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The impact of election periods on public expenditure in the municipalities of Rio Grande do Sul, 2009 to 2016

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Abstract. The objective of this study is to demonstrate the possible existence of opportunistic political-economic cycles in current and capital expenditures in the municipalities of the state of Rio Grande do Sul from 2009 to 2016. To this end, econometric analysis was used through the estimation of a panel data model. The results show that the electoral calendar only has an influence on the current expenditures of the municipalities in the evaluated period, since these are short-term expenses that are easily observed by the electorate. Therefore, this study contributes to the theory by showing that fluctuations in the economy, in terms of current expenditure, of the municipalities of Rio Grande do Sul for 2009 to 2016 are also explained by political variables, and not only by economic factors.

Keywords: Political-economic cycles; budgetary variables; panel data.

Acronyms and initials used

PE	Political-economic cycle
RE	Random effects
FE	Fixed effects
Ep	Standard error of prediction
FINBRA	Finances of Brazil (Finanças do Brasil) database
IBGE	Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografía y Estatística)

GPI-IA	General Price Index–Internal Availability (Índice Geral de Preços–Disponibilidade Interna)
OLS	Ordinary least squares
GDP	Gross domestic product
PCSE	Panel-corrected standard errors
TRE-RS	Regional Electoral Court of Rio Grande do Sul (Tribunal Regional Eleitoral do Rio Grande do Sul)

1. Introduction

Over time, the connection between politics and the economy has attracted scholars seeking to interpret the impact of elections on economic variables. In Brazil, government decision-making during pre- and post-election periods assumed greater importance in the political-economic field of study, especially following the approval of the 1988 Constitution of the Federative Republic of Brazil.

After twenty years of military government, the new Constitution permitted the restoration of democracy, whereby all economic agents could again express their opinions about the political leadership of the country. Since then, Brazilian elections have been held every four years, with groups of individuals presenting themselves as candidates for the posts of president, state governor, or municipal mayor, while in each case the population has the responsibility of electing the candidates best suited to the role of central administrator.

Since the return of democracy, Brazilian candidates, aiming to win elections, have sought to demonstrate their competence through benefits they can confer upon the population. Their main strategy focuses on fluctuations in the public budget, an instrument composed of government revenue and expenditure that can create well-being for society. This perspective frames the theory of opportunistic political-economic cycles, according to which candidates look to garner votes by way of expansionary policies that meet with the population's approval. To this end, political leaders attempt to improve macroeconomic variables when elections are approaching. Despite being strictly short-term, these measures attract votes, giving voters the sensation of enhanced well-being and prompting them to classify the candidate as competent. Then, after the election period, the elected leaders exercise contractionary policies with the aim of balancing public accounts (Queiroz & Silva, 2010).

In contrast to traditional economic theory, which accepts that economic fluctuations in a particular locality have purely economic causes, studies by Kalecki (1943) and Downs (1957) argue that these fluctuations also have electoral causes, in which policy design is one of the determinants of the behavior of economic and social variables. These studies show that all democratic institutional environments are subject to electoral actions that compromise the efficient management of public capital and jeopardize the optimal distribution of resources. For Downs (1957), political candidates act rationally; just as firms seek to maximize their profits, politicians only attempt to achieve electoral victory, and to do so they resort to economic manipulations aimed at maximizing their votes.

As such, the issue is important for understanding the political conjuncture of Brazilian localities after the period of redemocratization, as it helps elucidate the "opportunistic" practices of political leaders – practices that ultimately affect the local economy and, in turn, the well-being of the population residing in the locality. Thus, the main aim of this article is to demonstrate the possible existence of opportunistic political-economic cycles in the current and capital expenditure of municipalities in the state of Rio Grande do Sul during the period 2009 to 2016. The methodology employed is econometric analysis through estimation of a panel data model, utilizing data from the Brazilian Institute of Geography and Statistics (Instituto Brasileño de Geografía y Estadística, IBGE), the Finances of Brazil (Finanças do Brasil, FINBRA) database, and the Regional Electoral Court of Río Grande del Sur (Tribunal Regional Eleitoral do Rio Grande do Sul, TRE-RS).

