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Inequality and the Cost of Electoral Campaigns: Theoretic Predictions and Econometric Evidence for Brazil and Japan

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Abstract

Worldwide corruption scandal episodes frequently associate political corruption with the increasing costs of electoral campaign. This calls for better understanding the nature of electoral campaign financing. The present research analyzes the role of income inequality on the costs of elections. First, a game-theoretic, political economy model of voting in unequal constituencies concludes that higher income inequality increases the per capita private contributions to electoral campaigns. The intuition of that result is straightforward. As society gets more heterogeneous, parties representing different income groups support opposing policies; therefore, interest groups have higher incentives to contribute to the campaign, in order to avoid a very unfavorable policy being implemented if an opposing party wins. Next, that hypothesis is carefully tested using both cross-sectional electoral data from Brazilian 5564 municipalities and panel data from Japanese House of Councillor's prefectural-tier elections from 1977 to 2010. All tests support the hypothesis that more unequal societies engender more expensive elections.

Keywords: Elections, Campaign financing, political lobby, income inequality, Brazil, Japan.

JEL classification code: D72

1. Introduction

In September 1992 the Brazilian Lower House voted to impeach the first democratically elected President of Brazil in 30 years, Fernando Collor de Mello, accused of political corruption associated to, among others things, the unlawful use of campaign finance funds. As a result, Congress revised the country's electoral finance law in 1993 (Fleischer, 1997). Also in 1993, but on the other side of the globe, the Japanese National Diet "enacted the most far-reaching political reforms Japan has experienced since the American Occupation" (Reed, 2002). Among the three main goals of the reforms was "the reduction of the costs of elections, which would presumably reduce corruption" (Reed, 2002).

The two examples above show that the concern about the cost of electoral campaigns is present in such diverse countries as Brazil and Japan, extremely different not only in their geographic location but most fundamentally in their history, institutions, level of inequality and per capita income. Expensive electoral campaigns are naturally associated with political corruption, as stated in Reed (2002). Corruption is found to affect the efficient use of public resources and lower investment, contributing to a lower-than-potential growth (Mauro, 1995, 1996); in the medium run, it may keep a country away from attaining higher development levels. More fundamentally, it may affect the stability of democratic institutions by eroding public trust in the electoral process. In Brazil, according to Fleischer (1997), "[…] the rationale for the military intervention in 1964 was to 'end political corruption'." The result of that military intervention was the establishment of an authoritarian regime in Brazil that lasted for the following two decades.

Similarly, in Japan's fragile Taisho Democracy, "by 1932, endemic political corruption, Zaibatsu favoritism, and an ambitious military had eroded public support for the parties. After the assassination of Prime Minister Tsuyoshi Inukai by ultranationalists, the military took over the government with little visible public opposition" (Rosenbluth and Thies, 2010). This event led the country into a period of 13 years of authoritarian rule that only ended with the occupation of the Allied powers at the aftermath of World War II in 1945.

The previous examples suggest that understanding what affects the cost of electoral campaigns constitutes a fundamental endeavor in order to assess the prospects of democratic consolidation. The present research aims at exploring one answer to the question of what explains the cost of elections, by focusing on one of its possible causes, namely income inequality.

The work is both theoretic and empiric, and is divided in the following parts. First, after this introduction, chapter 2 develops a political economy model of voting in income-unequal constituencies. The main tool used there is game theory. The political game includes voters, political parties and interest groups. Voters tend to choose their representatives from the parties that announce policies closer to their preferred ones, but are also influenced by the electoral campaign. Political parties seek electoral victory and understand that the more money they spend in the campaigns, the more voters they will influence. Therefore, they seek private donations from interest groups in addition to their allotted public funds. In order to receive those donations, parties bias their political platforms in the direction of the lobby groups' preferred ones. Finally, lobbyists understand their effect on the electoral result and make private contributions in order to maximize the probability of a preferred policy being implemented. The main testable theoretic result of the political economy model is that more unequal constituencies tend to have more expensive (per capita) electoral campaigns. The main explanation for this result is that, as society gets more heterogeneous, parties representing different income groups implement opposing policies; therefore, interest groups have higher incentives to contribute to the electoral campaign, in order to avoid a very unfavorable policy to be implemented if an opposing party wins. Such incentives do not manifest in homogeneous societies, where income differentials are small and, thereby, party platform differences are also reduced.

The next chapters are dedicated to the systematic empirical testing of the theoretic hypothesis using data from Brazil and from Japan. All empirical calculations used the statistics software STATA, version 11, provided by IDE. Chapter 3 analyzes the Brazilian empirical evidence. It uses a cross-section database of two simultaneous local level elections, for mayors and for local assemblies. There are over 5000 municipalities in Brazil; therefore each regression consists of over 5000 observations. The regressions confirm the significant, at the 1% level, positive impact of inequality on the cost of electoral campaigns. In addition, several other explanatory variables are shown to affect the amount of private donations to candidates in both elections. In particular, it shows that elections are more expensive in constituencies that are also more heterogeneous in terms of educational attainment.

Chapter 4, then, turns to the case of Japan. The econometric study uses a thirty-three-year panel database including all elections for the Japanese Upper House, the House of Councillors' prefecture-wise elections, from 1977 to 2010. There are about 600 observations, one for each of the

47 prefectures for each one of the 12 election years within that period. The regressions confirm, also for the case of Japan, the significant, at the 1% level, positive effect of inequality on the cost of campaigns. In addition, several other explanatory variables are shown to affect the amount of private contributions received by candidates in these elections. In particular, it shows that prefectures that have higher numbers of farm household population tend to have cheaper electoral campaigns, whereas prefectures that have higher investment budgets tend to have more expensive electoral campaigns.

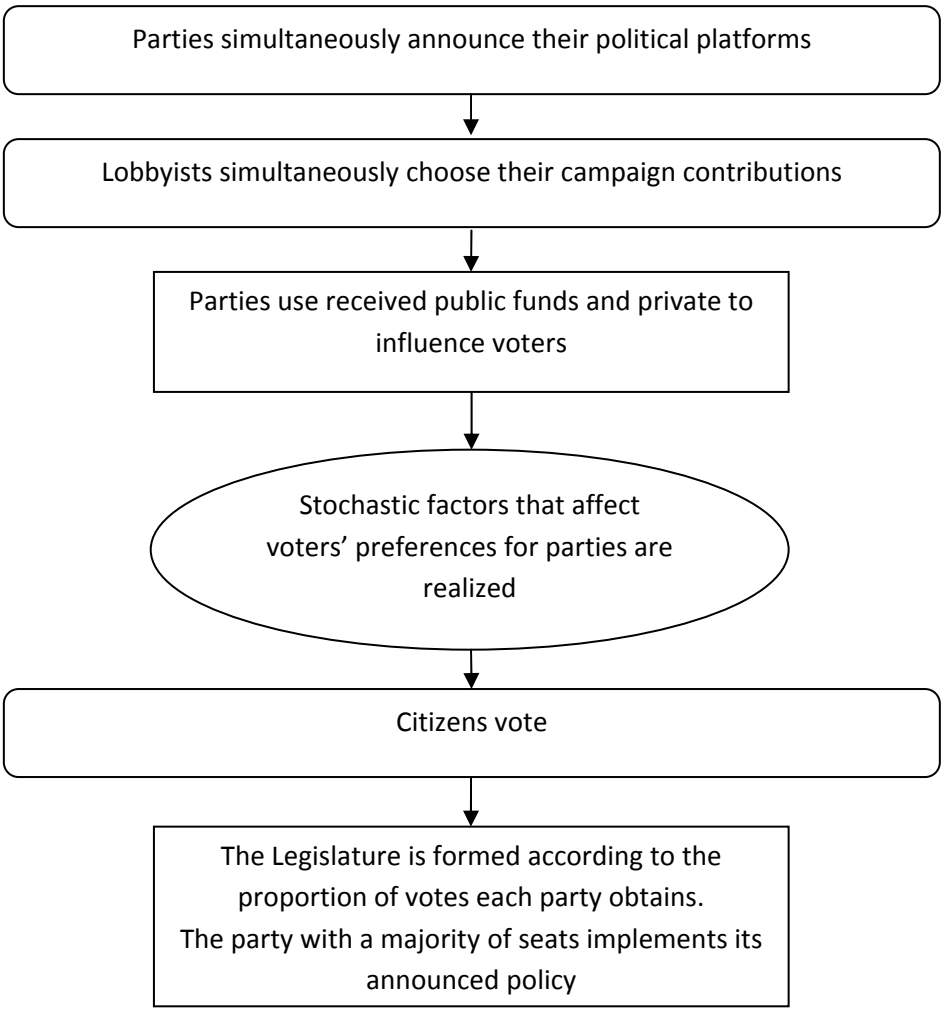
Finally, chapter 5 concludes by summarizing the main results, discussing some policy implications and presenting new directions for future research.

2. A political economy model of voting in unequal constituencies

This section draws heavily on Bugarin, Portugal & Sakurai (2010). It builds a stochastic model of electoral competition between ideological parties in the presence of interest groups, public and private electoral funding and pragmatic but impressionable voters. The electoral competition game between parties, lobbyists and voters is presented in Figure 2.1. The important hypothesis here is that parties announce their policies first, and then lobbyists 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, weights the effect of campaign spending and votes 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. For simplicity, the model assumes that the Legislature is composed of an odd number of seats. Therefore, one party always has a majority of seats.

Note that only the wider, curved rectangles correspond to real strategic decision in Figure 2.1. 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.

Figure 2.1: The electoral competition game



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 $\sum_J \alpha^J = \alpha^P + \alpha^R = 1$[1]. 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[2]. 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 strictly convex functions, where $(H')^{-1}$ is the inverse function of the derivative of *H*. The technical

[1] 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).

[2] 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).

assumptions are satisfied by the usual functional forms of utility such as $H(g) = g^{\beta}$, $0<\beta<1$ or $H(g) = \log(1+g)$. Expression (1) shows the pragmatic part of the utility of a voter of class *J*.

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

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 the 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 phenomena[3]. 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 $\psi>0$ 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

[3] A clear example of such a countrywide shock is the terrorist attack on September 11th, 2001, which increased the popularity of 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.

$\left[-\frac{1}{2\phi^J}, \frac{1}{2\phi^J}\right]$. 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*.

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[4].

Consider now the role of campaign contributions in the model. For simplicity, assume that overall campaign spending will affect the ideological component of a voter's utility function in a way that is linear to the difference between the total parties' expenditure. Then, the utility of a voter *i* in 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:

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

The parameter $h>0$ represents the effectiveness of campaign spending, i.e., how much the difference between party campaign expenditures can affect parties' 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 $W^J(g_A) > W^J(g_B) + \sigma^{iJ} + \delta + h(C_B - C_A)$.

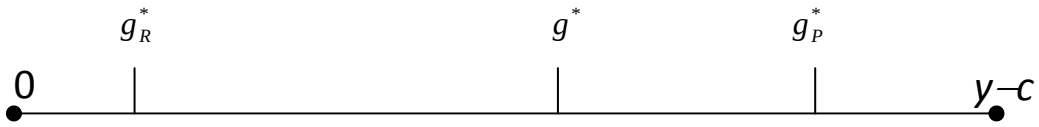
This comparison determines voters' electoral decision.

[4] 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.

2.2. A benchmark for welfare comparison

In order to determine a benchmark policy for future welfare comparison, first note that, at the ex-ante point of view, the stochastic variables have zero expected value. Therefore, we remove from voters' utilities the ideological part involving these stochastic components. Moreover, the expenditure influence component of voters' utilities has no real economic content and is also removed for welfare considerations. Hence, we endout with the ex-ante utility $W^J(g_P) = (y - g_P - c)\frac{y^J}{y} + H(g_P)$ for each agent *i* of class *J*. We want to determine what policy maximizes aggregate welfare according to the Bentham social welfare criterion. Therefore, we should maximize $W(g_P) = \sum_J \alpha^J W^J(g_P)$, which yields the socially optimal policy $g_P = g^* = (H')^{-1}(1)$. This will be our benchmark for welfare comparison henceforth. Figure 2.2 presents the relative positions of g_P^*, g_R^* and g^* in the policy interval [0, *y*–*c*].

Figure 2.2: The classes' preferred and the socially optimal policies



2.3. Lobbyists' contributions decision

From voters' electoral decisions, 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:

$$\sigma^J = W^J(g_A) - W^J(g_B) + h(C_A - C_B) - \delta \qquad (3)$$

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:

$$p_A = prob[\pi^A > 1/2] = prob[\delta < W(g_A) - W(g_B) + h(C_A - C_B)]$$

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[5]. Similarly, Japan allocates public finance according to the number of votes a party receives in the previous elections. Therefore, the present model assumes the total amount of 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* in the previous Legislature. 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* distribution by the government of the public funds for the electoral campaigns.

