is not correlated to the error ( $u_i$ ); in other terms,  $\text{cov}(ENC_i, Z_i) \neq 0$  and  $\text{cov}(Z_i, u_i) = 0$ .<sup>41</sup>

## 5.2 Instrumental variable

We tried to find an IV candidate by observing the literature that explains the effective number of candidates in the electoral process (first stage equation):

$$ENC_i = \gamma_i Z_i + X_i \Psi + e_i \quad (2)$$

If we find a good IV candidate, we can substitute the Eq. (2) on Eq. (1) and obtain a consistent estimate (two stage least squares—TSLS):

$$y_i = \beta_0 + \beta_1 (\hat{\gamma}_i Z_i + X_i \hat{\psi}_i + e_i) + X_i \Psi + u_i \quad (3)$$

The literature used in the discussion of Hypothesis 3 gives us a good way for obtaining an IV candidate (Amorim Neto & Cox, 1997; Benoit, 2002; Cox, 1997; Ordeshook & Shvetsova, 1994; Taagepera & Shugart, 1993). Among the variables which we can use, there are variables related to social cleavages and electoral rules. Certainly, variables representing social cleavages are not a good IV because they can influence the choice of public goods. For instance, minority groups like women or Afro-Brazilians may have a preference for a particular policy. This is a clear violation of the conditions for a good IV:  $\text{cov}(Z_i, u_i) \neq 0$ . In these conditions, our preference was directed toward electoral rules. We test some rules as IV (for instance, municipalities with second-rounds and a rule which establishes the number of seats in the local legislative body, like the size of the district). Finally, we chose as an IV candidate the rule which established the number of seats in the local legislative body conditioned by population size. Article 29, paragraph IV of the Federal Constitution establishes a stable

relationship between the number of seats and the local population (different bands between 15,000 and eight million inhabitants; for instance, municipalities with fewer than 15,000 inhabitants can have nine councilors and even though municipalities have more than 8 million inhabitants the maximum number of councilors they can have is 55). The population of the 1991 census determined the (same) number of seats on the local legislative body in three terms: 1993–96, 1997–2000, and 2001–04.<sup>42</sup>

We built three dummies and used two of them as IV (excluding the municipalities with few seats—less than 10). The first we called Medium District Size: a dummy with a value equal to one if the municipality has between 11 and 30 seats available for council candidate disputes and zero otherwise (municipalities with population between 15,000 and 900,000 inhabitants). The second, was called a Larger District Size: a dummy with a value equal to one if the municipality has 31 or more seats available for disputes and zero otherwise (municipalities over 900,000 inhabitants).

Since the rule regarding the number of councilors for a group of municipalities, it is very difficult to conceive what the rule for policies that consider both education and health looks like, even when the number of steps established by law is reduced using two dummies (between 15,000 and 900,000 inhabitants; over 900,000 inhabitants). *Brollo et al. (2010)* justify the use of federal transfers calculated for municipalities (a similar rule with different groups of population) as an IV of received transfers for determining corruption.<sup>43</sup>

As the literature establishes that a larger district size opens up space for a larger number of small parties to participate in the electoral process (reducing the mechanical effect of Duverger's law), our idea is that the number of seats on the local legislative branch in a prior election (including the possi-

bility that the system is opening up to a greater number of parties—average of seven and mode of five elected parties in 1996 for the legislative branch) is a good fit for the number of candidates for mayor in the next election (councilors may look at an executive position as a good career possibility). If this is true, municipalities with more seats (and parties) in the 1996 election signal a larger number of candidates for mayor in the next election (2000). It is on these two variables that we bet on good IV candidates.

## 6. RESULTS

In this *Table 5*, we show the influence of electoral competition on the supply of public goods (student enrollments, teachers, and free immunizations).<sup>44</sup>

The table shows four columns for each public good. In the first two columns appear the results of political competition before the term in which the public good is offered (the effective number of candidates—2000). In the last column appear the results of political competition (election) after the term (the effective number of candidates—2004). In this case, this measure captures the effects of a potential challenger on the reactions of the incumbent (following the arguments from *Ferejohn, 1986*). The OLS (Ordinary Least Squares) column shows the results before bias is corrected and the TSLS (Two Stage Least Squares) column shows the results corrected for bias. Moreover, the table has another bigger division. In the upper part, the results of the effective number of candidates are level and in the lower part the results are on the logarithm.

The First Stage (FS) results [Eq. (2)] for the TSLS in this table and the following tables are in *Appendix 1*. It is possible to

Table 5. *The effect of either present or future political competition on the supply of public education and health goods*

Independent variables	Number of student enrollments in municipal elementary schools—Per 10,000 inhabitants				Number of teachers in municipal elementary schools—Per 10,000 inhabitants				Number of free immunizations—Per 100,000 inhabitants			
	Present competition (2000)		Future competition (2004)		Present competition (2000)		Future competition (2004)		Present competition (2000)		Future competition (2004)	
	OLS	TSLS	OLS	TSLS	OLS	TSLS	OLS	TSLS	OLS	TSLS	OLS	TSLS
Effective number of candidates	<b>0.22***</b>	<b>18.24***</b>			<b>0.009**</b>	<b>0.90***</b>			<b>0.22***</b>	<b>20.47***</b>		
	<b>(0.08)</b>	<b>(5.26)</b>			<b>(0.003)</b>	<b>(0.28)</b>			<b>(0.06)</b>	<b>(6.09)</b>		
Observations	4298	4298			4269	4269			4909	4909		
Hansen J statistic ( <i>p</i> -value)	–	0.0018			–	0.0080			–	0.0011		
Effective number of candidates			<b>0.02**</b>	<b>16.33**</b>			<b>0.0006***</b>	<b>0.30*</b>			<b>0.02***</b>	<b>19.63**</b>
			<b>(0.008)</b>	<b>(7.53)</b>			<b>(0.0002)</b>	<b>(0.16)</b>			<b>(0.008)</b>	<b>(8.85)</b>
Observations			4407	4407			4375	4375			5015	5015
Hansen J statistic ( <i>p</i> -value)			–	0.0217			–	0.0237			–	0.0155
Log of effective number of candidates	<b>0.46***</b>	<b>40.54***</b>			<b>0.01**</b>	<b>2.09***</b>			<b>0.47***</b>	<b>44.59***</b>		
	<b>(0.17)</b>	<b>(11.83)</b>			<b>(0.007)</b>	<b>(0.68)</b>			<b>(0.13)</b>	<b>(13.25)</b>		
Observations	4298	4298			4269	4269			4909	4909		
Hansen J statistic ( <i>p</i> -value)	–	0.0017			–	0.0079			–	0.0009		
Log of effective number of candidates			<b>0.11**</b>	<b>52.94**</b>			<b>0.003***</b>	<b>1.52**</b>			<b>0.13***</b>	<b>65.44***</b>
			<b>(0.03)</b>	<b>(2.56)</b>			<b>(0.001)</b>	<b>(0.72)</b>			<b>(0.03)</b>	<b>(25.02)</b>
Observations			4407	4407			4375	4375			5015	5015
Hansen J statistic ( <i>p</i> -value)			–	0.0222			–	0.0204			–	0.0171
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Covariates used here are margin of victory (the 2000 election), per capita municipal transfers received from federal and state government (1997–2004 avg.), PSDB control (1997–2000 dummy), population growth (%), 1991–2000), per capita income (2000), population below 15 years old, population over 65 years old, the % of rural population in the total population, and population density (200, logged, pop/km<sup>2</sup>). The table reports Huber–White standard errors in parentheses. Statistical significance is noted with the conventional.