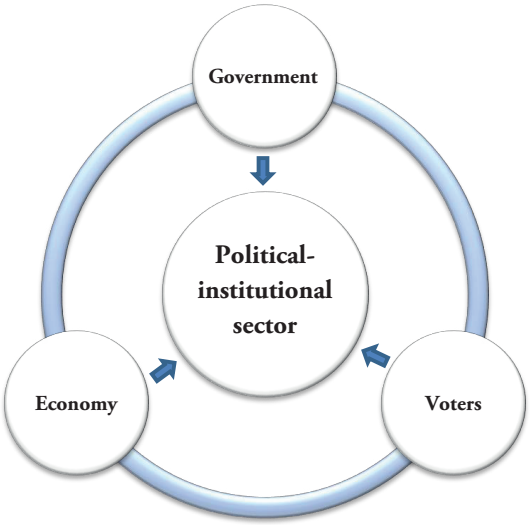
2. Theoretical framework

2.1 The theory of political-economic cycles

Kalecki (1943) introduced the concept of economic cycles, analyzed through the behavior of economic variables alone, while the research and analysis of Downs (1957) expanded the concept to include political-economic cycles. But it was not until the 1970s that this relationship was formally and closely developed, and gained currency in academia. The creation of models to demonstrate the presence of cyclical models of economic behavior throughout the electoral calendar led to the conclusion that various economic cycles are also determined politically. This discussion gave rise to the theory of political-economic cycles (PECs) (Cançado & Araujo, 2004; Reichenvater, 2007; Queiroz & Silva, 2010).

This theory assumes that political leaders have a particular desire for prestige and power that guides them in their decision-making. As Coelho notes, government is "[…] seen as an agent that has its own motivations and is susceptible to being influenced like all other agents" (2004, p. 5). Consequently, it is worthwhile for political leaders to implement economic improvements that translate primarily into inflation control and increased employment during election periods, with the aim of swaying the masses and, in turn, winning elections. Coelho (2004) argues that PECs are comprised of four main agents: government, economy, voters, and the political-institutional sector, which interact as shown in Figure 1.

Figure 1
Interaction between the agents that comprise political-economic cycles



Source: Coelho (2004); adaptation.

In this interaction, the government acts of its own free will, guided by particular interests, in pursuit of reelection; voters are agents that base their decisions on their knowledge of politics and the benefits it will afford them; the economy is represented by the environment in which the fluctuations in the economic variables occur, and is indicative of the administrative capability of the government; and finally, the political-institutional sector encompasses the interaction between the other three agents, and is the environment in which the PEC unfolds (Coelho, 2004).

The PEC theory was strengthened during the 1970s through the studies of Nordhaus (1975); Hibbs (1977); Alesina (1987); Rogoff and Silbert (1988); Rogoff (1990); and Persson and Tabellini (1990). The PEC can be broken down into two major dimensions: one related to the type of policy executed by policymakers, and the other to hypotheses regarding voters' expectations. Within the first dimension, there are two alternative models: opportunistic and partisan. The former treats the public agent as an individual who seeks only to maximize the number of voters and secure reelection, thereby acting to further personal interests alone; the latter assumes that public agents make decisions based on their political ideologies, and that their actions are geared toward accomplishing the interests of their political party.

In turn, in the second dimension, there are differences regarding whether voters can be considered adaptive or rational. Adaptive voters are regarded as "myopic" – that is, individuals who do not understand the political-economic system, and whose electoral decisions are shaped by the government's actions in the present and the past, which leads them to commit systematic errors. On the other hand, rational agents[1] are individuals who are knowledgeable about the entire political-economic system, allowing them to anticipate the government's actions before making a voting decision.

Table 1 presents the two main opportunistic models under the PEC theory, and the main studies conducted in this area. The models resulting from this subdivision are: a) the adaptive expectations opportunistic model, whose precursor is the study by Nordhaus (1975); and b) the rational expectations opportunistic model, explored primarily by Rogoff and Silbert (1988); Rogoff (1990); and Persson and Tabellini (1990). These models are described below.

Table 1
PEC hypotheses and opportunistic models of voter expectations

Hypothesis	Opportunistic models
Adaptive expectations (traditional model)	Nordhaus (1975)
Rational expectations	Rogoff & Silbert (1988) Rogoff (1990) Persson & Tabellini (1990)

Source: Alesina, Roubini, & Cohen (1997); adaptation.

2.2 Traditional opportunistic model (adaptive expectations)

Nordhaus (1975) introduced the adaptive expectations opportunistic model, in which political leaders utilize as much of the economic apparatus as they need to maximize the number of votes and win elections. In this theory, candidates do not consider their political ideology or the opinions of their voters to formulate macroeconomic policies. Moreover, the theory assumes the existence of a representative voter, such that government decision-making is based solely on macroeconomic fluctuations (Fialho, 1999; Veiga & Veiga, 2005; Araújo Junior, Cançado, & Shikida, 2005). Nordhaus (1975) bases his study on the Phillips curve, in which political leaders tend to exploit the

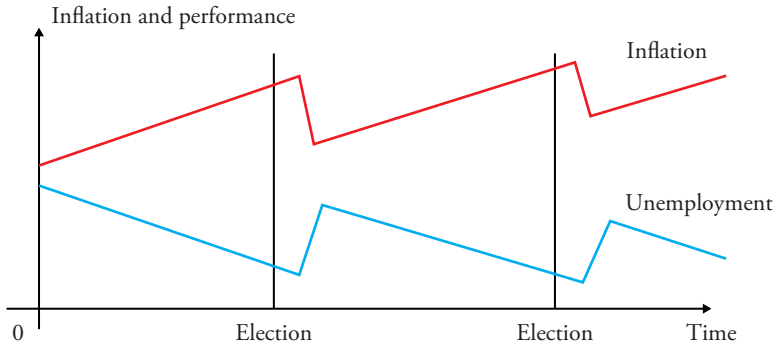
1 The idea of adaptive electoral behavior emerged in the mid-1970s, a period known as the first stage. The second stage, which developed in the 1980s, saw the emergence of the rational voter hypothesis.

