“ The Political Economy of Exchange Rate Policy in Brazil: 1964 / 1997.”

Prof^a Maria Cristina Trindade Terra

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Coordenação: Prof. Pedro Cavalcanti Gomes Ferreira
Email: ferreira@fgv.br - ☎ (021) 536-9250

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DEPARTMENT OF ECONOMICS, PUC-RIO
CATHOLIC UNIVERSITY OF RIO DE JANEIRO

THE POLITICAL ECONOMY OF EXCHANGE RATE POLICY IN BRAZIL:
1964-1997

MARCO BONOMO, PUC-RIO
CRISTINA TERRA, EPGE-FGV-RIO

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I. Introduction

Brazilian economic history has been extremely rich over the past thirty years. The period had authoritarian and democratic governments. Brazil has undergone chronic high inflation periods and severe balance of payments crisis, in which the exchange rate had always-crucial roles. Brazil had numerous heterodox stabilization attempts, where only the first, launched by the first military government, and the last - the Real Plan - were successful. In this paper we aim to analyze the political economy determinants of the exchange rate policy in Brazil over the past thirty years. We use two complementary methodologies. The first one consists in investigating the historical context of the exchange rate policy over this period. Thus, the first part of the paper is dedicated to an historical account of the political economy of the exchange rate policy in Brazil from 1964 to 1997. The second methodology is statistical. We use a Markov Switching Model (MSM) to characterize statistically the level and volatility regimes of the exchange rate, and the influence of the political economy variables on regime changes.

Our period starts with a regime of fixed exchange rate with infrequent adjustments. Then, a crawling peg is introduced in 1968, lasting through the whole high inflation period. When the successful Real Plan was launched, the issue of what kind of regime was adequate to the infant stabilization became important, with the government essaying first a free float regime, passing to a band, but effectively ending again in a crawling peg like regime. What did determine the choice of regime during those thirty years?

The different rules of adjustment were most of the time alternatives to keep the real exchange rate invariant on average. However, the level of real exchange rate was sometimes depreciated as in 1984 or appreciated as in the end of 1994. What did determine the level of the exchange rate?

In the next section we will try to answer those questions, with emphasis on the political economy factors.

In order to isolate the economic factors, we look not only for the real exchange rate as also for an estimate of the equilibrium exchange rate, and try to explain the misalignments. The third section characterizes statistically the misalignment and the volatility of the exchange rate using a Markov Switching Model and tests if the misalignment is related to political economy factors. Alternatively we use the same Markov Switching Process to characterize regimes of the real exchange rate.

The fourth section concludes.

II. Political Economy of Exchange Rate Policy in Brazil: 1964-97

II.1. Infrequent and Large Devaluations: 1964-1967

Our analysis starts in 1964, the first year of the military government, that would last for two decades. The military government inherited a precarious macroeconomic environment, with high inflation and current account deficit, and a system of multiple exchange rates. This system was introduced in 1953 by SUMOC (the agency responsible for coordinating the monetary and exchange rate policy), in the context of the Bretton Woods agreement. It was difficult to comply with the requirement of fixed exchange in an environment in which the difference between the internal and external inflation rate was substantial. Thus systems of licenses for imports and multiple exchange rates were created to deal with the disequilibrium in the balance of payments generated by a fixed basic exchange rate.

In 1964 the exchange rate was unified. Until 1967 the exchange rate policy was characterized by infrequent and large devaluations, causing substantial real exchange rate variability. Although an inflation stabilization plan was intended to reduce substantially the inflation rate, its strategy was gradualist. Meanwhile the high level of Brazilian inflation, as compared to international standards, would lead to fast appreciation of the real exchange rate when the nominal rate was kept fixed. When the real exchange rate had appreciated to a certain extent, the government would make a large devaluation completing a cycle, which would last from eight to fourteen months. According to Simonsen (1995), the supply of foreign currency would also have a correspondent cycle: immediately after the large devaluation there was a boost in the supply of external credit, which would be reduced while the nominal rate was fixed until intense speculative movement would make inevitable a new devaluation.