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

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 P is $\sum_J \alpha^J C_P^J$.

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

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

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:

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

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 δ 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 $C_A^J = C_B^J$. 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:

$$C_A^J = \max\left\{0, \psi h \alpha^J \left[W^J(g_A) - W^J(g_B)\right]\right\}$$
$$C_B^J = \max\left\{0, \psi h \alpha^J \left[W^J(g_B) - W^J(g_A)\right]\right\} \quad (8)$$

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,

$$C_A^J - C_B^J = \psi h \alpha^J [W^J(g_A) - W^J(g_B)] \quad (9)$$

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

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

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

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 $\bar{g}_A$, and party *B*, strictly preferring $\bar{g}_B$. 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.

$$U_A(p_A, p_B) = p_A(g_A, g_B) K - \gamma_A \mid \bar{g}_A - g_A \mid$$

$$U_B(p_A, p_B) = p_B(g_A, g_B)K - \gamma_B \mid \bar{g}_B - g_B \mid$$

The first summand of a party's utility represents its office-seeking motivation, the pragmatic or sociotropic part of their utility[6]. 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 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 $\left|\bar{g}_P - g_P\right|$ 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 $\bar{g}_A$ and $\bar{g}_B$. Since individuals create parties 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 the present model we will adopt a simpler approach, assuming that $\bar{g}_A = g_R^*$ and $\bar{g}_B = g_P^*$, i.e., party *A* represents the rich class whereas party *B* represents the poor class.[7]

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,

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

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

$\left|\bar{g}_A - g_A\right| = g_A - g_R^*$. 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 $\left|\bar{g}_B - g_B\right| = g_P^* - g_B$. 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 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 $\hat{y} = \dfrac{\alpha^P(1+\psi h^2\alpha^P)y^P + \alpha^R(1+\psi h^2\alpha^R)y^R}{\alpha^P(1+\psi h^2\alpha^P) + \alpha^R(1+\psi h^2\alpha^R)} = \dfrac{y + \psi h^2\left[\left(\alpha^P\right)^2 y^P + \left(\alpha^R\right)^2 y^R\right]}{\hat{\alpha}}$,

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

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)[8]. 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 $\tilde{g}_A = \tilde{g}_B = g^L = H^{-1}\left(\frac{\hat{y}}{y}\right) \neq g^*$. 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 $\hat{y}$.

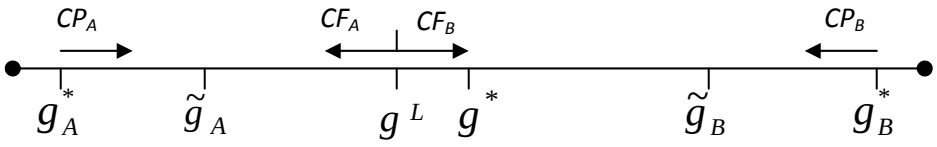
Fourth, in the presence of lobby and parties' ideological rigidity (i.e., positive values of h, γ_A and γ_B), then parties will differentiate themselves by announcing opposing policies with $\tilde{g}_A < g^L < \tilde{g}_B$. In this case, there will be no convergence of announced platforms, and therefore, 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, there is a centripetal movement (*CP*) towards platform g^L. Next, there is a centrifugal movement (*CF*) away from g^L, towards each party's respective ideological preference, g_A^* and g_B^* (Figure 2.3). Parties' final announcements, $\tilde{g}_A$ and $\tilde{g}_B$, are the compositions of these two opposing movements. A balance

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

between the search for interest groups support and the degree of the ideological rigidity will determine the optimal announcement.

Figure 2.3: Parties' centripetal and centrifugal movements



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

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

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 $\frac{\partial \tilde{g}_B}{\partial \gamma_B} > 0$.

2.5. 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.

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

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

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

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, while keeping the respective population sizes α^P and α^R constant, 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

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

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

Since $\beta = \left(\alpha^P\right)^2 \frac{y^P}{y} + \left(\alpha^R\right)^2 \frac{y^R}{y}$, we can write $\frac{\hat{y}}{y} = \frac{1+\psi h^2\beta}{\hat{\alpha}}$. 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.

Figure 2.4: The effect of inequality on the difference between parties' announced policies

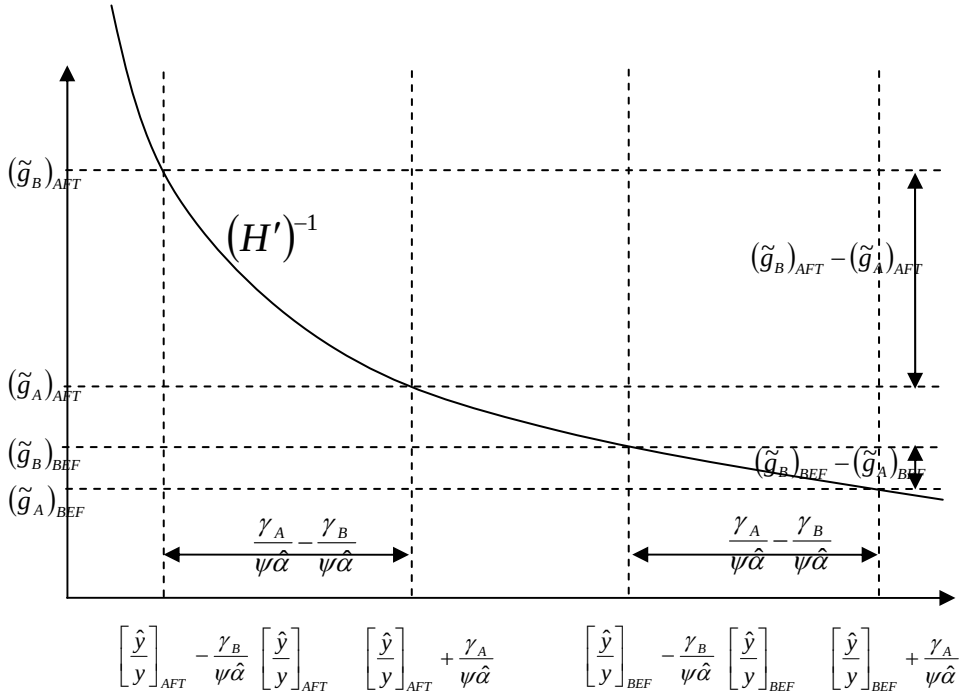


Figure 2.4 presents this shift, where the index *BEF* refers to the original situation (before) and the index *AFT* refers to the situation after the increase in inequality. Note that, since $\left(\left[\frac{\hat{y}}{y}\right]_{BEF}+\frac{\gamma_A}{\psi\hat{\alpha}}\right)-\left(\left[\frac{\hat{y}}{y}\right]_{BEF}-\frac{\gamma_B}{\psi\hat{\alpha}}\right)=\frac{\gamma_A}{\psi\hat{\alpha}}-\frac{\gamma_B}{\psi\hat{\alpha}}=\left(\left[\frac{\hat{y}}{y}\right]_{AFT}+\frac{\gamma_A}{\psi\hat{\alpha}}\right)-\left(\left[\frac{\hat{y}}{y}\right]_{AFT}-\frac{\gamma_B}{\psi\hat{\alpha}}\right)$ 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.

Proposition. 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:

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

Plugging in the utilities' expressions yields:

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

Now, from Lemma 3, $H(\tilde{g}_B) - H(\tilde{g}_A)$ increases with inequality. Moreover, since $\alpha^P > \frac{1}{2} > \alpha^R$, $\left(\alpha^P\right)^2 - \left(\alpha^R\right)^2 > 0$. 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 $\left(\alpha^R\right)^2 \frac{y^R}{y} - \left(\alpha^P\right)^2 \frac{y^P}{y}$ also increases with inequality. Hence, the total private contributions to the campaign increase 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. Furthermore, the result also constitutes a warning for Japan which, in spite of being one of the most equalitarian societies in the world, has witnessed and increase in income inequality in the recent years.

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

3. The econometric evidence for Brazil

3.1. Brazilian electoral system[9]

Brazil was discovered by Portuguese sailor Pedro Álvares Cabral on 22 April 1500. It remained a colony of Portugal until 1808 when the king of Portugal, Dom João VI, and his court fled to Brazil following an invasion of his kingdom by Napoleon Bonaparte in 1807. The kingdom was renamed the United Kingdom of Portugal, Brazil and Algarves, which capital was set to be Rio de Janeiro until 1820, when the Dom João VI returned to Portugal after Napoleon's defeat. The king left in Brazil, as regent, his son Dom Pedro who finally broke with Portugal and declared independence on 7 September 1822.

Brazil then became a monarchy under the rule of emperor Dom Pedro I, succeeded in power by his son, Dom Pedro II. The empire structure came to an end in 1889 when a republic was established in the country.

The constitution of the so-called "Old Republic" established a decentralized federalism that accorded to the states wide autonomy, inspired in the U.S. model. The republic was dominated by strong states' oligarchies, especially the coffee rich state of São Paulo and the rich dairy products producer state of Minas Gerais in a political equilibrium denominated "Café com leite", coffee with milk, where these two states took turns in the presidency.

The Old Republic delicate balance was broken by 1930 as a consequence of the great depression as well as a series of internal and external difficulties, culminating in the proclamation of the "Estado Novo" by a southern leader, Getúlio Vargas. Vargas conducted an authoritarian, fascist-style regime until he was forced to resign at the end of World War II, in which the country participated on the allied side.

The year 1945 marked the beginning of a new period characterized by a flourishing constitutional democracy supported by economic growth but also subjected to political unrest and social mobilization. The democratic post-war experience, which saw the building of the new modern

[9] The present section is based on the presentation in Hagopian (2010).

capital, Brasilia, ended in April 1964 with a military “coup d’état” amid economic instability and social and political unrest.

A 20-year military rule ended in 1985 when the first civilian president since 1964 took office. In 1988 a new “Citizen Constitution” was established ensuring wide political, religious, ethnic and social rights and liberty. The new democracy has been solidifying over the years as the public democratic institutions consolidate, universal suffrage becomes the rule, education becomes universal and the country is finally dealing in a significant way with its lasting income inequality history.

Brazil is presently a presidential federative republic composed of 26 states, one Federal District and 5564 municipalities. In Brazilian constitution the states and municipalities are awarded the status of members of the federation, which grants them constitutional autonomy and discretion.

There are executive, legislative and judiciary branches at all levels of government.

The federal government’s executive branch is directed by the President, who is both the head of state and the head of government, and is elected for four-years terms, with one possible consecutive reelection (non consecutive elections are not restricted). Similarly, each one of the 26 states, the Federal District and each one of the 5564 municipalities elect their governors and mayors (for the municipalities) for four-years terms with the same reelection constraints. The elections for president, governors and mayors are staggered, so that municipal elections are held two years after the presidential and state governors elections.

The federal legislative branch is bicameral, with an upper house, the Federal Senate and a lower house, the Chamber of Deputies, forming a balanced system in which no house dominates the other. The Senate is meant to equally represent the higher members of the federation and is composed by three senators from each state and the Federal District. Senators are elected in a SVNT single state constituency system for eight-year terms in staggered elections that are held every four years for one-third and two-thirds of the Senate respectively.

The Chamber of Deputies is meant to represent the entire country population and is composed of 513 deputies from the states and the Federal District. Deputies are elected in state-wise single districts in a single proportional system for four-year terms. The size of each state delegation is roughly proportional to its population, with the caveat that there is a minimum of eight and a

maximum of seventy deputies per state, which over represents the low population states and under represents the high population states.

The states and municipalities' legislative branch are unicameral and are elected in one single constituency by a single voter proportional system. There are no term limits for the legislative representatives.

Finally, the judicial branch is an independent body composed of specialized courts which are the Supreme Court, the Superior Court, Regional Federal Appeal Courts (five regions), labor courts, electoral courts, military courts and state courts. Most important to this article, the electoral courts were introduced in 1932 to investigate fraud in the Old Republic elections. The Tribunal Superior Eleitoral, the higher electoral court, rules over all areas regarding parties, mandates of elected representatives, admissibility of candidacies, counting ballot procedures, notably the all electronic voting system used in Brazil, and even the constitutionality of electoral legislation.

3.2. The data

The cross section econometric analysis for Brazil will focus on the 2004 elections for the Brazilian municipalities. In each of the 5564 Brazilians municipalities citizens voted simultaneously for mayors in a plurality system with second round runoff in municipalities with a population of 200,000 or more, and for local assembly representatives, the municipal legislature, in a proportional municipality-wide single constituency system. The econometric study tests if the relationship between electoral campaign private donations and inequality suggested by the theoretic model holds for these elections. Most of the basic data used here is common to the data used in Bugarin, Portugal and Sakurai (2011). All tables presented below are author's calculations using STATA statistical package.

