

THE POLITICAL ECONOMY OF EXCHANGE RATE POLICY IN BRAZIL:
AN EMPIRICAL ASSESSMENT^{*}

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I. Introduction

What are the determinants of the exchange rate level? Economists like to think about this question in terms of the economic factors underlying an equilibrium exchange rate level. We take an alternative and complementary point of view. We try to explain the short run departures of the real exchange rate level with respect to its equilibrium value using political variables.

This paper investigates whether political economy factors contribute to explain the exchange rate policy in Brazil over the past thirty years. We reason in terms of an analytical framework where the driving force affecting exchange rate policy is the tradeoff between the positive effect of a depreciated exchange rate on the balance of payments and its negative effect on inflation. The exchange rate policy resulting from this tradeoff depends on the political environment.

We test our hypotheses by modeling the disequilibrium level of the exchange rate as a Markov Switching Model with time-varying transition probability. Specifically, we characterize statistically the exchange rate regimes as overvalued and undervalued, and test for the influence of political economy variables on the probability of regime changes. The results support partially the predictions of our analytical framework. According to our statistical results there is an election cycle: the probability of having an appreciated exchange rate is higher in the months preceding elections while the probability of having a depreciated exchange rate is higher in the months succeeding elections.

We proceed as follows. Section two develops an analytical framework to interpret the real exchange rate evolution in Brazil. The third section provides a quantitative assessment of the main political economy factors that influenced exchange rate regime in Brazil, as identified in the second section. Section four concludes.

II. Analytical framework

This section provides an analytical framework for the interpretation of exchange rate policy in Brazil. This framework does not intend to encompass all the complexity of the different forces affecting the making of exchange rate policy over the period studied. It does, however, identifies and highlights the main recursive dilemmas around exchange rate policy choice.

First, it is important to say that we believe that nominal rigidities in the economy allow nominal exchange rate changes to affect its real value. This belief is crucial, otherwise a political economy investigation of the determinants of the exchange rate level might not make much sense. There is a limit to this discretion, though. If one sets a real exchange level that produces large imbalances on the balance of payments, this level should not be sustainable in the long run. It is plausible to assume that in the long run the real exchange rate level is determined by economic variables: external constraints and structural economic variables. Thus, the concept of equilibrium real exchange rate is appropriate as representing the real exchange rate long run trend. It, then, makes sense to study the short run misalignment produced by the exchange rate policy, as determined by political economy variables.

II.1 The inflation vs. balance of payments tradeoff and the policymaker preferences

It is out of the scope of this paper to formulate a rigorous model which encompass all the aspects of the determination of the exchange rate level in the short run in Brazil. However, it is useful to characterize the policymaker preferences in terms of the main tradeoff identified in Brazilian recent history: a more devalued exchange rate is bad for inflation and good for the balance of payments. The government preferences can be modeled in terms of the variables included in this tradeoff. The policymaker dislikes current account deviations from the level compatible with the country's intertemporal budget constraint, and she also dislikes inflation rate deviations from its optimal level.

Policymakers indirect preferences can then be represented as a weighted average of a function of the discrepancy between the current account and its intertemporal equilibrium level, and a function of inflation rate deviations from its optimal level: $U(e) = \alpha f_c(CA(e, X) - CA^*(e^*(X), X)) + f_\pi(\pi(e, X) - \pi^*)$, where α is a relative weight which measures the importance of the current account to the policymaker vis-a-vis the inflation rate, $CA(e, X)$ represents the current account as a function of the real exchange rate e and a vector X of exogenous (to our simple framework) variables, $\pi(e, X)$ represents the inflation rate also as a function of e and X , CA^* the current account level consistent with an equilibrium real exchange rate level and π^* represents the optimal level of inflation. We

assume that both f_c and f_π functions increase in the negative range up to zero, and then start to decrease. We also assume that they decrease at an increasing rate when the absolute value of the discrepancy increases. It is usual in the political economy literature to have quadratic functions, for its simplicity, although here it is plausible to assume that the first function is asymmetric, with negative deviations from the sustainable level being penalized more than positive deviations.

Current account is posited as a positive function of the real exchange rate due to the effect of the real exchange rate on trade balance. As we argued before, the short run real exchange rate behavior is different than that of its long run trend. The equilibrium real exchange rate is the rate which would produce a smooth trajectory for current account path compatible with the country's intertemporal budget constraint.