The average level of the real exchange rate appreciated over the period. However, since real wages fell even more (see DIEESE), this would not imply loss of competitiveness of exports. In fact, there was substantial current account improvement, possibly due to the 1964-65 recession. During this period, the level of protectionism in the Brazilian economy was very high. In 1965, imports reached their lowest value in three decades. In 1967-68, a short lived import liberalization was essayed, to be reverted at the end of 1968. As a result only capital goods and basic inputs remained as beneficiaries of tariff reduction.

What were the beneficiaries of the exchange rate policy in the period 1964-67? Because of the high level of tariff protection, a small appreciation of the real exchange rate would not affect the demand for domestic tradable goods. But it would improve the profitability since imported inputs would become cheaper. If we take into account that labor was also becoming cheaper in real terms, the domestic industry was a beneficiary of the policy in this period. However, in order to fight inflation and to please the IMF, aggregate demand was controlled through traditional monetary and fiscal restrictions, in addition to the non-orthodox wage policy. The economy faced a recession in 1964-65, which would make the benefits of the policy unequal. Since restrictions to profit remittance imposed in 1962 were lifted, Brazilian subsidiaries from multinational firms were stimulated to look for capital from their foreign counterpart. The small national firms did not have the same alternative, being subject to the unfavorable credit conditions of the period. Thus, among the firms, because of the recession, only the survivors, and in special the multinational subsidiaries gained with the policy.

The exporters were not necessarily losers, because the fall in real wages, possibly more than compensated for the real appreciation of the exchange rate. However, coffee exports had a share of more than 50% of total exports in 1964, and the price that the government guaranteed to them was substantially deteriorated in this period, improving the fiscal account. So, if some exporters were winners, among those were not included coffee exporters.

Workers were the main losers of the period. The recession increased unemployment and even the ones who remained employed lost because of the reduction in their real wage. That reduction was the result of active policy of the government. In a repressive context where the main union leaders were banned, a national wage policy was instituted, where the wages would be adjusted by a formula which would imply in reductions in real wages whenever the government underestimated the inflation rate for the period, which happened systematically. On the other hand the workers did not benefit from the appreciation of the real exchange rate: the coefficient of imports reached the extreme low value of 4% of GDP in 1965, with the imports being concentrated in oil, intermediate, and capital goods.

II.2. Minidevaluations and the Brazilian Miracle: 1968-1973

The year of 1968 starts a long period of mini-devaluation of the nominal exchange rate in order to keep the real exchange rate stable. The economy experienced extremely high rates of growth until 1973. The

rate of growth of exports was even higher during those years: a result of a policy intended to stimulate the growth and diversification of exports. The almost monthly devaluations were an important part of this policy, which included also subsidized credit, and tax and tariff exemptions to the export activities. There happened an important shift in the composition of exports, favoring industrial goods in detriment of the traditional coffee exports. Imports increased at similar pace with the exports. There was an important tariff reduction in the beginning of 1967 but the effective protection continued to be high. Imports did not achieve the degree of diversification of exports: although some import substitution happened in the sectors of intermediate and capital goods, there was no substantial expansion in the oil domestic production. Imports continued to be concentrated on oil, and intermediate and capital goods. The trade balance was positive for most of the period, with deficits only in 1971 and 1972. The substantial increase in foreign debt was much more than enough to finance the current account deficit, leading to the accumulation of reserves. The real exchange rate stability seems to have contributed to turn foreign loans attractive.

From the macroeconomic side, the introduction of a system of minidevaluations represented an explicit acknowledgment that future inflation rates would be far superior to international rates. In fact, the new economic team led by Delfim Neto, which started as minister during President Costa e Silva term in 1967 but which would continue until 1974, had put a much higher emphasis in growth. According to them, inflation reduction should be achieved gradually without sacrificing the goal of high economic growth. They also had a different diagnosis of the causes of inflation, which they identified in the cost side.

