TIMING OF ELECTIONS AND PUBLIC BUDGET ALLOCATIONS IN A FEDERAL SYSTEM[i]

ABSTRACT:

This study analyzes the elections' timing and its effects in the formulation of municipal policies, dividing them into two categories: the short-term and the long-term focus policies. Employing the instruments provided by Game Theory, we built a dynamic set of eight periods with imperfect information, in which two players (local and central policymakers) decide about the budget formulation policy, oriented to maximize next elections results. We analyze two models: first, we discuss a staggered election model, in which elections occur every two years, alternately, to local and central government layers). The second model explores the possibility of unification of local and central elections, in a synchronized way with the coincidence of mandates of the studied politicians (local and central governments). Results suggest that the vote-seeking behavior drives to sub-optimal allocations in both models, in a kind of anticipation effect. However, we highlight differences among incumbents' anticipation effect: its intensity is higher in local allocations than in central ones, because central expenditures increase local incumbent's image more than the opposite. Moreover, in synchronized elections, the deviation from optimal allocation would be lower than in staggered ones.

Keywords: Elections. Short-term policies. Long-term policies. Public budget. Cooperative games.

JEL Classification: H72. H77. D72. C71.

[i] Paper developed with the support of CAPES - Coordination for the Improvement of Higher Education Personnel.

INTRODUCTION

Many studies have examined the relation between economic fluctuations and elections (Ferreira & Bugarin, 2007). Elections may shift the accountability in public spending through two main channels – political competition that reduces moral hazard (Ferejohn, 1986; Barro, 1973) and adverse selection (Rogoff, 1990). Elections could therefore provide better incumbents, and re-election prospects may result in incentives for efficient governance. However, electoral pressures could also introduce a bias in policymaking as politicians seek to increase their popularity with an eye on re-election (Vergne, 2009).

A focus on motivation could mitigate this undesirable effect of elections. Most models look at an election as a set of voter choices based on a comparison of candidate profiles and platforms (Battaglini, 2014). However, when it comes to candidate comparisons, economists generally measure a politician's quality only by ability and pay no attention to motivation issues (Fedele & Naticchioni, 2015), although the latter has been discussed in public administration

theory (see e.g., Carpenter, Doverspike, & Miguel, 2012). The result of this simplification is that as the private sector is more flexible in rewarding performance (as against fixed wages in the public sector), common wisdom suggests that a political system produces a perpetual (adverse) selection of low-ability politicians, stuck in a path dependency cycle (Caselli & Morelli, 2004).

By relaxing this assumption of mutually exclusive sectors (public and private), a few recent studies have focused on other features of politicians' performances. One of these is *public-fit citizen*, which posits that such individuals are closely aligned with the values of the political system, either with positive or negative interests (Fedele & Naticchioni, 2015). This approach explains why a politician's careerism is a feature of many national political systems, i.e., citizens who enter public life tend to stay in it for long periods, even if they are highly able. As *public-fit citizens*, some politicians' choices to broaden their perspectives of a political career may hinder efficient allocation of the public budget. It is a trade-off between electoral prospects and the public interest, especially if a "political culture" incentivizes the politician's opportunistic behavior (Beniers & Dur, 2007).

We examine budget management at the local level as a game to evaluate the effects of political alignment at different levels of government, unconditional grants (from the central to local levels) and budget allocation between short-term and long-term spending. Further, it discusses two representations of the model; one with staggered elections and the other with synchronized elections.[1]

This study is organized as follows: Section 2 describes the current budget model in Brazil (particularly at the local level) and the extent of dependence on external transfers (both conditional and unconditional). Section 3 defines the parameters of the general model of the game. Next, we present and solve the game in its extensive form and finish by considering the unification of elections at the local and central levels. Section 4 concludes the study and points to potential areas of further research.

BUDGET FEATURES AT DIFFERENT GOVERNMENT LEVELS IN BRAZIL

Although the municipalities have benefited from the Constitution of 1988 with increased revenue, decentralization of public functions (such as health, primary education, environment,

[1] In 2015, the Brazilian Parliament discussed a proposal for the unification of local and central elections. The main argument was that it would reduce costs. Staggered elections, by their turn, were seen as contributing to the politicization of citizens (Moura, 2015). Although it was decided not to unify the elections, the margin of victory was narrow and other proposals for unification are still waiting consideration. Given this scenario, we retain the possibility of unified elections in our analysis.

and social security) have had a strong impact on local finances, generating fiscal vulnerability of municipalities (Teixeira, Mac Dowell, & Bugarin, 2003). In practice, most municipalities rely heavily on funds from the state and federal levels.[2]

Various criteria have been used to describe and categorize the budgetary resources of the municipalities (Abrantes & Ferreira, 2010). Based on the origin of the money, there are two sources—own revenues and transfers from the regional or central government (Rezende, 2001).

Own revenues can be further grouped as original or derived. Original revenue refers to revenue resulting from an offer of goods or services to citizens. Derived revenue is that which accrues from the imperative action of the state to tax without offering compensatory measures (in the form of goods or services), as is the case with taxes on property (Ribeiro Filho, Diniz, and Vasconcelos, 2003). Therefore, according to Brazilian law, even own revenues include taxes and contributions, as well as property, agricultural, industrial, and service revenues.

