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Inequality and Cost of Electoral Campaigns in Latin America

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Inequality and Cost of Electoral Campaigns in Latin America [ϕ]

Maurício Bugarin[μ] **Adriana Portugal**[α] **Sérgio Sakurai**[σ]

Abstract

This article explores theoretic and empirically the effects of inequality on the cost of electoral campaigns. An electoral competition model suggests that electoral campaigns costs increase with the level of inequality. That result stresses the need of careful campaign financing regulation in highly-unequal Latin America. An econometric analysis of Brazilian 2002 and 2004 elections at the state and municipal levels confirms that result, especially for the municipal elections. Moreover, according to the empirical results, the lower the age dispersion and the higher the education dispersion of voters, the more expensive are the electoral campaigns.

Key words: Electoral campaign costs, income inequality, party ideology, electoral competition.

JEL classification codes: D72, C72

1. Introduction

A fundamental characteristic of Latin America and the Caribbean is the region's high level of inequality. According to Boix (2004), in 1994 it held the second highest regional Gini index of 55.6. It is also a region that has shown impressive developments in democracy over the past decades. Indeed, according to the United Nations Development Program (2004), the Index of Electoral Democracy has raised from below 0.3 in 1977 to above 0.9 in 2002. In particular, electoral institutions are consolidating in most countries and regular elections have become the rule.

An important question that arises in this context of consolidating democracy is the effect of inequality in the electoral process. Can democraticy remain stable in highly unequal societies? The answer to this question may define the future of Latin American political institution.

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In order to answer that question, one must understand how inequality affects the political process. In particular, it is important to understand the role of inequality on the costs of electoral campaigns. The goal of the research presented in this article is to explore that relationship between inequality and electoral campaign costs, both at the theoretic and at the empirical point of view.

The article is divided in four sections in addition to this institution. Section 2 builds a basic model of electoral competition in the presence of public and private financing, and solves it for the equilibrium policies announced by competing parties. Section 3 analyses the effect of income inequality on the costs of electoral campaigns in the model's equilibrium. The main theoretical finding is that more unequal societies tend to yield relatively more expensive electoral campaigns. Section 4 performs empirical tests of that hypothesis, and finds some evidence that in Brazil, higher inequality may be associated with higher costs of electoral campaigns. Moreover, the econometric tests suggest that higher age dispersion of the population and lower average incomes also increase the costs of electoral campaigns. Finally, section 5 reviews the main findings at the present stage of the research and presents the next steps to be developed in the research program.

2. A Model of Electoral Competition with Public and Private Electoral Financing and Office and Policy Motivated Parties

The electoral competition model in strongly founded on Portugal and Bugarin (2007), which is itself an extension of Persson and Tabellini (2000, chapter 3).

The electoral competition game between parties, lobbyists and voters is presented in Figure 1. The important hypothesis here is that parties announce their policies first, and then lobbyists decide whether or not to make political contributions based on these announcements. Parties use the private contributions and the public funds they receive in order to influence voters during the electoral campaign. After the electoral campaign, each voter receives stochastic signals that affect his preferences for the parties, observes the announced platform of each party, and vote sincerely, i.e., for the party that best represents his preferences. There is one national electoral district in which each voter has one vote. After elections, each party is assigned a quantity of seats in the Legislature that corresponds to the percentage of received votes. Once the new Legislature is formed, it decides which policy to implement according to the following rule: the party that has a majority of seats is able to implement its campaign platform[1].

[1] The model assumes that the Legislature is composed of an odd number of seats. Therefore, one party always has a majority of seats.

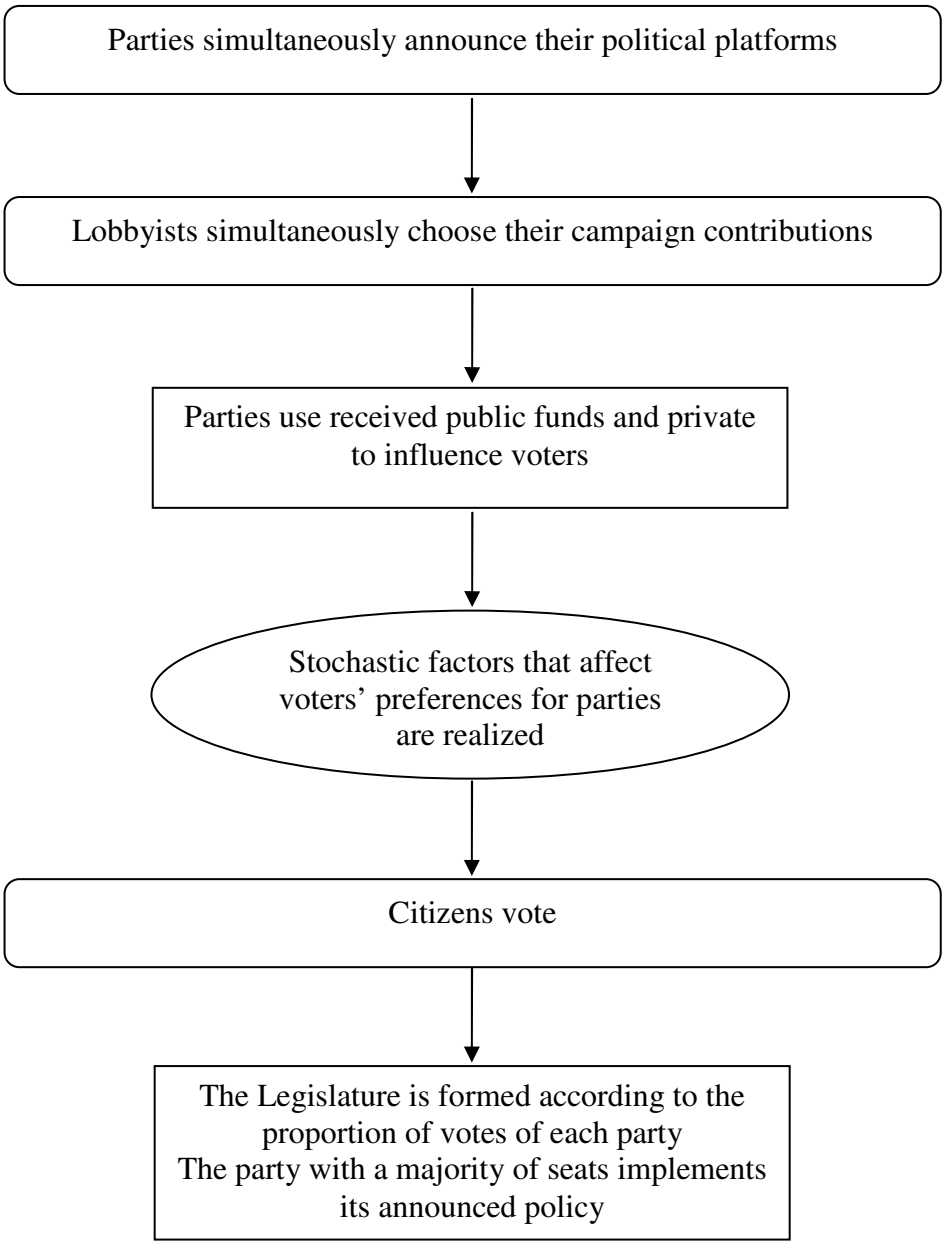

Figure 1: The Electoral Competition Game

Note that only the wider, curved rectangles correspond to real strategic decision in Figure 1. The top one corresponds to parties' platform announcement; the second one from the top corresponds to lobbyists' campaign contributions decisions; and the second one from the bottom refers to voters' choices. The third (squared) box from the top states the assumption that parties use all available resources in their electoral campaign, so that there is no decision about deviation of resources out of the campaign in the present model. The ellipsis represents the realization of random variable that are out of the control of the players and the last (squared) box states the typical

assumption of full commitment made in models of electoral competition, i.e., the majority party implements its announced policy.