As for the effect on the inflation rate, first observe that to depreciate the RER, it is necessary to devalue the nominal exchange rate at a faster pace than the difference between domestic and foreign inflation. The faster devaluation pace fosters tradables prices inflation, fueling back into the overall inflation rate. This short run inflationary impact becomes permanent when there is widespread formal and informal indexation. To keep the RER at the new more depreciated level, the RER devaluation rate must be the same as the new (higher) inflation differential. Hence, in indexed high inflation economies, a more depreciated RER will engender, *ceteris paribus*, a higher inflation rate.

The weights attributed to the two functions describing the policymaker's preferences as economic policy objectives should vary through policymakers. A more appreciated exchange rate has impacts, such as lower inflation and cheaper import products, that benefit a large number of dispersed economic agents, in detriment of a small number of concentrated economic interests, as exporters and domestic tradable producers. A policymaker may place a very high weight on current account balance in detriment of inflation control because he favors exporters and import competing producers. On the other extreme, he could have very low weight on current account adjustment because he needs political support, and inflation control is essential for that. We argue that a democracy tends to favor a lower current account weight, as compared to a dictatorship. This is because, in a democracy, elections become important and the interest of a dispersed large number of small economic agents have a better chance of being represented. However, even a dictatorship needs some political support. Sometimes the dictatorship is in a fragile political situation and needs to take decisions geared to gain, or at least not loose, political support. In this case it will place a higher weight on inflation.

In summary, the government chooses the optimal real exchange rate so as to maximize its welfare function, balancing the trade off between current account and inflation. The weight given to each policy objective depends, among other variables, on political economy factors, as the policy choice affects different groups in society in a distinct way.

II.2. Different policymakers and asymmetry of information

The real exchange rate tends to be more appreciated in periods preceding elections, and more depreciated after elections. This pattern is captured for Brazilian data in the econometric exercise performed in section III, and for other Latin American countries in Frieden, Stein and Ghezzi (1999). We will argue that the observed electoral cycles can be explained by imperfect information on the policymaker preferences. Let us consider the situation where there are two different types of policymakers: one type places a higher relative weight on the current account than the other. As a consequence the type that places a higher relative weight on the current account would choose a more depreciated real exchange rate.

If policymakers' preferences were known by the public, the policymaker more concerned with inflation would always win the elections. An interesting, and realistic, situation arises when the public cannot observe the policymakers' preferences. In such a situation, it may be worth for the policymaker concerned with the external sector performance to mimic the policymaker concerned with inflation so as to have some chance of being reelected.

Bonomo and Terra (1999) construct a formal model inspired by this insight. The model assumes two possible types of policymakers: one type is committed to the tradable sector and the other to the non-tradable sector.² However, since the non-tradable sector has a higher number of votes, if the policymakers' preferences were known by the public, the policymaker which represents the non-tradable sector would always win the elections. The policymaker may affect the relative gains for the two sectors by choosing its expenditures on non-tradables goods, and in this way altering the

² Policymakers in Alesina (1987) also have different preferences. However, in that paper the probability of reelection is exogenous, whereas in Bonomo and Terra (1999) the probability of reelection depends on the policymakers' actions.

equilibrium real exchange rate. The public tries to extract information about the policymaker preferences by observing the real exchange rate. However, economic policy is observed with a noise, since there are exogenous shocks to the external sector after the policy is chosen. Thus a given external sector performance is compatible with different combination of policies and shocks. The policymaker that represents the tradable sector tries to disguise herself by choosing expenditures so as to appreciate the real exchange rate and improve the likelihood of her reelection. However, due to the noise, it is not necessary that she imitates perfectly the other type to maintain a chance of being reelected. Moreover, since the tradable sector is hurt by a more appreciated exchange rate, she will choose the exchange rate policy by weighting their immediate interests (the depreciated exchange rate raises the sector's gain), against their long-run interests, that depend on her reelection (which probability increases with a more appreciated real exchange rate). A political budget cycle is also generated in the model, as government intervenes in the exchange rate market by taxing the tradable goods producers, and spending in non-tradable goods.

There is a vast literature on economic policy cycles generated by political economy considerations of policymakers, in asymmetric information contexts. In Persson and Tabellini (1990) unemployment cycles are generated during elections periods, whereas in Rogoff and Sibert (1988) and Rogoff (1990) cycles are in taxes and expenditures. Stein and Streb (1998) relates more closely to the idea presented here. They explain exchange rate valuation/devaluation cycles during elections periods, but the motive for the cycles is different from the one presented in this paper. In the one good model of Stein and Streb (1998), exchange rate devaluation is equal to inflation rate, and inflation tax is one financing source for the government. There are two types of policymakers: competent and incompetent. The competent policymaker needs to tax less than the incompetent one does. Hence, the incompetent policymaker could be willing to mimic the competent policymaker by devaluing less before election, and raise its chances of being reelected.

