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Political Cycles in Latin America: More Evidence on the Brazilian Economy[1]

Celso J. Costa Junior[2], Alejandro C. García-Cintado[3], Manuel A. Hidalgo-Pérez[4]

Abstract

This paper aims to shed additional light on the existence of opportunistic and partisan political-business cycles in the Brazilian economy over the 1996-2016 period. To that end, it relies on two different approaches: (I) an Oaxaca model in the spirit of Blinder and Watson (2016); and (II) a DSGE model where fiscal and monetary policies are treated as political- regime dependent (Milani, 2010). By and large, our results from both exercises show that there existed an opportunistic behavior by all the governments studied as regards fiscal policy,and that political ideology played a role in shaping macroeconomic policies in some of the administrations that ran the country within the time span considered. Specifically, as our DSGE exercise illustrates, President Dilma Rouseff's fiscal management differed significantly from previous governments'. In addition, we do not find any evidence of political business cycle of any type when it comes to monetary policy, in line with what the consensus in this literature states for the case of Brazil.

Keywords: Political cycles, monetary policy, fiscal policy, Blinder-Watson decomposition, Dynamic Stochastic General Equilibrium (DSGE) model.

JEL Codes: D72, E32, E52, E58, E62.

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2 State University of Ponta Grossa (Brazil). E-mail: cjcjunior@uepg.br

3 Pablo de Olavide University (Spain) and State University of Ponta Grossa (Brazil). E-mail: agcintado@upo.es. (corresponding author). Carretera de Utrera, Km. 1, 41013 Seville. Phone: +34 954348994

4 Pablo de Olavide University (Spain). E-mail: mhidper@upo.es

Introduction

Incumbent politicians seeking reelection (or to secure a successor) have incentives to make use of fiscal and monetary instruments in a way that, in the months preceding an election, public spending rises and interest rates decrease in order to satisfy the median voter, notwithstanding the negative effects on fiscal sustainability and macroeconomic stability of these expansionary measures. This is further compounded by the fact that as political parties represent groups of individuals that theoretically share the same interests and preferences, political ideology is expected to influence how economic policies are conducted.

Much has been written about Political-Business Cycles (PBCs, henceforth) in both the developed and the underdeveloped world. For the former set of countries, the evidence is somewhat mixed (for a couple of good overviews of the empirical literature, see Alesina et al., 1997, and Drazen, 2000). On the other hand, PBCs are thought to be more prevalent in the latter countries (Schuknecht, 1996; Bender and Drazen, 2005; Vergne, 2009; Ebeker and Icer, 2013). This is so because, contrary to the industrialized world, this class of countries tends to lack strong institutions that exert countervailing pressure to the political power (for instance, central bank independence, fiscal rules, judicial independence, etc). A significant number of academic articles lend support to the existence of PBCs in developing and emerging markets, from Turkey (Krueger and Turan, 1993) to Colombia (Eslava, 2006) to the very case of the country we analyze here: Brazil (Bonomo and Terra, 2005).

From a different perspective, in this paper we set out to ascertain whether Brazilian politicians tend to manipulate the economy before elections, whether there are significant differences among the main economic proposals of PSDB's and PT's governments, as well as whether the *"New Macroeconomic Matrix"*, NMM , introduced by President Dilma Rousseff in mid-2011, and carried out until 2015, was able to distinguish itself from the macroeconomic packages pursued in the two preceding governments[1] [2]. Our article aims to answer these questions by means of two different techniques: (I) an Oaxaca model in the spirit of Blinder and Watson (2016) (BW hereafter); (II) a DSGE model along the lines suggested by Milani (2010), where fiscal and monetary policies are considered to be political regime-dependent. We use a similar yet more streamlined model, which follows Costa Junior (2016).

We group our study of PBCs in Brazil into three distinct regimes – an "opportunistic regime" and "two partisan ones". The former regime attempts to verify whether within the period of seven quarters prior to the elections, the government boosts aggregate demand to stimulate growth and curb unemployment, with a view to increasing the chances of getting reelected (or securing a successor). As for the latter two, they try to detect whether the macroeconomic policies conducted by the "more left-wing" administrations considerably diverge from the fiscal and monetary packages put in place by their predecessors, often viewed as "more right-wing" governments. The main contributions of this work are: (I) to present a new way of capturing PBCs in emerging markets through a structural general equilibrium model that would fit the observed facts more closely than a partial equilibrium model would. We believe that the intertemporal, stochastic, and general-equilibrium nature of these models are key features in accounting for political business cycles; (II) to examine partisan PBCs in Brazil by comparing the following cases: PSDB versus PT governments, and Fernando Henrique Cardoso (FHC)'s and Lula's versus Dilma Rouseff's governments. It is important to emphasize here that there are just a few articles testing the partisan regime for the case of Brazil (and only at a regional level).

1 *Partido da Social Democracia Brasileira*, or Brazilian Social Democratic Party, and *Partido dos Trabalhadores*, or Workers' Party, respectively. The former is a center/center-left political party often viewed by its left-wing critics as favoring economic policies that end up benefiting the most affluent individuals in the society. Conversely, the Workers' Party places itself at the left of the political spectrum, advocating for big governments and their heavy intervention in the economy.

2 The "New Macroeconomic Matrix" refers to a set of "unorthodox" economic policies inspired by the school of thought named New Developmentalism which preaches expansionary policies to increase aggregate demand, price controls to tame inflation and the use of public subsidies to promote selected "winner" industries and firms.

In order to give some context to our analysis, it may be useful to provide further information about these three former Presidents of Brazil: FHC is a PSDB member and a retired Professor of Sociology at the University of São Paulo. He was President of the Federal Republic of Brazil from January 1, 1995 to December 31, 2002. Prior to that, he as the Minister of Finance helped launch the Real Plan (*Plano Real*, in Portuguese) in 1994, a combination of orthodox and unorthodox measures aimed at stabilizing a dysfunctional Brazilian economy suffering from hyperinflation. Luiz Inácio Lula da Silva is a former union leader and founding member of the PT who ran the country from 1 January 2003 to 31 December 2010. In spite of his left-wing view of society, he conducted a battery of efficiency-enhancing microeconomic reforms in addition to maintaining, during much of his terms, the fiscal discipline inherited from his predecesor, FHC. Dilma Rousseff is an economist and PT politician who served as President of Brazil from 2011 until 31 August 2016, when she was impeached. Under her presidency, the heretodox "New Macroeconomic Matrix" (see footnote 2) was actually implemented.

Our findings suggest that there is no evidence of either opportunistic or partisan PBCs in the implementation of monetary policy in Brazil. On the other hand, we find clear evidence of the existence of "opportunistic regimes" and of "partisan regimes" (Cardoso's and Lula's administrations versus Dilma's) as far as fiscal variables are concerned. Nonetheless, barring consumption and labor-income taxes, there seems to be no significant evidence of regime 2 (PSDB governments versus PT) on the fiscal side of the economy. It is worth stressing that our econometric exercise enables us to identify the reasons for the differences in the behavior of a given variable, if any, during the quarters prior to an election. The results of the econometric regressions by and large align themselves with some of the main findings obtained by the structural model: unlike monetary policy, there are opportunistic political cycles in fiscal policy regarding most instruments. In addition, partisan political-budget cycles are only found on the expenditure side.