trade-off between unemployment and inflation during election periods. His adaptive expectations model is based on the following premises:

- Premise 1. The economic system is based on the Phillips curve, augmented by expectations.
- Premise 2. Inflationary expectations are adaptive.
- Premise 3. Voters act identically; they possess adaptive expectations, making voting decisions based on retrospective macroeconomic performance and political myopia.
- Premise 4. The objective of the political leader is to maximize the number of votes through fluctuations in effective demand.
- Premise 5. All election periods involve two candidates competing for election: the incumbent, who is already in power, and the challenger.
- Premise 6. The election period is previously determined.

It is verified that voters formulate their preferences based on the aggregate unemployment rate and the inflation rate. Thus, the government is understood to have perfect knowledge of voters' preferences and can manipulate economic variables to maximize its votes (Preussler, 2001). According to Alesina, Roubini, and Cohen (1997), if elections were to occur in $t + 1$, political leaders would implement expansionary monetary and fiscal policies in period t in an attempt to influence the unemployment and inflation rates. After the election period, expectations are revised and the economy enters a period of recession. In response to the "crisis" induced, elected leaders will create new macroeconomic policies to balance the economy and public accounts. This relationship can be seen in Figure 2.

Figure 2
Opportunistic model with adaptive expectations, according to Nordhaus (1975)



Source: Siqueira (2015).

Therefore, according to Nordhaus (1975), the economic cycle is only formed if voters suffer from political myopia; that is, if their expectations and voting decisions are based on the immediate past.

2.3 Rational opportunistic model (rational expectations)

The rational opportunistic model proposes that voters know the political-economic system perfectly; that is, they have sufficient information to understand all political attitudes and, based on past performance, anticipate the attitudes of political leaders in subsequent periods. Consequently, voters make decisions by thinking about how to maximize the benefits they stand to obtain in the future (Downs, 1957). However, the model also allows for the existence of information symmetries that prevent voters from perceiving certain aspects of the political system, and its implications on economic fluctuations. This phenomenon enables the formation of a PEC (Coelho, 2004; Nakaguma & Bender, 2010; Preussler, 2001).

The decision of the electorate is based on the government's managerial capabilities, evaluated through the results of macroeconomic variables. On the other hand, candidates tend to act opportunistically so as to appear competent during the election period (Preussler, 2001). The pioneering works on the rational opportunistic model are those of Rogoff and Silbert (1988); Rogoff (1990); and Persson and Tabellini (1990). All of these studies focus on the interaction between politics, the economy, and the rational agent, but differ in how they approach politicians' use of macroeconomic instruments.

Persson and Tabellini's (1990) model is based on the Phillips curve. In their study, politicians seek to demonstrate their competence by manipulating the trade-off between unemployment and inflation, fulfilling the following theoretical assumptions:[2]

- Premise 1. The economy is described by the Phillips curve added to a term of competence.
- Premise 2. Inflationary expectations are rational; thus, individuals determine the inflation rate expected for period t based on the information in $t - 1$.
- Premise 3. All politicians are identical, in that they desire electoral victory and seek to maximize votes.
- Premise 4. In all elections, two politicians run for the post of central administrator in a given locality, where one will be the incumbent and the other the challenger.

2 As shown in the studies by Alesina *et al.* (1997) and Coelho (2004).

- Premise 5. Voters have the same expected utility, and all of them wish to elect the policymaker who is capable of maximizing it.
- Premise 6. Political leaders have total control over price levels in the economy. Later, to demonstrate their political-economic capabilities, they make use of monetary instruments to manipulate the fluctuations that occur in the macroeconomic variables (unemployment, inflation and product growth).
- Premise 7. The election period is previously determined.

This model suggests that voters are uncertain about the competence of the government, which could result in the formation of a PEC (Alesina *et al.*, 1997; Persson & Tabellini, 1990). During election periods, political leaders increase the aggregate demand of the economy through expansionary monetary policies, seeking to appear more competent. But only the most skilled policymakers are capable of increasing economic growth rate above the natural rate ($y_t > \bar{y}$).