In what follows we detail the main elements of the electoral competition model and, simultaneously, solve the game by backwards induction.

2.1. Voters' electoral decision

There is a continuum of unit mass of voters, Ω=[0,1]. Each voter belongs to one of two social classes according to his income. The upper class *R* ("rich") is composed of voters with high-income y^R, whereas the lower class *P* ("poor") includes voters with low income y^P. Thus, $y^R > y^P$. A social class *J*, *J*=*R, P*, has mass α^J, so that $\sum_J \alpha^J = \alpha^P + \alpha^R = 1$[2]. Moreover, we naturally assume that there are more poor citizens than rich ones, i.e., $\alpha^P > \frac{1}{2} > \alpha^R$.

There are two parties *P*=*A*, *B*, which compete by announcing the level of production of a *per capita* public good *g* that will be produced if the party obtains the majority of seats in the Legislature. Public good provision is financed by an income tax given by the rate τ, which is the same for all voters. All tax-collected resources are converted into the public good and public funding for parties' campaigns. Let *c* be the government's *per capita* cost of public funding of electoral campaigns. Then the government budget constraint is $\alpha^P \tau y^P + \alpha^R \tau y^R = \tau y = g + c$, where $y = \alpha^P y^P + \alpha^R y^R$ represents the average income of voters.

A voter's utility has two components: a pragmatic (or sociotropic) and an ideological (or idiosyncratic) one[3]. The pragmatic part of the utility represents the voter's decisions as an economic agent, and depends on the consumption of a private good, as well as the consumption of the public good provided by the government. Suppose platform *g* wins the election. Then, an agent of class *J*'s income, net of taxes, is $c^J = (1-\tau) y^J = (y - g - c)\frac{y^J}{y}$, which is normalized to be the agent's private consumption utility. Moreover, the agent's utility for public good consumption is $H(g)$ where *H* is a strictly increasing and strictly concave function, such that $(H')^{-1}$ and $H \circ (H')^{-1}$ are

[2] The two-class model is a simple way to characterize differences in wealth among citizens. However, it is straightforward to extend it to any finite number of classes. Portugal and Bugarin (2007), for instance, uses a three-class approach (the rich, the medium income and the poor classes).

[3] This is the most general way of characterizing an economic agent who also has political concerns. For more on this topic, see Ferejohn (1986), Bugarin (1999) or Bugarin (2003).

strictly convex functions[4]. Expression (1) shows the pragmatic part of the utility of a voter of class *J*.

$$W^J(g) = (y - g - c)\frac{y^J}{y} + H(g) \qquad (1)$$

Thus, each class has its own optimal policy for the public good provision. These optimal policies are obtained by maximizing each class' utility function and are given by:

$$g_R^* = (H')^{-1}\left(\frac{y^R}{y}\right), \quad g_P^* = (H')^{-1}\left(\frac{y^P}{y}\right).$$

Note that the poor class' preferred production of public good g_P^* is higher than the rich class' one, g_R^*: $g_P^* > g_R^*$. This is a consequence of the fact that the rich contribute more money for the provision of the public good than the poor.

The ideological component of a voter's utility function is represented by two random variables corresponding to the voter's bias towards party *B*, or equivalently, party *B*'s popularity at the time elections are held. The first random variable is common to all voters and is associated to the realization of a state of nature that affects the entire population. A war, an abrupt change in international prices of a commodity that is important to the country and a country-wide energy crisis are examples of such phenomenon.[5]. That process is described by a random variable δ, which the model assumes uniformly distributed on $\left[-\frac{1}{2\psi}, \frac{1}{2\psi}\right]$. The parameter ψ>0 measures the level of sensibility of society to aggregate shocks: the lower the value of ψ, the more those shocks may affect society.

The second random variable is particular to each voter *i* in group *J* and reflects his personal bias towards party *B*. This bias is modeled as a random variable σ^{iJ}, which is uniformly distributed on $\left[-\frac{1}{2\phi^J}, \frac{1}{2\phi^J}\right]$. Hence, the greater the parameter ϕ^J, the more homogeneous is class J. For simplicity, and in order to avoid electoral effects of class heterogeneity, we normalize all the classes' random variable parameters to $\phi=\phi^J$, *J=P, R*.

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[4] $(H')^{-1}$ is the inverse function of the derivative of *H*. The technical assumptions are satisfied by the usual function forms of utility such as $H(g) = g^\beta$, 0<β<1 or $H(g) = \log(1+g)$.

[5] A clear example of such a country-wide shock is the terrorist attack on September 11th, 2001, which increased the popularity f the U.S. president from 57% in February to 90% in September. See "Poll Analyses", Section "Gallup Poll News Service", The Gallup Organization, http:/www.gallup.com, 09/24/2001.

Therefore, if party *B* wins a majority of seats in the Legislature with the announced platform g_B, a voter *i* in the social class *J* derives utility $W^J(g_B)+\sigma^{iJ}+\delta$.

Note that positive values for σ^{iJ} and for δ indicate a favorable bias towards party *B*, whereas negative values indicate a favorable bias towards party *A*. Also note that the realization of the global random variable can be favorable to party *B* and at the same time, the realization of the individual-specific random variable can favor party *A*, and vice-versa.[6]

Consider now the role of campaign contributions in the model. For simplicity we assume that overall campaign spending will affect the ideological component of his utility function, in a way that is linear to the difference between the total parties' expenditure. Then, the utility of a voter *i* of class *J* when party *B*'s (respectively, party *A*'s) campaign spending is C_B (respectively, C_A) and party *B* wins the majority of the Legislature seats is:

$$W^J(g_B)+\sigma^{iJ}+\delta+h(C_B-C_A) \qquad (2)$$

The parameter $h>0$ represents the effectiveness of campaign spending, i.e., how much the difference between party campaign expenditures can affect its popularity. Note that if C_B is greater than C_A, then party *B* gains popularity during the electoral campaign. Otherwise, overall campaign expenditures reduce *B*'s popularity.

Suppose now that party *P* announces policy g_P, $P = A, B$. Then a voter *i* in group *J* will prefer party *A* to *B* if $W^J(g_A)>W^J(g_B)+\sigma^{iJ}+\delta+h(C_B-C_A)$.

This comparison determines voters' electoral decision.

2.2. A benchmark for welfare comparison

Suppose party *P* with the election with policy g_P. Then an agent *i* of class *J* derives utility $W^J(g_P)+\theta_P(\sigma^{iJ}+\delta)+h(C_B-C_A)$, where θ_P is the party index function, $\theta_P=1$ if $P=B$ and 0 otherwise. Suppose, moreover, that voters cannot be influenced by the electoral campaign expenditure, i.e., $h=0$. Then, the expected utility of that voter (before the random variables are realized) reduces to $W^J(g_P)=(y-g_P-c)\frac{y^J}{y}+H(g_P)$. We want to determine what policy maximizes aggregate welfare according to the Bentham social welfare criterion. Then, we should maximize $W(g_P)=\sum_J \alpha^J W^J(g_P)$, which yields the socially optimal policy $g_P=g^*=(H')^{-1}(1)$.