With regard to transfers from other levels of government, Prado 2001 (apud Schlesinger and Rolim, 2008) proposed three types of classifications: (1) transfers as instruments of fiscal policy of the federation, (2) transfers in the transferor budget (legal or discretionary transferences), and (3) the transfers in the receptor (free or tied transfers).

The first type covers both transfers from tax devolution as well as redistributive transfers linked to sectoral policies. Redistributive transfers help minimize social and economic disparities or inequalities through direct transference of wealth from the most economically dynamic regions to the most depressed regions. With respect to the transfers from tax devolution, they primarily represent a refund to the local region of a portion of the taxes collected by another level of government (state or federal) when the taxable event is linked to the municipality. The last case of transfers related to instruments of fiscal policy are linked to the implementation of sectoral policies, where the planning is centralized but implementation is shared with the local agent.

The second type of classification is based on legal norms (such as provisions under the Constitution) or discretionary decisions (where municipalities may negotiate budgetary contributions from state or federal governments, as in the case of parliamentary budget amendments). According to the authors, discretionary contributions play a complementary or emergency role. However, they constitute an important mechanism from the point of view of sustainability and of drumming up support for re-election campaigns.

[2] According to the Brazilian National Treasury, transfers from the central and regional governments accounted for, on average, 83.2% of the municipal budget in 2012.

The last type (free or tied transfers) is determined according to the degree of freedom that the receiver will have to manage the resource. If the resource allocation is conditional, that is, if it has specific purposes and cannot be substituted, we call them a tied transfer. On the other hand, unconditional transfers are those in which the local manager can choose the most appropriate use, based on criteria that he decides.

ELECTIONS AND BUDGET ALLOCATION IN BRAZIL: STYLIZED FACTS

Stylized facts are a stepping one suggested by Kaldor (1961) in the process of modelling. Even if this stylized view of the facts is broad enough to support initial abstractions, it is not necessarily a generalization, but a description of some features based on empirical observation of a phenomenon that is being analyzed (Meyer, 2011). The concept of stylized facts is a very useful and spread tool in dealing with simulation issues (Heine, Meyer, & Strangfeld, 2005), as we done in this study.

In the specific case under study here, our main interest is the impact of elections in the budget allocation, especially if and how they affect allocations in the short and long term. We first examine electoral effects in budget allocation and derived a stylized fact about synchronized and staggered elections. We construct two databases on public budget allocations in the lower levels of the Brazilian government. The first database encompasses the period 2005 to 2012, where the data is drawn from more than 2,700 municipalities;[3] the second one provides information about all 27 states of the Brazilian federation, for the 2004-2011 period.

We collect similar information about the budget at both levels, which includes own revenues from taxation, unconditional transfers from the central government, and local GDP and spending in four main areas: investment, health, social security, and education.[4] We change all variables into per capita constant values (Brazilian reals of the last year of each database) and calculate the natural logarithm to express the elasticity in regressions. To verify the elections calendar effect, we add a dummy for electoral years, which takes the value 1 in central and local elections for the first dataset (municipal budget allocation) and takes the value 1 only in central elections for the second dataset (regional budget allocation).

[3] All municipalities in the dataset provide observations for at least six years. In 2010, we had the lowest number of observations (2,769) while in 2005, we had the highest coverage (3,836 municipalities).

[4] In the Brazilian federation, education is a public good provided by all three layers: the municipal government is responsible for education until the first level (till about 10 years of age); regional governments provide education till high school and, in some states, to college too; central government offers university and technical education.

In both datasets, we perform four similar panel regressions, estimating the effects of the election calendar and other control variables in the four expenditures. Table 1 provides estimation from the Municipal Budget Allocation dataset. We highlight that in all models, the elections calendar effect was significant at the 1% level. Moreover, in the first three models (investment, health, and social security spending), the effect was positive. In the fourth model, the dummy that reflects the electoral staggered calendar negatively influences the level of spending on education. One possible explanation for this negative effect is that spent in education is not the better channel to win votes in the short-term.

Table 1 - Elections Effect in Municipal Budget (Staggered Elections)

	(1) Investment	(2) Health	(3) Social Security	(4) Education
Local GDP	0.554 ***	0.488 ***	0.680 ***	0.657 ***
	(0.033)	(0.027)	(0.030)	(0.046)
FPM Transfers	0.124 ***	0.228 ***	0.174 ***	0.204 ***
	(0.024)	(0.043)	(0.031)	(0.028)
Taxation	0.496 ***	0.252 ***	0.264 ***	0.352 ***
	(0.020)	(0.022)	(0.018)	(0.026)
Elections (d)	**0.279 *****	**0.032 *****	**0.061 *****	**-0.151 *****
	(0.007)	(0.005)	(0.005)	(0.008)
_constant	0.619 ***	2.148 ***	0.128	1.733 ***
	(0.144)	(0.223)	(0.174)	(0.192)
R-sq Within	0.2278	0.2006	0.2042	0.0767
Between	0.2680	0.3327	0.0934	0.0010
Overall	0.2221	0.2391	0.0990	0.0060

Notes: Estimations performed with Stata SE 12.0. Marginal effects. No serial correlation control needed. Heteroscedasticity adjusted by robust estimation. Robust Standard errors in parentheses. Stars indicate statistical significance at 1% (***), 5% (**) and 10% (*) levels. (d) For discrete change of dummy variable from 0 to 1.