3.2.1. The dependent variables

The main dependent variables are the aggregate electoral contributions candidates running respectively for mayors and for municipal assembly representatives received during the 2004 municipal elections. Campaign resources used at the municipal level are classified into three

categories: party's transfers from national and state level boards; party's transfers from local units (local political committees); and 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 variables are based on total campaign resources received by all candidates exclusively from private donations (the third category above) in each Brazilian municipality, as declared to the *Tribunal Superior Eleitoral* (TSE, the Higher Elections Court, the Brazilian Electoral Management Body, http://www.tse.jus.br/), in thousands of *reais* (the Brazilian currency denomination).

The detailed, per candidate data, were obtained from the TSE. The per-candidate data were then aggregate per city (municipality), for the elections for mayors and for local assembly representatives, to form the variables Tdonm, total private donations for mayor election, and Tdona, total private donations for local assembly election, respectively. Next we divided the variable Tdonm by the city population, and the number of voters in the city, to form the variables Tdonmpop and Tdonmvot, respectively, for the mayor elections. Similarly, we divided the variable Tdona by the city population, the number of voters in the city, and the number of voters in the city and by the number of seats, to form the variables Tdonapop, Tdonavot and Tdonavotst, respectively, for the local assembly elections. The population data where obtained from the 2000 Brazilian population census, IBGE (Instituto Brasileiro de Geografia e Estatística, the Brazilian Institute of Geography and Statistics, http://www.ibge.gov.br/home/default.php), whereas the number of voters and the number of seats were obtained from the TSE electoral database.

Then we applied the log transformation to obtain the dependent variables used throughout the study. These variables are described below.

Logtdonmpop: The 10-base logarithm of the per-thousand citizens' private donations received by the candidates for the mayor election.

Logtdonapop: The 10-base logarithm of the per-thousand citizens' private donations received by the candidates for the local assembly elections.

Logtdonmvot: The 10-base logarithm of the per-thousand voters' private donations received by the candidates for the mayor election.

Logtdonavot: The 10-base logarithm of the per-thousand voters' private donations received by the candidates for the local assembly elections.

Logtdonavotst: The 10-base logarithm of the per-thousand voters, per seats' private donations received by the candidates for the local assembly elections.

Table 3.1 below presents the summary statistics of the alternative campaign private donations variables used in this study and of their log transformations. The econometric studies only used the log versions of the campaign donations figures.

Table 3.1: Summary statistics of the dependent private campaign donations variables

Variable	Obs	Mean	Std. Dev.	Min	Max
tdonmpop	5266	6657.52	7444.19	0.00	111564.10
tdonmvot	5266	8786.31	9370.62	0.00	151399.60
tdonapop	5174	3285.18	3096.79	0.00	36654.09
tdonavot	5174	4351.23	3932.57	0.00	52985.63
tdonavotst	5174	476.33	438.77	0.00	5887.29
logtdonmpop	5170	8.32	1.15	-1.29	11.62
logtdonmvot	5170	8.62	1.14	-1.08	11.93
logtdonapop	5130	7.70	1.04	-2.57	10.51
logtdonavot	5130	7.99	1.02	-2.36	10.88
logtdonavtst	5130	5.77	1.03	-4.56	8.68

3.2.2. The explanatory variables

The main explanatory variable is the Gini coefficient. According to the theoretic model, we expect the Gini coefficient to be positively related to the cost of electoral campaigns, i.e., the more unequal a prefecture is, the more expensive the electoral process should be.

Several additional explanatory variables were tested. The main significant ones and their motivation are described below.

Socio-economic indicators:

Loginc: The 10-base log of the municipality income. This variable is meant to check if private campaign donations are higher or lower in richer municipalities. The municipalities' incomes where obtained from *Secretaria do Tesouro Nacional* (STN, the Brazilian Treasury Secretariat).

Educfrag: The population educational fragmentation index. This variable is a proxy for how heterogeneous is the electorate in terms of educational attainment. The index of educational fragmentation is calculated as $1-\sum_{j=1}^{8}\varepsilon_j^2$, where ε_j is the proportion of voters in class *j*, one of the 8 instruction levels. Therefore, the more homogeneous is the educational level of society, the lower the educational fragmentation index. The objective of this variable is to test whether more educated cities have cheaper electoral campaigns. The instruction level information was obtained from the TSE.

Demographic indicators:

Percyoung: The percentage of young population, below 15 years old, in the municipality. Percold: The percentage of old citizens, above 65 years old, in the municipality. These two variables aim at testing if younger and/or older people participate more in the electoral process, making it more expensive.

Agefrag: The age fragmentation index 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 proportion of voters in age class *j*, one of the 10 age classes. Therefore, the higher the index, the more fragmented the population in different age groups. To check if age heterogeneity increases the cost of electoral campaigns.

Percurbanpop: The percentage of urban population. To check if elections tend to be more expensive in the more urban municipalities.

The demographic data were based on the 2000 population census, IBGE.

Electoral indicators:

Candm, canda: The number of candidates running in for mayor and for the local assembly representatives, respectively. To test if higher competition implies higher electoral costs in the per capita terms.

Vot: The number of voters, in 1000 people. To check if there are gains of scale that could reduce the per capita cost of campaigns as the number of voters increase.

D2r: A dummy variable, which takes value 1 when a second round is to be held in the municipality. This happens in Brazil in cities with a population above 200,000 people, when the candidate with a plurality of votes does not have at least 50% of valid votes. In that case only the candidates who obtained the two highest numbers of votes compete in the second round. It is expected that a second round would increase the cost of elections. Note that a second round only applies to the mayors' elections. Therefore, this variable will only be included in the elections for mayors.

Incumbent: A dummy variable that takes value 1 if there is an incumbent among the candidates for mayor. One would expect that the presence of an incumbent would reduce the competition, due to the incumbency advantage and, thereby, reduce the cost of electoral campaigns. Naturally, this variable will only be used in the mayors' elections.

All electoral variables were obtained from the TSE.

Administrative regions variables:

Brazil is divided in five administrative regions, each of which encloses several states. The different regions display different patterns of immigration, history, development, GDP, among others. We include the region variables to test whether there is a regional component to the cost of electoral campaigns.

NO: Northern region; includes the states of Acre, Amapá, Amazonas, Pará, Rondônia, Roraima and Tocantins.

NE: Northeastern region; includes the states of Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte and Sergipe.

CO: Center western region; includes the states of Mato Grosso, Mato Grosso do Sul, Goiás and the Federal District.

SE: Southeastern region; includes the states of São Paulo, Rio de Janeiro, Espírito Santo and Minas Gerais.

SU: Southern region; includes the states of Paraná, Rio Grande do Sul and Santa Catarina.

In order to avoid perfect collinearity, the SE region dummy is removed from the regressions.

The summary statistics of the explanatory variables are presented in Table 3.2. Moreover, Table 3.3 presents the expected signs of these variables for each one of the three dependent variables' regressions, for each type of election.

Table 3.2: Summary statistics of the main control variables

Variable	Obs	Mean	Std. Dev.	Min	Max
gini	5266	0.56	0.06	0.36	0.82
loginc	5266	14.46	1.35	11.24	22.69
educfrag	5266	72.39	4.40	47.78	83.43
percyoung	5266	0.32	0.05	0.17	0.54
percold	5266	0.06	0.02	0.01	0.16
agefrag	5266	83.80	1.04	78.55	86.46
percurbanpop	5266	63.88	24.08	0	100
vot	5266	22.009	138.292	0.829	7771.274
candm	5266	2.35	1.01	1	11
canda	5174	38.23	37.55	1	858
seat	5266	9.33	1.89	9	55

Table 3.3: Expected signs of the control variables

Variable	Expected signs				
	logtdonmpop	logtdonmvot	logtdonapop	logtdonavot	logtdonavotst
gini	+	+	+	+	+
loginc	?	?	?	?	?
educfrag	+	+	+	+	+
percyoung	–	–	–	–	–
percold	–	–	–	–	–
agefrag	?	?	?	?	?
percurbanpop	+	+	+	+	+
vot	?	–	?	–	–
candm	+	+			
canda			+	+	+
seat			+	+	–
incumbent	–	–	–	–	–

3.3. The cross-section regressions

The econometric evidence for Brazil is separated in the two different elections, for mayors and for local assembly representatives.

3.3.1. The 2004 elections for mayors

First we regressed the per capita total private donations for the mayor's elections on the explanatory variables. The Breush-Pagan test yielded a chi-square statistic of $\chi^2(1)= 305.81$, which shows clear evidence of linear heteroskedasticity; moreover, the White test yielded a chi-square statistic of $\chi^2(123)= 358.89$ which also confirms evidence of heteroskedasticity. Therefore, we used robust standard error estimates. The regression results are presented in Table 3.4. Throughout this article

we use * to indicate a significant result at the 10% significance level, ** to indicate a significant result at 5% significance level and *** to indicate a significant result at the 1% significance level.

Table 3.4: Per-thousand-inhabitant electoral campaign private donations and inequality

The elections for mayors' cross-section regression

logtdonmpop	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
gini***	1.23	0.29	4.27	0.000	0.67	1.80
loginc***	-0.44	0.02	-25.38	0.000	-0.47	-0.41
educfrag***	0.03	0.00	8.48	0.000	0.03	0.04
percyoung***	-2.12	0.57	-3.71	0.000	-3.25	-1.00
percold***	-8.29	1.33	-6.24	0.000	-10.89	-5.68
agefrag	-0.03	0.02	-1.34	0.179	-0.08	0.02
percurbanpop***	0.0023	0.0007	3.11	0.002	0.0008	0.0037
candm***	0.33	0.02	18.59	0.000	0.29	0.36
vot**	-0.0003	0.0001	-2.21	0.027	-0.0005	0.0000
d2r***	0.47	0.13	3.67	0.000	0.22	0.72
incumbent	0.03	0.03	1.21	0.226	-0.02	0.09
NO*	0.11	0.06	1.90	0.058	0.00	0.23
CO***	0.64	0.06	10.17	0.000	0.52	0.76
SE**	-0.10	0.04	-2.26	0.024	-0.19	-0.01
SU***	-0.29	0.05	-5.61	0.000	-0.39	-0.19
_cons***	14.55	2.01	7.23	0.000	10.60	18.49

5170 observations, R^2: 0. 2491

*** Significant at 1%; ** significant 5%; * significant at 10%

Except for the age fragmentation and the incumbent variables, all explanatory variables used here are significant. In particular, the inequality affects positively the cost of electoral campaigns and is significant at the 1% level. Furthermore, educational fragmentation, urban population, the number of competing candidates and the presence of a second round all increase the per capita cost of

electoral campaigns. The positive sign of the coefficient of the percentage of urban population suggests that campaigns tend to be more competitive in the cities and that there is more citizens engaged in the electoral process there.

On the other hand, the richer the municipality and the higher the number of voters, the lower appears to be the volume of per capita donations.

Furthermore, the lower the proportion of young and old citizens in the population, the lower the volume of private contributions. This result seems natural, as younger and older people are not required to vote in Brazil and, in fact, do vote less that citizens at intermediate age. In addition, citizens at those ages tend to be less wealthy, therefore, are expected to contribute less to the campaigns.

Moreover, campaigns seem more expensive in the northern and center western regions and cheaper in the Southeastern and Southern regions, compared to the Northeastern region.

Except for the NO and SE region variables and the number of voters variable, which are significant at 5%, all significant independent variables are significant at the 1% level.

It is noteworthy that educational fragmentation of the population also raises the cost of electoral campaigns in Brazil. This may be due to the fact that, in order to reach heterogeneous constituents, politicians need to use a greater variety of instruments, which increases the need for resources. A clear policy implication is that investment in education, as a byproduct, can help reduce the cost of electoral campaigns, in addition to, naturally, reduction on the level of inequality and an increase in average income as well. This is particularly good news for Brazil, a country that is been able to reduce income inequality, to augment education standards and grow over the last two decades.

Next we regressed the per-thousand-voter private donations on the same variables. Here again both the Breusch-Pagan test ($\chi^2(1)= 341.60$) and the White test ($\chi^2(123)= 365.46$) indicate the use of robust estimators. Table 3.5 presents the corresponding regression results.