[6] Suppose, for example, that the country faces an economic expansion, so that society approves the incumbent for overall conduct of the economy, but the president is involved in a sexual scandal, which can affect voters differently.

This will be our benchmark for welfare comparison henceforth. Figure 2 presents the relative positions of g_P^*, g_R^* and g^* in the policy interval [0, y–c].

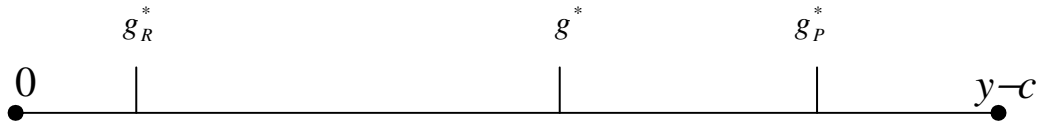


Figure 2: The classes preferred and the socially optimal policies

2.3. Lobbyists contributions' decision

From voters' electoral decision, one can identify for each class J a voter that is indifferent between the two parties, who is called the s*wing voter* of class J. That voter corresponds to the realization of σ^{iJ}, defined as σ^J by:

$$\sigma^J = W^J(g_A) - W^J(g_B) + h(C_A - C_B) - \tilde{\delta} \tag{3}$$

Therefore, the number of votes cast for party A is:

$$\pi^A = \sum_J \alpha^J \left[\sigma^J + \frac{1}{2\phi} \right] \phi = \frac{1}{2} + \phi \sum_J \alpha^J \sigma^J \tag{4}$$

Then, writing $W(g_A) = \sum_J \alpha^J W^J(g_A)$ and $W(g_B) = \sum_J \alpha^J W^J(g_B)$, the probability of party A getting the majority of seats is $p_A = prob[\pi^A > 1/2] = prob[\tilde{\delta} < W(g_A) - W(g_B) + h(C_A - C_B)]$

Equivalently:

$$p_A = \frac{1}{2} + \psi[W(g_A) - W(g_B) + h(C_A - C_B)] \tag{5}$$

Now, by symmetry:

$$p_B = \frac{1}{2} - \psi[W(g_A) - W(g_B) + h(C_A - C_B)] = 1 - p_A \tag{6}$$

Let us now determine the total amount of campaign resources available to the parties, C_A and C_B.

According to Zovatto (2003)'s 18 Latin-American country study, all 15 nations that adopted direct public financing of electoral campaigns have at least part of the resources based on party size in the previous elections[7]. Therefore, the present paper's model assumes the total amount of

[7] Argentina, Bolivia, Brazil, Colombia, Costa Rica, The Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay and Uruguay.

resources directed to a party P ($P = A, B$) is proportional to P's representation in Congress during the previous Legislature. Let β_P be the percentage of the total Legislative seats held by party P, $P = A, B$. Then, $\beta_A+\beta_B=1$ and the *per capita* funds received by each party from the government is $\beta_P.c$, where c is the *per capita* cost for the government of the public funding of electoral campaigns.

As for private financing, if each class J makes the private contribution C_P^J to party $P = A, B$, the total amount of private contributions to a party P is $\sum_J \alpha^J C_P^J$.

In order to allow for the possibility that the law bans private contributions, we introduce the parameter $\lambda \in (0,1]$ that measures how efficient the electoral authorities are in exposing illegal contributions. If private contributions are allowed, then $\lambda=1$; otherwise, the unlawful contributions may be unveiled and confiscated by the electoral authorities with probability $1-\lambda$. The hypothesis that $\lambda>0$ implies that it is never possible to completely block illegal contributions.

Therefore, the total amount of contributions party P receives is:

$$C_P = \beta_P c + \lambda \sum_J \alpha^J C_P^J,\ P = A, B$$

In order to determine group J's private contributions to a party P, C_P^J, let us analyze the interest groups' problem. An organized class' utility depends on the implemented policy, as well as on the amount of resources spent on political contributions. The present model assumes it takes the form:

$$p_A W^J(g_A) + (1-p_A) W^J(g_B) - \frac{1}{2}(C_A^J + C_B^J)^2 \qquad (7)$$

The first two terms in the above equation reflect the expected economic utility of a member of class J, whereas the last term reflects the utility cost of campaign contributions. The quadratic form of the cost function models the fact that contributions typically involve not only a monetary transfer, but also personal involvement of organized voters. Note that the ideological components of voters' utilities do not appear in the above equation because the stochastic components σ^{iJ} and $\tilde{\delta}$ are realized after the contribution decisions are taken and have zero expected value.

Therefore, organized class J's maximization problem is presented below, where p_A is given by equation (5).

$$\max_{C_A^J, C_B^J \geq 0} p_A W^J(g_A) + (1-p_A) W^J(g_B) - \frac{1}{2}(C_A^J + C_B^J)^2$$

Note that, if the utility an interest group obtains from platforms g_A and g_B are the same, then the group decides not to contribute, so that $C_A^J = C_B^J = 0$. However, if one platform gives more

utility than the other, the group contributes only to the party that announces the better platform, that is, C_P^J will be equal to zero for party P if g_P gives less utility to the group, where $P = A,B$. The solution to the interest groups' problem is:

$$\begin{aligned} C_A^J &= \max\{0, \lambda \psi h \alpha^J [W^J(g_A) - W^J(g_B)]\} \\ C_B^J &= \max\{0, \lambda \psi h \alpha^J [W^J(g_B) - W^J(g_A)]\} \end{aligned} \tag{8}$$

The above expression elucidates the lobbyists' contribution decisions.

2.4. Parties' platform announcement decision

Parties anticipate the contributions they will receive from interest groups by sequential rationality. It follows from (8) that,

$$C_A^J - C_B^J = \lambda \psi h \alpha^J [W^J(g_A) - W^J(g_B)] \tag{9}$$

$$C_A - C_B = \lambda^2 \psi h \sum_J (\alpha^J)^2 [W^J(g_A) - W^J(g_B)] + (\beta_A - \beta_B) c \tag{10}$$

Plugging in equation (10) into equation (5), one obtains party A's probability of obtaining a majority of votes.

$$p_A(g_A, g_B) = \frac{1}{2} + \psi \left[W(g_A) - W(g_B) + \psi (\lambda h)^2 \sum_J (\alpha^J)^2 [W^J(g_A) - W^J(g_B)] + hc(\beta_A - \beta_B) \right] \tag{11}$$

Parties care about winning a majority of votes. However, we assume that parties also care about which policy is implemented. That is, parties have ideological preferences, party A strictly preferring policy $\overline{g}_A$, and party B, strictly preferring $\overline{g}_B$. The main rationale here is that parties are committed to their founding principles, which establish their preferred political platforms. Thus, announcing a platform that deviates from their optimal one involves a utility loss. This is modeled by introducing a cost of announcing a policy away from the party's optimal one, according to the functional form below.

$$\begin{aligned} U_A(p_A, p_B) &= p_A(g_A, g_B) K - \gamma_A \mid \overline{g}_A - g_A \mid \\ U_B(p_A, p_B) &= p_B(g_A, g_B) K - \gamma_B \mid \overline{g}_B - g_B \mid \end{aligned}$$

The first summand of a party's utility represents its office-seeking motivation, the pragmatic or sociotropic part of their utility[8]. The term K represents the return to the party of gaining a majority in the Legislature, so that the term is the expected utility of being a majority party. The second summand represents the utility cost that a party bears by announcing a different policy from

[8] See Ferejohn (1986) for a discussion on the pragmatic/sociotropic part of the utility function *vis a vis* its ideological/idiosyncratic part.

its established optimal policy, the ideological or idiosyncratic part of their utility. There are two parts to this ideological component. First, the further away the proposed policy from the party's ideal policy, the costlier for the party. That is the term $\left|\overline{g}_P - g_P\right|$ which represents the pure *ideological bias*. Second, the coefficient γ_P represents how strongly this deviation affects a party's utility, and measures the party's *ideological rigidity*.