\* < 0.10.

\*\* *p* < 0.05.

\*\*\* *p* < 0.01.

observe in Table 8 in the first lines (Effective number of candidates) that the two variables produce a good instrument for ex-ante political competition (2000) but it is not such a good instrument (weak instrument—tests of significance have an incorrect size and confidence intervals are wrong) for ex-post political competition (2004). The FS results show that the size of the district (large or medium) in the 1996 election led to an increase in the number of mayoral candidates in the 2000 election, thus corroborating our discussion in the section on IV. The effect of a “Larger District Size” coefficient being greater than for a “Medium District Size” coefficient was expected, because a district with a higher number of legislative seats opens up room for more parties and, as a consequence, for more future candidates for mayor. Our evaluation of the instruments (strong or weak) is based on *F*-statistic (over 10 is a strong instrument and under 10 is a weak instrument).<sup>45, 46</sup>

Returning to Table 5, comparing the political competition coefficient between the OLS and TSLS results, bias exists and it needs to be corrected. When the bias is corrected the effect of political competition on the supply of public goods is higher.

The main results (always the TSLS column) show that political competition (before and after the term, and level or in log) increases the supply of student enrollments (level results, the effective number of candidates increases by 18.24 percentage points), teachers in municipal schools (0.90 percentage points), and free immunization for the municipal population (20.47 percentage points). The highest impacts were on student enrollments and immunizations.

The most likely result for Hypothesis 1 is that electoral competition increases the supply of public goods. Our result is close to that forecast by the Chicago School (Becker, 1983; Ferejohn, 1986; Polo, 1998; Wittman, 1989, 1995) and far from that described by Lizzeri and Persico (2005).<sup>47</sup> The result suggests that electoral competition (number of candidates) dissipates the incumbent’s rent and increases the supply of public goods. In spite of the politician maximizing votes, it has taken a larger number of competitors to increase public goods in the Executive election (a public good with objectives far from being for a specific group). The date used as a proxy for public goods serves for the population as whole, but not for specific groups. Moreover, considering that empirical literature at the local level shows the benefits of political competition on government efficiency and (reduction) rent extraction (Ashworth et al., 2010), the nonconclusive results of political competition on government efficiency (Besley et al., 2007), the result is that two-party competition supplies more public goods than a multiparty competition (Chhibber & Nooruddin, 2004), and that long-run political competition does not affect the supply of public goods (Cleary, 2007), our results reinforce the position that this relationship is positive.

The most likely result for our Hypothesis 2 is that ex-ante electoral competition is a better measure than ex-post competition in determining the supply of public goods. However, it is necessary to observe that the motivation for our preference depends on the IV candidate result (the instruments are weak for ex-post competition).

In order to test our Hypothesis 3 (the electoral rule—either run-off or simple majority elections—affects the number of competitors and the supply of public goods), we used the same techniques and procedures from the last exercise, but we do not report the results for ex-post political competition (2004) because of the IV results.<sup>48</sup> We report only ex-ante results in Table 6. The results show that the electoral run-off rule can be an important factor in the relationship between the number of competitors and the supply of public goods (the result is

more robust for free immunizations than for public education goods). This result is similar to that found by Chamon et al. (2009)<sup>49</sup> and Bordignon and Tabellini (2009).

Looking for the results for all municipalities in the TSLS column, the inclusion of the run-off rule (a dummy for municipalities over 200,000 voters and zero otherwise) reduced the impact of electoral competition (ex-ante) variable on the supply of public goods (it was 18.24, 0.90, and 20.47 percentage points and now is 14.24 percentage, 0.82 percentage, and 14.98 percentage points).

We would like to carry out the interaction between the effective number of candidates’ variable and a dummy for the run-off rule. However, as the effective number of candidates variable is corrected for avoiding bias (a consistent estimate), we had to correct the same problem in the interactive variable. In spite of a loss of efficiency in the estimate, we decided to have two columns using TSLS, by dividing the sample in order to keep the estimate robust: municipalities under and over 200,000 voters. We expect that the effect of electoral competition on the supply of public goods is stronger in municipalities with over 200,000 voters, given that the number of candidates with a two-round system is higher. The run-off rule increases the number of candidates because aspiring candidates were not previously discouraged by the parties, as was described in the literature (Jones, 1994; Wright & Riker, 1989). This is the tendency we obtained (significant results). Each effective candidate increases by 34.53 percentage points the number of student enrollments (per 10,000 inhabitants) in municipalities with over 200,000 voters and by 2.85 percentage points in municipalities with fewer than 200,000 voters. In the same way, each effective candidate increases by 1.41 percentage points the number of elementary school teachers (per 10,000 inhabitants) in municipalities with over 200,000 voters and by 0.12 percentage points in municipalities with fewer than 200,000 voters. Finally, each effective candidate increases by 43.71 percentage points (a strong effect) the number of free immunizations (per 100,000) in municipalities with over 200,000 voters and by 1.90 percentage points in municipalities with fewer than 200,000 voters.