Thus, one may conclude that the system of minidevaluations, which represented indexation of exchange rate to inflation, was designed to stimulate exports and foreign indebtedness, at the cost of increasing the inflationary inertia. This was in sharp contrast to the treatment given to wages, which had a system of adjustment designed to prevent past inflation from fueling future inflation¹. Despite the continued fall of the average minimum wage, the high rates of growth in this period led to increases in wages. However, the wage increases were far inferior to the productivity growth. Since the real exchange rate was constant, again the firms in the tradable sector should have benefited from additional reductions of the cost of labor in dollars. In particular the exporters were further stimulated with the other measures mentioned above, which included tariff exemptions.

Most of the people lost when inflation inertia was introduced. In fact, after falling gradually until 1972, inflation started to increase in 1973, despite the official numbers which showed an artificially low inflation in that year. However, the benefits of high growth are widespread, although unequal. Employment increased at a rate far superior to the population and real wages increased for almost all segments. Nonetheless, the increase in real wages was extremely unequal, with high wages increasing much more than low wages. And profits should have increased much more than wages, since real wages increased less than the productivity. Thus, those who were rich, or belonged to the upper middle class, benefited more from the miracle years than the poor. For all accounts there was an increase in income inequality, which was already worsened during the first military government.

II.3. The lack of reaction to the first oil shock: 1974-1979

Oil prices quadrupled at the end of 1973. Since oil was an important part of Brazilian imports, this had a severe impact on the trade balance, which changed from a modest surplus to a deficit of 4.7 billion dollars in 1974. Most oil importer countries reacted to the oil shock devaluating the exchange rate and controlling

¹ In fact, in 1968 the wage formula was changed to correct partially for the loss of real wage incurred because of underestimation of inflation by the government.

aggregate demand through monetary and fiscal restrictions. The aggregate demand control would lessen the inflationary impact of the oil shock, but would cause at least a temporary recession. The change in relative prices would stimulate the production of tradable goods and would reduce the spending of imported goods, particularly oil. The temporary recession would help the trade balance in the very short run, while the effect of the relative price change build up.

However, the Brazilian government chose a different strategy. The real exchange rate was kept constant and there was no severe aggregate demand control. Imports should be reduced through a menu of measures, which were aimed at restricting imports and at the same time stimulating the production of import substitutes. The measures designed to restrict imports included tariff increases, the interdiction imposed to Brazilian state enterprises to buy foreign goods for which there was a similar Brazilian product, and the compulsory deposit of 100% of the value of imports during six months without any interest paid. Oil imports were excluded from the restrictions, indicating that the government's objective could have been to minimize the effect of the oil price shock on inflation and growth. In order to stimulate import substitution of capital and intermediary goods, subsidized credit and tax exemptions were granted to the activity linked to the production of such goods. Also substantial public investments were devoted to this goal, among them the investment in oil prospection. (see Carneiro, 1990)

Thus, differently from the adjustment prevalent among most oil importer countries, the Brazilian strategy aimed at continuing the accelerated growth trajectory. The adjustment should be made through a later stage of the import substitution process, involving capital and intermediary goods. The import restriction had immediate effect: the coefficient of imports fell from 12% in 1974, an historical high, to 7.25% in 1978. The country grew at a rate of 6.7% while the imports remained constant in value. The performance of exports was disappointing, because of the world recession. Meanwhile, the country made use of the large liquidity of international capital markets to finance the current account deficit, which averaged US\$5.7 billions in the period. The foreign debt was increased by US\$20 billion in those years, with the amount of interest paid increasing from US\$500 millions to US\$2.7 billions in 1978. The industrial policy of stimulating exports and import substitution had a high cost in terms of fiscal performance, causing a substantial deterioration of the fiscal budget. The result of this policy was to leave the next government with an unpleasant heritage: high inflation rate, extremely heavy service of external debt and a deteriorated fiscal position. (see Carneiro, 1990)