Critics of the Persson and Tabellini (1990) model opened a discussion about the studies of Rogoff and Silbert (1988) and Rogoff (1990), with regard to the formation of cycles around budgetary variables. These studies find that under the hypothesis of rational expectations, PECs are formed through expansionary fiscal policies in which politicians, during election periods, reduce tax levels and increase public spending in areas readily perceived by the electorate (health, education, investment) in order to maximize votes. So, in the year before elections, politicians seek to implement expansionary fiscal policies, thereby affording themselves greater autonomy with which to increase public spending and provide the population with significant amounts of goods and services. With expanded public spending, politicians increase their managerial competence in the eyes of the electorate, thus forming the opportunistic political cycle.

2.4 Empirical evidence

In Brazil, studies on the PEC theory have spurred increasing debate over time, and can be grouped into two approaches: those seeking to demonstrate electoral manipulations in macroeconomic variables, and those seeking to highlight the manifestation of the budget cycle. The primary objects of study are the municipal, state, and federal spheres, with methodologies drawing on a variety of econometric models.

Outstanding studies in this area include that of Bittencourt and Hillbrecht (2003), who seek to demonstrate the influence of the electoral calendar on revenues, the public deficit, and spending in areas such as agriculture, regional development, education, and culture. Their study concentrates on Brazilian states over the period 1983-2000, utilizing the panel data method.

The main results point to the formation of opportunistic PECs through expanded public accounts during election periods.

Sakurai (2009) aims to show the presence of electoral cycles in the budgetary implementation of the 5,506 Brazilian municipalities over the period 1990-2005, using an econometric panel data model. The author bases his research on spending on agriculture; health and sanitation; transport; assistance and pensions; communications; housing and urban development; legislative aspects; and education and culture. He detects a cyclical movement over the period studied, with increased public spending in sectors such as health and sanitation; assistance and pensions; housing and urban development; and transport.

On the municipal front, the study by Veloso and Bornhold (2016) explores the PEC theory by reviewing the budgetary allocations of municipalities in the state of Rio Grande do Sul, during the period 1995-2008. They investigate public accounts in the following areas: overall budgetary expenditure; current expenditure; personnel and social security contributions; current transfers and investment expenditure; and spending by area (legislative; administration and planning; agriculture; communications; assistance and pensions; transport; health and sanitation; education and culture; and housing and urban development). Their primary results include the detection of opportunistic actions in overall, personnel, and current expenditures. As to spending per area, they note increased public expenditure during election periods on legislative expenses; administration and planning; housing and urban development; health and sanitation; and transport. Finally, although the authors point to the existence of electoral cycles in the Rio Grande do Sul municipalities, they stress that the associated actions are relative and not widespread, since they do not apply to all categories of public spending.

Gionedis and Guimarães (2016) look for opportunistic PECs in municipalities in the state of Paraná over the period 2003-2013, using an econometric panel data approach. They investigate electoral manipulations in current, capital, social assistance, education, urban development, and health spending. In so doing, they demonstrate the existence of an electoral cycle that influences the economy through periods of increased and decreased public spending. This cycle manifests itself, principally, in current and capital expense accounts, but is absent from sector-based spending (education, health, social assistance, and urban development). Thus, the authors propose that the municipal mayors in this state exploit public machinery to remain in office.

In addition to the aforementioned studies, it is worth mentioning those of Arvate, Avelino, and Lucinda (2008); Araújo Junior and Filho (2010); Nakaguma and Bender (2010); Rocha and Brilhante (2014); and Rodrigues (2015), all of which explore the possible presence of political cycles in Brazilian states. In the municipal sphere, notable works include those of Sakurai and Gremaud (2007); Vale, Araújo, and Paixão (2009); and Queiroz and Silva (2010).

3. Methodology

The aim of this article is to demonstrate the possible existence of opportunistic PECs in current and capital expenditures of municipalities in Rio Grande do Sul during the period 2009 to 2016. This period was chosen because it encompasses the two most recent municipal election cycles. The analysis draws on an econometric panel data model.

3.1 Database

The database employed includes current and capital spending and budgetary revenues of 439[3] municipalities in the state of Rio Grande do Sul, using information collected from the National Treasury Secretariat, which maintains the FINBRA database.[4] The political variables were extracted from the TRE-RS, with emphasis on pre-election, election, and post-election years. In addition to these, a variable on gross domestic product (GDP),[5] obtained from the IBGE, was used.

To identify possible opportunistic manipulations by the public agent in these municipalities, the following dependent variables were used: a) capital expenditure per capita, which takes into account spending on the purchase and production of investment goods. This includes spending on works and facilities, labor, purchase of equipment and durable goods, transfers to states and the federal government, and financial aid to students, among other areas; and b) current expenditure per capita, including government spending on the provision and maintenance of public goods and services. This category includes expenditures on personnel and social security contributions, as follows: pensions; staff compensation and reinstatement; consumables for

3 The study takes into account this number of municipalities because they were the only ones in the state with complete data for the period of analysis.