Finally, using the same technical procedures we investigate the possibility of a mayor in the second-term reducing the effect of electoral competition on the supply of public goods (Hypothesis 4). Table 7 shows the results of our investigation.

The results for each public good are shown in two columns (OLS and TSLS). The results of the TSLS column show that a reelected mayor does not have any effect on the supply of public goods (nonsignificance of the dummy when the mayor was reelected for the 2001–04 terms and zero otherwise). It is impossible for second-term to increase corruption and reduce the supply of public goods, as was described by Finan and Ferraz (2007). Thus, there is evidence that Hypothesis 4 is not valid.

## 7. SUMMARY OF CONCLUSIONS

It is very difficult to treat the relationship between the effects of electoral competition and the supply of public goods because this relationship is influenced by problems of commitment, the rules of the electoral system and interest groups, among other aspects. In spite of these problems, the direct relationship between electoral competition and the supply of public goods is sufficiently controversial in both theoretical and empirical terms. In theoretical terms, it can be seen on works of Polo (1998) and Lizzeri and Persico (2005). The former, following the Chicago tradition of treating political mar-

Table 6. *The effect of either present political competition on the supply of public education and health goods considering the difference in municipalities with or without second-round*

Independent variables	Number of student enrollments in municipal elementary schools—Per 10,000 inhabitants				Number of teachers in municipal elementary schools—Per 10,000 inhabitants				Number of free immunizations—Per 100,000 inhabitants			
	Present competition (2000)				Present competition (2000)				Present competition (2000)			
	OLS		TSLS		OLS		TSLS		OLS		TSLS	
	All municipalities		Municipalities under 200 mil inhabitants	Municipalities over 200 mil inhabitants	All municipalities		Municipalities under 200 mil inhabitants	Municipalities over 200 mil inhabitants	All municipalities		Municipalities under 200 mil inhabitants	Municipalities over 200 mil inhabitants
Effective number of candidates	<b>0.15**</b>	<b>14.24***</b>	<b>2.85***</b>	<b>34.53***</b>	<b>0.006**</b>	<b>0.82***</b>	<b>0.12***</b>	<b>1.41***</b>	<b>0.15***</b>	<b>14.98***</b>	<b>1.90***</b>	<b>43.71***</b>
	<b>(0.06)</b>	<b>(4.56)</b>	<b>(0.69)</b>	<b>(12.85)</b>	<b>(0.003)</b>	<b>(0.29)</b>	<b>(0.03)</b>	<b>(0.43)</b>	<b>(0.04)</b>	<b>(4.93)</b>	<b>(0.42)</b>	<b>(16.26)</b>
Dummy for municipalities over 200,000 voters	<b>4.90***</b>	1.78	–	–	<b>0.20***</b>	–0.001	–	–	<b>6.50***</b>	<b>3.39**</b>	–	–
	<b>(1.01)</b>	(1.40)	–	–	<b>(0.05)</b>	(0.09)	–	–	<b>(1.17)</b>	<b>(1.42)</b>	–	–
Observations	4298	4298	4196	102	4269	4269	4189	80	4909	4909	4807	102
Hansen J statistic	–	0.0029	0.0000	0.0000	–	0.0106	0.0000	0.0000	–	0.0020	0.0000	0.0000
( <i>p</i> -value)												
Log of effective number of candidates	<b>0.33**</b>	<b>31.54***</b>	<b>6.43***</b>	<b>80.16***</b>	<b>0.01**</b>	<b>1.87***</b>	<b>0.28***</b>	<b>3.44***</b>	<b>0.32***</b>	<b>32.75***</b>	<b>4.26***</b>	<b>101.47***</b>
	<b>(0.13)</b>	<b>(9.98)</b>	<b>(1.48)</b>	<b>(27.46)</b>	<b>(0.006)</b>	<b>(0.66)</b>	<b>(0.07)</b>	<b>(1.05)</b>	<b>(0.09)</b>	<b>(10.57)</b>	<b>(0.91)</b>	<b>(34.06)</b>
Dummy for municipalities over 200,000 voters	<b>4.91***</b>	<b>2.42**</b>	–	–	<b>0.20***</b>	0.03	–	–	<b>6.51***</b>	<b>4.09***</b>	–	–
	<b>(1.01)</b>	<b>(1.16)</b>	–	–	<b>(0.05)</b>	(0.07)	–	–	<b>(1.18)</b>	<b>(1.20)</b>	–	–
Observations	4298	4298	4196	102	4269	4269	4189	80	4909	4909	4807	102
Hansen J statistic	–	0.0028	0.0000	0.0000	–	0.0108	0.0000	0.0000	–	0.0017	0.0000	0.0000
( <i>p</i> -value)												
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Note:* Covariates used here are margin of victory (the 2000 election), per capita municipal transfers received from federal and state government (1997–2004 avg.), PSDB control (1997–2000 dummy), population growth (%), 1991–2000, per capita income (2000), population below 15 years old, population over 65 years old, the % of rural population in the total population, and population density (200, logged, pop/km<sup>2</sup>). The table reports Huber–White standard errors in parentheses. Statistical significance is noted with the conventional.

\* < 0.10.

\*\* *p* < 0.05.

\*\*\* *p* < 0.01.