For simplicity, we normalize the return K to 1. Moreover, let us analyze the parties' preferred policies $\overline{g}_A$ and $\overline{g}_B$. Since parties are created by individuals and there are only two possible preferred policies in society, one might expect those policies to coincide with the parties' preferred ones. In fact, Fiorina's studies (1988, 1992, 1996), suggest that parties' optimal platforms are more extreme than society's, due to two reinforcing phenomena. First, there is a self selection problem, as founding a party is a very demanding activity and only those who have strong and extreme policy positions accept to bear the corresponding cost. Second, parties are old and society has evolved over time towards the center of the political spectrum, whereas parties have kept their original, more extreme political positions. However, in this article we will adopt a simpler approach, assuming that $\overline{g}_A = g_R^*$ and $\overline{g}_B = g_P^*$, i.e., party A represents the rich class whereas party B represents the poor class. [9]

Note that under this hypothesis, as party A's preferred policy is located in the lowest values of public expenditure, one expects that any deviation in the platform in order to increase p_A will occur in such a way that g_A will automatically increase. So, one expects that, in equilibrium, $\left|\overline{g}_A - g_A\right| = g_A - g_R^*$. On the other hand, party B will deviate from its optimal policy in such a way that g_B will decrease. Thus, in equilibrium, one expects that $\left|\overline{g}_B - g_B\right| = g_P^* - g_B$. Hereafter, we assume that deviation pattern in what follows and confirm it once political parties' problems are solved. Hence, the parties' utility functions can be written as:

$$\begin{aligned} U_A &= p_A(g_A, g_B) - \gamma_A(g_A - g_R^*) \\ U_B &= p_B(g_A, g_B) - \gamma_B(g_P^* - g_B) \end{aligned} \tag{12}$$

When all effects of the parties' platform announcement are introduced in the expression of $p_A(g_A, g_B)$ and $p_B(g_A, g_B)$, then sequential rationality reduces the original extensive form game

[9] Note that this assumption is not essential for the model; it is sufficient that $\overline{g}_A$ is close to g_R^* and $\overline{g}_B$ is close to g_P^*. Portugal and Bugarin (2007) assumes instead that $\overline{g}_A < g_R^* < g_P^* < \overline{g}_B$.

to a normal form game between parties *A* and *B* where the utilities are given by (12). The resulting dominant strategy Nash equilibrium is given by:

$$\tilde{g}_A = (H')^{-1}\left(\frac{\hat{y}}{y} + \frac{\gamma_A}{\psi\hat{\alpha}}\right) \quad \text{and} \quad \tilde{g}_B = (H')^{-1}\left(\frac{\hat{y}}{y} - \frac{\gamma_B}{\psi\hat{\alpha}}\right) \tag{13}$$

where $\hat{y} = \dfrac{\alpha^P(1+\psi(\lambda h)^2\alpha^P)y^P + \alpha^R(1+\psi(\lambda h)^2\alpha^R)y^R}{\alpha^P(1+\psi(\lambda h)^2\alpha^P) + \alpha^R(1+\psi(\lambda h)^2\alpha^R)} = \dfrac{y + \psi(\lambda h)^2\left[(\alpha^P)^2 y^P + (\alpha^R)^2 y^R\right]}{\hat{\alpha}}$,

and $\hat{\alpha} = \alpha^P(1+\psi(\lambda h)^2\alpha^P) + \alpha^R(1+\psi(\lambda h)^2\alpha^R)$.

Note that $\hat{y} < y^R$ yields $\dfrac{\hat{y}}{y} < \dfrac{y^R}{y}$. Therefore, if γ_A is small enough, then $\dfrac{\hat{y}}{y} + \dfrac{\gamma_A}{\psi\hat{\alpha}} < \dfrac{y^R}{y}$. Since *H* is strictly concave, it follows that $\tilde{g}_A > g_R^*$, which supports our previous assumption on the position of the equilibrium policy $\tilde{g}_A$ with respect to g_R^*. Similarly, if γ_B is small enough, then $\hat{y} > y^P$ yields $\dfrac{\hat{y}}{y} - \dfrac{\gamma_B}{\psi\hat{\alpha}} > \dfrac{y^P}{y}$. Since *H* is strictly concave, it follows that $\tilde{g}_B < g_P^*$, which also supports our previous assumption on the position of the equilibrium policy $\tilde{g}_B$ with respect to g_P^*. In the present model we assume that the ideological rigidity coefficients are small enough so that the previous conditions are satisfied.

Let us now analyze expressions (13)[10]. First note that public funds *c* do not enter any of the expressions for the equilibrium announcements. Therefore, public funding of electoral campaigns has no effect on the parties' announced policies.

Second, in the absence of lobby (h=0) and with no party ideology (γ_A=γ_B=0), then both parties converge to the same socially optimal equilibrium announcement: $\tilde{g}_A = \tilde{g}_B = g^*$. Therefore, all deviations from the optimal policy is due either to the existence of lobby or to party ideological rigidity, or yet to the combined effect of both factor.

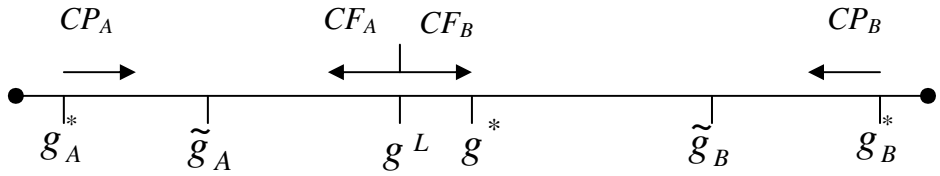
Third, in the presence of lobby but with no party ideology, then both parties still converge to the same announcements, but now $\tilde{g}_A = \tilde{g}_B = g^L = H^{-1}\left(\dfrac{\hat{y}}{y}\right) \neq g^*$. Therefore, the very presence of lobbyist groups makes the parties announce a suboptimal policy. The expression of $\hat{y}$ shows clearly that the deviation occurs towards the preferred policies of the more organized group with more members, although there is no private contribution in equilibrium, since both parties announce the same policy. This is the effect of α^J on $\hat{y}$. This lobby effect can only be circumvent if it is

[10] The following discussion was originally presented in Portugal & Bugarin (2007). It is replicated here in order to foster a deeper understanding of expressions (13).

possible to totally ban private contributions, i.e., λ=0, which does not seem to be feasible in Latin America nor in any other region of the world.