Table 3.5: Per-thousand-voters electoral campaign private donations and inequality: The elections for mayors' cross-section regression

logtdonmvot	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
gini***	1.12	0.29	3.92	0.000	0.56	1.68
loginc***	-0.39	0.02	-22.76	0.000	-0.43	-0.36
educfrag***	0.03	0.00	8.26	0.000	0.03	0.04
percyoung*	-1.00	0.57	-1.77	0.077	-2.11	0.11
percold***	-8.05	1.32	-6.10	0.000	-10.64	-5.46
agefrag	-0.02	0.02	-1.00	0.317	-0.07	0.02
percurbanpop**	0.0014	0.0007	1.99	0.047	0.0000	0.0029
candm***	0.32	0.02	18.52	0.000	0.29	0.36
vot***	-0.0003	0.0001	-2.77	0.006	-0.0006	-0.0001
d2r***	0.43	0.12	3.50	0.000	0.19	0.68
incumbent	0.03	0.03	1.03	0.301	-0.03	0.08
NO**	0.15	0.06	2.53	0.012	0.03	0.26
CO***	0.66	0.06	10.48	0.000	0.53	0.78
SE**	-0.10	0.04	-2.27	0.023	-0.18	-0.01
SU***	-0.25	0.05	-5.01	0.000	-0.35	-0.15
_cons***	13.21	1.99	6.65	0.000	9.32	17.11

5170 observations, R^2: 0. 2413
*** Significant at 1%; ** significant 5%; * significant at 10%

This second regression exhibits similar results to the previous one. First, it strongly reinforces, at the 1% level, that higher inequality induces higher volumes of campaign contributions. The main differences are that the role of the percentage of younger population becomes significant only at the 10% level, the percentage of urban population at the 5% level, and, on the other hand, the number of voters becomes significant at the 1% level.

3.3.2. The 2004 elections for the municipal assemblies

First we regressed the per capita total private donations for the municipal assembly's elections on the explanatory variables. Note that for this study the incumbent and second turn variables have been removed and the number of seats under dispute variable has been introduced. The Breush-Pagan test yielded a chi-square statistic of $\chi^2(1)= 77.24$, which shows clear evidence of linear heteroskedasticity; moreover, the White test yielded a chi-square statistic of $\chi^2(109)= 260.90$ which also confirms evidence of heteroskedasticity. Therefore, we used robust standard error estimates. The regression results are presented in Table 3.6.

Table 3.6: Per-thousand-inhabitant electoral campaign private donations and inequality

The elections for local assemblies' cross-section regression

logtdonapop	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
gini***	1.32	0.25	5.22	0.000	0.82	1.81
loginc***	-0.41	0.02	-23.88	0.000	-0.45	-0.38
educfrag***	0.02	0.00	6.60	0.000	0.01	0.03
percyoung***	-3.83	0.55	-6.96	0.000	-4.91	-2.75
percold***	-5.49	1.25	-4.41	0.000	-7.93	-3.05
agefrag**	-0.06	0.02	-2.52	0.012	-0.10	-0.01
percurbanpop***	-0.0017	0.0006	-2.66	0.008	-0.0030	-0.0005
vot***	-0.0010	0.0002	-5.35	0.000	-0.0013	-0.0006
canda***	0.0168	0.0008	20.51	0.000	0.0152	0.0184
seat***	-0.05	0.02	-2.99	0.003	-0.09	-0.02
NO***	0.15	0.06	2.73	0.006	0.04	0.26
CO***	0.38	0.06	6.66	0.000	0.27	0.49
SE***	-0.67	0.05	-13.96	0.000	-0.76	-0.57
SU***	0.14	0.04	3.23	0.001	0.06	0.23
_cons	18.03	1.91	9.44	0.000	14.29	21.78

5170 observations, R^2: 0. 2567

*** Significant at 1%; ** significant 5%; * significant at 10%

This third regression confirms the main results of the previous ones. First, it strongly reinforces, at the 1% level, that higher inequality induces higher volumes of campaign contributions. The main qualitative difference is that, except for the age fragmentation variable, all variables are significant at the 1% level. The age fragmentation variable, which was insignificant before, is now significant at the 5% level and negative. It suggests that having a more fragmented society in terms of age reduces the volume of private contributions. Since this is a proportional election with large number of seats, a greater segmentation of the population in different age groups may allow candidates to focus their campaigns towards specific age groups, permitting certain specialization which may reduce the costs needed to obtain a necessary number of votes to be elected.

An important difference regards the role of the percentage of urban population. For the local assemblies' elections that variable takes more significance (1% significance level) and changes signs. Its contribution is now negative, reducing the volume of contributions. This would suggest that elections for local representatives might be less expensive in urban areas.

Another difference is that, for the case of municipal assemblies, the Southern region donors seems to contribute more than the Northeastern region, reversing the result for the mayors' elections.

Finally, the new variable, the number of seats, appears to reduce the total contribution, a somewhat counterintuitive result.

Next we regress the per voter total private donations for the municipal assembly's elections on the same explanatory variables. Once again both the Breusch-Pagan test ($\chi^2(1)= 106.83$) and the White test ($\chi^2(109)= 260.24$) indicate the use of robust estimators. Table 3.7 presents the corresponding regression results.

Table 3.7: Per-thousand-voters electoral campaign private donations and inequality

The elections for local assemblies' cross-section regression

logtdonavot	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
gini***	1.20	0.25	4.79	0.000	0.71	1.69
loginc***	-0.36	0.02	-21.06	0.000	-0.39	-0.33
educfrag***	0.02	0.00	6.34	0.000	0.01	0.03
percyoung***	-2.65	0.55	-4.84	0.000	-3.73	-1.58
percold***	-5.16	1.24	-4.16	0.000	-7.58	-2.73
agefrag**	-0.05	0.02	-2.24	0.025	-0.10	-0.01
percurbanpop***	-0.0025	0.0006	-3.98	0.000	-0.0038	-0.0013
vot***	-0.0010	0.0002	-5.79	0.000	-0.0013	-0.0006
canda***	0.0164	0.0008	20.36	0.000	0.0149	0.0180
seat***	-0.05	0.02	-3.08	0.002	-0.09	-0.02
NO***	0.18	0.05	3.37	0.001	0.08	0.29
CO***	0.40	0.06	7.00	0.000	0.29	0.51
SE***	-0.66	0.05	-13.79	0.000	-0.75	-0.56
SU***	0.18	0.04	4.05	0.000	0.09	0.27
_cons	16.75	1.88	8.89	0.000	13.05	20.44

5170 observations, R^2: 0. 2487

*** Significant at 1%; ** significant 5%; * significant at 10%

The results of this second regression essentially confirm, in significance, sign and magnitude as well, the previous one, adding to the robustness of the result.

Finally, we regressed the per voter, per seat total private donations for the municipal assembly's elections on the same explanatory variables. Once again, both the Breusch-Pagan test ($\chi^2(1)$= 109.63) and the White test ($\chi^2(109)$= 261.50) indicate the use of robust estimators. Table 3.8 presents the corresponding regression results.

Table 3.8: Per-thousand-voters-per-seat electoral campaign private donations and inequality

The elections for local assemblies' cross-section regression

logtdonavotst	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
gini***	1.24	0.25	4.96	0.000	0.75	1.74
loginc***	-0.37	0.02	-22.15	0.000	-0.41	-0.34
educfrag***	0.02	0.00	6.19	0.000	0.01	0.03
percyoung***	-2.67	0.55	-4.88	0.000	-3.74	-1.60
percold***	-5.09	1.24	-4.11	0.000	-7.52	-2.67
agefrag**	-0.05	0.02	-2.19	0.029	-0.10	-0.01
percurbanpop***	-0.0025	0.0006	-3.89	0.000	-0.0037	-0.0012
vot***	-0.0008	0.0002	-4.27	0.000	-0.0011	-0.0004
canda***	0.0163	0.0008	20.19	0.000	0.0147	0.0179
seat***	-0.12	0.02	-6.35	0.000	-0.15	-0.08
NO***	0.19	0.05	3.45	0.001	0.08	0.30
CO***	0.41	0.06	7.22	0.000	0.30	0.52
SE***	-0.65	0.05	-13.61	0.000	-0.74	-0.56
SU***	0.19	0.04	4.28	0.000	0.10	0.28
_cons***	15.20	1.88	8.06	0.000	11.50	18.89

5170 observations, R^2: 0. 2632

*** Significant at 1%; ** significant 5%; * significant at 10%

The results of this third regression repeat again, in significance, sign and magnitude as well, the previous ones, reinforcing the robustness of the result. Note that, in spite of the fact that we divided the total private campaign contributions by the number of seats, the variable seats remains significant and still contributes to a reduction in private contributions.

4. The econometric evidence for Japan

4.1. Japanese electoral system[10]

Archeological data points to the existence of a primitive culture in Japan as old as 11,000 B.C., the so-called Jomon era. The introduction of metal (bronze and iron) technology and wet-field rice agriculture by 300 B.C. initiated a new era described as the Yayoi culture, which was followed by the Kofun era roughly from 300 to 710 D.C. It was during that period that written language was introduced in the country, together with Buddhism, both imported from China. That era also gave Japan its first written constitution as well as legal codes.

After a period characterized by constant wars between local warrior clans, the Tokugawa clan was finally able to unify the country under its strong rule from Edo, present-day Tokyo, by 1600 D.C. The Tokugawa maintained Japan closed to contact with the rest of the world for over 250 year until 1853, when the U.S.A. sent a fleet of modern steam vessels to the bay of Edo to deliver a letter from president Millard Fillmore demanding the opening of Japanese ports to U.S. trade.

The impressive military superiority demonstrated by the U.S. fleet and the increasing expansion of western countries into Asia motivated a radical change in Japanese politics, with the deposition of the Tokugawa clan in 1868 to reinforce the Meiji Emperor's leadership, a movement that was given the name of "Meiji restoration".

The Meiji restoration initiated a period of fast modernization of Japanese structures and saw, among other things, the establishment of the Imperial Diet in 1889 as established in the Meiji constitution. The Imperial Diet was a bicameral legislature inspired in the European parliamentary democracies, but it had no control over the cabinet and, therefore, had a smaller role in the balance of powers in Japan. However, the Diet had the authority to reject the budget proposed by the government, among other actions, so the cabinet had to negotiate with the newly created parties on several issues.

The prewar Japanese democratic experiment attained its peak during the co-called Taisho Democracy, which lasted from 1918 to 1932. Parties finally managed to control the cabinet

[10] The present section is based on the presentation in Rosenbuth and Thies (2010).

throughout the 1920s; however, over time the major parties became highly dependent on the support of the industrial conglomerates, the zaibatsu, to finance their increasingly expensive electoral campaigns.

Public support for the party system, however, had declined by the early 1930s amid political corruption scandals and in 1932 the military took over to embark Japan in a period of authoritarianism that lasted until the end of World War II.

Together with the Allied Occupation of Japan came, among other significant changes, a new constitution in 1947 that established the new political institutions of the country.

Japan is presently a parliamentary monarchy in which, according to the 1947 constitution, the National Diet is given the status of "highest organ of state power" and "sole law-making organ of the State". Despite the existence of elected prefecture and local level governments, Japan is nonfederal: all local government authority is delegated by the national government and may be retracted by it.

The National Diet is bicameral, formed by an upper house, the House of Councillors, and a lower house, the House of Representatives. The House of Representatives has the authority to choose alone the Prime Minister, to pass the budget, and to ratify treaties. Therefore, it has been traditionally seen as preponderant compared to the House of Councillors, and that has been especially true as the major postwar party formation, the LDP, used to have a strong majority in the upper house throughout the second half of the 20s century. However, all legislation other than the ones described above need to pass both houses in identical form in order to become a law, and the more recent developments in Japanese politics, where the majority coalition in the Lower House does not detain a majority in the Upper House, has highlighted the importance of the House of Councillors. According to Rosenbluth and Thies (2010), "[…] the Japanese Upper House is among the world's strongest".

During the second half of the 20th century successive political corruption scandals has highlighted some adverse incentives generated by the specific electoral regime, especially for the Lower House. After several attempts, there was a significant change in the House of Representatives' composition rules in 1993. Most specifically, the medium-member electoral districts, ranging from size two to

six, which prevailed throughout the postwar period, were finally substituted by single-member and large-member districts, as described below.

The House of Representatives is composed 480 members elected for a period of four years according to two complementary systems. A smaller number of 180 members are elected from eleven regional districts by closed list proportional representation. The districts typically encompass several prefectures. The remaining majority of 300 members are elected from 300 smaller single-member districts, which have roughly equal populations. Therefore, a voter casts two votes, one for a candidate in his single-member district and one for a party in the regional district. Note that a candidate may run in a single-member district and also be on a list in a regional district; therefore, he may lose in the single-member district and still be elected in the party list.