Here, we think of exchange rate policy as being used to deal with the external and internal imbalances, and different policymakers will have different trade-offs between the two policy objectives. The main difference is that one preference is more popular than the other is, and therefore has more chances of being reelected. Similarly to Stein and Streb (1998), before elections policymakers, independent of their tastes, would have a bias towards fighting inflation and pursue a more valued than average real exchange rate. If the policymaker committed to the tradable good sector is elected, there will be a real devaluation after the election. As a consequence one should observe an electoral cycle, where, on average, the real exchange rate appreciates before elections and depreciates after elections.

III. Exchange rate levels as regimes: a quantitative assessment

In this section we characterize statistically the behavior of the exchange rate by estimating a Markov Switching Model (MSM) with time-varying probabilities. In our characterization, the dependent variable is the RER misalignment and our political explanatory variables affect the transition probabilities. We begin by rationalizing our choice for both the dependent variable and the statistical specification.

The choice of a real exchange rate level results from pure economic factors and political economy factors. We assume that economic factors should have a more permanent effect on the real exchange rates, whereas the political economy factors should influence its cyclical component. If the economic factors were constant, it would suffice to look at the behavior of the observed real exchange rate in order to extract the impact of political economy components on exchange rate policy choice. That is not the case, however. Over the time period studied there were substantial changes in the terms of trade, in the international financial environment, and in domestic imbalances, just to name a few variables, which have affected the equilibrium real exchange rate.

The evolution of the equilibrium RER captures the real exchange rate long run trend, and, hence, the economic variables effect on it. The difference between the actual real exchange rate and its equilibrium value, denoted by *misalignment*, is the part of RER movements that is not being explained by the economic variables used. In this empirical study, we will test whether political economy variables can explain the RER misalignment.

We characterize the influence of political economy variables in the following way. The government has a discrete policy choice of maintaining the misalignment fluctuating around an over-valued or undervalued level, that is, it chooses from two different regimes for the misalignment rate mean. Since changing policy is costly, one should expect this choice to have some persistence. Observable political economy variables are the explanatory variables of misalignment regime choice. This is captured by political economy variables affecting the probability of changing

regimes, rather than determining the regime. Moreover, unobserved variables may also affect regime choice which, for this reason, is modeled as stochastic.

A MSM captures the exchange rate regime choice characterization described above. In such a model, the dependent variable time series behavior follows an auto-regressive process ruled by alternative states (or regimes), which have different means and/or variances. In the model specification used, there are two possible states, which differ on their means: an over-valued, and an undervalued regime. Hence, the RER misalignment is modeled as following an auto-regressive process, and the process mean may change over time, depending on which regime is prevalent. Political economy variables enter the model by affecting the probability of regime change.

An important advantage of using the MSM over other empirical specifications that characterize discrete choices is that it does not require previous identification of the regimes by the researchers. The characterization of regimes – their means and variances – is a result of the estimation procedure. As a by-product, we also have the probability for which regime generated the data at each period.

Other alternative would be to estimate jointly the effect of purely economic and political economy variables and to look at the coefficients of the political economy variables. A Markov Switching Model, however, is a nonlinear model with a relatively large number of parameters, even for a few independent variables. Thus, we simplify by choosing misalignment as our dependent variable. The choice of the Markov Switching Model can be justified both by its good characterization of the empirical features of the exchange rate series (see Kaminsky 1993, Bollen, Gray and Whaley 1998, and Diebold, Lee and Weinbach 1993) and its appealing interpretation.

IV.1 Markov Switching Model

In the specification of the Markov Switching Model we chose, there are two possible states (or regimes), that we will label 0 and 1. If the economy in t is in state 0 the behavior of the dependent variable in t will be that of an AR1 with auto-regressive parameter α and mean $\mu(0)$. Otherwise, the behavior in t will be that of an AR1 process with the same auto-regressive parameter α but with mean $\mu(1)$, which is different from $\mu(0)$. That means that the our dependent variable fluctuates randomly around a certain mean. That stochastic oscillation is modeled through the AR1 specification. A change of policy regime would be reflected in the change of mean. The policy regime is modeled as an unobservable state variable which is governed by a first order Markov process.

Let e be the either the degree of real exchange rate misalignment and S is an unobservable variable, which takes values 0 or 1, depending on the regime. Then:

$$(1) \quad e_{t+1} - \mu(s_{t+1}) = \alpha(e_t - \mu(s_t)) + \sigma \varepsilon_{t+1},$$

where the mean ($\mu(s_{t+1})$) is a function of the regime, and $\{\varepsilon\}$ are i.i.d. with the standard normal distribution.