Fourth, in the presence of lobby and parties' ideological rigidity (i.e., positive values of h, γ_A and γ_B), then parties will differentiate themselves by announcing opposing policies with $\tilde{g}_A < g^L < \tilde{g}_B$. In this case, there will be no convergence of announced platforms, and therefore, there will be private contribution in equilibrium, which will affect the probability of each party winning a majority of legislative seats.

Therefore one may decompose parties' decisions into two movements. First, a centripetal movement (*CP*) towards platform g^L. Next, a centrifugal movement (*CF*) away from g^L, towards each party's respective ideological preference, g_A^* and g_B^* (Figure 3). Parties' final announcements, $\tilde{g}_A$ and $\tilde{g}_B$, are the compositions of these two opposing movements. A balance between the search for interest groups support and the degree of the ideological rigidity will determine the optimal announcement.



CP_P: party P's centripetal movement, $P = A,B$

CF_P: party P's centrifugal movement, $P = A,B$

Figure 3 – Parties' Centripetal and Centrifugal Movement

Note that the higher the ideological rigidity (i.e. the higher value of γ_P), the higher the centrifugal movement, that is, the higher the deviation from the platform g^L towards parties' optimal platforms (g_A^* and g_B^*, respectively), .i.e.: $\frac{\partial \tilde{g}_A}{\partial \gamma_A} < 0$ and $\frac{\partial \tilde{g}_B}{\partial \gamma_B} > 0$.

3. The effect of inequality on the cost of electoral campaigns

In order to better understand the effect of inequality on the cost of electoral campaigns, note first that each party will receive campaign contributions from at most one interest group. More precisely, party *A* will either receive contribution from class *R* or will not receive any contributions at all. Similarly, party *B* will either receive contribution from class *P* or will not receive any contributions at all. In the present two-class model, expressions (8) and (13) show that party *A* will receive

contributions from interest group *R* whereas party *B* will receive contributions from interest group *P*. As a consequence, parties' total campaign resources take the form below.

$$C_A = \beta_A c + \alpha^R C_A^R = \beta_A c + \lambda \psi h \left(\alpha^R\right)^2 [W^R(\tilde{g}_A) - W^R(\tilde{g}_B)]$$

$$C_B = \beta_B c + \alpha^P C_B^P = \beta_B c + \lambda \psi h \left(\alpha^P\right)^2 [W^P(\tilde{g}_B) - W^P(\tilde{g}_A)]$$

Since the total amount of public contributions is defined by law and does not depend on the society's inequality level, it remains to check the effect of inequality on total private contributions $C=C_A-\beta_A c+C_B-\beta_B c = \lambda \psi h \left\{\left(\alpha^R\right)^2 [W^R(\tilde{g}_A) - W^R(\tilde{g}_B)] + \left(\alpha^P\right)^2 [W^P(\tilde{g}_B) - W^P(\tilde{g}_A)]\right\}$.

An increase in inequality in the present two-class model corresponds to an increase in the share of total income of the rich class' income and, therefore, a decrease the share of the poor class' income. Recall that average income is $y = \alpha^P y^P + \alpha^R y^R$; therefore, $\frac{\alpha^P y^P}{y} + \frac{\alpha^R y^R}{y} = 1$. Hence, an increase in inequality in corresponds to an increase in $\frac{\alpha^R y^R}{y}$ or, equivalently, a reduction in $\frac{\alpha^P y^P}{y}$.

The relationship between inequality and campaign finance costs is determined in the by the next lemmas and the following proposition.

Lemma 1. Define β as the weighted average $\left(\alpha^P\right)^2 \frac{y^P}{y} + \left(\alpha^R\right)^2 \frac{y^R}{y}$. Then, an increase in inequality yields an decrease in the value of β.

Proof: Write $\alpha = \alpha^R$ and $x=\frac{\alpha^R y^R}{y}$. Then,

$$\beta = \left(\alpha^P\right)^2 \frac{y^P}{y} + \left(\alpha^R\right)^2 \frac{y^R}{y} = (1-\alpha)(1-x) + \alpha x = \left(\alpha^P\right)^2 \frac{y^P}{y} + \left(\alpha^R\right)^2 \frac{y^R}{y} = (1-\alpha) - (1-2\alpha)x.$$

Since $\alpha = \alpha^R < \frac{1}{2}$, it follows that $1-2\alpha > 0$, so that β decreases as inequality (x) increases.

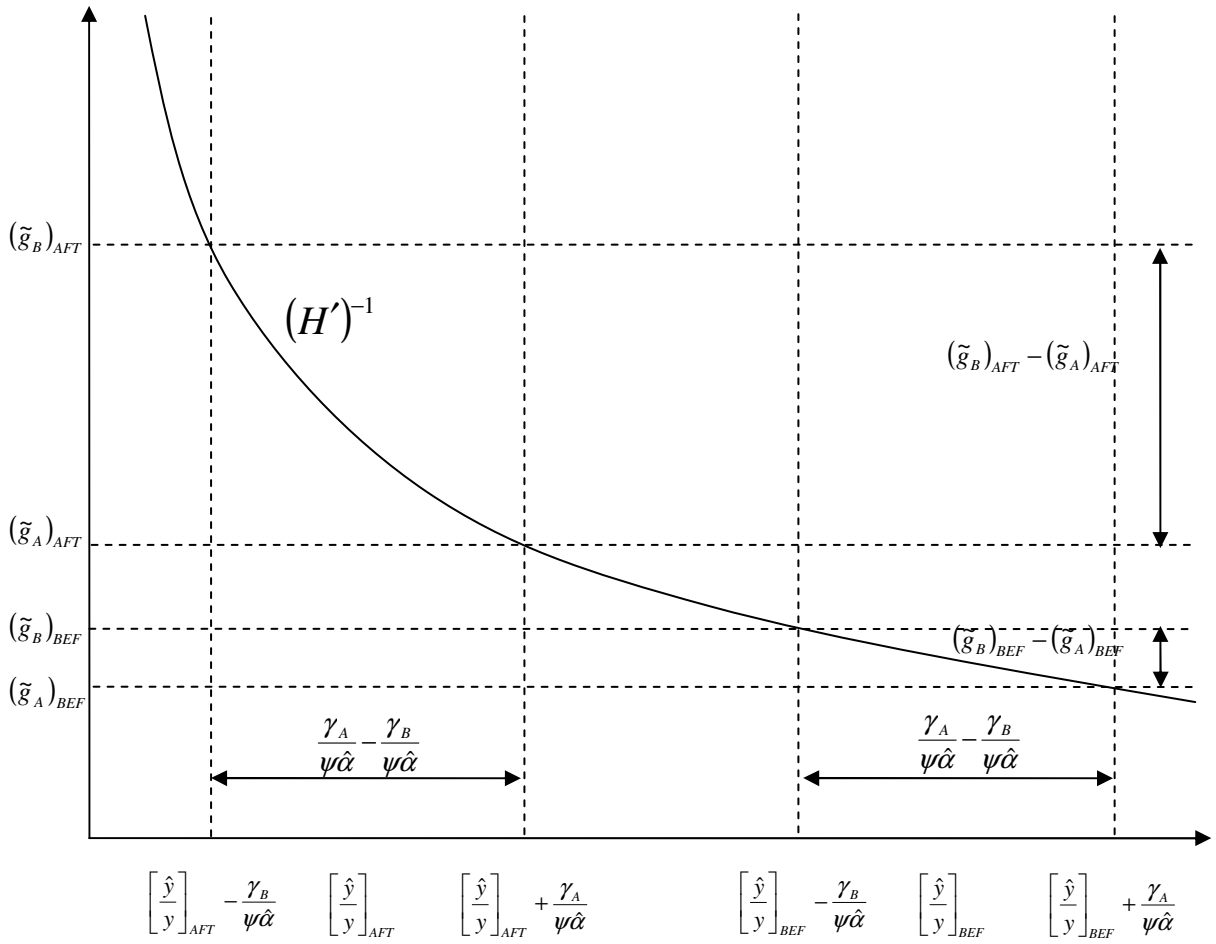
Lemma 2. The higher the inequality, the higher the difference between the policies announced by the two parties, $\tilde{g}_B - \tilde{g}_A$.