For the regional (or state) budget allocation, whose outputs are in Table 2, we perform similar panel regressions to compare the elections years' dummy effect. Although the predictive power of the models was higher, the election calendar effect was lower. Indeed, in the first model, elections positively influenced the amount spent but it was lower than under the staggered elections model in Table 1. In all other three models, the coefficients for elections were not significant. We reiterate that the main difference between these two datasets is that the second has synchronized elections.

Our first analysis suggests that the incumbents choose a budget allocation that broadens electoral prospects both for themselves (in the local elections) and for their partisan allies (in central elections). They seem to increase expenditures in more visible areas (which may coax voters). These preliminary results were similar to those reported by Sakurai & Menezes-Filho (2008) and Klein & Sakurai (2015).

Table 2 - Elections Effect in Regional Budget (Synchronized Elections)

	(1) Investment	(2) Health	(3) Social Security	(4) Education
Local GDP	0.170	0.070	0.139	0.197 ***
	(0.141)	(0.050)	(0.155)	(0.069)
FPE Transfers	-0.168	0.471 **	0.219	0.285 *
	(0.264)	(0.208)	(0.441)	(0.167)
Taxation	1.278 ***	0.639 ***	0.924 *	0.467 **
	(0.368)	(0.211)	(0.451)	(0.169)
Elections (d)	**0.194 *****	**0.022**	**0.035**	**-0.004**
	(0.039)	(0.016)	(0.049)	(0.017)
_constant	-4.418 ***	-2.302 ***	-6.201 ***	-0.945
	(1.285)	(0.525)	(1.590)	(0.583)
R-sq Within	0.5113	0.8079	0.3311	0.7395
Between	0.0048	0.4412	0.1510	0.4788
Overall	0.0379	0.5205	0.1808	0.5338

Notes: Estimations performed with Stata SE 12.0. Marginal effects. No serial correlation control needed. Heteroscedasticity adjusted by robust estimation. Robust Standard errors in parentheses. Stars indicate statistical significance at 1% (***), 5% (**) and 10% (*) levels. (d) For discrete change of dummy variable from 0 to 1.

By comparing the Table 1 and Table 2 coefficients, we can say that synchronized elections produce a different effect on public spending. However, these results are related to different government levels; hence, one should be prudent in drawing conclusions. To develop a theoretical explanation to understand this difference in synchronized and staggered elections, we present in the next section a model to illustrate the impact of elections on the allocation of the local public budget.

THE GENERAL MODEL

We present an extension of the models proposed by Battaglini (2014) and Kaiser & Taugourdeau (2013). The main difference between these models and ours is that we include the opportunistic behavior of politician as a cooperative game geared toward electoral prospects. Our model consists of a federation with two government levels: one central government *G*, and g local governments, where one local government is eligible for discretionary grants and *N* local governments are not eligible, or g = {1+N}. The size of the population in each municipality is normalized to *1*, such that total population is *N+1*. There are four goods--a local public good *l*, a central public good *c*, an unconditional grant public good *u*, and a private good *p*. All are normal goods and their utility is additively separable.

GOVERNMENTS AND BUDGET ALLOCATION

Governments have the political authority to define the allocation of the public budget *W* based on whether they are at the local or central level during an entire term of office, which is four years long. The budget funds for the central government and for non-eligible local governments are the amount of taxes in their layer. Although the central government targets

eligible local government for unconditional grants *u*, the decision about the allocation of these grants rests with the central government; therefore, the local budget is the same for eligible and non-eligible municipalities. We represent the budget source for each government layer with the following equations:

$$W_t^G = (N+1)\tau_t^G \qquad (1a)$$

$$W_t^g = \tau_t^g \ , \qquad g = 1+N \qquad (1b)$$

Incumbents in both layers have a four-year term and can be re-elected, but the elections are not synchronized (the elections are done every two years). Hence, the first period, t = 1, corresponds to the first year of the local incumbent; t = 3 corresponds to the third year of the local incumbent, and the first year of the central government's term of office, and so on.

In each period, the incumbents produce public goods by allocating the entire public budget to either urgent, emergency, or short-term (*s*) spending or for structural and long-term expenditures (*S*). The latter requires one period to make available public goods[5]; on contrary, short-term spending result instantaneously in public goods. The incumbents at both the local and central levels have to incur a minimum [6] of short-term expenditures, which means that $s \in \{\underline{s}, \dots, \overline{s}\}, \underline{s} > 0$. Thus, although the central government may spend its budget on unconditional short-term or long-term grants, the local incumbent does not know if he is the eligible for those grants or not.

$$W_t^g = W_t^{g,s} + W_t^{g,S} = \delta l_t + (1-\delta) l_t, \qquad g = \{1, N\} \quad 0 < \delta < 1 \qquad (2a).$$

$$W_t^G = W_t^{G,s} + W_t^{G,S} = \mu c_t + \zeta u_t + (1-\mu) c_t + (1-\zeta) u_t \ , \ 0 < \mu < 1, \ 0 \le \zeta \le 1 \quad (2b).$$

The budget allocation rules also imply non-negativity constraints: $(s^{g,G} > 0;\ S^{g,G} \ge 0)$ for each government level (which finances public spending via taxes). All the 1 + N local governments must decide every period about their level of short-term and long-term expenditures. The central government must take a decision on three different issues each period: the level of short-term and long-term expenditures, the level of short-term and long-term unconditional grants, and the municipalities to which these grants will be allocated.