The regime variable is a discrete variable with two possible values. The transition matrix M gives the probabilities of switching states:

$$M = \begin{pmatrix} p_t^{00} & p_t^{01} = (1 - p_t^{00}) \\ p_t^{10} = (1 - p_t^{11}) & p_t^{11} \end{pmatrix},$$

where p_{ij} gives the probability of moving from state i to state j .

If $\mu(0)$ is higher than $\mu(1)$ we can identify state 0 with an over-valued exchange rate regime and state 1 as an undervalued exchange rate regime. A higher p^{ii} means a higher probability of continuing on state i , and hence a consequence a lower probability of changing states. Thus, the expected time of permanence in state i , when it is visited is increased. As a consequence, a higher p^{ii} will mean a higher unconditional probability of being in state i , that is, the higher the probability of being in state i anytime.

The transition probabilities may be assumed constant, as Hamilton (1989), or time varying, as in Diebold, Lee and Weinbach (1993). When the transition probabilities are constant, the MSM amounts to a pure univariate time series model. Then, instead of a fixed AR1 with a given mean, we have that once in a while the mean of the AR1 changes to

another one, and we have constant probabilities of changing from an AR1 to the other. In this case we are not introducing the influence of any other variable in the behavior of the exchange rate variable: only its past behavior is explaining its future behavior.

When the transition probabilities are variable, we could make them depend on other variables. We assume that the probability of switching states depend on political economy variables. The specification of the effect of the explanatory variables on the probability transitions is:

$$(2) \quad p_t^{ii} = \frac{\exp(q_t^{ii})}{1 + \exp(q_t^{ii})}$$

$$q_t^{ii} = \beta_i + \sum_{k=1}^K \lambda_i^k X_i^k + \xi_t, \text{ for } i=0,1,$$

where X_i^k is an explanatory variable of the transition probability.

Note that p^{ii} , being defined as a logistic function of q^{ii} , has value between 0 and 1. Then, q^{ii} is modeled as depending linearly on the explanatory variables.

The model is estimated by maximum likelihood (see Hamilton 1994 and Diebold, Lee and Weinbach 1993).

IV.2 Empirical implementation

The empirical investigation performed has two objectives. One is to identify whether a Markov Switching Process can characterize our exchange rate variable. Estimating the Markov switching model with constant probabilities does it. In this specification, the equation that specifies the transition probabilities, equation (2), becomes:

$$(2.a) \quad p_t^{ii} = \frac{\exp(\beta_i + \xi_i)}{1 + \exp(\beta_i + \xi_i)}$$

The other objective is to test whether political economy variables affect the probability of being in an appreciated exchange rate regime. That is achieved by using the Markov switching model with time varying transition probabilities, where the transition probabilities are functions political economy variables. The exercise was performed using at most two political economy variables at a time, because otherwise the number of parameters to be estimated will be too big as compared to the number of observations available. In this specification, equation (2) becomes:

$$(2.b) \quad p_t^{ii} = \frac{\exp(\beta_i + \lambda_i^1 X_t^1 + \lambda_i^2 X_t^2 + \xi_i)}{1 + \exp(\beta_i + \lambda_i^1 X_t^1 + \lambda_i^2 X_t^2 + \xi_i)}$$

where X_t^1 and X_t^2 are two political economy variables.

The political economy variables used are the following:

- *Dummy variable for the dictatorship period:* This variable takes the value of one during the dictatorship period, and value of zero otherwise. Our conjecture is that dictatorship governments did not have to worry with elections results. The expected result is that during the dictatorship the probability of either remaining or changing to the undervalued regime should be lower during dictatorship than during democracy.
- *Dummy variable for pre-elections periods:* In Brazil elections are always during the months of September, October or November. This value takes the value of one from March of the election year, to the month elections take place. We chose this periodicity for the elections dummy because elections campaigns in Brazil start peaking up only after Carnival time, which occurs in February. According to our expectations, in a situation of asymmetric information policymakers should pursue an overvalued regime before elections, as explained above. Hence the probability of remaining or changing to the overvalued regime should be higher during the pre-elections period. We observe that, although there were elections during the dictatorship period, they had less

influence on power, and therefore the policymaker should not be as much electoral considerations when choosing economic policy. Hence, the estimation were also performed for a pre-elections dummy taking the value of one only for elections occurring during the democratic period, and the two first elections of dictatorship, when there was still the expectation that the military government would not stay in power for long.