Why did the government choose that unusual strategy? Was not a military government in a better position to impose macroeconomic adjustments than a democratic one? First we should observe that there was no unity in the armed forces. There were basically two groups: the moderate and more intellectual group associated to the President Castelo Branco and the hard liners. A hard liner, Emilio Garrastazu Médici, was the president during the miracle years. Brazil had the most authoritarian government in those thirty three years, which aided by favorable external conditions had also the most spectacular economic performance. President Geisel, who succeeded Médici, was a moderate. In order to maintain legitimacy among the militaries, the performance of his government, measured mainly by growth rates should not be disappointing. That is probably why, in face of unfavorable external conditions, he chose the strategy conceived by the Minister of Planning, Reis Veloso, despite the veiled opposition of the Minister of Finance, Mário Henrique Simonsen, who favored a more traditional macroeconomic adjustment. One should not neglect that the military government relied heavily on the support of the entrepreneurs for having some civil legitimacy, and that the government lost the parliamentary elections of 1974, despite the extraordinary economic performance in the preceding years. The entrepreneurs were enthusiastic with the high rates of growth and were unwilling to buy the macroeconomic adjustment of Simonsen, as history would reveal during the 1979 episode of Simonsen resignation. The Brazilian response to the first

oil shock shows, that contrary to widespread believe, a dictatorship may be less able to take necessary bitter measures than a democratic regime, exactly because of its fragile legitimacy.

II.4. Presetting exchange rate adjustment to influence inflationary expectations: 1979-1980

In March 1979, a new military president, João Figueiredo, succeeded President Geisel. The former Minister of Finance, Mário Henrique Simonsen, was nominated Minister of Planning, in a new institutional design where this Ministry would concentrate all the important economic decisions. He was determined in pursuing a more traditional macroeconomic policy of adjustment, which included control of aggregate demand through monetary and fiscal austerity. Controlling money and fiscal deficit in Brazil was not an easy task, due to an inadequate institutional framework. Banco do Brasil, which was a state commercial bank, was also part of the Monetary Authorities, and any eventual deficit in its accounts was automatically financed by the Central Bank. The Central Bank acted also as a developing bank, giving subsidized loans to priority sectors. On the other hand, the subsidies were not included in the Fiscal Budget. Simonsen wanted to reform those institutions in order to impose strict control to the fiscal and monetary accounts, in order to reduce growth, control inflation and improve external accounts. As the first moderate measures were not producing the desired results in the first semester, he was decided to take more drastic measures in the second semester. Political pressures led him to resign. His substitute, Delfim Neto, announced a heterodox stabilization approach, which would conciliate growth with inflation stabilization and current account deficit reduction.

What kind of pressures did lead to Simonsen resignation? The entrepreneurs in general were not satisfied with the perspective of an orthodox adjustment. According to a survey realized by the biweekly magazine Exame in July of 1979, only 19.29% of businessmen considered the prestige of the minister excellent or good. The exporters were dissatisfied with the withdrawal of fiscal incentives, and the lack of compensation through a faster devaluation of the exchange rate, which was kept constant in real terms. The farmers were not satisfied with Simonsen opposition to more subsidies to the agriculture, defended by Delfim Neto, the Minister of Agriculture and former Minister of Finance during the "miracle years". The farmers in Brazil always had strong political support in the congress, which contributed to reinforce the pressure over Simonsen. President Figueiredo was probably not very satisfied in having all the political cost of unpopular measures for himself, while his predecessors enjoyed the benefits of imprudent expansionary policies. Delfim promised a new miracle - external adjustment and inflation reduction with fast growth - and the political establishment was happy to give him an opportunity to do so.

