

POLITICAL BUSINESS CYCLES IN THE BRAZILIAN ECONOMY (1980~1999)

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Abstract: *The purpose of this paper is to test the "opportunistic" political business cycle models against a broad range of stylised facts for the Brazilian economy. We study the period spanning from 1980-1999, which encompasses the recent return to a democratic regime. The results indicate that the models are able to match the data in several aspects.*

Keywords: political business cycle; macroeconomic policy; economic performance; election; Brazilian economy.

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1. Introduction

The underlying idea regarding political business cycles comes from the understanding that changes in some economic variables seem to have a direct connection to electoral periods. The justification for it would be the interest of incumbents to keep the power for themselves. These cycle models are part of the literature of political cycle¹, that also includes partisan theory models².

The first relevant work in the literature of electoral cycle was due to Nordhaus (1975). His model presents three basic hypotheses: voters that give consideration only for recent events; a vote function that considers unemployment and inflation rate; and an adaptive-expectations Phillips Curve. As a result, the optimal policy for an incumbent who seeks to be re-elected would be one with decreasing unemployment and increasing inflation rate during the pre-electoral period. After election these trends are reversed. In the 80's, several models were built incorporating rational expectation and the game theory approach (strategic behaviour and asymmetric information). The most relevant works in this line were papers by Rogoff and Sibert (1988) and Rogoff (1990). These models, which were called rational political business cycle, suggest an opportunistic manipulation of visible economic policies as a way to signalise the competence of the incumbent. Some of behaviours in the pre-electoral period suggested by this class of models are: decreasing taxes and public prices, increasing governmental consumption and transfers leading to fiscal deficits, loosening of monetary policy and finally in higher inflation rates. After elections all behaviours are reversed.

There is a vast literature of empirical tests for electoral cycles model. Relevant works for Brazilian economy are the ones by Paiva (1994), who has found a negative relationship between oil price and elections, Fialho (1997), who has suggested electoral cycles in GDP growth and M1, but not in unemployment and inflation rates, and Bonomo and Terra (1999), who have found exchange rate misalignment before elections and reversion after them.

We extend the analysis of electoral cycles to a broad range of variables representing economic performance and policies during the period from 1980 to 1999, which is characterized by the return to a democratic regime.

¹ See Alesina, Cohen and Roubini (1997) for a survey.

Next section describes the data set for the analysed variables. Section 3 explains the econometric methodology. Section 4 presents the unit root tests for our time series. Section 5 presents the results of our estimations. Finally, the last section brings the concluding remarks.

2. Data Description

We have used monthly data of variables representing the economic performance and policies in Brazil during the last two decades. The data and notation utilized in this work are presented in Table 1.

TABLE 1 – DATA DESCRIPTION

<u>variable</u>	<u>notation</u>	<u>description</u>	<u>period</u>
unemployment	U	Open Unemployment Rate (source: IBGE) ¹	01/80 - 05/99
output	Y	GDP index	01/80 - 09/98
inflation	π	% variation of IGP-DI ² (source: FGV)	01/80 - 06/99
monetary supply	M1	M1 index deflated	01/80 - 06/99
interest policy	R	effective Over-Selic interest rate ³ in % discounted by inflation rate	01/80 - 06/99
credit policy	Cred	Total Loans to Private Sector index deflated	01/80 - 02/99
fiscal policy	WS	National Treasury Expenses index – Payroll and Social Levies – accounted in cash flow regime and deflated	01/86 - 04/99
exchange rate policy	E	exchange rate index deflated and discounted by the PPI-USA (producer price index in the USA; source: BLS)	01/80 - 06/99
public prices	Ene	energy price deflated	01/82 - 06/99

Remarks:

- i) IGP-DI was utilized to deflate nominal series
- ii) Data source: Brazilian Central Bank, except when other source cited
- iii) Indexes have basis 100 = jan/80, except “WS” (100 = jan/86) and “Ene” (100 = jan/82)

Notes:

- ¹ It refers to the percentage of economically active population who sought for position in the last 30 days and did not work in the last 7 days before the pool.
- ² Weighted average among a consumer price index (60%), a producer price index (30%) and a construction cost index (10%), calculated by Getulio Vargas Foundation (FGV).
- ³ Average effective interest rate of public federal bonds weighted by volume.

There are some remarks about the data. Fiscal policy analysis was restricted to the federal government wage bill. It was not possible to assess cycles in the government transfers, in the tax charge or in the fiscal deficit because of lack of reliable data. We have used energy price as a

² These models refer to differences in economic outcomes and policies among administrations of ideologically distinct parties (see papers by Hibbs, 1977, and Alesina, 1987).

proxy of public prices because this seems to be less affected by shocks, once Brazilian electrical energy matrix is strongly dependent on water source.