VOTERS

At every period *t* (t=1, … , 8), voters have an initial endowment *w* and pay taxes τ both to local and central governments. They spend the entire endowment on taxes and consumption.

[5] We may use as examples of long-term spending, the building of hospitals, schools, bridges, highways, industrial clusters, and so on.

[6]The intuitive logic behind this minimum is that there exists some kind of current expenditure that may be reduced or controlled but cannot be completely cut off (such as wages of public servants).

The voters derive utility from the goods; the utility function (3) represents the utility for voter *v* in period *t*, subject to the endowment restriction *w* (4):

$$\Gamma_t^v = \sum_{r=t}^{T=8} \beta^{r-t} \left[U_t^s(p,l,c,u) + V_t^S(\,l,c,u) + q_r\right] \tag{3}$$

$$w_t^v = p_t + \tau_t^l + \tau_t^c \tag{4}$$

In equation (3), β represents the voter's inter-temporal discount rate ($0 < \beta < 1$). The function $U_t^s(p,l,c,u)$ shows voters' utility with private consumption and with consumption of public short-term goods. As its counterpart, the function $V_t^S(\,l,c,u)$ represents the utility generated by long-term public expenditure, which the incumbents allocate in the previous period. As the voters' utility function is related to allocation decisions in the previous period, this adds informational asymmetry between incumbent—who decides the budget allocation—and voters, who must wait one period to see the results of long-term expenditures (Ferreira & Bugarin, 2007). Both U and V functions are concave and monotonically increasing in all their arguments. To avoid corner solutions, we assume that marginal utility falls from infinity to zero as consumption rises from zero to infinity.

The term q_r $(i.i.d.\{-\bar{q},\bar{q}\}, \forall t \neq r)$ is a political random shock that affects voters at the end of period r_{-1} and whose mathematical expectation is zero. A positive shock ($q_r > 0$) represents gains for the incumbent in the electoral race, and a negative shock ($q_r < 0$) benefits the opposition candidate. This term adds uncertainty in political races,[7] as is usual in probabilistic voting models.

VOTERS' PERCEPTION ABOUT LOCAL AND CENTRAL PUBLIC GOODS

The voter in the eligible municipality hardly differentiates between the provision of goods from the local budget or from unconditional grants (Solé-Ollé & Sorribas-Navarro, 2008). We provide this information through the equations below:

$$l_t^1 = \delta l_t^1 + (1-\delta) l_{t-1}^1 + \rho[\zeta u_t + (1-\zeta) u_{t-1}], \ \ \forall t \qquad 0 < \rho \leq 1 \tag{5a}$$

$$l_t^N = \delta s_t^N + (1-\delta) S_{t-1}^N, \ \ \forall t \tag{5b}$$

$$c_t = \theta s_t^G + (1-\theta) S_{t-1}^G + \{(1-\rho)[\zeta u_t + (1-\zeta) U_{t-1}]\}, \quad \forall t \qquad 0 < \rho \leq 1 \tag{5c}$$

[7] There are several variables that may be taken as exogenous to our model and may work as an incumbent's popularity shock, such as external economic fluctuations, "expressive" motives, and religious issues (Glaeser, Ponzetto, & Shapiro, 2005).

The equations *5a* and *5c* state that, although local and central funds provide the local public good in the eligible municipality, the voter attributes some proportion ρ of central funds (the unconditional grants) to the local incumbent's political ability to bring external resources.

The social benefit *B* provided by structural spending *S* is, by definition, higher than the short-term social benefit *b* that results from spending *s* in the amount β. This means that, ideally, the prioritization of structural expenditures is preferable. However, there is a minimum expenditure level in short-term issues, as mentioned before. Equivalent budgetary costs of short-term and long-term expenditures results in different social benefit levels. Moreover, the government must disburse the money for structural spending one period before *B* occurs.

THE POLITICIANS' PAYOFF

The payoff for politicians is the improvement in their image from the realized spending and is equal to the difference between benefits (*B*, *b*) and expenditures (l, c, u). In our model, the image improvement with structural actions is *I* and the gain with urgent actions is *i*. Note that short-term expenditures $(\delta l_t + \mu c_t + \zeta u_t)$ and image improvement *i* occur in the same period; while *I* occurs a period after$\{(1-\delta)l_t + (1-\mu)c_t + (1-\zeta)u_t\}$. An increase in *I* increases the re-election prospect, or the election of candidates supported by the incumbent.

The equations below represent the social benefits and image improvement, shared between the local level g and the central level G:

$$B_{t+1} = B_{t+1}^{g} + B_{t+1}^{G} = (1+\gamma)b_t \qquad 0 < \gamma < 1 \tag{6a}$$

$$b_t = b_t^{g} + b_t^{G} = i_t + (\delta l_t + \mu c_t + \zeta u_t) \tag{6b}$$

$$i_t = \left(i_t^{g} + i_t^{G}\right) = b_t - [\delta l_t + \rho(\zeta u_t)] - [\mu c_t + (1-\rho)\zeta u_t] \tag{6c}$$

$$\left(I_{t+1}^{g} + I_{t+1}^{G}\right) = B_{t+1} - [(1-\delta)l_t + \rho(1-\zeta)u_t] - [(1-\mu)c_t + (1-\rho)(1-\zeta)u_t] \tag{6d}.$$

Note, however, that even if the benefit of *S* is greater by an amount γb, it will appear only in the next period. Therefore, on one hand, it is important for the politician to consider voters' perception of the social benefit and its dispersion in time. On the other, it is also important to the politician's popularity as well as the voter's sensitivity in relation to actions of *s* and *S* type. This means that although *I* is greater than *i*, in electoral years the rational politician will increase s to enlarge *i*.