Table 7. *The effect of either present political competition on the supply of public education and health goods considering mayor reelected*

Independent variables	Number of student enrollments in municipal elementary schools—Per 10,000 inhabitants		Number of teachers in municipal elementary schools—Per 10,000 inhabitants		Number of free immunizations—Per 100,000 inhabitants	
	Present competition (2000)		Present competition (2000)		Present competition (2000)	
	OLS	TSLs	OLS	TSLs	OLS	TSLs
	All municipalities		All municipalities		All municipalities	
Effective number of candidates	<b>0.15**</b> (0.06)	<b>14.38***</b> (4.63)	<b>0.006**</b> (0.003)	<b>0.83***</b> (0.29)	<b>0.14***</b> (0.04)	<b>15.16***</b> (5.01)
Dummy for municipalities over 200,000 voters	<b>4.92***</b> (1.02)	1.71 (1.43)	<b>0.20***</b> (0.05)	−0.004 (0.09)	<b>6.52***</b> (1.18)	<b>3.32**</b> (1.45)
Mayor is in the second-term	−0.07 (0.05)	0.20 (0.25)	−0.003 (0.002)	0.01 (0.01)	−0.09 (0.05)	0.16 (0.24)
Observations	4296	4296	4268	4268	4907	4907
Hansen J statistic ( <i>p</i> -value)	—	0.0029	—	0.0108	—	0.0020
Log of effective number of candidates	<b>0.33**</b> (0.13)	<b>31.81***</b> (10.10)	<b>0.01**</b> (0.006)	<b>1.87***</b> (0.67)	<b>0.32***</b> (0.09)	<b>33.07***</b> (10.69)
Dummy for municipalities over 200,000 voters	<b>4.93***</b> (1.02)	<b>2.36**</b> (1.18)	<b>0.20***</b> (0.05)	0.03 (0.07)	<b>6.52***</b> (1.18)	<b>4.04***</b> (1.21)
Mayor is in the second-term	−0.07 (0.05)	0.14 (0.23)	−0.003 (0.002)	0.009 (0.01)	−0.09 (0.05)	0.11 (0.23)
Observations	4296	4296	4268	4268	4907	4907
Hansen J statistic ( <i>p</i> -value)	—	0.0028	—	0.0109	—	0.0017
Covariates	Yes	Yes	Yes	Yes	Yes	Yes

Note: Covariates used here are margin of victory (the 2000 election), per capita municipal transfers received from federal and state government (1997–2004 avg.), PSDB control (1997–2000 dummy), population growth (%; 1991–2000), per capita income (2000), population below 15 years old, population over 65 years old, the % of rural population in the total population, and population density (200, logged, pop/km<sup>2</sup>). The table reports Huber–White standard errors in parentheses. Statistical significance is noted with the conventional.

\* < 0.10.

\*\* *p* < 0.05.

\*\*\* *p* < 0.01.

kets as competitive economic markets where the larger number of candidates can reduce the rent of politicians in office and increase the supply of public goods; the latter, considering that politicians maximize votes and in a plurality system, associate the larger number of candidates with greater pork-barrel expenditure (a focus on the preference of minority groups) and lower supply of goods (the supply of public goods attends the preferences of a larger group of individuals, therefore, it is less focused). In empirical terms, Chhibber and Nooruddin (2004), when investigating India, and Cleary (2007) for Mexican municipalities, showed that political competition reduces (does not affect, for the second author) the supply of public goods, while Hecock (2006), when investigating Mexican States and Ashworth et al. (2010), Flemish municipalities, showed the opposite.

Analyzing the institutional environment of each of the countries where the local investigations were realized, it is possible that the difference in the results is conditional upon the differences found in these environments. First, the partial or total absence of local government autonomy for deciding their own public policy (India, Mexico, and Belgium). Second, the party system is not sufficiently open to the entry or exit of competitors at the local level (Mexico and Belgium). Third, the participation of voters, who are the main beneficiaries of public policy, who cannot participate in the electoral process (in India, Mexico, and Belgium voting is not compulsory).

We choose to work with Brazilian local governments to test this relationship because the local government decides its own policy (other levels of government do not decide either the expenditure or the supply of local public goods), the party political system is open to the entry or exit of competitors (the candidates can decide to compete and to find a party to do so), and the vote is compulsory (public policy is chosen by different groups in society). In addition, municipalities have two other electoral rules that may also be affecting this relationship and we added it in our investigation. First, the possibility of a second-round for municipalities over 200,000 voters when the first candidate does not win the first-round with 51% of the valid votes (the run-off rule can further increase the number of candidates, considering that the literature observes that party strategy does not select strong candidates). Second, the term limit for mayors (a mayor can be reelected only once and in the second-term corruption and rent increases and the supply of public goods decreases).

Considering that one of the characteristics of a party political system is an opening for new candidates, the supply of public goods may be influencing the choice of candidates for certain municipalities (a reverse causality). Thus, there may be a bias in our estimate. To avoid this problem, we use the (federal) rule which establishes a fixed relationship between the number of seats on the local legislative body and the size of the local population (the 1991 census) for producing an IV. Two dummies were built and used as an IV for the effective number of candidates: medium and large size districts. Our idea is that more seats on the local legislative body (and parties) is a good fit for future candidates for mayor, because it is a natural career path for councilors (the number of seats in the 1996 election influences the number of candidates for mayor in the 2000 election). Our instrument was considered stronger ( $F$ -statistic greater than 10 at the 1% level) for measuring ex-ante the number of effective candidates (the 2000 election affecting the 2001–04 term results) and our idea may be correct: the correlation between the number of local legislative bodies (parties) in the election before with the number of effective candidates in the mayoral election after is positive. Moreover,

comparing the OLS and TSLS results it is possible to see that the bias is important and when the bias is correct (producing a robust estimate) the effect of political competition is stronger on the supply of public goods.

We have two options measuring competition considering the literature and the limitation of our data: the number of effective candidates and the margin of victory. We re-did Cleary's work (2007) using Brazilian municipal data, with the same technique (Log-Odds OLS Regressions), almost the same control variables, and with one of the variable dependents used by him (sewer coverage). It seems that the most suitable result is to use the effective number of candidates regardless of time (short-run and long-run). Thus, we decided to use the effective number of candidates as the main measure of competition and to control all results with the margin of victory considering both variables in the short-run.

The choice of public goods' variables (dependent variables) used in our investigation depended on the importance of social expenditure in local governments. We did not want to use public goods that were not representative of these governments. As education and health are the most important social expenditure for these governments, we use two educational public goods (teachers and student enrollments) and one health public good (free immunization) as representative.