To analyse the behaviour of the variables, we have used the annual difference (*D12*), calculated as $D12 x_t = x_t - x_{t-12}$, where x_t is the variable transformed into natural logarithms. For inflation and real interest rates, which contain negative values in the sample, we have used other transformation: $x_t = \text{signal}(X_t) \sqrt[2]{|X_t|}$. The adoption of *D12* is justified by we are interested in how the variables have behaved in relation to a given past period. Besides that, this procedure solves for seasonality and non-stationarity problems.

To represent the electoral periods, we have used dummy variables with value 1 during months of electoral period and 0 (*zero*) otherwise, denoted by “*EVP-N*” or “*EVP+N*”, when considering only presidential elections, and “*EVE-N*” or “*EVE+N*”, when including state/parliamentary elections³. Municipal elections were not considered here as we are testing a set of variables usually related to federal policies. The signals “-” and “+” represent pre and post-electoral periods respectively. In pre-electoral periods, we have considered “*N*” months before each election, besides election months⁴. In post-electoral periods, we have considered “*N*” months since the President nomination⁵ or “*N*” months after election when there was not a new President elected.

In order to make the tests more flexible in relation to the extension of the electoral periods, we consider $N = 5, 8$ or 11 months in the pre-electoral period and $N = 6, 9$ or 12 months in the post-electoral period. These values were suggested by the horizon of economic contracts in Brazil during the period⁶.

3. Econometric Methodology

We have made use of an autoregressive specification for each series:

$$AR(\rho): \quad y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \dots + \alpha_p y_{t-p} + \alpha_{p+1} EV_t + \varepsilon_t$$

³ Presidential elections occurred in 01/85, 11~12/89, 10/94 and 10/98. In 1985, the President was elected by the Congress, but popular pressure was strong. State/parliamentary elections occurred in 11/82, 11/86, 10~11/90 and 11/94.

⁴ Two-turns elections took place in distinct months until 1994.

⁵ In 1985 and 1990, when the nomination occurred in March 15, we have started the pre-electoral period in April. In 1998, the President was reelected and his nomination was considered just after election.

⁶ Alesina and Roubini, 1992, adopts this criteria for OCDE economies.

where ρ is the correlation order, y is the economic variable transformed into $D12$ and EV is the electoral variable. This specification has been implemented in several studies of political cycles. It comes from the assumption that changes in the tested variables are originated in a stochastic process with stationary variance⁷.

EV captures the cyclical trends in the economic variable path, i.e., the direction and the statistical significance of cyclical movements. The magnitude is not being analysed because the estimated coefficient indicates the average impact, which would not reflect the social costs or benefits of these cycles considering the small number of elections and the estimation using $D12$. According to the political business cycles models, in the pre-electoral period the expected signal of EV would be positive for GDP, money supply, credit, public expenses and exchange rate, but negative for unemployment, real interest rate and public prices. The signal would be positive or null for inflation. All signals should be reverted after elections.

However, high inflation has been one of the main economic problem in Brazil. Thus the inflation restriction can be interpreted as a way through which an incumbent can signalises her competence. According to it, the signal of EV before election would be negative for inflation and credit, and positive for interest rate and exchange rate⁸. Appreciated exchange rate could also be interpreted as an attempt of income transfer from some sectors (export) to others (suggested by Bonomo and Terra, 1999).

The correlation order (ρ) was obtained by the “general to specific” methodology, i.e., we begin with 18 lags until we find a specification that was significant for the major lag. Trend was included when statistically significant. Impulse dummies were included in some months (with value 1 in the month and 0 out) in order to correct outliers in residues, which generated mis-specification due to estimation by linear regression⁹.

⁷ See McCallum (1978). Among several authors, Alesina (1988, 1989) and Alesina and others (1988, 1991, 1992) have also followed that methodology.

⁸ Control of prices, wages, interest rate, credit supply and exchange rate were typical instruments of anti-inflationary policies in the studied period.

⁹ Other estimation methods could solve this problem, but we have chosen to keep the traditional OLS method because of the small number of interventions relative to the sample.

TABLE 2: UNIT ROOT TESTS^a

Variable	DF Statistic ^b	Lags ^c	ADF Statistic ^b	Phillips-Perron Statistic ^b
D12lnU	-3,0547**	13	-2,7962***	-3,3931**
D12lnY	-4,2157*	17	-2,2216	-5,4306*
D12r2 π	-4,4625*	13	-3,0157**	-4,2676*
D12lnM1	-3,1215**	16	-3,6573*	-2,9039**
D12r2R	-8,4841*	17	-4,0978*	-11,8391*
D12lnCred	-3,2877***	18 (with trend)	-3,4913**	-3,3997***
D12lnWS	-5,3866*	13	-2,6302***	-3,4758*
D12lnE	-2,9098**	18	-3,0078**	-2,5803***
D12lnEne	-3,4205**	13	-4,9455*	-4,0149*

Remarks: a) constant was included in all tests;

b) *, **, *** = unit root rejection in 1%, 5% and 10% of confidence interval;

c) defined by the general to specific methodology.