The House of Councillors is composed of 242 members elected according to two different systems for six-years in staggered terms, so that elections occur every three years. A smaller number of 96 representatives are elected by open list proportional voting in a single nation-wide constituency. The remaining majority of 146 representatives are elected from 47 prefectural constituencies by means of single non-transferable voting. Therefore, like for the Lower House elections, a voter casts two votes, but here the voter may, if he desires, vote for a specific candidate in the nation-wide election. Differently from the House of Representatives, a candidate cannot run in both tiers simultaneously.

4.2. The data

In order to test for the relationship between campaign contributions and income inequality one needs constituency-wise inequality data. If we were to perform a cross-sectional study, like the Brazilian one, we would have to use the Lower House data for the medium-size districts (for the elections before 1994) or small-size districts (for the elections after 1994). Unfortunately, data on income inequality for such areas are not available. On the other hand, the electoral system has been quite stable along the years for the Upper House prefecture-wise tier. Therefore, we opted for using the House of Councillors, local constituency electoral data, coupled with the prefecture Gini coefficients calculated by the Japan Statistics Bureau since 1979. Although there is additional electoral campaign information available for a few earlier years, the lack of inequality figures

restricted our time span to 1977 to 2010, all together 12 elections, totalizing 564 observations. All tables presented below are author's calculations using STATA statistical package.

4.2.1. The dependent variables

The main dependent variable is the aggregate expenditure for local constituencies' electoral campaigns for the House of Councillors, from 1977 to 2010, Tcstexp. The variable Tcstexp was calculated from the data contained in the Report on the Result of the Elections for the House of Councillors (RRE, "Sangiin tsujo-senkyo kekka shirabe"), published by the Japan Statistics Bureau, Ministry of Home Affairs and Communication. The RRE contains detailed expenditure data for each candidate in each prefecture ("ken") in current values. These expenditures were aggregated by ken for each electoral year, forming the Tcurexp variable. Next that variable was deflated using the Consumer Price Index calculated by the Statistics Bureau of the Government of Japan (JSB). The variable Tcstexp was then calculated, in constant *yen* values of 2005. The graph in Figure 4.1 below presents the per-year sum of Tcstexp, TTcstexp, in which the 1974 elections' data were also included. Graph 4.2 present the per prefecture evolution of total expenditure from 1977 to 2010, where the standard prefectural coding in used (Hokkaido: 01, Aomori-ken: 02,…, Okinawa-ken: 47).

Figure 4.1: Total campaign expenditure for the Japanese Upper House elections, local constituencies, 1974-2010, in constant 2005 Japanese yen

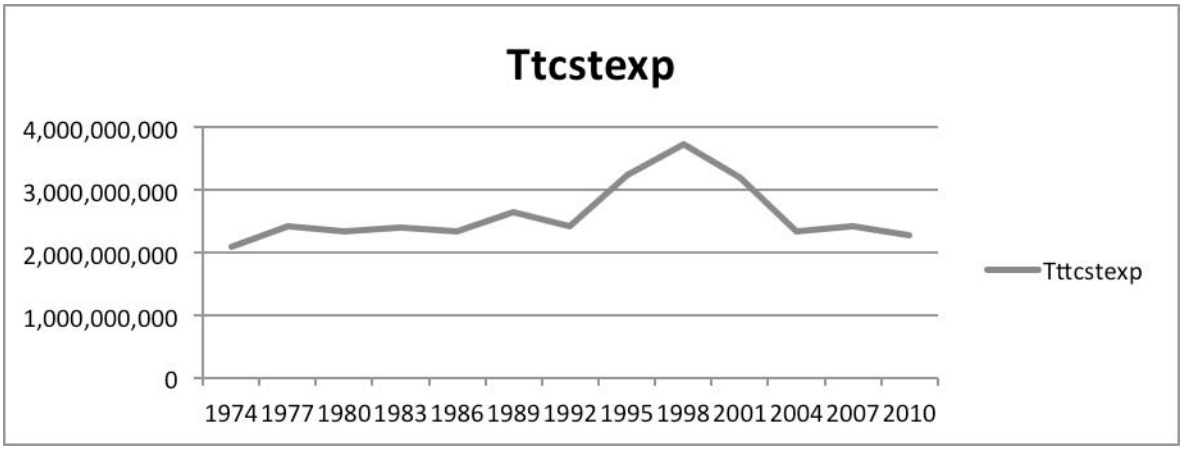
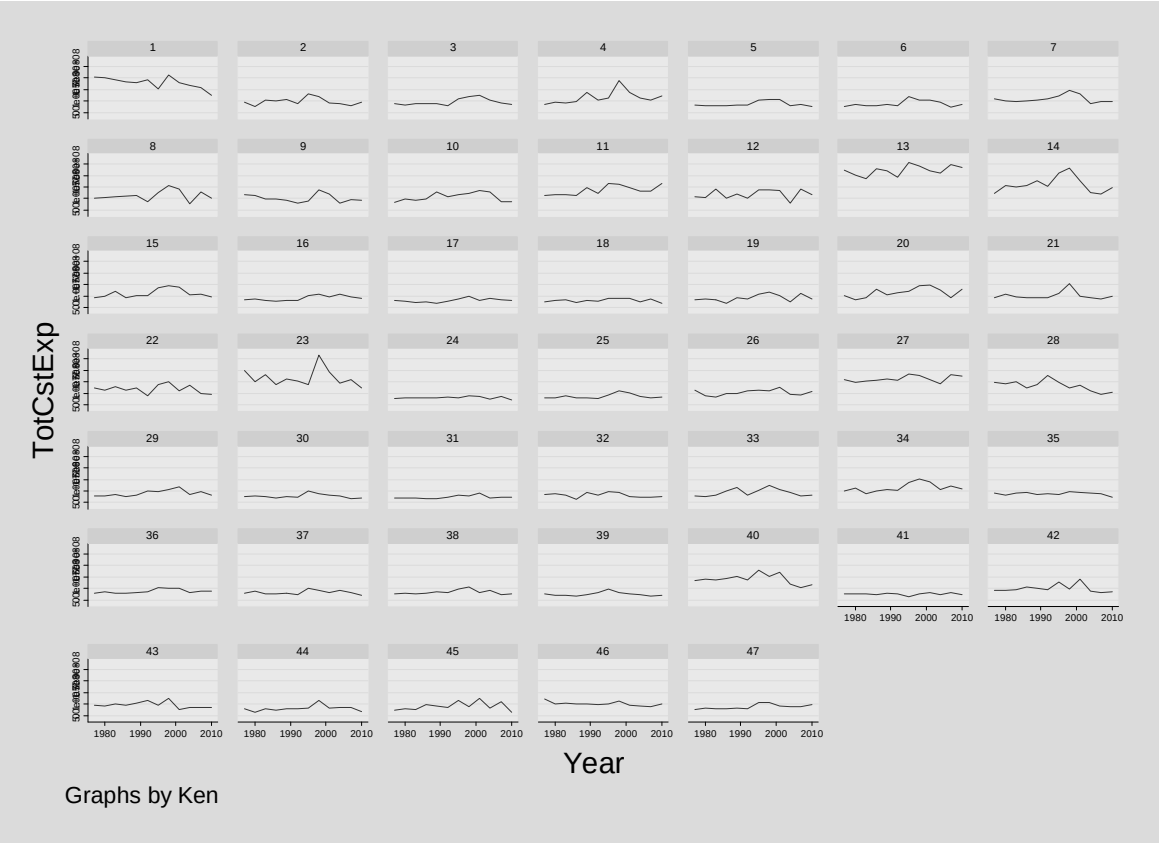


Figure 4.2: Evolution of total campaign expenditure for the Japanese Upper House elections local constituencies, by prefecture, 1977-2010, in constant 2005 Japanese yen



The graphs in 4.1 and 4.2 suggest that there is a rather stable behavior of the cost of electoral campaigns in Japan, in constant terms, except for the year 1998, which seems to have been an abnormally expensive election year.

All dependent variables used in the present econometric study of Japanese elections were derived from Tcstexp. First we calculated the following campaign expenditure variables.

Cstsxppop: The per-thousand citizens' electoral campaign expenditure. It is the Tcstexp divided by the prefecture population (in thousands) at the corresponding year. The population figures were collected from the Japan Statistical Yearbook published by JSB.

Cstexpelvt: The per-thousand elective voters' electoral campaign expenditure. It is the Tcstexp divided by the number of elective voters (in thousands) in the prefecture at the corresponding year. The elective voters' figures were collected from the Japan Statistical Yearbook published by JSB.

Cstexpelvtst: The per-thousand elective voters' electoral campaign expenditure per number of seats available. It is the Tcstexp divided by the number of elective voters (in thousands) in the prefecture at the corresponding year, divided by the number of seats at stake. The numbers of seats' figures were collected from the Japan Statistical Yearbook published by JSB.

Then we applied the log transformation to obtain the dependent variables used throughout the study. These variables are described below.

Logcstexppop: The 10-base logarithm of the per-thousand citizens' electoral campaign expenditure.

Logcstexpelvt: The 10-base logarithm of Cstexpelvt.

Logcstexpelvtst: The 10-base logarithm of Cstexpelvtst.

Figure 4.3 below presents the graphs of the per-year sum of the electoral expenditure variables.

Figure 4.3: Total campaign expenditure for the Japanese Upper House elections, local constituencies, 1974-2010
(in constant 2005 Japanese yen, per inhabitants, per elective voters and per elective voters and seats)

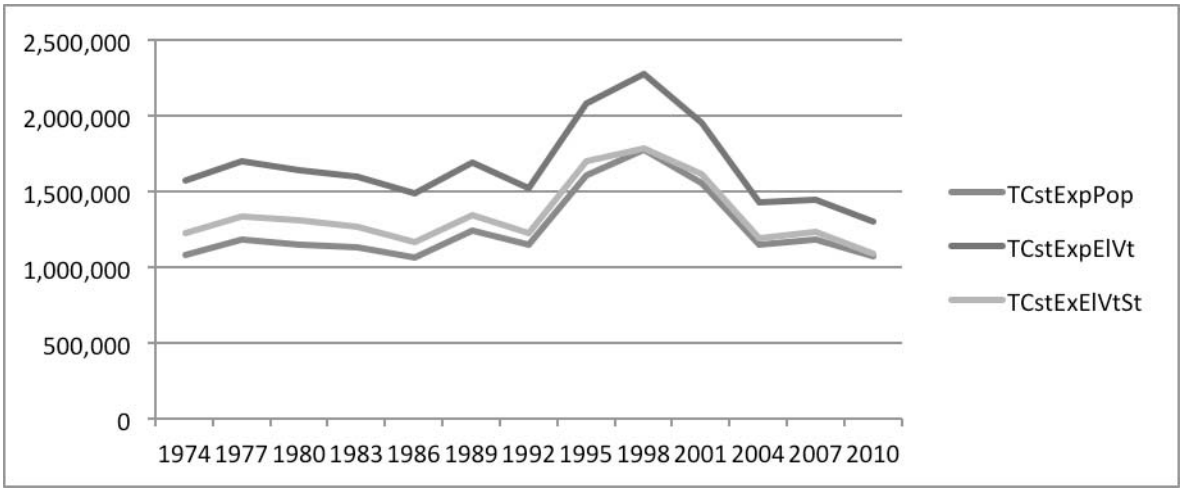


Table 4.1 below presents the summary statistics of the alternative campaign expenditure variables used in this study and of their log transformations. The econometric studies only used the log versions of the campaign expenditure figures.