In order to achieve our target, we test four hypotheses. First, whether electoral competition increases the supply of public goods. Second, which measure of competition (ex-ante term or ex-post term, signaling possible challengers) is more important for dealing with this relationship. Third, the effect of the run-off rule on this relationship. Fourth, the effect of the term limit on this same relationship (the same mayor reelected once).

The result indicates that electoral competition (the effective number of candidates) increases the supply of public goods in the Brazilian institutional environment. In the first hypothesis, one effective candidate, the number of student enrollments increases by 14.24 percentage points, the number of teachers by 0.82 percentage points, and the number of free immunizations by 14.98 percentage points. Following the Chicago School (Becker, 1983; Ferejohn, 1986; Polo, 1998; Wittman, 1989, 1995), our results may be showing that electoral competition dissipates the incumbent's rent (in the office) and increases the supply of public goods, unlike in Lizzeri and Persico (2005), in which a higher number of competitors increases spending on nondiffuse targets (a public good like education and health is not concentrated on specific groups).

It is not clear to us which measure is more important for affecting the supply of public goods (ex-ante or ex-post). However, we choose to report the ex-ante electoral competition result (mentioned before) because the results of IV were stronger with this measure. Our results show what is expected from the literature: in municipalities where the run-off rule is possible (over 200,000 voters), the supply of public goods is higher for all goods used as proxy than in municipalities that do not have this rule. According to the literature, this kind of electoral rule reduces the control of parties over the number of candidates and this effect can even increase the number of effective candidates more, which may explain the difference in the supply of public goods. Wright and Riker (1989) show that in the run-off rule the number of candidates is higher because the aspiring candidate wants to be only one of the top two finishers and they were not previously discouraged by parties. Finally, the new term limit rule (one personal reelection for all mayors), which could increase the rent in office (corruption) does not affect the final results obtained before.

## NOTES

1. India is a federalist country where sub-national governments are partially autonomous, and the Central Government of India provides varying degrees of full, partial, and limited autonomy within the state legislature.
2. For instance, according to law, municipalities with between 15,000 and 30,000 inhabitants can have 11 councilors. In this same population size band, all municipalities have the same number of councilors.
3. See [Brollo, Nannicini, Perotti, and Tabellini \(2010\)](#) who use using the same argumentation for IV with regard to on another Brazilian rule (federal grants for municipalities).
4. According to the *Government Finance Statistics Yearbook*, IMF, 2003, tax revenues represent, on average, only 24% of the total revenue of municipalities. Only in the United Kingdom (with a unitary government system and local governments with less autonomy and few attributes) do current transfers amount to such a high share of local government revenues. Municipalities in Latin American neighbors, such as Mexico, Chile and Colombia, are far less dependent on transfers. Federations with large territories and broad social or economic diversity, such as Brazil (Russia, Canada, Australia and the United States) also have less transfer-dependent local governments.
5. Each municipality has its own “little constitution”, called the organic law.
6. India, for instance, has three levels of governments (federal, state and local). Twenty-eight states have their local governments governed by their own state members and seven union territories, without local governments (governed directly by the federal government).
7. Voters can choose to vote for either individuals or parties. Parties do not choose the order of candidates on a list.
8. [Schlesinger \(1966\)](#).
9. [Arvate, Mendes, and Rocha \(2010\)](#) studied the possibilities of careers for mayors in Brazil.
10. The legal prohibition of running for another term does not prevent politicians from changing their electoral domicile to run for the position of mayor. In Minas Gerais state, the practice is common. The current mayor of Pirapora (North of Minas—2008–12), Warmillon Fonseca Braga (DEM) is an example. In 2016 he will complete 16 years as a mayor (8 years in Lagoa dos Patos and a further eight in Pirapora). Pirapora, the birthplace of Braga, is 100 km from Lagoa dos Patos.
11. See [Mainwaring and Scully \(1995\)](#) and [Ames \(1995a,b\)](#).
12. The greater number of parties also allows an individual to move to another party when he/she is not satisfied with that party's choices. Among strong candidates who are defeated in their own party, it is very common to join another party to try to run for election.
13. Voting is not compulsory in Mexico, the United States, Belgium and India (except in Gujarat state). In spite of the electoral legislation, [Power \(2009\)](#) does not accept the idea that voting is compulsory in Brazil because legal exemptions and the relevance of potential sanctions against non-voters are small.
14. Voting is not compulsory in the United States. [Peltzman \(1992\)](#) observes that voters are wealthier (well-informed) than non-voters in United States governor elections. [Verba, Schozman, and Brady \(1995\)](#) find that educated and wealthy individuals participate far more frequently than their less well-educated and poorer counterparts.
15. A great piece of this development can be found on [Persson and Tabellini's book \(2004\)](#).
16. The weighted sum of voters' preferences should be considered as a benchmark. The electoral solution considers the median voter preference. If income distribution is symmetric then electoral competition still implements a socially optimal allocation. As income distribution is asymmetric for the majority of countries, redistributive taxation is used, such as [Meltzer and Richard's model \(1981\)](#), and the final supply of public goods is greater than a socially optimal allocation.
17. The pivotal actor in electoral contests is not necessarily always the median voter. It may be optimal for executives in some institutional and strategic settings to target a narrow group of voters (e.g., voters in swing districts or partisan voters), whereas other contexts may encourage governments to represent broader electoral interests (see [Persson & Tabellini, 2004](#)).
18. [Osborne and Slivinsky \(1996\)](#) and [Besley and Coates \(1995\)](#) develop the model of “citizen-candidate”. The idea of [Osborne and Slivinsky \(1996\)](#) is that the existing number of candidates depends on the relationship between the return to a citizens' holding office above their payoff for implementing their favorite policy and the cost of all participants who are running. If the ex-ante net return is positive and elevated, there are more incentives for candidates to run. Considering the example of the authors of three candidates, two being extremists in their position on policy (the supply of public goods), the third candidate enters the race solely because they prefer the resulting equal-probability lottery over their two rivals' positions (different from the extreme positions of the other two candidates). If he/she does not enter, the extremist whom he/she likes less will undoubtedly win. By entering, the moderate steals more votes from the extremist who is on the other side of the median from the extremist who is on the same side. Being pivotal in the election, he/she wins and imposes their preference. It has to be said that the final supply of public goods (policy) depends on the size of the incumbents' rent in the holding office.
19. Although the Chicago School has claimed that electoral competition and democracy tend to produce efficient results, little analytical research has explored the problem of rents (the elected candidate can exploit their position to extract rents from office). [Wittman \(1989, 1995\)](#), [Becker \(1983\)](#), and [Ferejohn \(1986\)](#) were the first authors to consider that political competition can also reduce the politician's rent as a way of increasing the supply of public goods.
20. Problems of enforceability, verifiability, or observability of the supply of public goods after the election are not considered in this model.
21. [Cox \(1987\)](#) shows also that the political system with many parties is inefficient.
22. See the survey by [Cleary \(2007\)](#) on the evolution of the Mexican Party system.
23. The measure of the efficiency level of Flemish local governments relates their total expenditure (i.e. the inputs used) on their provision of public goods (i.e. the outputs produced) using a non-parametric approach to obtain the efficiency ratings (Data Envelopment Analysis).
24. The results use data from 308 Belgian local governments in the year 2000.
25. See also [Persson and Tabellini \(2000\)](#).