4. Unit-Root Tests

The Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF) and Phillips-Perron tests were applied in each time series.

According to Table 2, statistical-tests reject unit-root in our series, except ADF statistic for “D12lnY”. In this case, we have accepted the stationarity of the series following the result of Phillips-Perron test, which is the less restrictive about error problems.

5. Results

Our presentation of estimated parameters and statistical-tests is restricted to the minimum necessary to understand the results (see Table 3). In each variable, only results for the *EV* with higher statistical significance are shown¹⁰.

We also present results for *AR I-p* test (Lagrange-Multiplier test for serial correlation until order *p*) all estimations. Besides that, we have run tests for residual normality [$\chi^2(2)$ test], heteroskedasticity (Lagrange-Multiplier test for ARCH structure and White test), misspecification and functional form (*Reset* and a F-test that checks linearity against the square of residuals depending on squares and cross-products of the regressors). The test results reject specification problems in all estimations with a significance level of more than 5%.

¹⁰ Additional results can be obtained upon request.

5.1. Remarks

We point out the following notes before presenting our results:

- i) M1 may not be consensually accepted as a “proxy” for the money supply;
- ii) variations in real interest rate (in the way we have calculated it) could be said to mostly reflect errors in inflation expectation than government policy until Plano Real (07/94);
- iii) public expenses may be distorted by delay in payments, changes in wage policy, etc., and by inflation volatility.

5.2. Results for pre-electoral periods

Considering a level of statistical significance of 10%, the results presented in Table 3 suggest an increase in GDP (when using *EVP-5*, *EVP-8*, *EVE-5* and *EVE-8*), real interest rate (using *EVE-5* and *EVE-8*) and credit supply (using *EVE-8*), and a decrease in unemployment rate (using *EVE-8*) and energy price (using *EVP-5*, *EVP-8*, *EVE-5*, *EVE-8* and *EVE-11*).

TABLE 3 – ESTIMATION RESULTS

<u>PRÉ-ELECTORAL PERIOD</u>									
<u>Dependent var.</u>	<u>D12lnU</u>	<u>D12lnY</u>	<u>D12r2π</u>	<u>D12lnM1</u>	<u>D12r2R</u>	<u>D12lnE</u>	<u>D12lnWS</u>	<u>D12lnE</u>	<u>D12lnEne</u>
EV	EVE-8	EVP-8	EVE-5	EVE-11	EVE-5	EVE-8	EVE-8	EVP-5	EVE-5
coeficiente	-0,023	0,010	-0,096	0,017	0,544	0,014	0,063	-0,011	-0,041
t-statistic	-2,071	2,443	-0,738	1,382	2,551	1,664	1,402	-1,559	-3,007
(t-probability)	(0,040)	(0,016)	(0,462)	(0,169)	(0,011)	(0,098)	(0,163)	(0,121)	(0,003)
R ²	0,92	0,78	0,87	0,97	0,61	0,94	0,54	0,96	0,86
AR 1-7 F(7,184)	0,560	1,462	0,665	0,776	2,070	1,161	1,378	1,514	1,152
(AR - probab.)	(0,787)	(0,184)	(0,701)	(0,609)	(0,050)	(0,328)	(0,222)	(0,166)	(0,334)
<u>PÓST-ELECTORAL PERIOD</u>									
<u>Dependent var.</u>	<u>D12lnU</u>	<u>D12lnY</u>	<u>D12r2π</u>	<u>D12lnM1</u>	<u>D12r2R</u>	<u>D12lnE</u>	<u>D12lnWS</u>	<u>D12lnE</u>	<u>D12lnEne</u>
EV	EVE+12	EVE+12	EVP+6	EVE+12	EVP+9	EVE+12	EVP+9	EVP+12	EVP+9
coeficiente	0,021	-0,007	-0,327	-0,024	0,281	-0,013	0,126	0,018	-0,011
t-statistic	1,939	-1,871	-1,930	-1,853	1,148	-1,549	2,332	2,827	-0,790
(t-probability)	(0,054)	(0,063)	(0,055)	(0,066)	(0,252)	(0,123)	(0,021)	(0,005)	(0,430)
R ²	0,92	0,77	0,87	0,97	0,59	0,94	0,55	0,96	0,85
AR 1-7 F(7,184)	0,632	1,621	0,537	0,730	1,850	1,341	1,130	1,423	1,545
(AR - probab.)	(0,729)	(0,133)	(0,805)	(0,646)	(0,081)	(0,234)	(0,349)	(0,199)	(0,156)

Note: see Appendix to estimation description

We would also have weak evidence of decrease in exchange rate (see *EVP-5*). But we can find exchange rate appreciation in the electoral years of 1986, 1989, 1990 and 1994, which strengthen the evidence of a potential electoral cycle.