TIMING OF SPENDING AND THE GOVERNMENT OBJECTIVE FUNCTION

When spending is the long-term type *S*, by the assumptions of the model, if the decision and disbursement occur at *t*, the benefits associated with this spending require a period of

maturation to be observable, which results in the social return on public spending occurring in *t+1*. On the other hand, the short-term allocations *s* provide observable benefits in the same period as the disbursement. Therefore, the local incumbent has to decide the level of δ (for all *1+N* jurisdictions) in each period. As the short-term spending must be positive $(\underline{s} > 0)$, the allocation of grants for short-term expenditures could shift the investment limit for the local government. However, at the time of formulating the budget, the local incumbent does not know if his jurisdiction will be eligible or not. Hence, he will always have to decide the δ level on the assumption that $\underline{s}\ is$ done.

We can split the government objective function into social planer, the local incumbent, and the central incumbent, according to the equations below:

$$p_t + l_t + (1 + N)\, c_t + u_t \qquad (7a)$$

$$p_t + (I_{t-1} + i_t) + \rho\, (I_{t-1} + i_t) \qquad (7b)$$

$$p_t + \gamma_l(I_{t-1} + i_t) + (1 + N)\, \gamma_g(I_{t-1} + i_t) + (1 - \rho)\, \gamma_u(I_{t-1} + i_t) \qquad (7c)$$

For voters, decisions consist of voting in favor of or against the politicians in the game, which will determine if the politician is elected or not. In contrast with politicians, the voter plays only in some periods of the game. In the general model, he plays at the end of periods 2 and 6 for central elections and in periods 4 and 8 for local elections. We assume that to guide their decision, voters will consider the relationship between social benefit and social cost as previously discussed.

UTILITY FUNCTION OF POLITICIANS

We assume that the main goal of the politician is to retain power (Carpenter et al., 2012; Caselli & Morelli, 2004). Therefore, the mayor will allocate resources to municipal budget expenditures that will maximize his probability of re-election $\mathbf{R_l}$. For his part, the central politician will allocate resources in both central public goods as well as in unconditional grants to allied municipalities that will maximize his probability of re-election $\mathbf{R_c}$.

According to the general model, there are local elections at the end of periods t = 4 and t = 8. Central elections occur at the end of periods t = 2 and t = 6. We assume that the electoral mandate is for the same length for both positions and mayors may run for re-election only once. Therefore, the mayor maximizes his chance of re-election by maximizing utilities from t = 1 to t

= 4. On the other hand, the central politician's challenge is to maximize utility in periods t = 3 to t = 6 and in periods t = 7 to t = 2.[8] We do not consider here any inter-temporal discount rate.

The politician will achieve his goal (re-election) in the case his accumulated image *AI* is greater than that of his opponents' *AI*[9]. The equation below describes the accumulated image AI:

$$AI_t = (I_t + i_t) + \xi(I_{t-1} + i_{t-1}) + \xi^2(I_{t-2} + i_{t-2}) + \cdots + \xi^n(I_{t-n} + i_{t-n}) \qquad (8)$$

In equation (8), the accumulated image remains but decreases over time under a tax $\xi, (\xi < 1)$. This implies that the current image impacts voter's choices more strongly than past ones.

POLITICIANS' EFFICIENCY PROBLEM

SOCIAL PLANNER

We present a benevolent social planner as an efficiency benchmark for public policies. Such a planner will try to maximize the social benefit derived from public budget allocations. As the social planner does not care about his election prospects, his efficiency problem does not change in electoral years. Therefore, the social planner gets to solve a sequence of static efficiency problems as follows:

$$\max_{(\delta,\ \mu,\ \zeta)} b \quad \sum_{1}^{N} p_t + l_t + c_t + u_t, \quad \forall t \leq T \qquad (9a)$$

With Equation 6 and considering that for the social planner, improvements to his image from realizing the spending is not worthless, we can rewrite Equation (9) sans issues of political image as:

$$\max_{(\delta,\ \mu,\ \zeta)} b \quad \sum_{1}^{N} p_t + \begin{bmatrix}(1-\delta)l\\(1-\mu)c\\(1-\zeta)u\end{bmatrix}.(1+\gamma)b_t + \begin{bmatrix}\delta.l\\\mu.c\\\zeta.u\end{bmatrix}.b_t, \quad \forall t \leq T \qquad (9b)$$

$$s.t. \qquad W_t^g = \delta l_t + (1-\delta)l_t\,,$$

$$W_t^G = W_t^{G,s} + W_t^{G,S} = \mu c_t + \zeta u_t + (1-\mu)c_t + (1-\zeta)u_t$$

[8] For modeling purposes, we consider only eight periods. However, since for the central politician there is no limit to re-elections, one can speak of matching t = 7, 8 and t = 1, 2 assuming that after t = 8 the process will restart, albeit with a new mayor.