The remainder of this paper is organized as follows: section 2 reviews the literature on political-business cycles. Section 3 displays the analytical tools, including data processing and econometric tests, and presents a discussion about the results. Finally, section 4 concludes.

Political-business Cycles

Political-business Cycles in the Literature

It is probably not an overstatement to claim that Nordhaus (1975) pioneered the development of the PBC literature. His theoretical model assumes that incumbent politicians tend to exploit short-run Phillips curve *trade-offs* prior to the elections with a view to gaining popularity and thus defeating their political adversaries later on. Through fiscal and monetary policies, they would be able to induce PBCs in order to increase their re-election chances – behavior referred to as opportunistic. Accordingly, in studying the trajectory of the main macroeconomic variables, a neat PBC should be observed whose turning points would be expected to coincide with the electoral timetable. The same author also looked into differing preferences over policies or economic outcomes among political parties and came to the conclusion that cycles are spawned by differences between parties in their economic targets and their ideology – behavior known as partisan.

Hibbs (1977; 1986) posits that left-wing parties are more likely to conduct expansionary policies to reduce unemployment to the detriment of stable inflation. By contrast, right-wing parties are more prone to prioritizing price and financial stability over achieving lower unemployment. That would happen because the latter parties represent the interests of upper-class individuals, whereas the former parties would be voted by lower-middle-class individuals, who happen to attach more importance to shifts in unemployment. This author finds evidence suggesting the

existence of partisan PBCs in the post-war USA and UK. He observed that the unemployment rate tended to decrease when liberal governments – Democratic Party and Labor Party, respectively – were in office, and it tended to increase as conservative administrations – Republican Party and Conservative Party, respectively – ran the country.

The aforementioned analyses consider voters to form their expectations in a naive adaptive way, which means that they are systematically deceived by politicians before elections. In an attempt to challenge the unsatisfactory assumption that voters are naive, unable to learn from the past and prone to systematic errors, new models using rational expectations emerged, among which the pioneering works are Rogoff and Sibert (1988) and Rogoff (1990). The former article asserts that PBCs are generated by swings in the fiscal instruments. According to the authors, in pre-election years governments pursue expansionary fiscal policies via lower taxes and/or higher public spending. The argument whereby in traditional partisan models governments choose an inflation-unemployment combination consistent with their ideology does not hold water in an economy whose agents have rational expectations. Over the years, once an entire PBC is left behind, voters would manage to internalize all facts and understand the intertemporal political behavior, namely, a pre-election increase in economic activity will be followed by an inflation spike or a recession in the post-election period. Therefore, in such an environment, only "fiscal or monetary surprises" will have an effect on real variables.

On the other hand, Rogoff (1990) significantly refines a model retaining some features from the previous models that assumes the opportunistic political-business to relate to the fiscal behavior rather than to output or inflation. In his model, one in which voters and politicians are utility-maximizing individuals, the PBC stems from the influence of (intertemporal) information asymmetries on the "competence" of the political leader in managing public resources. This incumbent politician will be biased toward allocating public spending out of investment and into more visible government consumption expenditures in the pre-election period. In equilibrium, voters can infer the actual level of competence of the incumbent by observing the degree of tax and spending distortions. According to Rogoff, this social mechanism need not be inefficient in that it allows for more updated information flows on the administrative skills of the incumbent. Endeavors to shorten this cycle can end up being welfare-reducing as either the aforesaid information channel would be chocked or the alternative signalling devices to which the politician in power could turn would be more costly.

Alesina and Roubini (1992) were among the first to shed some empirical light on the PBC. Drawing on Nordhaus (1975)'s theoretical model, they find little evidence of effects of electoral cycles on macroeconomic variables, namely GDP growth and unemployment rate. Conversely, they do find evidence of PBC in the fiscal and monetary policies, which would be clearly expansionary in the pre-election periods. Such a loose policy stance would cause inflation to pick up right before the elections. Some authors argue that models where incumbent policy-makers seek to manipulate the economy via monetary policy are not adequate from either a theoretical or empirical point of view. Falling into this category is Drazen (2001), who stresses the important role of fiscal policy in shaping the PBC due to its ability to affect the real side of the economy, as opposed to monetary policy. Using a sample of 42 developing countries spanning 1975-2001, Vergne (2009) points out that there seem to be signs that elections affect the allocation of public expenditure, so that in election years, current government spending grows at the expense of public investment. In addition, non-industrialized countries are more likely to experience PBCs, which would tend to fade over time as democracy is strengthened. Furthermore, Schuknecht (2000) studies 24 underdeveloped countries for the period 1973-1992 and concludes that capital expenditures are the preferred fiscal tool for influencing electoral outcomes.

In an inquiry covering both democratic and non-democratic countries for the period 1975-1995, Shi and Svensson (2006) corroborate that in election years, the primary surplus falls significantly regardless of the level of economic development, although the change in the fiscal

stance is more sizable in developing countries. Focusing on low-income countries, Ebeke and Ölçer (2013) investigate the behavior of fiscal variables before and after elections. Their results illustrate that the over election years, government consumption rises notably. Then, a fiscal consolidation program is front-loaded in the two subsequent years through revenue increases and reductions in government investment, without any significant adjustment in current consumption.

The empirical literature on PBCs in Brazil employs two different econometric approaches: panel data (Botelho, 2002; Bittencourt and Hillbrecht, 2003; Nakaguma and Bender, 2006; Klein, 2012; De Araújo and Leite Filho, 2010; Nakaguma and Bender, 2010; Videira and Mattos, 2011; and Sakurai and Menezes-Filho, 2011) and time series (Gonçalves and Fenolio, 2007; Fialho, 1997; and Preussler and Portugal, 2003). As a corollary to the first econometric strategy, there actually exists an opportunistic PBC concerning fiscal policy. Sakurai and Menezes-Filho (2011) also find evidence of partisan political budget cycles in the Brazilian municipalities. By contrast, Gonçalves and Fenolio (2007), by expanding a Taylor rule with electoral variables for the period 2000:Q1-2006:Q4, find no signs that the Selic rate has been manipulated on electoral grounds. Fialho (1997) applies the Alesina-Roubini-Cohen methodology to the Brazilian economy over the period 1953-1995 and gets mixed results. He obtains evidence of a PBC in real GDP and real money supply, but not in the unemployment rate nor in the inflation rate. Preussler and Portugal (2003) test for the hypothesis of political opportunism in several macroeconomic variables, in several fiscal tools and in the interest rates for Brazil over the period 1980-2000. Their findings confirm the existence of an opportunistic PBC as regards the inflation rate and federal government total outlays, rejecting this hypothesis regarding the unemployment rate, GDP growth and the remainder of the fiscal policy instruments. In short, some theoretical models argue that incumbent politicians are capable of combining fiscal and monetary policies to induce desire outcomes in the targeted economic variables. The bulk of this literature however establishes that it is on the fiscal side of the economy where the mechanisms of the political-business cycle play out.