26.  $\kappa_{st} = -|d_{st} - 0.5|$  where  $d_{st}$  is the average share in the vote of Democrats or Republicans. Larger values for this variable correspond to states and periods with more political competition.
27. Wright and Riker (1989) argue that a candidate can maximize his or her rank, rather than simply maximizing votes. Rank-maximization is appropriate for candidates under the run-off system in which candidates aim to finish among the top vote-getters.
28. See Persson and Tabellini (2004) and Besley and Smart (2007).
29. The *Tribunal Superior Eleitoral* (TSE) publishes electoral data. Unfortunately, electronic data are not available before. Data were available after the electronic ballot was introduced by Law # 9.100, from 1995 onwards. The 1996 municipal elections were the first to have electronic ballots in the vast majority of contests.
30. Following the 1988 Constitution (article 211), the municipality is responsible for elementary schools.
31. See <http://www.inep.gov.br/basica/levantamentos/microdados.asp>.
32. Brazil has a National Immunization Program (*PN*) where the buying and the distribution of vaccines for municipalities are centralized in federal government. Moreover, federal government sends resources to the municipalities for immunizing the population, for epidemic control, and for combating dengue fever. In 1999, the federal government included flu immunization in the program, more municipalities and increased the number of those immunized. The federal budget for buying vaccines was R\$ 94 million (*Br. Real* in 1995) and R\$ 495 million (*Br. Real* in 2003).
33. See <http://www.who.int/gho/countries/en/index.html>.
34. See <http://www2.datasus.gov.br/DATASUS/index.php?area=0205>.
35. Laakso and Taagepara (1979).
36. The effect of competition on the supply of public goods is a little lower when short-run competition variables are introduced.
37. The results do not change using tax revenue in the place of revenue transfers.
38. The transfers received by municipalities from state and federal governments have an important effect on local finances. They gain even more importance in the Brazilian case, since after the dictatorship period the 1988 Constitution led to the decentralization of federal tax revenue. Brazilian federal and state transfers occurred through either discretionary or legal funds. Discretionary transfers result from agreements or financial cooperation between the federal or state governments and the municipalities.
39. See [http://www.tesouro.fazenda.gov.br/estatistica/est\\_estados.asp](http://www.tesouro.fazenda.gov.br/estatistica/est_estados.asp). The nominal values were deflated by the IGP-DI (base = 2000).
40. We intend to investigate the advantageous of the incumbent in these circumstances in another work.
41. See Wooldridge (2001).
42. There are a great number of municipalities that establish a different number in their organic laws. However the Superior Court orders municipalities to obey the Constitution.
43. We control per capita federal transfers for all results.
44. Although the results for the number of student enrollments and teachers are shown separately, we estimate the same investigation using the number of student enrollments per teacher and the results are the same (competition increases the number of student enrollments per teacher). The results can be requested from the author.
45. The Hansen J Statistic (over-identification test of all instruments) indicates also that the instruments are appropriately uncorrelated with the error (Chi-square with p-value significant at the minimum level of 99%).
46. In this same table are the FS results of all investigations realized in the work. As our investigation was reduced to ex-ante electoral competition after the main results, we show only FS results for the ex-ante electoral competition.
47. It is important to highlight that Lizzeri and Persico (2005) developed their ideas considering a Parliamentary system.
48. A two-sample *t*-test (8.11) with equal variances establishes a difference between the average number of effective candidates between municipalities under and over 200,000 voters—the average number of effective candidates is higher for municipalities over 200,000 voters (2.55) than in those municipalities below (2.20).
49. Chamon et al. (2010) obtained their results with municipalities with over 150,000 inhabitants.

## REFERENCES

- Ames, Barry (1995a). Electoral rules, constituency pressures and pork barrel: Bases of voting in the Brazilian congress. *The Journal of Politics*, 57(2), 324–343.
- Ames, Barry (1995b). Electoral strategy under open-list proportional representation. *American Journal of Political Science*, 39(2), 406–433.
- Amorim Neto, Otavio, & Cox, Garry W. (1997). Electoral institutions, cleavage structures, and the number of parties. *American Journal of Political Science*, 41(1), 149–174.
- Angrist, J. D., & Evans, W. N. (1998). Children and their parent's labor supply: Evidence from exogenous variation in Family size. *American Economic Review*, 88(3), 450–462.
- Arvate, Paulo R., Mendes, Marcos, & Rocha, Alexandre (2010). Are voters fiscal conservatives? Evidence from Brazilian municipal elections. *Estudos Economicos*, 40(1), 67–101.
- Arvate, P. R., & Zoghbi, A. C. (2010). Intergenerational conflict and public education expenditure when there is co-residence between the elderly and young. *Economics of Education Review*, 29(6), 1165–1175.
- Ashworth, John, Geys, Benny, Heyndels, Bruno, & Wille, Fanny (2010). Political competition and local government performance: Evidence from Flemish municipalities. Working paper.
- Becker, Gary S. (1983). A theory of competition among pressure groups for political influence. *Quarterly Journal of Economics*, 98(3), 371–400.
- Benoit, Kenneth (2002). The endogeneity problem in electoral studies: A critical reexamination of Duverger's mechanical effect. *Electoral studies*, 21(1), 35–46.
- Besley, Timothy, & Coates, Stephen (1997). An economic model of representative democracy. *Quarterly Journal of Economics*, 112, 85–114.
- Besley, Timothy, Persson, Torsten, & Sturm, Daniel M. (2007). Political competition, policy and growth: Theory and evidence from the United States. CEPR discussion papers, number 5138.
- Besley, Timothy, & Smart, Michael (2007). Fiscal restraints and voter welfare. *Journal of Public Economics*, 91, 755–773.