[9]For the sake of simplicity, we do not consider in the case of congressmen, issues related to electoral coefficients or the effects of party coalitions.

$$\delta l_t \geq \underline{s}\,, \qquad \mu c_t \geq \underline{s}\,, \qquad \zeta u_t \geq 0$$

Recalling that the benefits of long term expenditures are greater than those of short-term ones, the social planner will always choose the higher level of long-term expenditures to maximize benefits, which implies that:

$$\delta, \mu \succcurlyeq \underline{s}, \quad \zeta \succcurlyeq 0 \quad \forall\, t \geq T \tag{10}$$

By choosing a minimal level of short-term expenditure, the social planner will provide a maximization of social benefits in the entire period (T = 1, … , 8).

ISOLATED DECISIONS OF LOCAL AND CENTRAL INCUMBENTS

As elections will not change the social planner's allocations, his policies will result in similar benefits in all periods. In contrast, both the local and central incumbent will distort the allocation in elections years, to maximize his image improvement and thereby increase his elections prospects. This distortion gives us our first proposition:

Proposition A: *Incumbents increase short-term spending in electoral years (both in central and local elections) in* an *anticipation effect, to maximize their electoral prospects by influencing voters, according to voters' inter-temporal discount rate.*

Taken singly, those incumbents will deviate from the social planner's optimal allocation in electoral years, according to the level of the elections. In this sense, local incumbents will increase short-term expenditures in periods 4 and 8 (during local election years), whereas central incumbents will do that in periods 2 and 6 (synchronized with central elections). The short-term allocation is positively correlated with the voters' inter-temporal discount rate (the higher it is, the more the budget allocation will prioritize the short term).

$$W_t^g \succ \delta \succcurlyeq \underline{s} \;\leftrightarrow\; t \neq (4,8);\; \lim_{\beta \to 1} \delta = \bar{s} \;\leftrightarrow\; t = (4,8) \tag{11.a}$$

$$W_t^G \succ \mu \succcurlyeq \underline{s}, \zeta \succcurlyeq 0 \;\leftrightarrow\; t \neq (2,6); \lim_{\beta \to 1} \mu, \zeta = \bar{s} \;\leftrightarrow\; t = (2,6) \tag{11.b}$$

We assume that the main interest of politicians is maximize their accumulated image instead of the social benefit. However, as the former is by symmetry derived from the latter (recall Equation (6)), we build Table 3 in terms of the kind of social benefit (b or B) targeted by each category of policy makers, to compare the differences in allocation when it comes to social planner or political incumbents.

Table 3 – Policy Makers Maximization Subject According to Elections Calendar

Policy Makers	**Periods**

	T	**t+1**	**t+2**	**t+3**	**t+4**	**t+5**	**t+6**	**t+7**
Election level	-	central	-	Local	-	Central	-	Local
Social Planner	B_{t+1}	B_{t+2}	B_{t+3}	B_{t+4}	B_{t+5}	B_{t+6}	B_{t+7}	B_{t+8}
Central Incumbent	B_{t+1}	$\boldsymbol{b_{t+1}}$	B_{t+3}	B_{t+4}	B_{t+5}	$\boldsymbol{b_{t+5}}$	B_{t+7}	B_{t+8}
Local Incumbent	B_{t+1}	B_{t+2}	B_{t+3}	$\boldsymbol{b_{t+3}}$	B_{t+5}	B_{t+6}	B_{t+7}	$\boldsymbol{b_{t+7}}$

Source: The authors.

The voters' temporal preferences are important to determine the switch back from long-term to short-term spending. Recalling that B is bigger than b (Equation (6.a)) and that voters prefer some spending anticipation (Equation (3)), two effects influence the incumbents' decision: β increases the short-term and γ increases the long-term allocation of public resources.

INTERACTION BETWEEN INCUMBENTS IN STAGGERED ELECTIONS

When we consider the interaction between central and local incumbents, we may recognize intuitively that the links among them may also interfere with the level of short-term spending. In cross-elections (central ones for mayors, local elections for central incumbents), the anticipation effect means some erosion of image improvement, but the incumbent expects a compensation in the following years. Compensation for local supporters is related to central incumbents' discretionary decision about where to allocate unconditional grants. If elected, a deputy can make budget amendments that favor his supporters. As the election is not taken for granted and the local incumbent himself will face an election in two years, the better his image, the higher will be the anticipation effect. The perspective of compensation yields our second proposition:

Proposition B: *Local incumbents will increase the anticipation effect in central election years as a tool to acquire votes for their allies, according to their own level of accumulated image and their allies' electoral prospects (as being elected is a condition for allies to reward the supporters).*

As the image improvement ranges from 0 to 1, when it gets closer to the unity, the stimuli for local incumbents to create in anticipation effect are at their maximum. Similarly, the anticipation effect is present in the allies' probability of election (we called that ϕ, ranging from 0 to 1), both for local as well as for central elections.