Table 4.1: Summary statistics of the dependent campaign expenditure variables

Variable	Obs	Mean	Std. Dev.	Min	Max
totcstexp	564	56200000	34500000	12800000	218000000
cstexp	564	27017.65	11554.69	5235.01	76761.68
cstexpelvt	564	35675.69	14779.96	6492.96	99522.41
cstexelvtst	564	28850.32	18255.88	3241.1	99522.41
logtotcstexp	564	7.68	0.23	7.11	8.34
logcstexp	564	4.39	0.18	3.72	4.89
logcstexpelvt	564	4.52	0.18	3.81	5
logcstexelvtst	564	4.36	0.32	3.51	5

4.2.2. The explanatory variables

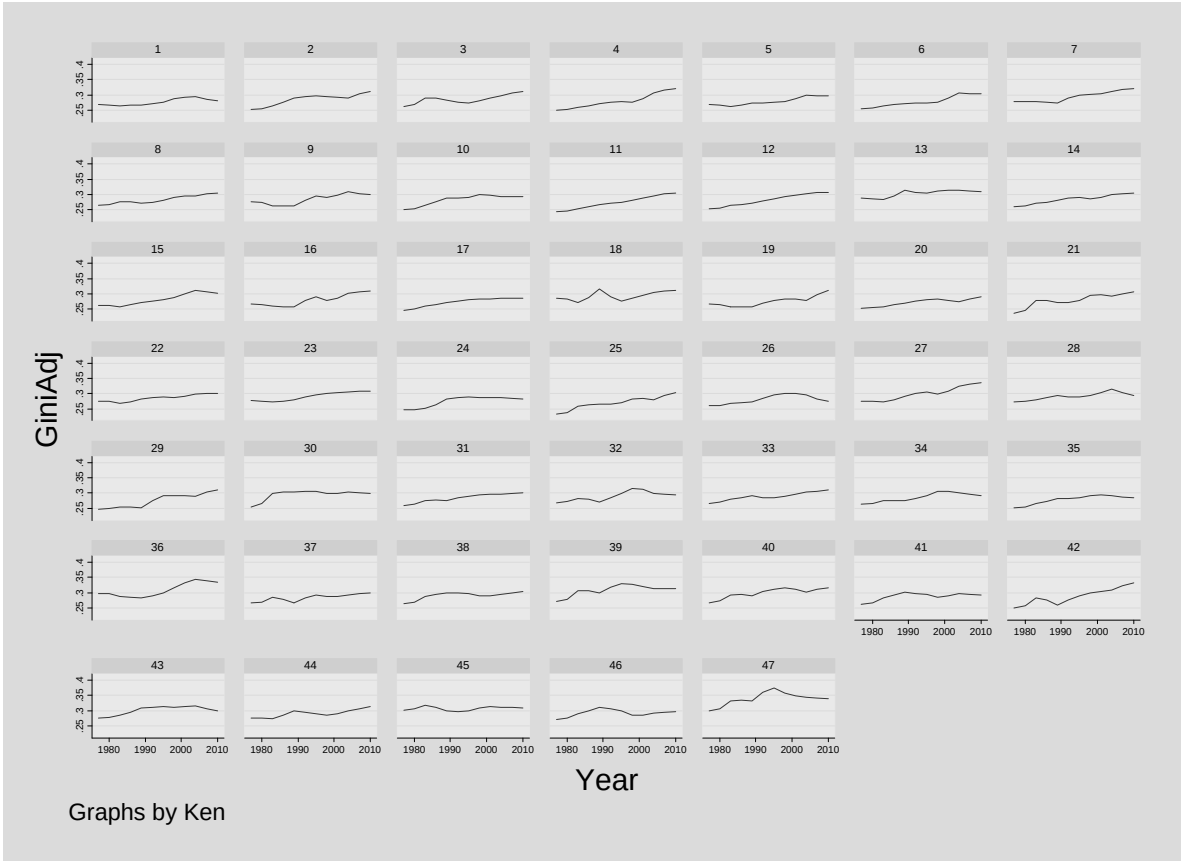
The main explanatory variable is the Gini coefficient. According to the theoretic model, we expect the Gini coefficient to be positively related to the cost of electoral campaigns, i.e., the more unequal a prefecture is, the more expensive the electoral process should be. The JSB calculates Gini coefficients for all households for the prefectures of Japan every 5 years since 1979, i.e., 1979, 1984, 1989, 1994, 1999, 2004, and 2009. There are no data available prior to 1979, which restricted the econometric study to the elections from 1977 to 2010: 1977, 1980, 1983, 1986, 1989, 1992, 1995, 1998, 2001, 2004, 2007, 2010. Since the Upper House elections occur at three years' intervals, there was not a perfect match between the Gini coefficient and election years, except for the years 1989 and 2004. Therefore, this study considered two approaches. The first was to take the Gini coefficient of the closest year to the election and, for those elections in years in between, calculate the average of the Gini coefficients of the two closest years. The second approach was to adjust the

Gini coefficients according to a weighted average where the weights corresponded to the distance to the electoral year. Table 4.2 below explains these two approaches to adjust the Gini coefficients to the electoral year. Note that, being extreme years, no adjustment could be made for the electoral years of 1977 and 2010. Both adjusted Gini coefficients lead to similar results. Therefore only the more natural weighted Gini variable, Giniadj, will be presented here. Figure 4.4 presents the evolution of the adjusted Gini for Japanese prefecture, taking the usual coding (Hokkaido: 01,…,Okinawa: 47), from 1977 to 2010. The graphs suggest a significant deterioration in inequality throughout the period in Japan.

Table 4.2: Gini adjustment for Japan's Upper House electoral year

Electoral Year	Gini Year	Adjusted Gini Approach 1	Adjusted Gini Approach 2
1977	1979	1979	1979
1980		0.5(1979)+0.5(1984)	0.8(1979)+0.2(1984)
1983	1984	1984	0.2(1979)+0.8(1984)
1986		0.5(1984)+0.5(1989)	0.6(1984)+0.4(1989)
1989	1989	1989	1989
1992	1994	0.5(1989)+0.5(1994)	0.4(1989)+0.6(1994)
1995		1994	0.8(1994)+0.2(1999)
1998	1999	1999	0.2(1995)+0.8(1999)
2001		0.5(1999)+0.5(2004)	0.6(1999)+0.4(2004)
2004	2004	2004	2004
2007	2009	0.5(2004)+0.5(2009)	0.4(2004)+0.6(2009)
2010		2009	2009

Figure 4.4: Evolution of the adjusted Gini in Japanese prefectures, 1977-2010



Several additional explanatory variables were tested. The main significant ones and their motivation are described below. All the data were collected from the Japan Statistical Yearbooks (JSY) published by the JSB.

Economic indicators:

Logcstinv: The 10-base logarithm of the prefecture investment in constant 2005 billion yen. The hypothesis here is that the private companies that benefit from prefecture's investments are more willing to contribute to the electoral campaigns the higher the prefecture investment budget is, in anticipation of the future benefits.

Giniadjloggdp: The product of the Gini and the log of the prefecture GDP in constant 2005 billion yen. This variable is meant to check if there is a difference in the effect of inequality on the cost of electoral campaigns as the prefecture becomes richer. There is no clear a priori expectation about the sign of this variable.

Social distress indicators:

Unemp: Prefecture unemployment rate. To check whether there is more electoral competition in prefectures with higher unemployment rates.

The JSB calculates prefecture unemployment rates every 5 years. Therefore, there is no complete match between election years and unemployment rate availability year. In the electoral interval 1977-2010 only the years 1980, 1995 and 2010 corresponded to both electoral and unemployment rate calculation years. As we did for the Gini coefficient, we calculated weighted averages for the intermediate years. The details of that calculation can be found in the Appendix. Note, however, that, although linear approximations for Gini coefficient appear reasonable, given the slow behavior of such time series, the same may not be true for unemployment rates, which are more volatile.

Percaidpop: Number of people receiving public livelihood assistance per 1000 prefecture inhabitants. To test weather public aid affects the cost of electoral campaigns.

The a priori expectations about the sign of the social distress variables is that people under social distress are more dependent on the government and, thereby, may be more inclined to vote for the ruling party. In that case, election costs should be lowered.

Demographic indicators:

Pop: Prefecture population, in thousands inhabitants. Since all dependent variables have been divided by some measure of population, there is no clear expectation about the effect of that variable on electoral campaign expenditures.

Percfarmpop: Percentage of farm household population over total prefecture population. Postwar politics in Japan up until the 90s have been characterized by a partnership between the ruling party and small farmers, whereby LDP's clientelist organizations provided protection to the farmers and, in return, the LDP received electoral support from the

farmers' communities. According to Horiuchi and Saito (2008), "[…] throughout the postwar period, the governing party has provided generous support to part-time farmers who cultivate tiny rice paddies. […] these protective measures kept these farmers' income extremely susceptible to political discretion. Because of these peculiar features, rice farmers were induced to commit themselves to the LDP's electioneering as active campaigners through their 'rice roots' network". Therefore, we would expect that farm populations would reduce electoral competition and, thereby, reduce the cost of elections.

Percurban: Percentage of urban area over total prefecture area. These variable aims at testing if electoral campaigns expenditure is higher in more urban prefectures. Although this variable is calculated in terms of area and, therefore, does not directly reflect the population in urban areas, a symmetrical rationale compared to the one used to predict the sign of percfarmpop would suggest that pecurban increases the cost of elections.

Electoral indicators:

Elivoters: Numbers of eligible voters. Voters: Total number of eligible voters who actually voted. Percvoters: Percentage of the eligible voter population who actually voted. Only the variable Voters was directly used as an explanatory variable in the regressions. That variable is expected to be positively correlated with the cost of electoral campaigns.

Seats: Number of seats at stake in each election. We would expect that a higher number of seats under contest might increase electoral competition and, therefore, increase the costs of electoral campaigns. Note, however, that the dependent variable logcstexelvtst divides the expenditure not only by elective voters, but also by the number of seats. Therefore, we would expect either the seats variable to be non significant or to have negative sign in that regression. Observe that the number of seats is not a fixed characteristic of each prefecture, in which case this variable could not be included in the (fixed effects) panel data regressions. Indeed, there were adjustments in the number of seats in the elections of 1995, 2001 and 2007. The adjustments of 1995 and 2007 preserved the total number of seats under dispute at 76 and 73, respectively. However, the 2001 adjustment actually reduced the total number of seats under dispute from 76 to 73. A detailed account of the specific changes prefecture wise is presented in the Appendix.

Cnd: Number of candidates listed in the RRE reference. Efcnd: Number of candidates who actually reported campaign expenditures according to RRE. Cnd2: Number of candidates according to the JSY. It is noteworthy that, although in most of the observations Cnd2 equals Cnd, in a few instances it is actually higher. Since the Efcnd variable was obtained directly from the Report on the Result of Elections, this is the variable that we will use in the present work. We expect that Efcnd will have a positive effect on the dependent variables.

Time indicator:

D98: A dummy that takes value one in election year 1998. To try to single out the visual effects found in the aggregate expenditure graphs 4.1 and 4.2. Therefore, we expect D98's coefficients to have a positive sign.

Table 4.3: Summary statistics of the main control variables

Variables	Obs	Mean	Std. Dev.	Min	Max
Giniadj	564	0.2876	0.0200	0.232	0.375
Logcstinv	564	2.7694	0.2809	2.17	3.74
Giniadjloggdp	564	1.0839	0.1398	0.77	1.56
Unemp	564	3.9329	1.9582	0.5	12.5
Percaidpop	564	9.6950	6.0846	1.6	39.5
Pop	564	2629.317	2431.238	588	13162
Percfarmpop	564	17.40	10.70	0.21	58.35
Percurban	564	37.27	19.09	8.93	93.72
Voters	564	1181.812	1029.186	283	6234
Seats	564	1.60	0.79	1	5
Efcnd	564	4.95	3.10	2	27

The summary statistics of these additional explanatory variables are presented in Table 4.3. Moreover, Table 4.4 presents expected signs of these variables for each one of the three dependent variables' regressions.

Table 4.4: Expected signs of the control variables

Variables	Expected sign		
	logcstexp	logcstexpelvt	logcstexelvtst
giniadj	+	+	+
logcstinv	+	+	+
giniadjloggdp	?	?	?
unemp	–	–	–
percaidpop	–	–	–
pop	?	?	?
percfarmpop	–	–	–
percurban	+	+	+
voters	+	+	+
seats	+	+	–
efcnd	+	+	+
d98	+	+	+

4.3. The POLS regressions

The first exploration consisted in pooling all data together to run POLS regressions.

4.3.1. The per capita cost of electoral campaigns

First we regressed the prefecture per-thousand-inhabitants expenditure (in log) on the Gini, the Gini-times-per capita GDP (log), the prefecture investment (log), the unemployment rate, the percentage of the population receiving livelihood aid, the population of the prefecture, the percentage of the farm population, percentage of urban land, the number of effective candidates, the number of seats at stake, and the dummy for the electoral year 1998.

The Breush-Pagan test yielded a chi-square statistic of $\chi^2(1)=2.8$ which shows no evidence of linear heteroskedasticity; however, the White test yielded a chi-square statistic of $\chi^2(89)=163.74$ which shows evidence of unrestricted heteroskedasticity. Therefore, we used robust standard error estimates. The regression results are presented in Table 4.5.

Except for the unemployment rate, all explanatory variables used here are significant. In particular, the inequality affects positively the cost of electoral campaigns and is significant at the 1% level. Furthermore, the prefecture investment budget, the number of effective voters, the number of competing candidates and number of seats at stake all increase the per capita cost of electoral campaigns. Moreover, campaigns have been exceptionally expensive in 1998. All these variables are significant at the 1% level.

The insignificance of the unemployment rate may suggest that unemployed citizens are not different from employed citizens in what concerns the sensibility towards electoral campaigns. It may also be a result of the use of linear estimators for the unemployment rates in electoral years where no data was available.