- Bordignon, Massimo, & Tabellini, Guido (2009). Moderating political extremism: Single round vs run-off elections under plurality rule. Working paper 348. IGER (Innocenzo Gasparini Institute for Economic Research), Bocconi University.
- Brollo, F., Nannicini, T., Perotti, R., & Tabellini, G. (2010). The political resource curse. National Bureau of Economic Research, No. 15705.
- Brown, David, & Hunter, Wendy (2004). Democracy and human capital formation: Education spending in Latin America, 1980–1997. *Comparative Political Studies*, 37(7), 842–864.
- Button, J. W. (1992). A sign of generational conflict: The impact of Florida's aging voters on local school and tax referenda. *Social Science Quarterly*, 73, 786–797.
- Calvo, Ernesto, & Murillo, Maria Victoria (2004). Who delivers? Partisan clients in the Argentine electoral market. *American Journal of Political Science*, 28(2), 151–177.
- Chamon, Marcos, João, M. P. De Mello, & Firpo, Sergio Pinheiro (2009). Electoral rules, political competition and fiscal spending: Regression discontinuity evidence from Brazilian municipalities. Department of Economy, PUC-RIO, number 559.
- Chen, Jowei (2008). Republican vote buying in the 2004 US Presidential election. Unpublished typescript, Stanford University.
- Chhibber, Pradeep, & Nooruddin, Irfan (2004). Do party systems count? The number of parties and government performance in the Indian states. *Comparative Political Studies*, 37(2), 152–187.
- Cleary, Matthew R. (2007). Electoral competition, participation, and government responsiveness in Mexico. *American Journal of Political Science*, 51(2), 283–299.
- Cox, Garry (1997). *Making votes count: Strategic coordination in the World's electoral systems*. Cambridge, UK: Cambridge University Press.
- Dahlberg, Matz, & Johansson, Eva (2002). On the vote-purchasing behavior of incumbent governments. *The American Political Science Review*, 96(1), 27–40.
- Downs, Anthony (1957). *An economic theory of democracy*. New York: Harper.
- Ferejohn, John (1986). Incumbent performance and electoral control. *Public Choice*, 30, 5–25.
- Finan, Frederico, & Ferraz, Claudio (2007). Electoral accountability and corruption in local governments: Evidence from audit reports. ISL discussion papers series, number 2843.
- Grossman, Gene M., & Helpman, Elhanan (1996). Electoral competition and special interest politics. *Review of Economic Studies*, 63, 265–286.
- Hecock, Douglas R. (2006). Electoral competition, globalization, and subnational education spending in Mexico, 1999–2004. *American Journal of Political Science*, 50(4), 950–961.
- Herron, Michael C., & Theodos, Brett A. (2004). Government redistribution in the shadow of legislative elections: A study of the Illinois member initiative grants program. *Legislative Studies Quarterly*, 29(2), 287–311.
- Jones, Mark (1994). Presidential election laws and multipartism in Latin America. *Political Science Quarterly*, 47, 41–57.
- Laakso, Markku, & Taagepera, Rein (1979). Effective number of parties: A measure with application to West Europe. *Comparative Political Studies*, 12, 3–27.
- Ladd, H. F., & Murray, S. (2001). Intergenerational conflict reconsidered: County demographic structure and the demand for public education. *Economics of Education Review*, 20, 343–357.
- Lindbeck, Assar, & Weibull, Jorgen W. (1988). Balanced-budget redistribution as the outcome of political competition. *Public Choice*, 52, 273–297.
- Lizzeri, Alessandro, & Persico, Nicola (2005). A drawback of electoral competition. The provision of public goods under alternative electoral incentives. *Journal of the European Economic Association*, 3(6), 1318–1348.
- Mainwaring, Scott P. (2002). *Rethinking party systems in the third wave of democratization: The case of Brazil*. Stanford University Press.
- Mainwaring, Scott, & Scully, Timothy (1995). *Parties and party systems in Latin America*. Stanford: Stanford University Press.
- Meltzer, Allan H., & Richard, Stephen F. (1981). A rational theory of the size of government. *Journal of Political Economy*, 89, 914–927.
- Myerson, Roger B. (1993). Incentives to cultivate favored minorities under alternative electoral systems. *American Political Science Review*, 87(4).
- Oates, William (1999). An essay on fiscal federalism. *Journal of Economic Literature*, 37, 1120–1149.
- Ordeshook, Peter C., & Shvetsova, Olga V. (1994). Ethnic heterogeneity, district magnitude, and the number of parties. *American Journal of Political Science*, 38(1), 100–123.
- Osborne, Martin, & Slivinsky, Al (1996). A model of political competition with citizen parties. *Quarterly Journal of Economics*, 111(1), 65–96.
- Peltzman, Samuel (1992). Voters as fiscal conservatives. *Quarterly Journal of Economics*, 100(2), 327–361.
- Persson, Torsten, & Tabellini, Guido (2000). *Political economics: Explaining economic policy*. The MIT Press.
- Persson, Torsten, & Tabellini, Guido (2004). Constitutions and economic policy. *Journal of Economic Perspectives*, 18(1), 75–98.
- Polo, Michele (1998). Electoral competition and political rents. IGER working paper, number 144 (p. 28).
- Poterba, J. M. (1997). Demographic structure and the political economy of public education. *Journal of Policy Analysis and Management*, 16, 48–66.
- Poterba, J. M. (1998). Demographic change, intergenerational linkages, and public education. *The American Economic Review*, 88(2), 315–320.
- Power, Timothy J. (2009). Compulsory for whom? Mandatory voting and electoral participation in Brazil, 1986–2006. *Journal of Politics in Latin America*, 1(1), 97–122.
- Samuels, David (1997). Determinantes do Voto Partidário em Sistemas Eleitorais Centrados no Candidato: Evidências sobre o Brasil. *Dados*, 40(3).
- Schlesinger, Joseph A. (1966). *Ambition and politics: Political careers in the United States*. Chicago: Rand McNally.
- Stasavage, David (2005). Democracy and education spending in Africa. *American Journal of Political Science*, 49(2), 343–358.
- Svensson, Jakob (2005). Controlling spending: Electoral competition, polarization and endogenous platforms. World Bank. Working paper.
- Taagepera, Rein, & Shugart, Matthew Soberg (1993). Predicting the number of parties: A quantitative model of Duverger's mechanical effect. *American Political Science Review*, 87(2), 455–464.
- Verba, Sidney, Schozman, Key Lehman, & Brady, Henry E. (1995). *Voice and equality: Civic voluntarism in American politics*. Harvard University Press.
- Wittman, Donald (1989). Why democracies produce efficient results. *Journal of Political Economy*, 97(6), 1395–1424.
- Wittman, Donald (1995). *The myth of democratic failure: Why political institutions are efficient*. Chicago: Chicago University Press.
- Wooldridge, Jeffrey M. (2001). *Econometric analysis of cross section and panel data*. MA, Boston: The MIT Press.
- Wright, Stephen G., & Riker, William H. (1989). Plurality and run-off systems and numbers of candidates. *Public Choice*, 60, 155–175.