4 It should be noted that the data were transformed into real 2016 values using Brazil's General Price Index–Internal Availability (Índice Geral de Preços–Disponibilidade Interna, IGP-DI). In addition, the per capita values were altered to correct for possible distortions caused by the different dimensions of the Río Grande do Sul municipalities. This transformation was carried out using the IBGE's annual population estimate.

5 Variable also transformed in per capita terms and deflated by the IGP-DI based on 2016.

hospitals, schools, and other public facilities; school meals; recruitment of teachers and doctors, and so on.

These variables are important for the analysis of political cycles given the theoretical assumption that government consumption expenses (that is, current expenditures), as expenses incurred in the short term, are more perceptible to the electorate, and thus represent a field ripe for electoral manipulation. As far as expenses incurred for the execution of public investment – known as capital expenditure – are concerned, these constitute an important "weapon" for electoral victory, since they include government projects and reforms which, even if executed in the long term, are one of the areas that best demonstrate public administrative competence.

Meanwhile, the independent variables are subdivided into electoral and control. For the electoral variables, two dummy variables were used: one to signal the "pre-election or election" period for the years 2011-2012 and 2015-2016; and another for the "post-election" period, for the years 2009-2010 and 2013-2014. In the case of these variables, it was decided to leave the post-election period in the database.

The objective of the control variables is to capture possible fluctuations in fiscal spending originating in economic variables. The following were used: a) budgetary revenues per capita, composed of the total revenues collected by municipalities in the state of Rio Grande do Sul. Their use is justified because, according to Oliveira, "[…] the possible boost to spending carried out by *policymakers* can be explained by the increase in the volume of revenues collected" (2008, p. 50); and b) national GDP per capita, also used by Nakaguma and Bender (2006), since it captures the fluctuations in public spending resulting from the economic growth of the country.

It should be noted that the current values of the budgetary variables and national GDP were transformed into real 2016 values by way of the IGP-DI. Moreover, these values were transformed into per capita values in order to avoid possible distortions caused by the different sizes of the Rio Grande do Sul municipalities.

3.2 Econometric procedure

The present study utilizes the econometric panel data model as its method of measurement. This method is characterized by its capacity to group cross-sectional data series into time series (Greene, 2008). Baltagi (2005) and Greene (2008) point out that using this type of model has certain advantages, such as: a) the ability to control the heterogeneity of individuals when they relate to time, something which cannot be detected when using the time-series or cross-section methods in isolation; b) the possibility of grouping a large amount of data, which makes the model more informa-

tive, reduces collinearity, and increases variability, efficiency, and degrees of freedom; and c) the capacity to detect and measure more complex effects that cannot be identified using pure cross-section or time-series methods.

The general matrix for the panel data model, according to Baltagi (2005) and Greene (2008), can be defined as:

$$Y_{it} = X'_{it}\beta + Z'_{i}a + \varepsilon_{it} \qquad (1)$$

where: X'_{it} = regressors; Z'_{i} = individual heterogeneities of each unit; that is, particular characteristics of each individual that are constant over time (such as skin color, gender, and family characteristics, among others). It is important to mention that individual heterogeneities can be concentrated both in the intercept and the term of error of the econometric model. This relationship is established by the type of panel data model to be utilized (fixed effects, FE: or random effects, RE); β = parameters to estimate; and ε_{it} = a random term of error.

The panel data model, according to Greene (2008), can be divided into two main types: a) FE models, which control for the heterogeneities of each individual over time through the intercept of the model (β_0). In this situation, even though β_0 differs across agents, it does not vary over time; and b) RE models, in which the element that captures the individual heterogeneities is not fixed-term but random. In this case, there are two error terms: one, an observed variable, that captures the individual heterogeneities; and another, the traditional error term present in any econometric model. However, in the event that individual heterogeneities do not manifest themselves, the panel data models must be treated as pooled – that is, an average model for the entire population, estimated using the ordinary least squares (OLS) method.

To determine the most appropriate model for a given study, the researcher must perform Chow, Breush-Pagan Lagrange multiplier (LM), and Hausman tests in advance. The structures and sequence of these tests is set out in Table 3. After selecting the most appropriate model, it is necessary to check for the presence of certain problems: autocorrelation, heteroscedasticity, and contemporaneous correlation. To this end, it is necessary to perform the other tests also represented in Table 3.

In the event that the model presents the problems of heteroscedasticity and contemporaneous correlation, the Hausman test will prove invalid, and should be substituted for an alternative, known as the Mundlack. This test has the RE model as the null hypothesis, and the FE model as the alternate hypothesis.

3.3 Definition of the econometric model

To accomplish the stated aim, this study will use two econometric models, defined generically in Equation 2:

$$Desp_{it} = \beta_0 + \beta_1 ROper_{it} + \beta_2 PIBper_{it} + \beta_3 Anoelepre_{it} + \varepsilon_{it} \qquad (2)$$

Where: *Desp* = capital expenditure and current expenditure per capita, defined, respectively, in the first and second models; *ROper* = budgetary revenue per capita; *PIBper* = national GDP per capita; *Anoelepre* = dummy that takes the value of 1 for the pre-election or election year, and 0 otherwise; β_0 = coefficient of the constant; ε = random error term.