Empirical Analysis

Data Processing

The database we use in the empirical analysis is comprised of quarterly data from 1996:Q1 to 2016:Q2, which are displayed in the table 1[3]. We rely on the algorithm X12-ARIMA and log difference to seasonally adjust and de-trend the data, respectively. The variables are thus expressed in growth rates. We choose to start our analysis in 1996 due to issues with data quality (accessibility and reliability) before that date. It should be borne in mind that inflation ran at three/four digits annually over the 1980s/first half of 1990s. After several failed attempts, the stabilization program dubbed the Real Plan (*Plano Real*, in Portuguese), implemented in 1994, finally succeeded in taming the inflation monster.

Table 1. Observable variables.

Series	Source
Broad CPI(%a.m.)	IBGE/SNIPC
Labor-income tax - R$ (millions)	Min. Economy/SRF
Capital-income tax R$ (millions)	Min. Economy/SRF
Tax on manufactured products (IPI)	Min. Economy/SRF
- Total - Gross revenues - R$ (millions)	

3 The data that support the findings of this study are available from the corresponding author upon request.

Table 1 (continued). Observable variables.

Series	Source
Debt - total - Federal Gov. and Central Bank - Net - R$ (millions)	Bacen/Not. Imp./F. Púb
Final Consumption - Households - R$ (millions)	IBGE/SCN 2010 quarterly.
Final Consumption - Public Administration - R$ (millions)	IBGE/SCN 2010 quarterly.
Fixed Capital - Gross formation - R$ (millions)	IBGE/SCN 2010 quarterly.
Paid working hours - General industry - Index (Jan. 2001 = 100)	PIMES/IBGE
Selic Over (% a.m.)	BCB Bulletin/M. Economy.

Source: Own elaboration

Econometric Analysis of Political-business Cycles

As models of PBCs evolved, a myriad of articles trying to assess the empirical validity of those models started to arise. The literature splits the empirical tests into two large distinct groups: the first one focuses on evaluating the macroeconomic findings –GDP growth, unemployment and inflation rate–, whereas the second group concerns the instruments of economic policy –money supply, exchange rate, tax collection, public transfers and government expenditures. This paper aims to analyze the PBCs by adopting the latter approach, since it would be more geared toward the tools the policy-maker has at her disposal so as to attain some given goals. Consequently, this subsection shows an application of this traditional analysis.

In our case, we will study the different evolution of these instruments by comparing them over two different periods of time: the seven quarters prior to the election vis-à-vis the rest of the quarters[4]. To reach our goal, we will use the decomposition of the differences in the mean developed by BW. From these authors, we take the idea of decomposing this evolution so that we can identify the reasons for the differences in the behavior of the variable, if any, during the quarters prior to an election.

Before explaining in detail the econometric methodology that we apply, we must define a series of dummy variables crucial for the analysis:

Definition 3.1 (Opportunistic Regime) Fiscal and monetary policies are observed to be expansionary (contractionary) over the pre-election (post-election) quarters. Accordingly, the first Regime alludes to a situation in which the government behaves in an "opportunistic" way in the seven quarters prior to an election quarter. In order to test whether there exists an OR, we define a dummy variable to identify this regime (*OR*). We would expect government expenditure and taxes to increase and get cut, respectively, in this pre-election period.

$$\text{Opportunistic Regime (OR)} = \begin{cases} OR = 1, in\ the\ 7\ quarters\ prior\ to\ an\ election\ in\ the\ regime\ 1 \\ OR = 0,\ otherwise \end{cases}$$

Definition 3.2 (Partisan regime) Assume that preferences of the different parties are disimilar according to their ideology. In that case, for example, regarding the possible trade-off between employment and inflation, it is expected that the left-wing parties will worry more about the former than the latter. So, left-wing politicians are more prone to expanding public comsumption even if they incur greater budget deficits.

4 Following Milani (2010).

We use the term Partisan Regime (*PR*) to refer to the fact that, as it was explained in the introduction, PSDB administrations are expected to behave as "right-wing" parties, whilst PT governments are expected to pursue "left-wing" policies. Likewise, we choose to label FHC's and Lula's governments as "right-wing", and Dilma Rousseff's as "left-wing". To examine whether there is evidence of *PR*, we define a dummy variable taking the following values for all the quarters in our sample:

$$\text{Partisan Regime (PR)} = \begin{cases} PR = 0, in\ the\ case\ of\ a\ PSDB\ or\ FHC's\ and\ Lula's\ governments \\ PR = 1, otherwise \end{cases}$$

After describing these dummy variables, the next step is to test whether there is a PBC over the period chosen. In order to achieve that, we first seek to specify the following equation

$$y_t = \psi + [\gamma_1 + \theta_1 PR_t]OR_t + [(\gamma(L) + \theta(L)PR_t)OR_t + \phi(L)]y_t + \varepsilon_t \quad (1)$$

where y_t is our dependent variable, ψ is a constant, the term $[\gamma_1 + \theta_1 PR_t]$ captures the effect on the average growth when the Brazilian economy is within the seven quarters prior to an election, the term $[(\gamma(L) + \theta(L)PR_t)OR_t + \phi(L)]$ portrays the ARIMA component of the variable behavior, which is allowed to be different across the regimes studied, and L is a lag operator.

First, estimation of (1) gives the sample mean of the growth rate conditional upon the average values of the covariates:

$$\overline{y_t} = \hat{\psi} + \left[\widehat{\gamma_1} + \widehat{\theta_1 \overline{PR_t}}\right]\overline{OR_t} + \left[\left(\hat{\gamma}(L) + \hat{\theta}(L)\overline{PR_t}\right)\overline{OR_t} + \hat{\phi}(L)\right]\overline{y_t} \quad (2)$$

Building on (2), we can define the OR-GAP (Opportunistic Gap) as the difference in the average growth rates for each dependent variable over the seven quarters prior to the elections (*OR*=**1**) vis-à-vis the rest of the quarters (*OR*=**0**). This variable, OR-GAP, is given by the following expression:

$$OR - GAP = E[y|OR = 1, PR_t, y_{t-1} \dots y_{t-4}] - E[y|OR = 0, PR_t, y_{t-1} \dots y_{t-4}] \quad (3)$$

Thus, plugging (2) into (3) leads us to the following equation:

$$\begin{aligned} OR - GAP &= E[y|OR = 1, PR_t, y_{t-1} \dots y_{t-4}] - E[y|OR = 0, PR_t, y_{t-1} \dots y_{t-4}] = \\ &= \hat{\gamma}(L)\hat{y}_t + \widehat{\gamma_1} + \widehat{\theta_1}PR_t + \hat{\theta}(L)E[PR_t|OR = 1]\bar{y} \end{aligned} \quad (4)$$

Expression (4) just reflects the three components that account for the OR-GAP as regards each explanatory variable. This equation is nothing more that an Oaxaca-Blinder decomposition, as long as we use the pooled estimation of (1) as reference (Neumark, 1988). The autorregresive structure in this expression is of utmost importance, inhereting from Alesina et al. (1992) the approach proposed here. The first element of (4), tells us how the business cycle may explain part of the OR-GAP. It should be noted that the trend have been extracted for all the variables considered. This implies that this autoregressive part shows the stochastic component that could be explained by the business cycle.