- *Dummy variable for after-elections periods:* This dummy variable takes value of one during twelve months following an election, for the elections occurring during democratic periods. If either types of policymakers tend to pursue an overvalued exchange rate policy prior to elections, it is expected that after elections the real exchange rate should be devalued to reach its real desired level if the policymaker is the type concerned with the external sector. It is expected that the probability of remaining or changing to the overvalued regime should decrease after elections.

Two different sets of estimations were performed. The first set used real exchange rate misalignment as dependent variable, and the second set used the real exchange rate. The results when real exchange rate misalignment was used as dependent variable were more robust and in conformity with the predictions of the analytical framework presented above. As argued above, real exchange rate misalignment is in fact the more appropriate variable to look at when explaining the effect of political economy variables on exchange regime choice. The results using misalignment as a dependent variable will be presented in turn. The results with real exchange rate are shown in the Appendix.

Misalignment is calculated as the difference between the logarithm of the RER and of its equilibrium value. Both the RER and its equilibrium valued used are the series calculated and estimated in Goldfajn and Valdés (1999). They calculate the RER as a trade-weighted average of bilateral RER's, including trade partners responsible for at least 4% of Brazilian trade. The equilibrium RER is the predicted value from the regression of the RER on the fundamentals, which are the terms of trade, the level of government spending, and the degree of openness (see Goldfajn and Valdés 1999 for details).

A real exchange rate overvaluation indicates that the real exchange rate is more valued than it should be according to its equilibrium level, and the opposite is true for the undervalued regime.

Results

Figure VIII presents the evolution through time of exchange rate misalignment, and of the elections dummy over time (the left axis shows the value of exchange rate misalignment, and the right axis presents the value of the elections dummy). This figure shows a concentration of negative misalignments or exchange rate overvaluation during the periods prior to elections. The effect is specially strong during the democratic period.

Table II presents a summary of the estimation results. Each row presents the result of a different specification, depending on which variables are being used to explain the transition probabilities between exchange rate regimes. Table III presents the estimated transition probabilities for each specification of Table II.

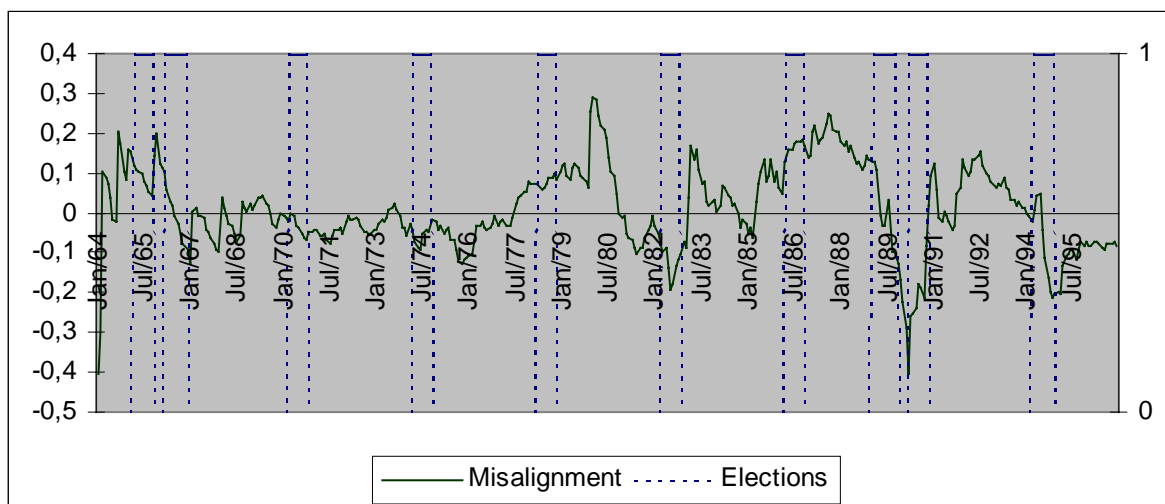


Figure I

We start by estimating an univariate model, which is a Markov switching model with constant probabilities. The results in row (1) of Table I suggest the existence of two regimes³. The overvalued regime has mean -0.081 , and the undervalued regime has mean 0.012 . As for the constant transition probabilities, if the economy is in the overvalued regime, the probability it will remain there is 84.5% , whereas if the economy is in the undervalued regime, the probability the economy will remain there is 96.4% , as shown in table II.

After the estimation of the univariate two regime specification, different political economy variables are included as possible variables that affect the transition probabilities. Row (2) presents the results when political regime dummy is used as an explanatory variable of the transition probabilities. During the dictatorship, the probability of remaining in the valued regime is lower (this probability is 70.7% during democracy and close to 0.0% during dictatorship), the probability of remaining in the undervalued regime is higher compared to the probabilities during the democratic period (96.3% during democracy and 98.1% during dictatorship). This result is expected, if it is true that democratic governments would be more worried about its popularity, and therefore more eager to undertake popular economic policies.