In the notation of the panel data, the subindex *i* corresponds to individuals, which in this study comprise 439 municipalities in the state of Rio Grande do Sul; *t* represents the period, which has the value of 8, referring to the years of analysis (2009 to 2016). Thus, the value of *n* will be equal to 3,512. The database contains all information on the municipalities for each period of time, classifying the panel as balanced. In addition, a positive sign is expected for the variables *ROper*, *PIBper*, and *Anoelepre*, given the expectation that public expenditure will be greater during election years than during years when there are no elections. It should be noted that the model was calculated using Stata, version 15.0 (data analysis and statistical software).

4. Results and discussion

Before discussing the results on the presence of PECs in Rio Grande do Sul municipalities, it is necessary to determine which panel data model best fits the sample used. Table 2 presents the econometric statistics for both the FE and RE panel data models.

Table 2 attests to the good fit of the FE and RE models, both of which show signs of the presence of individual heterogeneities. It can be observed that the parameters of the econometric statistics are similar, and that all are significant at 1%. Then, during the visual analysis, the presence of some econometric problems (such as autocorrelation, heteroscedasticity, and contemporaneous correlation) becomes feasible. This makes the parameters significant as a whole and manifests their distortions in relation to the expected signs, as occurs with the variable linked to the electoral cycle. Thus, it is necessary to identify formal tests to perform these problems and enable a subsequent decision regarding the panel data model to use. These tests are presented in Table 3.

Table 2
Comparison between panel data models

Parameters	FE (ep) **p-value**	RE (ep) **p-value**
Dependent variable: capital spending per capita		
Constant	1132,429[(1)] (42,81456) **0,000**	1443,897[(1)] (24,90467) **0,000**
Total income per capita	0,0869056[(1)] (0,0036933) **0,000**	0,1168605[(1)] (0,0037918) **0,000**
National GDP per capita	0,0000118[(1)] (0,0000000355) **0,000**	0,000000847[(1)] (0,0000000150) **0,000**
Pre-electoral and electoral year	141,1277[(1)] (8,610297) **0,000**	149,5559[(1)] (9,377223) **0,000**
R-sq		
Within	0,5446	0,5286
Between	0,8324	0,8549
Overall	0,8079	0,8296
Dependent variable: current spending per capita		
Constant	- 2360,265[(1)] (107,8523) **0,000**	- 244,413[(1)] (33,99195) **0,000**
Total income per capita	0,2092757[(1)] (0,0093036) **0,000**	0,2509554[(1)] (0,0082854) **0,000**
National GDP per capita	0,00000181[(1)] (0,0000000896) **0,000**	0,0000000768[(1)] (0,0000000196) **0,000**
Pre-electoral and electoral year	- 259,8343[(1)] (21,68983) **0,000**	- 187,645[(1)] (22,65064) **0,000**
R-sq		
Within	0,3573	0,2799
Between	0,6445	0,6953
Overall	0,3257	0,4270

Note:
[(1)] Significant at 1%.

Table 3
Model specification tests

Test	Diagnostic	Test hypothesis	Capital spending		Current spending	
			Value of the statistic	p-value	Value of the statistic	p-value
Chow	Test of pooled model against FE	H_0: pooled model H_1: FE model	2,97	0,0000	22,15	0,0000
Breush-Pagan LM	Test of pooled model against RE	H_0: pooled model H_1: RE model	96,65	0,0000	3.899,55	0,0000
Hausman	Test of RE against FE	H_0: RE model H_1: FE model	36,77	0,0000	618,92	0,0000
Wooldridge	Test for presence of autocorrelation	H_0: absence of autocorrelation H_1: presence of autocorrelation	16,404	0,0001	48,434	0,0000
Pesaran	Test for presence of contemporaneous correlation	H_0: absence of contemporaneous correlation H_1: presence of contemporaneous correlation	307,003	0,0000	229,424	0,0000
Wald	Heteroscedasticity	H_0: absence of heteroscedasticity H_1: presence of heteroscedasticity	$5{,}8 \times 10^5$	0,0000	54.153,76	0,0000
Mundlak	Test of RE against FE	H_0: RE model H_1: FE model	1.484,31	0,0000	11.074,65	0,0000

The first measurement seeks to identify the panel data model to be applied (either FE or RE). Through the Chow test, the FE model was found to be the most appropriate. However, the Breush-Pagan LM identified the RE as the most suitable. Thus, the hypotheses were compared using the Hausman test, which showed that the FE model is the preferred econometric panel data tool for the analysis. After determining the model, tests were performed to check for the presence of problems of autocorrelation, contemporaneous correlation, and heteroscedasticity. The Wooldridge, Pesaran, and Wald tests demonstrated the existence of the three problems in the model employed. Thus, the presence of heteroscedasticity invalidates the Hausman test; to correct this, an alternative test, the Mundlak, was per-

formed to decide between the FE and RE models. This test indicated that the FE model is, in fact, the most suitable for the database under analysis.