The rest of (4) can be referred to as the "idiosyncrasic" part of OR-GAP ($I^{'}OR - GAP$). It could be accounted for by the existence of a political cycle ($\hat{\gamma}_1 + \hat{\theta}_1 PR_t + \hat{\theta}(L)E[PR_t|OR = 1]\bar{y}$). This second element of the equation is also the aggregation of two other components. The first one is the average effect of the political cycle throughout all the sample ($\hat{\gamma}_1$), while the rest of the equation gives us the average difference when *PR*=1 given that , the Partisan Regime, or PR-GAP:

$$PR - GAP = OR - GAP(PR = 1) - OR - GAP(PR = 0) =$$
$$= E[y|OR = 1, PR = 1] - E[y|OR = 1, PR = 0] =$$
$$= \widehat{\theta_1} + \hat{\theta}(L)\overline{y_t} \quad (5)$$

First, our results support the existence of PBCs during the quarters prior to the elections as far as only a small group of variables is concerned: public spending, consumption tax and the labor-income tax. We find a rise of the former variable, as well as a fall in the remaining variables. In all these cases, growth differences over the periods prior to elections were statistically significant, at least at 10. However, the decomposition posed in this exercise offers us a much richer vision than what we can really observe simply by looking into the differences in the mean. It should be recalled that the three components into which we divide that difference suggest that there can be two possible reasons for this. The first one reflects the difference in the stochastic behavior of the time series over the quarters prior to the elections. In our equation (4) it can be identified as the differences in the coefficients associated with the autorregresive structure describing the behavior of the variable. This component is dubbed business cycle, on the grounds that these series lack both trend and seasonality, and their arima component would only capture either the business cycle embedded in the series, or its error component. It is worth mentioning that the component business cycle is dependent on the potential changes in the implemented policies that would be partially justified by the political gain from enhancing several macroeconomic variables before the elections. However, it is not easy to detach such component from other possible factors not embodied in the model. Therefore, on this component, there is some sort of ambiguity about its behavior. The second and the third components would play the role of indicating whether or not there exists a discretionary impulse, either positive or negative, in the series, over the quarters prior to the elections. Such components would be our OR and PR.

Table 2. Opportunistic-GAP and Decomposition.

		Estimation		
Variable	Oaxaca Decomposition	Value	Std Dev	t-statistic
Government spending	OR-GAP	0.825	0.134	6.16***
	Cycle	0.229	0.090	2.55***
	I'OR-GAP	0.595	0.156	3.82***
	PR-GAP	0.208	0.108	1.92*
Private Consumption	OR-GAP	-0.087	0.104	-0.83
	Cycle	0.079	0.016	5.00***
	I'OR-GAP	-0.166	0.102	-1.62
	PR-GAP	-0.231	0.102	-2.26**
Fixed-Capital Investment	OR-GAP	0.073	0.321	0.23
	Cycle	0.402	0.089	4.51***
	I'OR-GAP	-0.329	0.313	-1.05
	PR-GAP	-0.375	0.294	-1.27
Public Debt	OR-GAP	-0.092	0.379	-0.24
	Cycle	0.230	0.574	0.40
	I'OR-GAP	-0.321	0.710	-0.45
	PR-GAP	-0.157	0.647	-0.24

Table 2 (continued).Opportunistic-GAP and Decomposition.

		Estimation		
Variable	Oaxaca Decomposition	Value	Std Dev	t-statistic
Interest rate (SELIC rate)	OR-GAP	-0.019	0.023	-0.84
	Cycle	-0.011	0.009	-1.13
	I'OR-GAP	-0.008	0.027	-0.31
	PR-GAP	-0.026	0.031	-0.85
Private Workers Hours	OR-GAP	0.030	0.129	0.24
	Cycle	-0.024	0.040	-0.60
	I'OR-GAP	0.054	0.134	0.41
	PR-GAP	-0.056	0.105	-0.54
Consumption Tax (IPI)	OR-GAP	-0.980	0.530	-1.85*
	Cycle	-0.853	0.107	-7.96***
	I'OR-GAP	-0.128	0.535	-0.24
	PR-GAP	-0.209	0.417	-0.50
Labor-income Tax	OR-GAP	-1.989	0.652	-3.05***
	Cycle	-1.553	0.401	-3.87***
	I'OR-GAP	-0.435	0.777	-0.56
	PR-GAP	0.634	0.586	1.08
Capital-income Tax	OR-GAP	1.693	1.186	1.43
	Cycle	0.282	0.079	3.57***
	I'OR-GAP	1.411	1.190	1.19
	PR-GAP	1.245	1.053	1.18

Source: Own elaboration
Notes: ***, ** and * mean significance at 1, 5 and 10%, respectively

Thus, once the variables have been broken down, we obtain a very interesting picture of the political-business cycle in Brazil. First of all, the difference in the growth of public spending is more evident over the quarters prior to the elections. In terms of growth differential, during the 7 quarters prior to the elections, public spending increases on average a little bit more than 8 two-tenths of a point compared to the rest of the period. This increase is mainly due to the positive effect of the business cycle experienced on average during the aforesaid time span, 0.23 points. It is also brought about by the $I'OR - GAP$ (idiosyncratic OR-GAP), almost 0.6. Among the latter figures, slightly less than half are accounted for by the PR.

Consequently, the outcomes that we obtain display clear evidence of a boost in public spending in the run-up to the elections. A crowding-out effect arises, which mainly comes about in the data through changes in private consumption. Notwithstanding the fact that there does not seem to exist signs of significant growth in that item throughout those months, the decomposition undertaken enables us to convey a richer story. Thus, while the cycle component provides differential growth, the OR shows a fall in this type of spending, a movement in the opposite direction to that of the government expenditure. The latter is completely determined by the

impulse over the periods when PR takes place. Concerning investment, the cycle captures its differencial behavior prior to the elections. It bears mentioning that even though we observe a decrease in this variable regarding the OR and PR components, this fall cannot be considered to be significant.

Somewhat surprisingly, this higher public spending does not seem to affect other variables, such as the interest rate, hours worked and the fiscal deficit, significantly. Once the cycle has been extracted, the I'OR component shows that the changes are negative, positive and negative, respectively. However, none of them is statistically significant, thereby making it clear that the political cycle is not relevant as far as these variables are concerned. As for taxes, there seem to be remarkable changes in the consumption tax and the labor-income tax, unlike what we observe with respect to the capital-income tax. It is important to note that in the two cases in which the effect of the political cycle is found to be relevant, the change is negative, that is, it is a fall, although it only occurs during one phase of the cycle.