Table 4.5: Per-thousand-inhabitant electoral campaign expenditure and inequality

POLS regression 1

logcstexp	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
giniadj***	5.0714	0.6329	8.01	0.000	3.8282	6.3146
giniadjloggdp***	-1.0143	0.1553	-6.53	0.000	-1.3194	-0.7091
logcstinv**	0.1005	0.0428	2.34	0.019	0.0163	0.1846
Unemp	-0.0009	0.0043	-0.20	0.840	-0.0092	0.0075
percaidpop***	-0.0042	0.0010	-4.18	0.000	-0.0061	-0.0022
pop***	-0.0001	0.0000	-7.18	0.000	-0.00012	-0.00007
percfarmpop**	-0.0021	0.0008	-2.55	0.011	-0.00376	-0.00049
percurban***	-0.00127	0.00034	-3.77	0.000	-0.00193	-0.00061
voters***	0.00008	0.00003	2.89	0.004	0.00003	0.00014
efcnd***	0.0352	0.0046	7.58	0.000	0.0260	0.0443
seats***	0.0333	0.0128	2.61	0.009	0.0082	0.0583
d98***	0.0729	0.0177	4.12	0.000	0.0382	0.1076
_cons***	3.8078	0.1429	26.65	0.000	3.5271	4.0885

564 observations, Adjusted R^2: 0.6377
*** Significant at 1%; ** significant 5%; * significant at 10%

On the other hand, the variable giniajdloggdp suggests that the effect of inequality on the per capita cost of electoral campaigns decreases as the prefecture becomes richer.

The negative sign in percaidpop suggests that campaigns are less costly in areas where a higher percentage of the population depends on government social welfare support.

Moreover, the higher is the population of a prefecture, the higher is the per capita cost of electoral campaigns.

In addition, the negative and significant sign of the variable percfarmpop suggests that elections may be cheaper in the more rural prefectures. A possible explanation for this result is that the LDP has traditional roots in rural area, which makes competition less fierce there. The negative sign for

percurban, on the other hand, suggests that there may be gains of scale or scope associated with campaigning in urban areas.

4.3.2. The cost of electoral campaigns per eligible voter

Next, we regress the per-thousand-eligible-voter electoral campaign expenditure on the same explanatory variables. The result is shown in table 4.6 below. In this case both Breusch-Pagan and the White tests suggest the presence of heteroskedasticity. Therefore, robust estimators were again used. [11]

All the results obtained in POLS regression 1 are found again here, but there seems to be a better fit. Indeed, the adjusted R^2 coefficient is higher and now the investment variable becomes significant at the 1% significance level.

[11] The Breusch-Pagan test statistic yielded a $\chi^2(1)=4.13$ with Prob>chi2=0.0420 and the White test statistic is $\chi^2(89)=150.86$ with Prob>chi2= 0.0001.

Table 4.6: Per-thousand-eligible-voters electoral campaign expenditure and inequality

POLS regression 2

logcstexpelvt	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
giniadj***	5.6142	0.6245	8.99	0.000	4.3876	6.8409
giniadjloggdp***	-1.2258	0.1528	-8.02	0.000	-1.5260	-0.9257
logcstinv***	0.1430	0.0420	3.40	0.001	0.0605	0.2255
unemp	-0.0062	0.0042	-1.48	0.139	-0.0145	0.0020
percaidpop***	-0.0035	0.0010	-3.56	0.000	-0.0055	-0.0016
pop***	-0.0001	0.0000	-6.78	0.000	-0.00011	-0.00006
percfarmpop**	-0.0019	0.0008	-2.25	0.025	-0.00350	-0.00024
percurban***	-0.00117	0.00033	-3.55	0.000	-0.00182	-0.00052
voters***	0.00008	0.00003	2.86	0.004	0.00003	0.00013
efcnd***	0.0329	0.0045	7.33	0.000	0.0241	0.0418
seats***	0.0393	0.0126	3.13	0.002	0.0146	0.0640
d98***	0.0660	0.0176	3.76	0.000	0.0315	0.1005
_cons***	3.8772	0.1409	27.52	0.000	3.6005	4.1539

564 observations, Adjusted R^2: 0.6410
*** Significant at 1%; ** significant 5%; * significant at 10%

4.3.3. The cost of electoral campaigns per eligible voter, per seat

Next we regress the per-thousand-eligible-voter-per-seat electoral campaign expenditure on the same explanatory variables. Here, again, both Breusch-Pagan and the White tests suggest the presence of heteroskedasticity. Therefore, robust estimators were again used. [12]

Table 4.7 presents the regression results. The results obtained in the previous regressions are again confirmed, with a higher R^2 coefficient of 86.65%. The only difference in the significance levels

[12] The Breusch-Pagan test statistic yielded a $\chi^2(1)=15.92$ with Prob>chi2=0.0001 and the White test statistic is $\chi^2(89)=175.75$ with Prob>chi2= 0.0000.

occur with the investment variable, only significant at the 10% level now, and the percentage of farm household population, which is significant at the 1% level now.

Table 4.7: Per-thousand-eligible-voters-per-seat electoral campaign expenditure and inequality, POLS regression 3

logcstexelvtst	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
giniadj***	6.9232	0.6768	10.23	0.000	5.5938	8.2525
giniadjloggdp***	-1.5652	0.1745	-8.97	0.000	-1.9080	-1.2224
logcstinv*	0.0895	0.0480	1.86	0.063	-0.0048	0.1838
unemp	-0.0065	0.0048	-1.35	0.177	-0.0159	0.0029
percaidpop***	-0.0034	0.0011	-3.13	0.002	-0.0056	-0.0013
pop***	-0.0001	0.0000	-5.60	0.000	-0.00012	-0.00006
percfarmpop***	-0.0026	0.0009	-2.86	0.004	-0.00446	-0.00083
percurban***	-0.00152	0.00036	-4.21	0.000	-0.00224	-0.00081
voters***	0.00012	0.00003	3.69	0.000	0.00006	0.00018
efcnd***	0.0396	0.0047	8.36	0.000	0.0303	0.0489
seats***	-0.2129	0.0158	-13.46	0.000	-0.2440	-0.1818
d98***	0.0551	0.0190	2.90	0.004	0.0178	0.0923
_cons***	4.2030	0.1502	27.99	0.000	3.9080	4.4981

564 observations, Adjusted R^2: 0.8665
*** Significant at 1%; ** significant 5%; * significant at 10%

4.4. The panel data regressions

In order to further explore the data, we first performed the Breusch-Pagan Lagrange Multiplier test for random effects[13] for the model in which the dependent variable is the per thousand inhabitant electoral campaign expenditure, regression 1. The statistic $\bar{\chi}^2(1)=134.63$ rejects the null hypothesis that variances in groups are zero, in favor of the random group effects models. Therefore, panel data

[13] See Appendix.

regressions appear more appropriate for furthering the understanding of the effects of inequality on the cost of electoral campaigns for the Upper House in Japan.

4.4.1. Random effects panel data regression

As suggested by the results of the Breusch-Pagan Lagrange Multiplier test, we started analyzing the random effects model. Table 4.8 presents the result of the random effects regression using the same explanatory variables as before.

Observe that all the results obtained in the POLS regression 1 are replicated here, but now all the coefficients are significant at the 1% level, except for the unemployment variable, which is non significant, as before.

In order to check whether the random effects model is more appropriate for the present database we performed the Hausman test. The test yielded a $\chi^2(9)= 33.24$ with Prob>chi2=0.0001. Therefore, the null hypothesis is rejected, suggesting that a fixed effects regression is desirable[14].

Furthermore, in order to test for heteroskedasticity, we performed the xttest3 in Stata for the fixed effect panel data regression[15]. The corresponding statistic is $\chi^2(47)=352.20$ with Prob>chi2= 0.0000, which gives strong support for the presence of heteroskedasticity. Therefore, we used only the fixed effects model with robust standard deviation coefficients in all the following regressions.

[14] See Appendix for the details of the Hausman test.

[15] According to Stata help information, "xttest3 calculates a modified Wald statistic for groupwise heteroskedasticity in the residuals of a fixed effect regression model, following Greene (2000, p. 598)". This test was developed by Christopher F Baum, Boston College, USA.

Table 4.8: Per-thousand-inhabitant electoral campaign expenditure and inequality

Random effects regression

logcstexp	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
giniadj***	4.6072	0.8733	5.28	0.000	2.8956	6.3187
giniadjloggdp***	-0.8790	0.1998	-4.40	0.000	-1.2706	-0.4875
logcstinv***	0.1533	0.0512	2.99	0.003	0.0530	0.2536
unemp	-0.0005	0.0051	-0.10	0.922	-0.0104	0.0094
percaidpop***	-0.0035	0.0013	-2.76	0.006	-0.0061	-0.0010
pop***	-0.0001	0.0000	-6.35	0.000	-0.00013	-0.00007
percfarmpop***	-0.0029	0.0011	-2.75	0.006	-0.00496	-0.00083
percurban***	-0.00127	0.00040	-3.20	0.001	-0.00206	-0.00049
voters***	0.00007	0.00003	2.62	0.009	0.00002	0.00012
efcnd***	0.0285	0.0030	9.65	0.000	0.0227	0.0343
seats***	0.0459	0.0146	3.15	0.002	0.0174	0.0745
d98***	0.0719	0.0173	4.15	0.000	0.0379	0.1058
_cons***	3.6926	0.1954	18.90	0.000	3.3096	4.0755

Number of obs = 564, Number of groups = 47, Obs per group=12
R-sq: within = 0.3855, between = 0.7967, overall = 0.6273
*** Significant at 1%; ** significant 5%; * significant at 10%

4.4.2. Fixed effects robust panel data regressions

Tables 4.9, 4.10 and 4.11 present the results for the robust fixed effect panel data regressions for the dependent variables logcstexp, logcstexpelvt and logcstexelvtst, respectively.

Table 4.9: Per-thousand-inhabitant electoral campaign expenditure and inequality

Fixed effects robust regression

logcstexp	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
giniadj**	1.0882	0.4136	2.63	0.012	0.2556	1.9207
giniadjloggdp*	-0.1597	0.0839	-1.90	0.063	-0.3285	0.0092
logcstinv***	0.2514	0.0614	4.09	0.000	0.1278	0.3751
unemp	-0.0007	0.0050	-0.14	0.892	-0.0108	0.0095
percaidpop	-0.0011	0.0020	-0.58	0.562	-0.0051	0.0028
pop***	-0.0001	0.0000	-4.94	0.000	-0.00019	-0.00008
percfarmpop**	-0.0035	0.0016	-2.17	0.035	-0.00666	-0.00025
percurban**	-0.00104	0.00051	-2.04	0.047	-0.00206	-0.00002
voters**	0.00008	0.00003	2.64	0.011	0.00002	0.00013
efcnd*	0.0247	0.0092	2.68	0.010	0.0061	0.0433
seats***	0.0611	0.0158	3.86	0.000	0.0292	0.0929
d98***	0.0653	0.0185	3.52	0.001	0.0280	0.1026
_cons***	4.0838	0.3647	11.20	0.000	3.3498	4.8178

Number of obs = 564, Number of groups = 47, Obs per group=12
R-sq: within = 0.3956, between = 0.5329, overall = 0.4734
*** Significant at 1%; ** significant 5%; * significant at 10%

Table 4.10: Per-thousand-eligible-voter electoral campaign expenditure and inequality

Fixed effects robust regression

logcstexpelvt	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
giniadj**	0.8740	0.4004	2.18	0.034	0.0680	1.6799
giniadjloggdp**	-0.2194	0.0825	-2.66	0.011	-0.3854	-0.0534
logcstinv***	0.2610	0.0608	4.29	0.000	0.1387	0.3833
unemp	-0.0075	0.0049	-1.52	0.136	-0.0174	0.0024
percaidpop	-0.0015	0.0019	-0.77	0.446	-0.0054	0.0024
pop***	-0.0002	0.0000	-5.89	0.000	-0.00021	-0.00010
percfarmpop*	-0.0028	0.0015	-1.83	0.074	-0.00581	0.00028
percurban**	-0.00105	0.00052	-2.02	0.050	-0.00210	0.00000
voters***	0.00009	0.00003	3.05	0.004	0.00003	0.00014
efcnd***	0.0247	0.0092	2.70	0.010	0.0063	0.0432
seats***	0.0654	0.0162	4.04	0.000	0.0328	0.0980
d98***	0.0590	0.0181	3.25	0.002	0.0225	0.0955
_cons***	4.5085	0.3623	12.45	0.000	3.7793	5.2377

Number of obs = 564, Number of groups = 47, Obs per group=12
R-sq: within = 0.4097, between = 0.6185, overall = 0.5265
*** Significant at 1%; ** significant 5%; * significant at 10%

Observe, first, that these final three regressions all have higher within R^2 coefficients than the random effects regression. Moreover, the third one, on logcstexpelvtst, has the highest R^2 coefficients (within, between and overall) of all three fixed effects regressions. Therefore, we consider Table 4.11 to represent the most accurate of all the regressions in the present study.