Proof: Recall that $\tilde{g}_A = (H')^{-1}\left(\frac{\hat{y}}{y} + \frac{\gamma_A}{\psi\hat{\alpha}}\right)$ and $\tilde{g}_B = (H')^{-1}\left(\frac{\hat{y}}{y} - \frac{\gamma_B}{\psi\hat{\alpha}}\right)$, where

$$\hat{y} = \frac{\alpha^P(1+\psi(\lambda h)^2\alpha^P)y^P + \alpha^R(1+\psi(\lambda h)^2\alpha^R)y^R}{\alpha^P(1+\psi(\lambda h)^2\alpha^P) + \alpha^R(1+\psi(\lambda h)^2\alpha^R)} = \frac{y + \psi(\lambda h)^2\left[\left(\alpha^P\right)^2 y^P + \left(\alpha^R\right)^2 y^R\right]}{\hat{\alpha}},$$

and $\hat{\alpha} = \alpha^P(1+\psi(\lambda h)^2\alpha^P) + \alpha^R(1+\psi(\lambda h)^2\alpha^R)$.

Since $\beta = \left(\alpha^P\right)^2\frac{y^P}{y} + \left(\alpha^R\right)^2\frac{y^R}{y}$, we can write $\frac{\hat{y}}{y} = \frac{1+\psi(\lambda h)^2\beta}{\hat{\alpha}}$. Therefore, the higher the inequality, the lower $\frac{\hat{y}}{y}$. Since $\frac{\gamma_A}{\psi\hat{\alpha}}$ and $\frac{\gamma_B}{\psi\hat{\alpha}}$ do not depend on income, the effect of an increase in inequality on $\frac{\hat{y}}{y} - \frac{\gamma_B}{\psi\hat{\alpha}}$ and on $\frac{\hat{y}}{y} + \frac{\gamma_A}{\psi\hat{\alpha}}$ is a shift to the left (smaller values) that preserve the distance between those two points. The following graph presents this shift, where the index *BEF* refers to the original situation (before) and the index *AFT* refers to the situation after the increase in inequality. Note that, since the $\left(\left[\frac{\hat{y}}{y}\right]_{BEF} + \frac{\gamma_A}{\psi\hat{\alpha}}\right) - \left(\left[\frac{\hat{y}}{y}\right]_{BEF} - \frac{\gamma_B}{\psi\hat{\alpha}}\right) = \frac{\gamma_A}{\psi\hat{\alpha}} - \frac{\gamma_B}{\psi\hat{\alpha}} = \left(\left[\frac{\hat{y}}{y}\right]_{AFT} + \frac{\gamma_A}{\psi\hat{\alpha}}\right) - \left(\left[\frac{\hat{y}}{y}\right]_{AFT} - \frac{\gamma_B}{\psi\hat{\alpha}}\right)$ and the function $(H')^{-1}$ is strictly decreasing and strictly convex, it follows that $(\tilde{g}_B)_{AFT} - (\tilde{g}_A)_{AFT} > (\tilde{g}_B)_{BEF} - (\tilde{g}_A)_{BEF}$. Therefore, the higher the inequalities, the higher the difference between the platforms announced by the two parties.



Lemma 3. The higher the inequality, the higher the difference between the utilities citizens derive from the public goods corresponding to the policies announced by the two parties, $H(\tilde{g}_B)-H(\tilde{g}_A)$.

Proof: Recall that $\tilde{g}_A=(H')^{-1}\left(\frac{\hat{y}}{y}+\frac{\gamma_A}{\psi\hat{\alpha}}\right)$ and $\tilde{g}_B=(H')^{-1}\left(\frac{\hat{y}}{y}-\frac{\gamma_B}{\psi\hat{\alpha}}\right)$. Therefore, $H(\tilde{g}_B)-H(\tilde{g}_A)=\left(H\circ(H')^{-1}\right)\left(\frac{\hat{y}}{y}-\frac{\gamma_B}{\psi\hat{\alpha}}\right)-\left(H\circ(H')^{-1}\right)\left(\frac{\hat{y}}{y}+\frac{\gamma_A}{\psi\hat{\alpha}}\right)$. Now, by the same rationale used in the previous lemma and by the fact that $\left(H\circ(H')^{-1}\right)$ is a strictly convex function, it follows that $H(\tilde{g}_B)-H(\tilde{g}_A)$ increases with inequality.

Theorem: The cost of electoral campaigns is an increasing function of income inequality, i.e., the higher the income inequality, the higher the cost of electoral campaigns.

Proof. Recall that $W^J(g) = (y - g - c)\frac{y^J}{y} + H(g)$ for *J*=*P*, *R*. Therefore, the difference in a voter from class *J*'s utility is $W^J(\tilde{g}_A) - W^J(\tilde{g}_B) = (\tilde{g}_B - \tilde{g}_A)\frac{y^J}{y} + \left[H(\tilde{g}_A) - H(\tilde{g}_B)\right]$.

Moreover, private contributions are:

$C = \lambda\psi h\left\{(\alpha^R)^2[W^R(\tilde{g}_A) - W^R(\tilde{g}_B)] + (\alpha^P)^2[W^P(\tilde{g}_B) - W^P(\tilde{g}_A)]\right\}$

Plugging in the utilities' expressions yields:

$$\frac{C}{\lambda\psi h} = [\tilde{g}_B - \tilde{g}_A]\left[(\alpha^R)^2\frac{y^R}{y} - (\alpha^P)^2\frac{y^P}{y}\right] + [H(\tilde{g}_B) - H(\tilde{g}_A)]\left[(\alpha^P)^2 - (\alpha^R)^2\right]$$

Now, from Lemma 3, $H(\tilde{g}_B) - H(\tilde{g}_A)$ increases with inequality. Moreover, since $\alpha^P > \frac{1}{2} > \alpha^R$, $(\alpha^P)^2 - (\alpha^R)^2 > 0$. Therefore, the second summand in the right hand side increases with inequality. Furthermore, by Lemma 2, $\tilde{g}_B - \tilde{g}_A$ also increases with inequality. Finally, it is straightforward to check that the term $(\alpha^R)^2\frac{y^R}{y} - (\alpha^P)^2\frac{y^P}{y}$ also increases with inequality. Hence, the total private contributions to the campaign increases as society becomes more unequal.