## APPENDIX A

Table 8. *First stage results of our empirical investigation*

Independent variable	First Stage from											
	Number of student enrollments in municipal elementary schools—Per 10,000 inhabitants				Number of teachers in municipal elementary schools—Per 10,000 inhabitants				Number of free immunizations—Per 100,000 inhabitants			
	Dependent variable: Effective number of candidates											
	Present competition (2000)		Future competition (2004)		Present competition (2000)		Future competition (2004)		Present competition(2000)		Future competition (2004)	
	Level	Log	Level	Log	Level	Log	Level	Log	Level	Log	Level	Log
Medium size district	0.08*** (0.01)	0.03*** (0.008)	0.09* (0.04)	0.02** (0.01)	0.07*** (0.01)	0.03*** (0.008)	0.11*** (0.04)	0.03*** (0.01)	0.08*** (0.01)	0.03*** (0.007)	0.08* (0.04)	0.02* (0.01)
Larger district	0.54*** (0.14)	0.22*** (0.05)	0.56** (0.21)	0.21*** (0.05)	0.83*** (0.14)	0.33*** (0.04)	0.34*** (0.12)	0.16*** (0.03)	0.53*** (0.14)	0.21*** (0.05)	0.59*** (0.21)	0.22*** (0.05)
Observations	4298	4298	4407	4407	4269	4269	4375	4375	4909	4909	5015	5015
F-Statistic	14.44***	16.12***	4.39**	7.64***	22.15***	28.16***	4.56**	9.59***	15.49***	17.34***	4.81**	8.09***
Including a dummy for municipalities over 200,000 voters—Results for all municipalities												
	Present competition (2000)		Present competition (2000)		Present competition (2000)							
	Level	Log	Level	Log	Level	Log	Level	Log	Level	Log	Level	Log
Medium size district	0.08*** (0.01)	0.03*** (0.008)	0.07*** (0.01)	0.03*** (0.008)	0.08*** (0.01)	0.03*** (0.007)	0.07*** (0.01)	0.03*** (0.007)	0.08*** (0.01)	0.03*** (0.007)	0.07*** (0.01)	0.03*** (0.007)
Larger district	0.41*** (0.16)	0.17*** (0.06)	0.68*** (0.16)	0.27*** (0.05)	0.41*** (0.16)	0.17*** (0.06)	0.68*** (0.16)	0.27*** (0.05)	0.41*** (0.16)	0.17*** (0.06)	0.68*** (0.16)	0.27*** (0.06)
Observations	4298	4298	4269	4269	4909	4909	4269	4269	4909	4909	4269	4269
F-Statistic	10.88***	12.39***	14.17***	17.11***	12.12***	13.82***	14.17***	17.11***	12.12***	13.82***	14.17***	17.11***
Including two dummies: one for municipalities over 200,000 voters and one with mayors in the second-term—Results for all municipalities												
	Present competition (2000)		Present competition (2000)		Present competition (2000)							
	Level	Log	Level	Log	Level	Log	Level	Log	Level	Log	Level	Log
Medium size district	0.08*** (0.01)	0.03*** (0.008)	0.07*** (0.01)	0.03*** (0.008)	0.07*** (0.01)	0.03*** (0.008)	0.07*** (0.01)	0.03*** (0.007)	0.07*** (0.01)	0.03*** (0.007)	0.07*** (0.01)	0.03*** (0.007)
Larger district	0.41*** (0.16)	0.17*** (0.06)	0.68*** (0.16)	0.27*** (0.05)	0.40*** (0.16)	0.17*** (0.06)	0.68*** (0.16)	0.27*** (0.05)	0.40*** (0.16)	0.17*** (0.06)	0.68*** (0.16)	0.17*** (0.06)
Observations	4296	4296	4268	4268	4907	4907	4268	4268	4907	4907	4268	4268
F-Statistic	10.60***	12.11***	13.87***	16.79***	11.78***	13.49***	13.87***	16.79***	11.78***	13.49***	13.87***	16.79***
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Covariates used here are per capita municipal transfers received from federal and state government (1997–2004 avg.), PSDB control (1997–2000 dummy), population growth (%), 1991–2000), per capita income (2000), population below 15 years old, population over 65 years old, the % of rural population in the total population, and population density (200, logged, pop/km<sup>2</sup>). The table reports Huber–White standard errors in parentheses. Statistical significance is noted with the conventional.

\* < 0.10.

\*\*  $p < 0.05$ .

\*\*\*  $p < 0.01$ .