The second set of political economy variables used to explain the transition probabilities are the pre-election dummies, and the results are in rows (3), (4), and (5) in Table I. Rows (3) and (4) present the results when a dummy variable for pre-elections period is used as possible explanatory variable of the transition probabilities. In row (3), the pre-elections dummy has value of one during the period previous to all elections occurred from 1964 to 1996, whereas in row (4) the pre-elections dummy has value of one only during democracy and the first two elections of the military dictatorship (when the dictatorship was believed to be transitory). Both the pre-election and the pre-election during democracy dummies have the same qualitative impact over the transition probabilities: the proximity of elections increases the probability of remaining in the overvalued regime, and decreases the probability of the economy remaining in the depreciated regime. However, both results are not statistically significant. On the other hand, there is a significant negative impact of the pre-elections dummy on the probability of the economy remaining in the undervalued regime, if the economy is there. This means that the probability of changing from the undervalued regime to the valued one is higher before elections.

Comparing rows (3) and (4), Table II, the negative impact of pre-elections is larger when only pre-elections during democratic periods are taken into account: for the pre-elections dummy the probability of the economy remaining in the undervalued regime changes from 98% in normal times to 90.1% during pre-elections periods, whereas for the pre-election during democracy dummy the probability changes from 97.8% during normal times to 83% during pre-election periods.

³ The hypothesis of two regimes against the null of an AR1 could be tested with base on an likelihood ratio test. However, the asymptotic distribution of the statistics is not chi-squared as usual. Garcia (1998) derives the asymptotic distribution for this statistics.

The difference between the impact of pre-election during democracy and during dictatorship is made clear in estimation (5), which uses both a pre-election during democracy dummy and pre-election during dictatorship dummy. All coefficients have the expected sign, but only the coefficient of the pre-elections during democracy dummy for the undervalued regime is significant (Table I). The probability of the economy remaining in the undervalued regime when it is there in normal times is 98%. In pre-elections during dictatorship the probability changes to 96.5%, whereas in pre-elections periods during democracy this probability changes to 82.9% (Table II). In summary, during pre-election periods the probability of the economy remaining in the undervalued regime decreases, and the effect is larger during democratic periods than during dictatorship periods. These results are in conformity with the expectation that previous to elections the policymaker would be more willing to undertake popular measures, such as an exchange rate over-valuation policy.

If during pre-elections periods there is a higher probability of the exchange rate regime moving to a valued one, one should expect that in after-election periods the opposite is true, in order to reestablish equilibrium in the economy. The estimation using after-election dummy, presented in Table III row (6), yields exactly the expected result: after election, the probability the economy will remain in the valued regime if it is already there decreases (from 49.6% to 0.2%), and the probability it will remain in the undervalued regime increases (from 98.4% to value close to 100%). Furthermore, all coefficients are statistically significant (Table II).

Row (7) combines the political regime and the pre-elections during democracy dummies. All coefficients estimated have high t-statistic, and the sign are in conformity with our expectations. The probability of remaining in the over-valued regime is smaller during dictatorship and larger during pre-elections periods (increases from a value close to 0 to 42.6%). The probability of remaining in the undervalued regime is larger during dictatorship period and smaller during pre-elections periods (Table III).

The next specification uses the political regime and the after-elections dummies as explanatory variables for the transition probabilities. As shown in Table II row (8), the political regime dummy has a negative impact on the probability of remaining in the over-valued regime (during democracy the probability is 42.1% and during dictatorship it is close to 0), and a negative impact on the probability of remaining in the undervalued regime (the probabilities are 98.0% and 98.3% for the democratic and dictatorial periods, respectively). The after-elections dummy has a negative impact on both probabilities. However, in absolute value, the coefficient of this variable is much larger for the probability of remaining in the over-valued regime, and the t-statistics for the coefficient of the probability of remaining in the undervalued regime is very low (-0.25). Hence, the results indicates that after-elections dummy has a significant negative impact only on the probability of the economy remaining on the over-valued regime once it is there (probability changes from 42.1% in normal times to 12.8% after elections).

Finally, as the results in row (9) show, the minister of finance change dummy has a positive impact on the probability of the economy remaining in the over-valued regime, and a negative impact on the probability of remaining in the undervalued regime, although the t-statistics for this latter impact is very low (-0.22). The probability of remaining in over-valued regime is 91.5% during normal times, and it increases to a value close to 100% during minister change periods. On the other hand, the probability of remaining in the undervalued regime decreases from 98.4% in normal times to 97.9% during minister change periods. These results are in conformity with the expectation that during politically turbulent time the government is more willing to undertake more popular measures.