The intuition for the proposition is that social classes have closer preferred policies in more equal societies. In that case, the cost for an interest group of having the opposite party winning the elections is reduced. Therefore, interest groups are less willing to contribute to electoral campaigns. Therefore, one may expect relatively more expensive electoral campaigns in high inequality countries. This remark supports Samuels (2001) assertive that Brazilian elections are relatively more expensive than the US one. Moreover, it highlights the importance of well regulating electoral campaigns in Latin America, since countries in the region display some of the highest Gini coefficients in the world.

The next part of the research project aims at developing an empirical methodology for testing this result. Next section presents the main econometric results for Brazil.

4. The cost of electoral campaigns in Brazil

"In 1993, for the 1994 elections on, Brazil's congress passed a law requiring all candidates to submit a *prestação de contas*, or a registry of campaign contributions, to the national electoral court, the Tribunal Superior Eleitoral (TSE) in Brasília. Violations of the law could result in fines, revocation of a candidacy" (Samuels, 2001). This resulted in a rich database on financing of electoral campaigns. Our first step in this research will be to explore that database.

There are elections every two years in Brazil. In 2006 there were elections for President, Senators and Chamber of Deputies' representatives, State Governors and State Assembly representatives. Two years earlier, in 2004, there were elections for Mayors, and Municipal Assembly representatives. Two years before that, in 2002, elections were held for the same positions as in 2006; in 2000, for the Mayors and Municipal Assembly representatives as in 2004, and so on.

For this analysis we initially performed an econometric analysis using the 2002 electoral data for the Senate, the Chamber of Deputies, State Governors and State Assembly representatives in section 4.1. Second, we performed an more careful analysis using the 2004 electoral data for the Municipality Mayors and the Municipality Chamber of Representatives.

4.1. Initial exploration: The 2002 elections at the State level

The dependent variable is the total campaign resources received by all candidates, as declared to the TSE. We used the following explanatory variables. The Gini index as a proxy for inequality; the average income as richer states may have different patterns of costs of electoral campaigns; an index of age fragmentation of the population as a proxy for how heterogeneous is the electorate in terms of age span.

The index of age fragmentation is calculated as $1-\sum_{j=1}^{10} v_j^2$ where v_j is the percentage of voters in age class *j*, one of the 10 age classes[11]. The less fragmented are voters' age classes, i.e., the more concentrated is population in a few age classes, the lower the index. On the other hand, the more fragmented are voters' age classes, the higher is the age fragmentation index.

The initial results are stimulating and challenging.

First, all selected regressions present the expected sign for the Gini coefficient, i. e., positive. That is, the higher the Gini coefficient, which corresponds to higher levels of inequality, the higher the campaign costs. However, the Gini coefficient was significant at the 5% level in 2 out of the 5

[11] The age classes are: 16 year old, 17 year old, 18 to 20 years old, 21 to 24 years old, 25 to 34 years old, 35 to 44 years old, 45 to 59 years old, 60 to 69 years old, 70 to 79 years old, above 79 years old.

regressions (both for the Senate), and it was significant at the 10% level only for 3 of them (Senate and Federal Chamber of Deputies). The regressions for State Governors and State Chamber of Deputies did not confirm a significant explanatory power for the Gini coefficient.

Second, the income coefficient pointed in a somewhat unexpected direction, with its negative sign: the higher the average income, the cheaper the electoral campaigns. Moreover the coefficient was significant at 5% level in all regressions, and was marginally significant at 1% level in 3 out of the 5 regressions.

Third, the estimated coefficient of the age fragmentation index was negative and significant at 1% level in all regressions. This suggests that the more age heterogeneous a society is, the more expensive elections are. One possible explanation for this result is that in more age-diverse societies different candidates specialize in different age electorate. This reduces competition and, therefore, the cost of the electoral campaign. On the other hand, when the population age is concentrated in a few age classes all candidates compete for the same voters, which increases the cost of elections.

We present the regression's results in Table 1, where * stands for statistically significant at 10%, ** stands for statistically significant at 5% and *** means statistically significant at 1%.

Table 1: 2002 Elections for the Senate, Brazilian Chamber of Deputies, Governors, State Chamber of Deputies

	Per voter cost for the Senate election	Per voter per candidate cost for the Senate election	Per voter cost for the Federal Chamber of Deputies election	Per voter cost for the State Governor election	Per voter cost for the State Chamber of Deputies election
Gini coefficient	15.82776** (6.89594)	3250.415** (1334.674)	641.0542* (351.1803)	18.39294 (20.45696)	155.8127 (144.2092)
Per capita income	-.0050524** (.002390)	-1.355971** (0.462547)	-.3266849** (.1217058)	-.0196166** (.0070896)	-.1346747** (.0499774)
Age fragmentation	-1.404204*** (0.370881)	-314.442*** (71.78219)	-63.72152*** (18.88738)	-5.269795*** (1.100228)	-22.12065*** (7.755942)
Constant	110.7528*** (30.33138)	-24884.2*** (5870.485)	5075.112*** (1544.646)	436.9085*** (89.97875)	1812.454*** (634.2958)
R^2	0.4116	0.4791	0.3639	0.5019	0.2995
Observations	27	27	27	27	27

4.2. The 2004 elections at the Municipal level

Campaign resources used at the municipal level can classified into three categories, as follows:

1) Party's transfers from national and state level boards;
2) Party's transfers from local units (local political committees);
3) Private donations (including private resources from the own candidates).

Since party funds are partially supplied by public contributions and we are more directly concerned with private contributions, our dependent variable will be total campaign resources received by all candidates exclusively from private donations (the third category above) in each Brazilian municipality, as declared to the TSE, in thousands of *reals* (the Brazilian currency denomination). It is noteworthy that, according to our database, the total amount of revenue and the total amount of campaign expenditures is equal, meaning that, in practice, all the resources are effectively spent by the candidates. We run three OLS regressions for the mayors' polls and three OLS regressions for the municipal assembly polls. Each successive regression included the previous regression variables as well as additional variables, as described below.

Regression 1:

i) The Gini index and the Gini times average per capita income, as proxies for inequality. The use of the latter variable aims at investigating whether the effect of inequality on the cost of electoral campaigns is more or less important in richer municipalities.

Regression 2:

ii) The amount of Party's transfers from national and state level boards (the first category of campaign revenue) in thousands of *reals*, in order to test whether there is a correlation between public and private campaign financing.

iii) The number of candidates and the square of the number of candidates; the number of voters and the square of the number of voters. These four variables were included in order to control for size effect both of the electorate and of the candidates[12].

iv) An index of age fragmentation of the population, as a proxy for how heterogeneous is the electorate in terms of age span. Similarly to section 4.1, the index of age fragmentation is calculated as $1-\sum_{j=1}^{10} v_j^2$, where v_j is the proportion of voters in age class j, one of the 10 age classes. As in the previous study, the higher the index, the more fragmented the population in different age groups.

[12] We also run regressions using revenue per voter, revenue per candidate and revenue per candidate, per voter, but the regressions using the total amount of revenues fitted the data better than these other alternative possibilities. This explains why we included the number of voter and the number of contesters.

v) An index of educational fragmentation, as a measure of how the municipal population is composed in terms of different levels of instruction. The index of educational fragmentation is calculated similarly to the age fragmentation index, except that we have 8 instruction levels. Therefore, the more homogeneous is the educational level of society, the lower the educational fragmentation index.