In a nutshell, using BW decomposition, we find clear evidence of PBCs in the Brazilian economy only when it comes to fiscal policy. Public spending tends to rise and some taxes tend to decrease before elections. In addition, our econometric results indicate that there would not be PBCs in the monetary policy in Brazil. Interestingly, these results generally concur with the ones derived through a DSGE model, which are presented right below in the next section.

New-Keynesian Analysis of the Political-business Cycles

In this section, it is assumed that the dynamics of the economy can be accounted for by a New-Keynesian model[5] based on an extension of Costa Junior (2016), which embeds fiscal and monetary policy rules à la Milani (2010). The latter author's model is a very stylized DSGE model consisting of only four equations: an Euler equation, a New-Keynesian Phillips curve, a Taylor rule and a fiscal rule. In order to achieve a better fit of the model to the data, this paper uses a New-Keynesian model that includes the main frictions of the DSGE modeling: price and wage rigidity, ricardian and non-ricardian agents, investment adjustment costs and variable capital utilization (no financial frictions). In addition, as the government is assumed to care about households' utility[6], the policy rules incorporate a component capturing this preference, $\phi_{W,Z}$ and $\phi_{W,R}$, for the case of fiscal and monetary policies, respectively. Correspondingly, these rules are given by:

Fiscal policy:

$$Z_t = \gamma_Z Z_{t-1} + (1-\gamma_Z)(1-\phi_{W,Z})\phi_Z(B_t - Y_{t-1} - P_{t-1}) + \phi_{W,Z}\Xi_t + S_t^Z$$

where $Z \in \{G, \tau^c, \tau^l, \tau^k, T\}$, G is government spending, τ^c is the consumption tax rate, τ^l is the labor-income tax rate, τ^k is the capital-income tax rate, T is the lump-sum tax, γ_Z is the smoothing parameter of the fiscal variable, ϕ_Z is a parameter governing the sensitivity of the fiscal variable to changes in the debt-to-GDP ratio, B_t is the government debt, Y_{t-1} is GDP (in t–1), P_{t-1} is the price level (again, in t-1), $\phi_{W,Z}$ is a parameter governing the sensitivity of fiscal policy to the utility gap of the household and S_t^Z is the stochastic component of the fiscal rule with the following law of motion:

$$S_t^Z = \rho_Z S_{t-1}^Z + \varepsilon_{Z,t}$$

where ρ_Z is the autoregressive component and $\varepsilon_{Z,t} \sim N(0, \sigma^{I,t})$.

5 The equations of the model are shown in the appendix A.

6 The variable Ξ is defined as the difference between current utility and its steady state's value or utility gap. So if the former exceeds the latter, the utility gap is positive.

Monetary policy:

$$R_t^B = \gamma_R(1-\phi_{W,R})R_{t-1}^B + (1-\gamma_R)(1-\phi_{W,R})(\gamma_Y Y_t + \gamma_\pi \pi_t) + \phi_{W,R}\Xi_t + S_t^m$$

where γ_R is the interest-rate smoothing parameter, γ_Y and γ_π are the Taylor rule coefficients relative to GDP, Y_t, and to inflation, π_t, respectively, $\phi_{W,R}$ is a parameter governing the interest rate sensitivity relative to utility deviation from steady state and S_t^m is the stochastic component of the monetary rule with the following law of motion:

$$S_t^m = \rho_m S_{t-1}^m + \varepsilon_{m,t}$$

where ρ_m is the autoregressive component and $\varepsilon_{m,t} \sim N(0, \sigma^{m,t})$.

The procedure to estimate political-business cycles using a DSGE model proves to be quite straightforward, consisting of splitting the database into subperiods under study. In the first subperiod, we divide the database between the seven quarters prior to the elections and the rest of the sample. In the second one, we divide the database into the periods when the PSDB and the PT governments ran the country, respectively. Finally, we repeat the process dividing the database into the periods where FHC and Lula governed, on one side, and those in which Dilma Rouseff was President, on the other hand. Subsequently, we test the null hypothesis that the administrations are identical regarding economic policy by verifying whether the difference between the values of the estimated economic-policy parameters would be different from zero.

Calibrated parameters, ***prior*** *and* ***posterior***

In this subsection we pursue a two-tier approach in that some of the parameters not directly related to the main goal of this article are calibrated, while those relevant parameters for the analysis of fiscal and monetary policies are estimated using the Bayesian methodology. The main calibration procedure employed here is to pick the parameter values from other relevant articles in the DSGE literature. Table 3 summarizes the calibrated values for those parameters.

Table 3. Calibrated parameters.

Parameters	Meaning	Value	Source
R_{ss}^B	Steady-state interest rate	1.0128 [3]	Bacen/Boletim/M. Finan.
β	Discount factor	$1/R_{ss}^B$	–
σ	Coefficient of relative risk-aversion	2	Cavalcanti and Vereda (2010)
ϕ	Marginal disutility of labor	1.5	Cavalcanti and Vereda (2010)
ψ	Elasticity of substitution between intermediate goods	11	Castro et al. (2015)
α	Capital share in production	0.39	Kanczuk (2002)
θ	Price rigidity parameter	0.74	Castro et al. (2015)
τ_{ss}^c	Steady-state consumption tax rate	0.164	Araújo and Ferreira (1999)
τ_{ss}^l	Steady-state labor-income tax rate	0.1772	Araújo and Ferreira (1999)
τ_{ss}^k	Steady-state capital-income tax rate	0.0616	Araújo and Ferreira (1999)
$\frac{C_{ss}}{Y_{ss}}$	Steady-state ratio of private consumption to GDP	0.6	IBGE/SCN 2010 Quarterly
$\frac{I_{ss}}{Y_{ss}}$	Steady-state ratio of investment to GDP	0.2	IBGE/SCN 2010 Quarterly
$\frac{G_{ss}}{Y_{ss}}$	Steady-state ratio of government consumption to GDP	0.2	IBGE/SCN 2010 Quarterly
$\frac{K_{ss}}{Y_{ss}}$	Steady-state ratio of capital stock to GDP	2.5	IBGE/SCN 2010 Quarterly
δ	Depreciation rate	I_{ss}/K_{ss}	–

Source: Own elaboration.

Given the *prior* distributions of the parameters, the model was estimated using a Markov chain process via the Metropolis-Hastings algorithm with 100000 iterations and 2 parallel chains. The way we assess whether there is a political-business cycle in Brazil is by comparing the values of the parameters relating economic policy to households' utility and verifying whether they are identical in both periods. Then, we proceed to make two estimations for each study and compare the results accordingly (table 4).

Table 4. Findings of the New-Keynesian Analysis.