In summary, we found that the dictatorship favored an undervalued currency. We identified a misalignment cycle around elections: an overvalued currency is more likely before elections, while there is a higher probability of changing from a overvalued to a devalued currency immediately after elections. The election cycle showed to be stronger during the democratic period than during the dictatorial period. We also detected a political instability effect on the exchange rate: an overvalued exchange rate is more likely when there is a finance minister change.

Interpretation

The results we found are in accordance with the predictions of our analytical framework. Interpreting Brazilian history accordingly, we conclude that during the military dictatorship inflation fighting was less important. The reason is that stabilization brings immediate benefits to a disperse and large number of citizens, who, different from the tradable sector producers, do not exert a direct organized pressure on the government. The majority of people has influence over the government through the elections. Thus, when democracy is restored, inflation fighting became a priority⁴. In

⁴A more thorough examination of the history of the Brazilian exchange rate policy between 1964 and 1997 may be found in Bonomo and Terra (1999).

the subsection above we found that the exchange rate is more likely to be overvalued during democracy, which is consistent with our analysis.

During democracy voters' assessment of the government preferred policies become important. Since voters do not know policymakers' preferences, incumbents have an incentive to behave as if they had popular preferences. This means that before election incumbents tend to have a more appreciated exchange rate, in order to influence voters. In the subsection above, we also found evidence of an election cycle of the exchange rate during democracy. This empirical pattern fits our asymmetric information framework.

V. Conclusion

This paper studied exchange rate policy in Brazil, from a political economy perspective. An analytical framework was constructed to try and encompass the main forces at work, and a quantitative assessment of the analytical framework was performed, using Brazilian data for the period studied.

Exchange rate policy in Brazil has been a crawling peg throughout the period studied, except for two short periods. The policy choice has basically been the administration of the crawling peg, which could lead to real exchange rate appreciation or depreciation. The main forces guiding this exchange rate policy choice were the result from a trade off between inflation and balance of payments (see Bonomo and Terra 1999, for an historical account). Exchange rate policy that results in a real exchange rate appreciation helps reducing inflation, but deteriorates the balance of payments, and the reverse is true for real exchange rate depreciation. These two effects of exchange rate policy do not have a symmetric effect on the different members of society: inflation reduction benefits a large number of dispersed agents, whereas balance of payments improvement benefits a more concentrated group of exporters and import competing domestic industries.

The analytical framework posited that policymakers' policy choice depends on the relative weight she places on the balance of payments as opposed to inflation reduction. In particular, policymakers in need of popular support would place a relatively higher weight on inflation reduction. Hence, democratic governments should place more weight on inflation reduction, as opposed to dictatorial governments. An elections cycle could also be generated if policymakers differed on the relative weights they place on their policy objectives, and the public could not observe the policymakers' preferences, but only their policy choices.

The analytical framework predictions were tested empirically. A Markov switching model with time-varying transition probabilities was used to characterize the exchange rate regimes, and the influence of political economy variable on them. The dependent variable chosen was the real exchange rate misalignment with respect to its equilibrium level. We argue that real exchange rate misalignment is a more appropriate measure for the exercise we perform. In trying to identify *political economy* factors that affect exchange rate policy we do not want to capture the effects of other exogenous purely economic variables. The misalignment measure controls for the effects of the economic variables, and the political economy variables should explain the remaining variations. In fact, the empirical evaluation is more robust and in conformity with the predictions of the analytical framework when exchange rate misalignment is being studied, instead of the real exchange rate itself⁵.

The main predictions of the analytical framework were captured in the empirical exercise. We found that during the dictatorship period the probability of the economy remaining in the undervalued regime was larger than during the democratic period, and the reverse is true for the probability of remaining in the over-valued regime. The elections cycle was also identified: the probability of having an appreciated exchange rate is higher in the months preceding elections while the probability of having a depreciated exchange rate is higher in the months succeeding elections. Moreover, the elections cycle showed to be stronger during the democratic period, than during the dictatorial period.

⁵ The results we found using the real exchange rate as the dependent variable are reported in the appendix of Bonomo and Terra (1999).