Regression 3:

vi) The effective number of candidates running for mayor and for the municipal assembly as proxies for electoral competition. More specifically, we considered the effective number of candidate in the contemporary election and also, in the previous election. The latter could be seen as an expectation about how competitive will be the coming race (which can, possibly, influence the amount of resources to be used during the electoral campaign) and the former can be viewed as a measure of the competitiveness of the previous election and its influence in the coming one.

vii) A dummy variable, which takes value 1 when a second round is to be held in the municipality (cities whose population is above 200,000 people). Note that a second round only applies to the mayors elections. Therefore, one would expect that variable to have no effect on the municipal assembly regression, but a positive effect in the mayors elections, making the campaign more costly.

viii) Only in the regressions using the mayor election data, we included four dummies of political alignment with higher levels of government. They were included in order to evaluate whether an alliance with elected politicians at higher levels of government can increase the level of private donations to the local race. These dummies take value 1 if:

viii.i) The incumbent mayor is of the same political party of the President;

viii.ii) The incumbent mayor is of the same political party of the State governor;

viii.iii) The winner (a challenger of the incumbent or the incumbent himself, in the case he/she is reelected) is of the same political party of the President;

viii.iv) The winner is of the same political party of the State governor.

Table 2 reports the results for the local Mayor election, where, as before, * stands for statistically significant at 10%, ** stands for statistically significant at 5% and *** means statistically significant at 1%. The estimated coefficients appear in the first line of each cell and the corresponding *t*-statistics appear in the second line, in parenthesis.

All regressions confirm, at the 1% level, that there is a positive correlation between the Gini coefficient and the cost of political campaigns, i.e., the more unequal a municipality, the more costly are mayors electoral campaigns. Moreover, Regression 1 suggests at the 1% level that this positive relationship increases as the average income in the municipality augments.

Neither party donations, nor the number of candidates, nor its square had any significance in none of the regressions. However, the number of voters affects in an increasing, concave way the costs of electoral campaigns, at the 1% level in all regressions.

The index of age fragmentation affected negatively the independent variable at the 1% level for all corresponding regressions (2 and 3), which confirms that elections tend to be cheaper in more age-heterogeneous societies, a result that was also found in the simples, governors' elections. In contrast, the educational fragmentation index is positive and significant at the 1% level for Regression 3 and at the 5% level for Regression 2. This suggests that more uniform education in society makes electoral campaigns cheaper.

The effective number of candidates appears negatively related to the independent variable, a result that is significant at the 1% level. This suggests that more competitive elections tend to receive less private contributions than less competitive ones. That result deserves further exploration; however, one possible explanation is that the more competitive an election is, the less clear is its result and, therefore, the riskier is the contribution viewed as a private agent's investment. Therefore, the less willing to contribute will be the private sector.

Finally, there is a clear increase in the cost of elections when there two electoral turns and there does not appear to be a significant effect of the political alignment variables.

Table 2: OLS Regressions for Mayors Elections in Brazil, 2004

Regression specifications	1	2	3
Gini index	657.752*** (89.501)	299.961*** (42.687)	325.295*** (44.589)
Gini index & per capita income	1.943*** (0.242)	0.074 (0.110)	0.036 (0.103)
Party donations		0.802 (0.535)	0.830 (0.507)
Number of candidates		5.779 (20.554)	21.148 (19.186)
Number of candidates Squared		3.753 (4.086)	1.723 (3.976)
Number of voters		3.8E-03*** (4.4E-04)	3.4E-03*** (4.6E-04)
Number of voters squared		-4.8E-10*** (5.6E-11)	-4.3E-10*** (5.7E-11)
Educational fragmentation		2.168*** (0.514)	2.328*** (0.497)

Age fragmentation		-12.310** (5.229)	-15.042*** (5.166)
Effective number of candidates in the current election			-17.343*** (5.984)
Effective number of candidates in the previous election			-1.094 (5.818)
Second round			313.996** (149.725)
Political alignment Governor & Incumbent mayor			-5.956 (4.657)
Political alignment President & Incumbent mayor			20.010 (15.910)
Political alignment Governor & winner			-12.873 (8.834)
Political alignment President & winner			0.439 (4.576)
Constant	-453.616*** (67.317)	703.876* (424.815)	935.496** (420.651)
Observations	5266	5266	5266
R^2	0.1259	0.7345	0.7402

We obtain comparable results for the elections of the local (municipal) Assembly representatives, which are reported in Table 3. We invite the reader to check its results.

Table 3: OLS Regressions for Municipal Assembly Representatives' Elections in Brazil, 2004

Regression specifications	1	2	3
Gini index	486.310*** (108.327)	107.710*** (20.988)	154.003*** (21.361)
Gini index & per capita income	1.875*** (0.423)	0.181*** (0.071)	0.105 (0.066)
Party donations		5.429*** (1.774)	5.723*** (1.861)
Number of candidates		-0.170 (0.364)	0.476 (0.351)
Number of candidates squared		5.6E-03** (2.5E-03)	4.2E-03* (2.4E-03)
Number of voters		2.4E-03*** (2.7E-04)	2.2E-03*** (3.3E-04)
Number of voters squared		-4.9E-11 (3.6E-11)	-1.7E-11 (4.3E-11)
Educational fragmentation		0.193 (0.287)	0.957*** (0.223)
Age fragmentation		3.358 (2.785)	-3.218 (2.613)
Effective number of candidates in the current election			-14.970*** (2.619)
Effective number of candidates in the previous election			-1.224 (2.335)
Second round			151.646 (96.512)
Constant	-398.780*** (98.760)	-366.663 (232.398)	147.239 (219.742)
Observations	5174	5174	5174

R^2	0.0836	0.9511	0.9539

5. Conclusion: The Brazilian case and beyond

The present study aims at better understanding the relationship between inequality and the cost of electoral campaigns, with a clear focus on high unequal countries. It is composed of two parts, a theoretic model and an empirical investigation. The theoretic analysis is based on a model of electoral competition with interest groups. The initial conclusion of that analysis suggests that elections tend to be more expensive in societies with higher levels of inequality. That suggestion was put to the test in the preliminary empirical study, which tends to confirm the result for Brazilian state elections of 2002. In addition, the empirical study hints that the more diverse is a society in terms of the age distribution of its citizens, the less expensive the electoral campaign. A more careful empirical study was then conducted using the electoral data for the 2004 Municipal elections in Brazil, both for Mayors and for the Municipal Assembly Representatives. This much larger database included over 5000 observations and confirmed this positive relation between inequality and the cost of electoral campaigns for the entire country. Moreover, the Municipal data confirms that income is negatively correlated with the index of age fragmentation. Furthermore, it is positively related with the index of educational fragmentation. Therefore, the more heterogeneous is the educational distribution in society, the more expensive are electoral campaigns. This last result suggests that education may play a role similar to income equality on campaign costs, which is an additional argument in favor of a more equally educated society.

However, these empirical results are restricted to the Brazilian case. Data on other developing countries and on the advanced economies may bring some light to this article's discussion.

Furthermore, on the theoretic point of view, one would like to be able to introduce the new significant variables that have been highlighted in the empirical study, in order to get a better understanding of the channels by which they affect the electoral costs.

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Appendix

Table 1: Regional Gini coefficients in 1993

(Distribution of persons by $PPP income per capita)

Africa	47.2
Asia	61.8
Latina America and the Caribbean	55.6
Eastern Europe and Former Soviet Union	46.4
Western Europe (EU-15)	32.4

Source: Boix (2004)