Regime 1 (opportunistic)					
Parameter	Post-election period (40 periods)	Pre-election period (35 periods)	Difference in the parameters	Acceptance region (90%)	The H0 is accepted (Identical parametersin both periods)
$\phi_{W,R}$	0.9692	0.9739	-0.0047	±0.0549	YES
$\phi_{W,R}$	-0.0558	-0.1953	0.1395	±0.11	NO
$\phi_{W,R}$	0.5644	0.836	-0.2716	±0.11	NO
$\phi_{W,R}$	0.1314	0.3409	-0.2095	±0.11	NO
$\phi_{W,R}$	0.6796	0.92	-0.2404	±0.11	NO
$\phi_{W,R}$	0.1622	0.8446	-0.6824	±0.11	NO
Regime 2 (partisan)					
Parameter	PSDB governm. (37 periods)	PT governm. (48 periods)	Differencein the parameters	Acceptance region (90%)	The H0 is accepted (Identical parameters in both periods)
$\phi_{W,R}$	0.9394	0.9762	-0.0368	±0.0519	YES
$\phi_{W,R}$	-0.1866	-0.1001	-0.0865	±0.104	YES
$\phi_{W,R}$	0.557	0.9327	-0.3757	±0.104	NO
$\phi_{W,R}$	0.6624	0.907	-0.2446	±0.104	NO
$\phi_{W,R}$	0.8867	0.9789	-0.0922	±0.104	YES
$\phi_{W,R}$	0.9027	0.9657	-0.063	±0.104	YES
Regime 3 (partisan)					
Parameter	FHC's and Lula's governm. (59 periods)	Dilma's governm. (16 periods)	Differencein the parameters	Acceptance region (90%)	The H0 is accepted (Identical parameters in both periods)
$\phi_{W,R}$	0.9768	0.9705	0.0063	±0.067	YES
$\phi_{W,R}$	-0.0208	-0.4207	0.3999	±0.134	NO
$\phi_{W,R}$	0.1679	0.3774	-0.2095	±0.134	NO
$\phi_{W,R}$	0.134	0.531	-0.397	±0.134	NO
$\phi_{W,R}$	0.8885	0.6589	0.2296	±0.134	NO
$\phi_{W,R}$	0.6317	0.913	-0.2813	±0.134	NO

Note: Acceptance region = $\left(\frac{\sigma_A^2}{n_A} + \frac{\sigma_B^2}{n_B}\right) 1.645$, where σ_A^2, n_A, σ_B^2, and n_B are the variances and the number of periods for the intervals A = {Regular period, PSDB administration, FHC's and Lula's administrations} and B = {Pre-election period, PT administration, Dilma administrationg}, respectively.

Source: Own elaboration.

Regarding the fiscal policy rule, the sensitivity parameter of fiscal policy relative to the utility deviation from steady state, $\phi_{W,Z}$, is expected to be negative when it comes to government spending, and positive when it comes to taxes. Moreover, the more expansionary the fiscal policy is, the greater (in absolute value) the value of $\phi_{W,Z}$ should be. Table 4 shows evidence on the presence of both opportunistic and partisan political-business cycles for regime 3, and no statistical evidence of partisan political-business cycles as regards regime 2. The values of $\phi_{W,Z}$ are in accordance with what to be expected, although $\phi_{W,Z}$ (grayed in table 4) exhibited a more expansionary behavior during FHC's and Lula's governments than over Dilma Rouseff's. Interestingly, "political opportunism" in fiscal policy in Brazil has been supported by a good number of academic papers on the Brazilian economy (Botelho, 2002; Bittencourt and Hillbrecht, 2003; Nakaguma and Bender, 2006; Klein, 2012; De Araújo and Leite Filho, 2010; Nakaguma and Bender, 2010; and Videira and Mattos, 2011; Fialho, 1997; and Preussler and Portugal, 2003). It should be borne in mind that, to the best of our knowledge, the "partisan regime" has scarcely tested in the Brazilian literature, thereby making it somewhat difficult for us to engage in useful comparisons.

On the monetary policy side, the expected value of the sensitivity parameter of the interest rate with respect to utility deviation, $\phi_{W,R}$, is positive. Hence, the results shown in table 4 are in line with the expected values. Nonetheless, there does not seem to be evidence of opportunistic and partisan political-business cycles in the conduct of monetary policy in Brazil. These findings concerning monetary policy were already to be expected, according to Gonçalves and Fenolio (2007). Further, the economic literature in Brazil does not present conclusive evidence on whether the Central Bank of Brazil behaved differently under the administrations of FHC, Lula and Dilma Rousseff.

In short, we did not find evidence of an opportunistic and a partisan political-business cycle in the monetary policy. On the other hand, the "opportunistic regimes" (regime 1) and the "partisan regimes" (FHC's and Lula's governments versus Dilma Rouseff's) were detected in all fiscal variables. By contrast, fiscal policy in regime 2 (PSDB versus PT) did not yield any significant result, except for the cases of the consumption tax and labor-income tax. It should be noted that in a sense, these results are not surprising. As already mentioned in the literature review, most articles find no PBCs of any kind in monetary policy. In the case of Brazil, its central bank was granted operational autonomy as the Real Plan came into existence. This *de facto* independence has likely insulated the monetary authority from political pressures to engineer economic cycles with a view to increasing output and income and reducing unemployment. Contrary to monetary policy, which is conducted by unelected technocrats, fiscal policy lies in the hands of politicians, who tend to rely on fiscal stimulus so as to induce PBCs, regardless of the rapid deployment of fiscal rules and councils all over the world. As for the partisan regimes, throughout the period of analysis, the Brazilian economy was hit by the occurrence of several crises. In the early 1990, Brazil underwent a severe inflationary process. FHC's first PSDB government was thoroughly oriented toward the stabilization of this scourge that had afflicted the Brazilian economy for more than a decade. The successful program rested on a responsible fiscal management and a restrictive monetary policy. Later came the Tequila crisis in the first semester of 1995, the Asian Crisis in 1997 and the Russian crisis in 1998, all them leading the government in power to further engage in fiscal and monetary austerity and even to have recourse to the aid of the IMF.