Another issue that encourages mayors to support central elections' allies is that voters assign part of the benefits from unconditional grants to local incumbents (even if they are not

from the same party of central incumbents). Hence, even if central incumbents support mayors in elections, local incumbents are more likely to feed an anticipation effect in cross elections than the opposition. Equation 12 highlights the difference in cross elections, according to the jurisdiction level:

$$\lim_{AI\to 1;\phi\to 1} \delta.\, l = \bar{s} \quad \leftrightarrow \; t = (2,6) \tag{12.a}$$

$$\lim_{AI\to 1;\phi\to 1} \underline{s} < \begin{bmatrix} \mu.\, c \\ \zeta.\, u \end{bmatrix} < \bar{s} \;\leftrightarrow\; t = (4,8) \tag{12.b}$$

According to Equation 12, in electoral years the short-term spending will increase. If we represent the increase in anticipation effect by mayors as ψ_l and by central incumbents as ψ_c, the maximization in electoral years may be described as in Table 4:

Table 4 – Policy Makers Maximization Subject in Electoral Years – Staggered Elections

Policy Makers	**Periods**			
	t+1	**t+3**	**t+5**	**t+7**
Election level	Central	Local	Central	Local
Social Planner	B_{t+2}	B_{t+4}	B_{t+6}	B_{t+8}
Central Incumbent	b_{t+1}	$(1-\psi_c)B_{t+4} + \psi_c\, b_{t+3}$	b_{t+5}	$(1-\psi_c)B_{t+8} + \psi_c\, b_{t+7}$
Local Incumbent	$(1-\psi_l)B_{t+2} + \psi_l\, b_{t+1}$	b_{t+3}	$(1-\psi_l)B_{t+6} + \psi_l\, b_{t+5}$	b_{t+7}

Source: The authors.

Recalling that ψ_l is higher than ψ_c and B is higher than b (equations 12 and 6.a), and combining information from tables 3 and 4, we can rank years from the most to the least efficient in the sequence, non-election years, central elections, and local elections. In the entire period, we will have four years with maximum efficiency, two with medium, and two with low efficiency.

INTERACTION BETWEEN INCUMBENTS IN SYNCHRONIZED ELECTIONS

In Brazil, as described above, we have elections every two years. If the elections were synchronized, according to our model, we will see an interesting effect in the allocation, as a result of politician preferences. This issue gives us the following proposition:

Proposition C: *Synchronized elections reduce stimuli for the incumbents to deviate from optimal allocation of public spending, when it comes to the trade-off between short- and long-term expenditures.*

Synchronized elections reduce the proportion of elections years in the entire period. Consider an eight-year period with only two elections years (t = (4, 8)). As politicians are vote seeking, incumbents will try to maximize their accumulated image and will, therefore, target long-term allocations in all years. Table 5 describes only the years with deviations from the optimal allocation (the social planner allocation):

Table 5 – Policy Makers Maximization Subject in Electoral Years – Synchronized Elections

Policy Makers	**Periods**	
	t+3	**t+7**
Election level	Central and Local	Central and Local
Social Planner	B_{t+4}	B_{t+8}
Central Incumbent	b_{t+3}	b_{t+7}
Local Incumbent	b_{t+3}	b_{t+7}

Source: The authors.

The social gain will be strongly representative in years t_{+1} and t_{+5}. Allocation of public resources in those years will target the long term both for local as for central jurisdictions.

CONCLUSION

In this study, we analyzed the effects of the timing of elections in the formulation of public budget policies, dividing those policies into two categories according to the timeframe as short term and long term. Employing the instruments provided by Game Theory, we built a dynamic set of eight periods with imperfect information in which two players (local and central policymakers) decide the budget formulation policy, oriented to maximize the next election's results. We analyze two models: first, we discuss a staggered election model, where elections occur every two years, alternately, to local and central government layers. Our second model explores the possibility of unification of local and central elections in a synchronized way with the convergence of mandates of the studied politicians (local and central governments).

We now highlight three main results of our theoretical discussion. Firstly, by comparing allocations of a hypothetical social planner with local and central incumbents, we demonstrate that the choices of those politicians in allocation of the public budget are sub-optimal in election

years. When elections are held at the end of the year, the incumbents increase short-term expenditures as a tool to leverage their prospects in their respective elections. Such an anticipation effect is a source of low efficiency in public spending. This result helps to explain why politicians aim at electoral prospects against public interest. It is merely a matter of politicians' rationality, expressed by an opportunistic behavior. Taking political agents as rational players, one can see that expect better budgeting choices is a vain hope. Institutions must develop and/or improve tolls to control budget decisions. This focus does not suppress the relevance of discussing electoral decisions and the stimuli to ameliorate voters' choices mechanisms, but complement the latter.

A second issue emerges when we study cross elections, i.e., elections on a different level from the jurisdiction of the incumbent (local elections for central incumbents and central elections for mayors). We argue that deviations also occur in cross-election years, according to incumbent's accumulated image and allies' electoral prospects; however, the anticipation effect is greater in local allocations than in central ones because central expenditures increase the local incumbent's image.

Then, we discuss the results of synchronized elections. In this eight-period model, the vote-seeking incumbents in both layers will prioritize the long term in six periods (in the staggered model, they choose the long term only in four periods). This result emerges owing to the lack of a cross-elections effect (discussed above). Therefore, according to our model, synchronized elections reduce incentives for incumbents to change the allocation of public resources from the long term to the short term. In this sense, even if staggered elections may help to promote the political education of citizens, they have a social cost in terms of the allocation of the public budget.