After detecting these problems that distort the econometric statistics, the distortions were corrected using panel-corrected standard errors (PCSE). The results of all estimations are presented in Table 4.

Table 4
Results of the model estimation

Explanatory variable	Dependent variable	
	Capital spending (ep) **p-valor**	Capital spending (ep) **p-valor**
Constant	37,22094 (186,3928) **0,842**	1587,088[1] (104,294) **0,000**
Total income per capita	0,1568636[1] (0,0439295) **0,00**0	0,0704512[1] (0,022032) **0,001**
National GDP per capita	0,00000025[2] (0,00000013) **0,048**	0,000000914[1] (0,0000000467) **0,000**
Pre-electoral and electoral year	- 252,8992 (187,6795) **0,178**	96,82805[3] (56,98029) **0,089**
rho |	0,4313671	0,6636614
R^2	0,2202	0,7493
Observations	3512	3512

Notes
Model estimated in accordance with Equation 2.
[1] significant at 1%; [2] significant at 5%; [3] significant at 10%.

In the case of the total per capita income of the Rio Grande do Sul municipalities, there is a positive relationship with the levels of expenditure analyzed; that is, there is a direct relationship between revenues and fluctuations in municipal spending, whereby the level of spending of municipalities depends on taxes collected. Thus, in both models, the per capita income variable was significant at 1%, showing that for each increase in total income of 1 real per capita, levels of capital expenditure tended to rise by approximately 0.15 reais per capita, while current expenditure increased by 0.07 reais per capita.

As to the behavior of national GDP and its impact on capital and current expenditure levels, the variable is significant at 1% for both models. The analysis demonstrates that Brazil-wide economic growth has a positive effect on the public spending levels of Rio Grande do Sul municipalities.

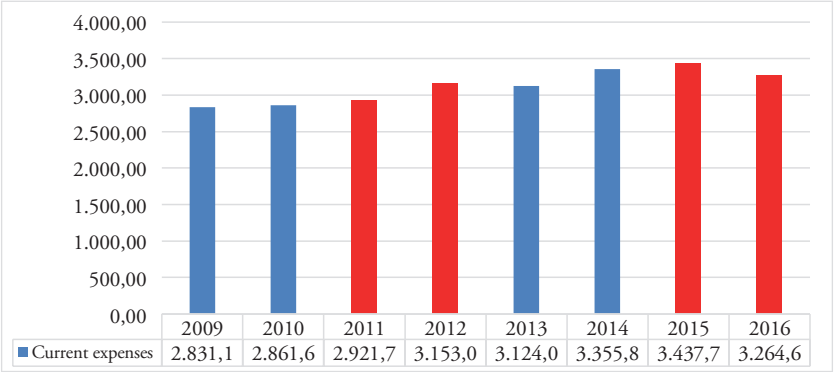
The fluctuations in capital spending described in Table 4 demonstrate that there are no significant differences when the influence of the election period on the government's investment expenditure is taken into account; that is, there were no PECs over the period. This result was also obtained by Veloso and Bornhold (2016) in their analysis of PECs in Rio Grande do Sul municipalities, with their analysis of investment expenditure yielding a negative result. Rogoff (1990) finds that leaders seek to change the configuration of public spending by attempting to limit investment expenditure, since, on average, it takes one year to be perceived by the electorate. Instead, they attempt to increase spending in areas that are perceived by the electorate more quickly, such as public goods and services (Nakaguma & Bender, 2006).

The present study also seeks to find possible evidence for the electoral calendar's influence on the current expenditures of municipalities over the period 2009-2016. The results, presented in Table 4, demonstrate that the variable Anoelepre presented a parameter significant at 10%; that is, election periods are also responsible for the fluctuations in public accounts. *Ceteris paribus*, current expenditures in pre-election and election years tend to be, approximately, 96.83 reais per capita greater than in post-election periods. That is, during election periods the government takes direct action in relation to the public accounts in an attempt to secure reelection. In addition, after this period of high spending, there is a period of containment of government expenditure to ensure that the budget remains balanced.

The formation of PECs is more evident in relation to the fluctuations in the current expenditure of certain municipalities of Rio Grande do Sul in the period analyzed. Thus, in the municipalities of Caxias do Sul, Pelotas, and Bagé, for example, government spending on public goods and services was higher in pre-election and election periods (years 2011-2012 and 2015-2016) than in post-election years (2009-2010 and 2013-2014) (Figure 3).