In 2002, after some failed attempts, Lula's PT took over for the first time in Brazil's history. He was compelled to strike a balance between two different (and often conflicting) routes: on the one hand, the pursuit of the much-needed macroeconomic stability; on the other hand, meeting his voters' demands. In writing a *"Carta ao Povo Brasileiro"* (Letter to the Brazilian People), the future PT government signaled its strong commitment to macroeconomic stability and contract enforcement, objectives that seemed clearly at odds with the most radical views from within the own political party. Indeed, Lula ended up embracing the inherited fiscal discipline from

FHC's administration for most of his time in office. It bears mentioning that this sound fiscal management gave room for maneuver to conduct countercyclical macroeconomic policies that could cushion the blow of the Great Recession of 2008. All these expansionary fiscal measures enabled the government to attain its goal: the economic downturn had been overcome in a few months. Nevertheless, If this exceptional crisis had called for exceptional policies, abandoning them as the economy resumed growing fast seemed to be sensible. This was not what happened. The PT government chose the option "prime the pump" despite the clear signs of increasing economic activity already present over the second semester of 2009. At the end of his mandate, Lula appeared to take advantage of the Great Recession to turn to left-wing populism. Arguably, the speed with which Brazil emerged from recession encouraged the authorities to adopt this set of expansionary policies as an integral part of a long-run developmental model. In 2011, Dilma Rouseff got elected and deepened this model that came to be called the *"New Macroeconomic Matrix"*, NMM. Basically, in addition to seeking to stimulate aggregate demand through expansionary policies, the NMM preached price controls to tame inflation that ensued from this ever-growing excess demand and the recourse of public subsidies to pick "winners" among industries and firms (see, for example, Lopreato, 2015). So the only actual major turnaround with respect to the model adopted by FHC to overcome hyperinflation, consisting of macroeconomic stability, enforcement of contracts, and reliance on the market system as the main mechanism for allocating scarce resources, seems to occur in the last years of Lula's second term and, above all, during Dilma Rousseff's government.

Concluding remarks

Using a New-Keynesian model with fiscal and monetary policies dependent on the political regime, this paper sought to analyze political-business cycles in Brazil under three different classes of political regimes – an "opportunistic regime" and two "partisan ones". The former regime aims to identify whether over the seven quarters prior to the election quarter, the government manipulated the economy with the goal of getting itself re-elected (or securing a successor). On the other hand, the latter kind of regimes attempts to evaluate whether the macroeconomic strategies pursued by PSDB and PT governments differed from each other, and whether Dilma Rousseff's macroeconomic policy was in any way different from the ones undertaken by the preceding two governments.

Our findings showed that there was no evidence pointing to the existence of opportunistic and partisan political-business cycles as far as monetary policy is concerned. On the contrary, we uncovered the "opportunistic regime" (regime 1) and the "partisan one" of regime 3 (FHC's and Lula's governments versus Dilma's) in all fiscal variables. As for fiscal policy under regime 2 (PSDB versus PT), no significant result was found, barring the consumption and labor-income taxes. In fact, these outcomes concerning the behavior of the fiscal and monetary authorities under the "opportunistic regime" were expected given the chronicle on the governments' performance from 1996 to 2016 briefly reported at the end of the preceding section and the facts established by the theoretical and empirical literature. Lastly, the results under the regime 3 confirmed the existence of partisan political-business cycles over the period studied.

Besides, we provide more evidence by applying Blinder and Watson (2016) decomposition technique that yields similar results to the ones obtained via the DSGE model, namely, the key policy interest rate –the SELIC rate in Brazil– is found statistically irrelevant when it comes to generating PBCs, whereas public expenditure and some taxes seem to be important variables in accounting for political-budget cycles in the Brazilian economy.

To sum up, in this article we presented statistical evidence showing that the governments in question used fiscal policy to estimulate the economy prior to elections, that the PSDB and PT governments conducted very similar macroeconomic policies, and that both FHC's and Lu-

la's governments pursued "right-wing" macroeconomic policies (the latter, during much of his two terms), whereas Dilma's undertook "left-wing" policies. Both the structural model and the econometric specification confirm these outcomes.

Last but not least, it bears stressing again that, to the best of our knowledge, this paper contributes to the prior literature along two main dimensions: (I) It is the first article that uses a DSGE model in order to examine the existence of PBCs in Brazil and Latin America. This is a methodology that has barely been explored in the literature and that could be applied to other countries as well. These models present the advantage over other techniques that they are intertemporal and stochastic, so expectations play a major role in the determination of the outcomes found, and that they rest on general equilibrium, so all the variables of the model get determined jointly. When studying political-(macro)economic problems, this is of utmost importance ; (II) it tests the partisan regime in the Brazilian economy in a way not done before, by comparing political parties and presidents according to their business-friendly or -unfriendly policymaking agenda. Thus, we compare PSDB versus PT governments, and Fernando Henrique Cardoso (FHC)'s and Lula's versus Dilma Rouseff's governments. It should be recalled again that the partisan regime has only been tested in Brazil at a regional level.

Declaration of interest statement

No potential conflict of interest was reported by the authors.

References

Alesina, A., & Roubini, N. (1992). Political cycles in OECD economies. *The Review of Economic Studies*, 59, 663-688.

Alesina, A., Cohen, G. D. & Roubini, N. (1992). Macroeconomic policy and elections in OECD democracies. *Economics & Politics*, 4, 1-30.

Araújo, C. H. V. & Ferreira, P. C. G. (1999). Reforma tributária, efeitos alocativos e impactos de bem-estar. *Revista Brasileira de Economia*. 53, 133-166.

Bittencourt, J. L. & Hillbrecht, R. O. (2003). Ciclo Político na Economia Brasileira: um Teste para a Execução Orçamentária dos Governos Estaduais-1983/2000. In Anais do XXXI Encontro Nacional de Economia.

Blinder, A. S. & Watson, M. W. (2016). Presidents and the US Economy: An econometric exploration. *American Economic Review*, 106, 1015-45.

Bonomo, M. & Terra, C. (2005). Elections and exchange rate policy cycles. *Economics & Politics*, 17(2), 151-176.

Botelho, R. (2002). Determinantes do comportamento fiscal dos estados brasileiros. IPE/USP (Dissertação de mestrado).

Castro, M.R., Gouvea, S.N., Minella, A., Santos, R.C. & Souza-Sobrinho, N.F. (2015). SAMBA: Stochastic analytical model with a Bayesian approach. *Brazilian Review of Econometrics*, 35, 103-170.

Cavalcanti, M. A. F. H., & Vereda, L. 2010. Propriedades dinâmicas de um modelo DSGE com parametrizações alternativas para o Brasil. Ipea, Texto para Discussão, n 1588.

Costa Junior, C. J. (2016). *Understanding DSGE models*. Málaga: Vernonpress.

De Araújo, J. & Leite Filho, P. (2010). Ciclos político-econômicos: uma análise do comportamento dos gastos públicos nos estados brasileiros no período de 1995 a 2008. In Anais do XXXVIII Encontro Nacional de Economia.

Drazen, A. (2000). The political business cycle after 25 years. *NBER macroeconomics annual*, 15, 75-117.

Ebeke, C. & Ölcer, D. (2013). Fiscal policy over the election cycle in low-income countries. IMF Working Papers. International Monetary Fund.

Fialho, T. M. M. (1997). Testando a evidência de ciclos políticos no Brasil. *Revista Brasileira de Economia*, 51, 379-390.

Gonçalves, C. E. S. & Fenolio, F. R. (2007). Ciclos eleitorais e política monetária: evidências para o Brasil. *Pesquisa e planejamento econômico*, 37, 465-487.

Hibbs, D. A. (1977). Political parties and macroeconomic policy. *American Political Science Review*, 71, 1467-1487.