Table 4.11: Per thousand eligible voter, per seat elections expenditure and inequality

Fixed effects robust regression

logcstexelvtst	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
giniadj***	3.6229	1.2669	2.86	0.006	1.0728	6.1731
giniadjloggdp**	-0.8411	0.3437	-2.45	0.018	-1.5329	-0.1493
logcstinv***	0.2339	0.0683	3.43	0.001	0.0965	0.3712
unemp	-0.0077	0.0055	-1.40	0.167	-0.0188	0.0034
percaidpop	-0.0015	0.0024	-0.63	0.534	-0.0064	0.0034
pop***	-0.0001	0.0000	-2.78	0.008	-0.00018	-0.00003
percfarmpop**	-0.0036	0.0015	-2.39	0.021	-0.00667	-0.00058
percurban**	-0.00120	0.00057	-2.10	0.042	-0.00235	-0.00005
voters***	0.00010	0.00003	3.34	0.002	0.00004	0.00016
efcnd***	0.0253	0.0086	2.94	0.005	0.0080	0.0426
seats***	-0.1570	0.0313	-5.02	0.000	-0.2200	-0.0941
d98***	0.0523	0.0170	3.08	0.003	0.0182	0.0865
_cons***	4.0086	0.2548	15.73	0.000	3.4956	4.5216

Number of obs = 564, Number of groups = 47, Obs per group=12
R-sq: within = 0.4138, between = 0.9202, overall = 0.8423
*** Significant at 1%; ** significant 5%; * significant at 10%

It is noteworthy that in all three regressions the significant explanatory variables are the same and include all but two variables. The non-significant variables are the unemployment rate and the percentage of the population receiving livelihood government assistance, which we classified as the social distress variables.

The non-significance of the unemployment rate was found and discussed before. The percaidpop, on the other hand, was significant in the previous regressions. Its non-significance here suggests that the social distress indicators do not seem closely related to the cost of electoral campaigns. In other words, unemployed people or people living under government assistance do not seem to display any difference in their behavior towards the electoral process.

The remaining explanatory variables, all of them significant, have the expected signs. The Gini coefficient, positive and significant at 1% (in the third regression, at 5% in the others), supports the

hypothesis obtained from the theoretic model that more inequality engenders more expensive electoral campaigns.

Furthermore, the number of voters who actually participate in the electoral process and the number of effective candidates also increase the cost of campaigns. This naturally suggests higher political participation and competition is associated with more expensive electoral processes.

The product of the Gini coefficient and the prefecture GDP has a negative significant sign and suggests that the effect of inequality on the cost of electoral campaigns becomes less accentuated when the prefecture improves its average wealth.

The percentage of farm population and the percentage of urban area tend to reduce the cost of campaigns. These effects have been discussed previously. The farm population effect may be related to the traditional stronghold of the LDP in the rural areas, which may make campaigns less competitive. The effect of urban land, on the other hand, may reflect some gains of scale or scope due to the population concentration.

The number of seats is a significant variable in all regressions but, naturally, changes sign in the third one, due to the fact that the dependent variable is divided by the number of seats. Therefore, whereas the number of seats at stake increases the per capita and the per-elective-voter campaign expenditure, it reduced the per-elective-voter per-seat cost of the campaigns.

Finally, the 1998 election remains a singularity, as a higher-than-average costly election. It is curious that 1998 is also the first electoral year for the Upper House elections under the new electoral law, which had as one of its three main motivations, the reduction of the costs of elections[16].

[16] See Reeds (2002), p. 244.

5. Conclusion

The present research was initially motivated by the increasing concerns about campaign financing manifested all over the world. In order to better understand what explains the cost of elections, this research focused on one possible factor: income inequality among citizens.

The role of income inequality on the cost of electoral campaigns was investigated here using essentially two different approaches, one theoretic and another one empirical. The theoretic approach used a game-theoretic, political economy model of voting in order to understand the incentives political lobby groups have to donate to electoral campaigns. The mains theoretic finding is that interest groups tend to donate higher amounts if policies implemented by opposing parties, in the case they win the elections, are very unfavorable. The model shows that the more unequal society is, the more unfavorable is the policy implemented by a party that represents different constituencies. Therefore, the higher the level of income inequality, the more private contributions there will be, in per capita terms, to the electoral campaigns.

The empirical approach was meant to test the hypothesis of a positive correlation between inequality and the cost of elections. It used two different data sets for two different countries: Brazil and Japan. These two countries were chosen due to their extreme positions in the scale of world inequality indices: while Japan is one of the most homogeneous societies in the world, Brazil is one of the most unequal countries in terms of income distribution.

The Brazilian data consisted of cross section information on 2004 municipal elections for Brazilian 5564 mayors and local legislatures. The Japanese data consisted of 1977 to 2010 panel information on the House of Councillors' prefectural tier elections. The data was exhaustively tested, consistently supporting the theoretic hypothesis.

The main policy implication of this research regards the regulation of campaign financing. It is no coincidence that Japan has become more concerned about this issue exactly as inequality has grown in the country. Indeed, as the research suggests, higher inequality means more expensive campaigns, controlling for other explanatory variables, which, in turn makes politicians more vulnerable to corruption. A legislation that associates minimal public funding with rigid a control of private funding may reduce that vulnerability. As for a country like Brazil that has had incredibly high historical inequality levels, the implication is very clear: in order to maintain institutional stability

and the trust of citizens in the electoral process, it is fundamental to reduce inequality. The country has achieved significant and continual reductions in inequality over the last 15 to 20 years; however, inequality levels are still very high and a strong effort still needs to be made in order to reduce income heterogeneity in Brazilian society.

In addition, the econometric investigation highlighted several significant variables that also explain the cost of elections. For the case of Brazil one can highlight education: the more homogeneous voters are in educational attainment, the cheaper are the elections. Therefore, the country has an additional incentive to continue, and even reinforce, its effort in the public education policies, as it will reduce the vulnerability of politicians. On the other hand, for the case of Japan the size of the urban households population tends to increase the cost of elections. As the country has become more urban throughout the years and shall become even more so as the government protection for local small farmers gradually decreases, Japan needs to focus even more carefully on the regulation of electoral financing.

The econometric studies highlight several other variables that impact the cost of elections. Others still need to be analyzed in additional empirical studies. In particular, the role of incumbency has not been explored for Japan and could present policy implications, including a contribution about term limits in the Legislature. As for Brazil, a panel data analysis could bring additional light on the time effect and on individual municipality specific effects of elections in the country. These additional explorations are left here as suggestions for further research.

Finally, the political economy model focuses on the role of inequality on the cost of elections and does not include any of the additional significant explanatory variables used in the econometric studies. Enriching the theoretic model to better understand these additional effects is also presented here as a suggestion for further research.

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Appendix

A.1. The Brazilian administrative regions

Região Norte: northern region; Região Nordeste: northeast region; Região Centro-Oeste: center-western region, Região Sudeste: southeast region; Região Sul: southern region.

A.2. Japan's unemployment rates for the Upper House electoral years

Table A.1: Unemployment rates for the Japan Upper House electoral years

Electoral Year	Unemployment Year	Adjusted Unemployment rate
1977	1975	0.6(1975)+0.4(1980)
1980	1980	1980
1983	1985	0.4(1980)+0.6(1985)
1986	1990	0.8(1985)+0.2(1990)
1989		0.2(1985)+0.9(1990)
1992	1995	0.6(1990)+0.4(1995)
1995		1995
1998	2000	0.4(1995)+0.6(2000)
2001	2005	0.8(2000)+0.2(2005)
2004		0.2(2000)+0.8(2005)
2007	2010	0.6(2005)+0.4(2010)
2010		2010

A.3. Evolution of seats per prefecture in Japan's Upper House elections

Note: in black, the prefectures that did not change their number of allotted representatives; in red the prefectures that lost (one) representative over the period; in green the prefectures that gained (one) representative over the period.

In total, 6 prefectures, four of which around Tokyo metropolitan area, gained representatives: Miyagi, Saitama, Chiba, Tokyo, Kanagawa and Gifu. On the other direction, 9 prefectures lost representatives: Hokkaido, Tochigi, Gumma, Hyogo, Okayama, Fukuoka, Kumamoto.

Table A.2: Adjustment in the number of seats under contest for the Upper House's local constituencies elections

Prefecture	2010	2007	2004	2001	1998	1995	1992	1989	1986	1983	1980	1977	1974
Hokkaido	2	2	2	2	2	2	4	4	4	4	4	4	4
Aomori-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Iwate-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Miyagi-ken	2	2	2	2	2	2	1	1	1	1	1	1	1
Akita-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Yamagata-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Fukushima-ken	2	2	2	2	2	2	2	2	2	2	2	2	2
Ibaraki-ken	2	2	2	2	2	2	2	2	2	2	2	2	2
Tochigi-ken	1	1	2	2	2	2	2	2	2	2	2	2	2
Gumma-ken	1	1	2	2	2	2	2	2	2	2	2	2	2
Saitama-ken	3	3	3	3	3	3	2	2	2	2	2	2	2
Chiba-ken	3	3	2	2	2	2	2	2	2	2	2	2	2
Tokyo-to	5	5	4	4	4	4	4	4	4	4	4	4	4
Kanagawa-ken	3	3	3	3	3	3	2	2	2	2	2	2	2
Niigata-ken	2	2	2	2	2	2	2	2	2	2	2	2	2
Toyama-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Ishikawa-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Fukui-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Yamanashi-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Nagano-ken	2	2	2	2	2	2	2	2	2	2	2	2	2
Gifu-ken	2	2	2	2	2	2	1	1	1	1	1	1	1
Shizuoka-ken	2	2	2	2	2	2	2	2	2	2	2	2	2
Aichi-ken	3	3	3	3	3	3	3	3	3	3	3	3	3
Mie-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Shiga-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Kyoto-fu	2	2	2	2	2	2	2	2	2	2	2	2	2
Osaka-fu	3	3	3	3	3	3	3	3	3	3	3	3	3
Hyogo-ken	2	2	2	2	2	2	3	3	3	3	3	3	3
Nara-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Wakayama-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Tottori-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Shimane-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Okayama-ken	1	1	1	1	2	2	2	2	2	2	2	2	2
Hiroshima-ken	2	2	2	2	2	2	2	2	2	2	2	2	2
Yamaguchi-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Tokushima-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Kagawa-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Ehime-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Kochi-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Fukuoka-ken	2	2	2	2	2	2	3	3	3	3	3	3	3
Saga-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Nagasaki-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Kumamoto-ken	1	1	1	1	2	2	2	2	2	2	2	2	2
Oita-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Miyazaki-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
Kagoshima-ken	1	1	1	1	2	2	2	2	2	2	2	2	2
Okinawa-ken	1	1	1	1	1	1	1	1	1	1	1	1	1
TOTALS	73	73	73	73	76	76	76	76	76	76	76	76	76

A.4. Breusch and Pagan Lagrangian multiplier test for random effects

Panel data regression of logcstexp on giniadj giniadjloggdp logcstinv unemp percaidpop ypop farmpop percurban cnd seats year d98

logcstexp[ken,t] = Xb + u[ken] + e[ken,t]

Estimated results:

	Var	sd=sqrt(Var)
logcstexp	0.033722	0.1836356
e	0.0093561	0.0967271
u	0. .0028189	0. 0530933

Test: Var(u) = 0, chibar2(01) = 134.63, Prob > chibar2 = 0.0000

A.5. Hausman test for random versus fixed effects

Table A.3: Hausman test coefficients

logcstexp	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
giniadj	2.7665	4.6072	-1.84	0.996
giniadjloggdp	-0.4614	-0.8790	0.42	0.234
logcstinv	0.2529	0.1533	0.10	0.041
unemp	0.0000	-0.0005	0.00	0.003
percaidpop	-0.0009	-0.0035	0.00	0.001
pop	-0.00012	-0.00010	0.00	0.000
percfarmpop	-0.00309	-0.00290	0.00	0.001
percurban	-0.0011	-0.0013	0.00	0.000
voters	0.0001	0.0001	0.00	0.000
efcnd	0.0248	0.0285	0.00	0.001
seats	0.0596	0.0459	0.01	0.007

Test: Ho: difference in coefficients not systematic

chi2(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 33.24

Prob>chi2 = 0.0001

(V_b-V_B is not positive definite)

A.6. Modified Wald test for groupwise heteroskedasticity in fixed effects regression model

Test: Ho: sigma(i)^2 = sigma^2 for all i

chi2 (47) = 353.20

Prob>chi2 = 0.0000

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