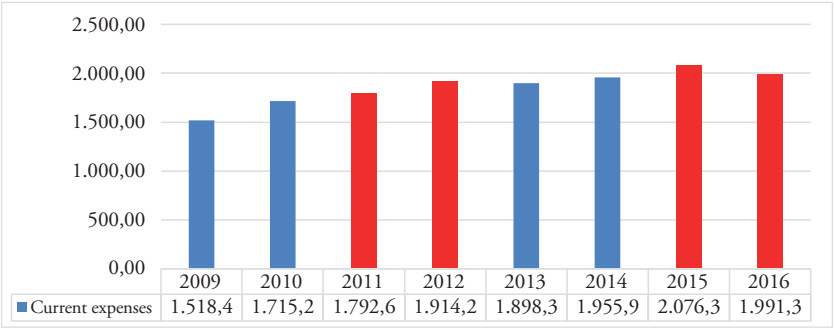
Figure 3
Current expenditures, municipalities of Caxias do Sul, Pelotas, and Bagé, 2009-2016
(in Brazilian reais)

Caxias do Sul



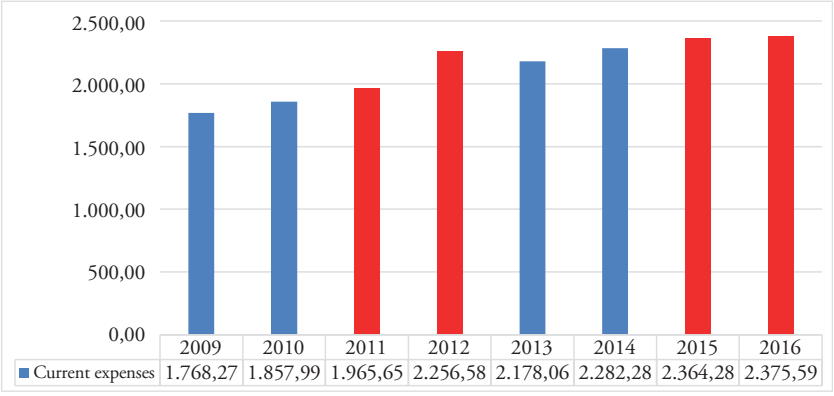
	2009	2010	2011	2012	2013	2014	2015	2016
Current expenses	2.831,1	2.861,6	2.921,7	3.153,0	3.124,0	3.355,8	3.437,7	3.264,6

Pelotas



	2009	2010	2011	2012	2013	2014	2015	2016
Current expenses	1.518,4	1.715,2	1.792,6	1.914,2	1.898,3	1.955,9	2.076,3	1.991,3

Bagé



	2009	2010	2011	2012	2013	2014	2015	2016
Current expenses	1.768,27	1.857,99	1.965,65	2.256,58	2.178,06	2.282,28	2.364,28	2.375,59

Post-election period Pre-electoral and electoral period

Source: FINBRA; compiled by authors.

This result is corroborated by Veloso and Bornhold (2016), who observe an increase in current expenditures in Rio Grande do Sul municipalities during periods close to elections. Further evidence also has been found for municipalities in other Brazilian states. For instance, Gionedis and Guimarães (2016) demonstrate the existence of PECs in municipalities in the state of Paraná during 2003-2013 for the areas of current expenditures, capital expenditures, education, health, social assistance, and urban development, and they observe a cyclical movement in current government expenditures. The authors point to an increase in the run-up to elections, followed by a subsequent period of decrease. They argue that these results prove that the actions of politicians are geared solely toward electoral victory and staying in office.

5. Conclusion

With Brazil's return to democracy in 1988, the relationship between elections and economic cycles, at both state and municipal levels, began to be studied. As a primary aim, researchers turned their attention to exploring the political influence on fluctuations in the economy. The theory of PECs arose within this perspective, in an attempt to demonstrate that public spending fluctuations are motivated by opportunism on the part of candidates. During election periods, political leaders make use of the public machinery, generating budgetary deficits in order to win elections and keep their elected posts. Thereafter, a period of belt-tightening ensues to balance the budget.

This study seeks to contribute to these analyses by demonstrating the presence of opportunistic political cycles in the current and capital expenditure budgetary variables across 439 municipalities in the state of Rio Grande do Sul during the period 2009-2016. Among the main findings, is that the election period only influenced current expenditures, which were subject to increases in pre-election and election years, followed by a period of containment. As to capital expenditure, no opportunistic cycles were observed. This is because these forms of expenditures are long-term, and thus it takes time for them to be perceived by voters.

The results point to opportunistic PECs in Rio Grande do Sul over the period analyzed, indicating that fluctuations in budgetary expenditure occur not only for economic reasons, but are also determined politically. Analysis of this topic does not end with this study. As a proposal for future research, new methodologies are suggested to capture the influence of past expenditures on present spending fluctuations. In addition, the possible existence of partisan cycles in these municipalities should be explored.

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