Although statistical evidence of inflation rate cycle was not found, one can observe reductions in 1986, 1990, 1994 and 1998, which are electoral years. In 1989 there was an increasing inflation rate, but it could be explained by the extremely low credibility of the incumbent party in that year. Decreasing inflation rate before some elections in Brazil can be said to be an evidence of public policies intending to signalise the incumbent's competence. Increasing real interest rate and exchange rate appreciation can be seen as instruments for anti-inflationary policy. The exchange rate appreciation could be also justified as a transfer of income from some economic sectors in favour of consumers in general.

5.3. Results for post-electoral periods

Estimated statistics suggest increase in unemployment rate (using *EVE+12*) and in public workers expenses (using *EVP+12* and *EVP+9*), and decrease in GDP (using *EVE+12*) and inflation rate (using *EVP+12* and *EVP+6*) and M1 (using *EVE+12*). We have also found exchange rate depreciation (using *EVP+6*, *EVP+9*, *EVE+9* and *EVE+12*). Moreover, one can observe some evidence of decrease in the credit supply (using *EVE+12*) at a higher level of statistical significance.

Reduction in inflation rate after presidential elections can be interpreted as a consequence of restrictive policies adopted to control inflationary pressures originated in expansionary pre-electoral policies. However, in the Brazilian case one should observe that inflationary pressure came also from expectations of an orthodox plan immediately after election, specially in the case of the 1989 election.

Existence of electoral cycle in M1 does not seem so obvious if one considers that reductions occurred in 1983, 1989 and 1991 were closely correlated to inflation accelerations, which reduced money demand.

Evidence of increase in wage expenses by the government in its first running year find justification in that civil servants' wage increases may occur before election, but impacting only in the next year. This policy can be seen as an example of signalisation of competence (from the incumbent to that specific class of voters).

6. Concluding Remarks

The aim of our work is to assess the implications of political business cycle models in Brazilian economy through an econometric estimation of economic variables. The results suggest existence of electoral cycles in the same pattern implied by the political business cycle models. Thus the results do not allow us to reject the theoretical models, but the suggested implications have not been observed in all elections. One could argue that opportunistic policies are assumed only when incumbent popularity is low (as do Frey and Schneider, 1978). However, in our case, the failures in cycles are not concentrated in some specific elections. Maybe we can raise the argument that specific policies are chosen in each election because of the difficulty to manipulate all policies at the same time.

As a normative implication one can suggest institutional restrictions to limit electoral cycles, for instance, central bank independence, inflation targeting, and constitutional limitation in public deficit and debt. On the other hand, Rogoff (1990) asks whether electoral cycles are bad in a social welfare point of view as they are generated in the interaction process between the incumbent and society. Besides that, cycles just signalise the incumbent competence, which might not be inferred otherwise.

Appendix: Estimation Description

<u>Variable</u>	<u>Specification</u>	<u>Estimation period</u>	<u>Dummies for outliers</u>
D12lnU	AR13	02/82 - 05/99	04/90, 02/92
D12lnY	AR17	06/82 - 09/98	04/90, 04/91
D12r2 π	AR13	02/82 - 06/99	04/86, 04/87, 02/89, 04/90, 04/91, 08/94
D12lnM1	AR16	05/82 - 06/99	03/86, 03/87, 04/87, 04/89, 07/89, 01/90, 03/90, 05/90, 03/91, 03/92, 09/94, 01/97
D12r2R	AR17	06/82 - 06/99	11/85, 04/87, 03/89, 07/89, 03/90, 02/91, 03/91, 02/92, 07/94, 02/99
D12lnCred	AR18 with trend	07/82 - 02/99	06/87, 07/87, 05/90, 07/94, 07/96, 09/98
D12lnWS	AR13	02/88 - 04/99	12/90, 04/95
D12lnE	AR18	07/82 - 06/99	02/83, 03/83, 01/90, 03/90, 04/90, 11/90, 01/91, 04/91, 01/99, 02/99, 04/99
D12lnEne	AR13	02/84 - 04/99	05/85, 04/90, 04/91, 03/93, 07/94

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