VI. References

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Table I

Dependent Variable: Exchange Rate Misalignment

$$e_{t+1} - \mathbf{m}(s_{t+1}) = \mathbf{a}(e_t - \mathbf{m}(s_{t+1})) + \mathbf{se}_{t+1}$$

$$p_t^i = \frac{\exp(\mathbf{b}_i + \mathbf{I}_i^1 X_t^1 + \mathbf{I}_i^2 X_t^2 + \mathbf{x}_t)}{1 + \exp(\mathbf{b}_i + \mathbf{I}_i^1 X_t^1 + \mathbf{I}_i^2 X_t^2 + \mathbf{x}_t)}, \text{ where } p_t^i = \Pr[S_{t+1} = i | S_t = i]$$

Explanatory variables of the transition probabilities	Mean		Constant part of probability		X1 coefficient		X2 coefficient		Auto-regressive factor	Standard deviation	Likelihood Function Value	Likelihood Ratio Test p-value		c2
	Overvalued $\mu(0)$	Undervalued $\mu(1)$	Overvalued β_0	Undervalued β_1	Overvalued λ_0^1	Undervalued λ_1^1	Overvalued λ_0^2	Undervalued λ_1^2	α	σ		Inclusion of X1	Inclusion of X2	
(0) AR(1) - One regime case	0,000 (0.14)								0,940 (54.32)	0,035	756,11			
(1) Constant Probabilities	-0,081 (-2.07)	0,012 (13.48)*	1,702 (3.85)	3,293 (9.85)					0,964 (70.39)	0,027 (23.78)	791,66			
(2) X1-Political regime	-0,036 (-0.92)	0,056 (15.30)*	1,008 (1.89)	3,007 (6.24)	2,596 (3.81)	-2,131 (-2.76)			0,964 (67.76)	0,027 **	798,45	0,000		
(3) X1-Pre-elections	-0,083 (-2.2)	0,011 (12.64)*	1,272 (2.17)	3,902 (7.53)	0,784 (0.92)	-1,692 (-2.41)			0,962 (70.1)	0,027 **	794,70	0,014		
(4) X1-Pre-election during democracy	-0,082 (-2.11)	0,011 (13.17)*	1,425 (2.59)	3,788 (8.23)	0,432 (0.50)	-2,201 (-3.08)			0,963 (69.03)	0,027 **	795,65	0,005		
(5) X1-Pre-election during democracy X2-Pre-election during dictatorship	-0,082 (-2.50)	0,011 (13.19)*	1,226 (2.18)	3,897 (8.04)	0,635 (0.74)	-2,321 (-3.27)	14,881 (0.01)	-0,575 (0.51)	0,962 (70.78)	0,027 (24.98)	796,60			0,168
(6) X1-After-election during democracy	-0,078 (-1.92)	0,015 (14.34)*	2,184 (-3.12)	3,421 (8.84)	-0,745 (-0.83)	-0,996 (-1.34)			0,965 (71.94)	0,027 **	792,73	0,144		
(7) X1-Political regime X2-Pre-election during democracy	-0,037 (-1.01)	0,057 (15.68)*	0,455 (0.59)	18,372 (0.02)	3,119 (3.70)	-17,498 (-0.02)	0,407 (0.43)	-16,659 (-0.02)	0,963 (69.93)	0,027 **	802,87	0,000	0,003	
(8) X1-Political regime X2-After-election during democracy	-0,040 (-1.01)	0,055 (14.19)*	-0,090 (-0.11)	3,481 (5.74)	4,328 (4.27)	-2,953 (-3.32)	-2,791 (-2.96)	0,884 -0.90	0,964 (69.33)	0,028 **	800,49	0,000	0,043	

Asymptotic t-ratios are in parentheses

*This is the t-ratios of the difference between the mean of the two regimes.

**Value larger than 99.99.

Table II**Estimated Transition Probabilities for each Specification on Table I**
Dependent Variable: Exchange Rate Misalignment

Explanatory variables of the transition probabilities	Probabilities when dummies equal zero		Prob. when dummy X1=1		Prob. when dummy X2=1	
	Overvalued	Undervalued	Overvalued	Undervalued	Overvalued	Undervalued
(1) Constant Probabilities	0,846	0,964				
(2) X1-Political regime	0,733	0,953	0,974	0,706		
(3) X1-Pre-elections	0,781	0,980	0,887	0,901		
(4) X1-Pre-elections during democracy	0,806	0,978	0,865	0,830		
(5) X1-Pre-elections during democracy X2-Pre-elections during dictatorship	0,773	0,980	0,865	0,829	1,000	0,965
(6) X1-After-elections during democracy	0,899	0,968	0,808	0,919		
(7) X1-Political regime X2-Pre-elections during democracy	0,612	1,000	0,973	0,706	0,703	0,847
(8) X1-Political regime X2-After-elections during democracy	0,478	0,970	0,986	0,629	0,053	0,987
(9) X1-Minister of Finance change	0,841	0,975	0,817	0,925		