REFERENCES:

Abrantes, L. A., & Ferreira, M. A. M. (2010). *Gestão Tributária.* (Curso de E). João Pessoa: UFPB. Retrieved from http://portal.virtual.ufpb.br/biblioteca-virtual/files/pub_1291087045.pdf

Barro, R. J. (1973). The control of politicians: An economic model. *Public Choice*, *14*(1), 19–42. http://doi.org/10.1007/BF01718440

Battaglini, M. (2014). A Dynamic Theory of Electoral Competition. *Theoretical Economics*, *9*(March), 515–554. http://doi.org/10.3982/TE1328

Beniers, K. J., & Dur, R. (2007). Politicians' motivation, political culture, and electoral competition. *International Tax and Public Finance*, *14*(1), 29–54. http://doi.org/10.1007/s10797-006-8878-y

Carpenter, J., Doverspike, D., & Miguel, R. F. (2012). Public service motivation as a predictor of attraction to the public sector. *Journal of Vocational Behavior*, *80*(2), 509–523. http://doi.org/10.1016/j.jvb.2011.08.004

Caselli, F., & Morelli, M. (2004). Bad politicians. *Journal of Public Economics*, *88*(3-4), 759–782. http://doi.org/10.1016/S0047-2727(03)00023-9

Fedele, A., & Naticchioni, P. (2015). Moonlighting Politicians: Motivation Matters! *German Economic Review*, n/a–n/a. http://doi.org/10.1111/geer.12072

Ferejohn, J. (1986). Incumbent performance and electoral control. *Public Choice*, *50*(1-3), 5–25. http://doi.org/10.1007/BF00124924

Ferreira, I. F. S., & Bugarin, M. S. (2007). Transferências voluntárias e ciclo político-orçamentário no federalismo fiscal brasileiro. *Revista Brasileira de Economia*, *61*(3), 271–300. http://doi.org/10.1590/S0034-71402007000300001

Glaeser, E. L., Ponzetto, G. A. M., & Shapiro, J. M. (2005). Strategic Extremism: Why Republicans and Democrats Divide on Religious Values. *The Quarterly Journal of Economics*, *120*(4), 1283–1330.

Heine, B.-O., Meyer, M., & Strangfeld, O. (2005). Stylised Facts and the Contribution of Simulation to the Economic Analysis of Budgeting. *Journal of Artificial Societies and Social Simulation*, *8*(4), 1–34. http://doi.org/-

Kaiser, K., & Taugourdeau, E. (2013). The timing of elections in federations: a disciplining device against soft budget constraints? *Public Choice*, *154*(3-4), 197–215. http://doi.org/10.1007/s11127-011-9814-y

Kaldor, N. (1961). Capital Accumulation and Economic Growth. In *The Theory of Capital* (pp. 177–222). London - UK: Macmillan.

Klein, F. A., & Sakurai, S. N. (2015). Term limits and political budget cycles at the local level: evidence from a young democracy. *European Journal of Political Economy*, *37*, 21–36. http://doi.org/10.1016/j.ejpoleco.2014.10.008

Meyer, M. (2011). Bibliometrics , Stylized Facts and the Way Ahead : how to build good social simulation models of science? *Journal of Artificial Societies and Social Simulation*, *14*(4), 1–5. Retrieved from <http://jasss.soc.surrey.ac.uk/14/4/4.html

Moura, A. (2015). Processo de Reforma Política. Speech on the Parliamentary Agenda. Brasília: Câmara Federal. Session 148. June 10th. 2015. Retrieved from http://www.camara.leg.br/internet/sitaqweb/discursodireto.asp?nuSessao=148.1.55.O

Rezende, F. (2001). *Finanças Públicas* (2nd ed.). São Paulo, SP: Atlas.

Ribeiro Filho, J. F., Diniz, J. A., & Vasconcelos, M. T. C. (2003). Comportamento da receita tributária em municípios localizados no estado de pernambuco no contexto da Lei de Responsabilidade Fiscal. *Contabilidade, Gestão E Governança*, *6*(1), 131–152. Retrieved from http://cgg-amg.unb.br/index.php/contabil/article/viewArticle/198

Rogoff, K. (1990). Equilibrium Political Budget Cycles. *The American Economic Review*, *80*(1), 21–36. Retrieved from http://www.jstor.org/stable/2006731

Sakurai, S. N., & Menezes-Filho, N. A. (2008). Fiscal policy and reelection in Brazilian municipalities. *Public Choice*, *137*(1-2), 301–314. http://doi.org/10.1007/s11127-008-9329-3

Schlesinger, G., & Rolim, C. F. C. (2008). O impacto das transferências intergovernamentais na política fiscal dos municípios: uma análise comparativa das mesorregiões Norte Pioneiro e Sudoeste Paranaense. *Revista Paranaense de Desenvolvimento*, *114*(1), 33–51.

Solé-Ollé, A., & Sorribas-Navarro, P. (2008). The effects of partisan alignment on the allocation of intergovernmental transfers. Differences-in-differences estimates for Spain. *Journal of Public Economics*, *92*(12), 2302–2319. http://doi.org/10.1016/j.jpubeco.2007.06.014

Teixeira, L., Mac Dowell, M. C., & Bugarin, M. S. (2003). Consórcios Intermunicipais de Saúde : Uma Análise à Luz da Teoria dos Jogos. *Revista Brasileira de Economia*, *57*(1), 253–281.

Vergne, C. (2009). Democracy, elections and allocation of public expenditures in developing countries. *European Journal of Political Economy*, *25*(1), 63–77. http://doi.org/10.1016/j.ejpoleco.2008.09.003