Hibbs Jr, D. A. (1986). Political parties and macroeconomic policies and outcomes in the United States. *The American Economic Review*, 76, 66-70.

Kanczuk, F. (2002). Juros reais e ciclos reais brasileiros. *Revista Brasileira de Economia*, 56, 249-267.

Klein, F. A. (2014). Do Opportunistic and Partisan Fiscal Cycles Come Together?. In Anais do XL Encontro Nacional de Economia.

Lopreato, F. L. C. (2015). Aspectos da atuação estatal de FHC à Dilma. Texto para Discussão, Instituto de Pesquisa Econômica Aplicada (IPEA).

Marques Junior, L. D. S. (2013). A política econômica da reeleição e a deterioração da política fiscal no Governo Dilma. *Indicadores Econômicos FEE*, 41, 41-48.

Milani, F. (2010). Political business cycles in the new Keynesian model. *Economic Inquiry*, 48, 896-915.

Nakaguma, M. Y. & Bender, S. (2006). A emenda da reeleição e a Lei de Responsabilidade Fiscal: impactos sobre ciclos políticos e performance fiscal dos Estados (1986-2002). *Economia aplicada*, 10, 377-397.

Nakaguma, M. Y. & Bender, S. (2010). Ciclos políticos e resultados eleitorais: um estudo sobre o comportamento do eleitor brasileiro. *Revista Brasileira de Economia*, 64, 3-24.

Neumark, D. (1988) Employers' discriminatory behavior and the estimation of wage discrimination. *The Journal of Human Resources*, 23(3), 279-295.

Nordhaus, W. D. (1975). The political business cycle. *The Review of Economic Studies*, 42, 169-190.

Preussler, A. P. & Portugal, M. S. (2002). Um estudo empírico dos ciclos político-econômicos no Brasil. *Análise Econômica*, 21, 179-205.

Rogoff, K. (1990) Equilibrium political budget cycles. *American Economic Review*, 80, 21-36.

Rogoff, K. & Sibert, A. (1988). Elections and macroeconomic policy cycles. *The Review of Economic Studies*, 55, 1-16.

Sakurai, S.N. & Menezes-Filho, N. (2011) Opportunistic and partisan election cycles in Brazil: New evidence at the municipal level. *Public Choice*, 148(1–2), 233–247.

Shi, M. & Svensson, J. (2002). Conditional political budget cycles. CEPR Discussion Papers.

Schuknecht, L. (2000). Fiscal policy cycles and public expenditure in developing countries. *Public Choice*, 102, 113-128.

Vergne, C. (2009). Democracy, elections and allocation of public expenditures in developing countries. *European Journal of Political Economy*, 25, 63-77.

Videira, R. A. & Mattos, E. (2011). Ciclos políticos eleitorais e a interação espacial de políticas fiscais entre os municípios brasileiros. *Economia Aplicada*, 15, 259-286.

Appendix

Log-linear model

Table 5. Structural log-linear model.

Equation	(Definition)
$S_t^L + \sigma C_t + \varphi L_t = W_t - P_t - \left(\frac{\tau_{ss}^l}{1-\tau_{ss}^l}\right)\tau_t^l - \left(\frac{\tau_{ss}^c}{1+\tau_{ss}^c}\right)\tau_t^c$	Supply of labor
$S_t^P - S_{t+1}^P + \sigma\,(C_{t+1} - C_t) = \left(\frac{1-\tau_{ss}^k}{1+\tau_{ss}^c}\right)\left(\frac{R_{ss}}{P_{ss}}\right)\left[R_{t+1} - P_{t+1} - \left(\frac{\tau_{ss}^k}{1-\tau_{ss}^k}\right)\tau_t^k - \left(\frac{\tau_{ss}^c}{1+\tau_{ss}^c}\right)\tau_t^c\right]$	Euler equation capital stock
$S_t^P - S_{t+1}^P + \sigma\,(C_{t+1} - C_t) + \left(\frac{\tau_{ss}^c}{1+\tau_{ss}^c}\right)\left(\tau_{t+1}^c - \tau_t^c\right) + \pi_{t+1} = R_t^B$	Euler equation financial assets
$K_{t+1} = (1-\delta)K_t + \delta I_t$	Law of motion of capital
$S_t^P = \rho_P S_{t-1}^P + \varepsilon_{P,t}$	Preference shock
$S_t^L = \rho_L S_{t-1}^L + \varepsilon_{L,t}$	Labor supply shock
$Y_t = A_t + aK_t + (1-a)L_t$	Production function
$A_t = \rho_A A_{t-1} + \varepsilon_{A,t}$	Productivity shock
$L_t = CM_t + Y_t - W_t$	Demand for labor
$K_t = CM_t + Y_t - R_t$	Demand for capital
$CM_t = (1-a)W_t + aR_t - A_t$	Marginal cost
$\pi_t = \beta E_t \pi_{t+1} + \left[\frac{(1-\theta)(1-\beta\theta)}{\theta}\right](CM_t - P_t)$	Phillips curve
$\pi_t = P_t - P_{t-1}$	Inflation rate
$\left(\frac{B_{ss}}{R_{ss}^B}\right) B_{t+1} - R_t^B\Big) - B_{ss}B_t + \tau_{ss}^c P_{ss}\,[C_{ss}(C_t + \tau_t^c + P_t) + I_{ss}(I_t + \tau_t^c + P_t)] + \tau_{ss}^l W_{ss} L_{ss}\left(\tau_t^l + W_t + L_t\right) + \tau_{ss}^k R_{ss} K_{ss}\left(\tau_t^K + R_t + K_t\right) = P_{ss} G_{ss}(G_t + P_t)$	Government budget constraint
$Z_t = \gamma_Z Z_{t-1} + (1-\gamma_Z)(1-\phi_{W,Z})\phi_Z(B_t - Y_{t-1} - P_{t-1}) + \phi_{W,Z}\Xi_t + S_t^Z$	Fiscal rule for $Z \in \{G, \tau^c, \tau^l, \tau^k, T\}$
$S_t^Z = \rho_Z S_{t-1}^Z + \varepsilon_{Z,t}$	Fiscal policy shock
$\Xi_t = \left(\frac{C_{ss}^{1-\sigma}}{1-\sigma}\right)\left[S_t^P + (1-\sigma)C_t\right] - \left(\frac{L_{ss}^{1+\varphi}}{1+\varphi}\right)\left[S_t^P + S_t^L + (1+\varphi)L_t\right]$	Utility gap
$R_t^B = \gamma_R(1-\phi_{W,R}(R_{t-1}^B + (1-\gamma_R)(1-\phi_{W,R})(\gamma_Y Y_t + \gamma_\pi \pi_t) + \phi_{W,R}\Xi_t + S_t^m$	Taylor rule
$S_t^m = \rho_m S_{t-1}^m + \varepsilon_{m,t}$	Monetary policy shock
$Y_t = \phi_{Css} C_t + \phi_{Iss} I_t + \phi_{Gss} G_t$	Equilibrium condition