Delfim followed at first a heterodox strategy, by basing his policies on price controls. At the end of 1979 the exchange rate was devaluated in 30%. Simultaneously exports of primary products were taxed in 30%, fiscal incentives to the manufacture exports were removed, and the requirement of depositing for 360 days the value of imports was lifted. Thus, the devaluation was complemented with measures with opposite effects on exports and imports in such a way that the main overall effect would be an increase in government revenues. For the year of 1980 the exchange rate devaluation was predetermined in 40%, a rate much lower than the inflation rate of 1979, which was 77%. The objective was to influence inflation expectations. It aimed also to make compatible the lower interest rates, necessary for the growth strategy, and the stimulus to foreign indebtedness, necessary to close the gap in the balance of payments due to the current account deficit.

This endeavor took one year, and failed completely. Inflation accelerated, real exchange rate was appreciated to a level slightly inferior to the prevalent one before the maxi-devaluation at the end of 1979, and the balance of payments continued to deteriorate leading to substantial loss of reserves. One important cause of the inflation acceleration was the new wage policy, implemented in October of 1979.

The most important short run inflationary factor was that the periodicity of wage adjustments was increased to twice a year. If inflation had remained constant this would amount to a substantial increase in real wages, in a context where the second oil shock and the balance of payment adjustment would require a fall in real wages. As mentioned by Simonsen (1996), inflation increased from 45% a year (between July of 1978 and July of 1979) to 45% a semester, or 110% a year (between December 1979 and December 1980). Moreover the policy was disastrous also in the middle run, since the wages between one and three minimum wages (a large proportion in Brazil) would be adjusted every semester by 1.10 times the inflation rate. As a consequence, the higher a stationary level of inflation, the higher should be the increase in real wage (see Simonsen 1996, for details).

The deterioration of the balance of payments had several causes. The second oil shock affected negatively the trade balance, which otherwise was also deteriorating due to speculative anticipation of imports and postponement of exports because of the lack of credibility of the exchange rate policy. The significant increase in international interest rates and the increase in the spread charged to Brazil, due to the worsening of the international credibility of Brazilian policy, contributed to further increase the current account deficit. The control of domestic interest rates, the increased uncertainty over the future exchange rate policy and the capacity of Brazil to honor the external debt in the future contributed to the retraction of the foreign loans, leading to the substantial loss of reserves. The heterodox policy was, therefore, abandoned, and the orthodox approach reestablished.

Why did the government choose the maxidevaluation of the currency instead of accelerating the minidevaluations? Suppose for a while that after the maxidevaluation the government keeps the real exchange rate constant, in such a way that at the end there is a real devaluation of the exchange rate. In what respect it will have different effects than a policy of accelerating the minidevaluations, as was promised before to the exporters? First, the price effect of the maxidevaluation is instantaneous, while the acceleration of the minidevaluations would change relative prices gradually, thus benefiting exporters instantaneously. In fact the government imposed offsetting policies on exports and imports, and there was no substantial instantaneous effect on the incentives to increase exports and to reduce imports.

Second, a maxidevaluation would impose an instantaneous loss to debt holders, but would not decrease the stimulus of new loans, while the acceleration of minidevaluations would make new foreign loans more expensive. Since the foreign loan debtors had access to "dollar" deposits on the Central Bank, which were remunerated with base on the devaluation of the exchange rate with respect to the US dollar, if they anticipate correctly the maxidevaluation and deposit their money, they would have no loss. The ones who did not deposit their money would have a tax credit equivalent to the loss, to be used along five years. In this way the government intended to absorb most of the loss of the maxidevaluation, and at the same time the new loans would not be burdened with a higher rate of devaluation. As a complement to the maxidevaluation, the government decided to forbid withdrawals of the "foreign currency" deposits already made in the Central Bank, in the hope of stimulating further foreign indebtedness. At the end, because rules were broken, the effect could be the opposite, since uncertainty about future policy increased.

The policy of Delfim during the first year of his term continued to prioritize to stimulate exports and import substitution. However, it did not represent an increase in the incentive to those sectors, since the maxidevaluation was immediately compensated by fiscal measures, and the devaluation of the real exchange rate was eroded during 1980 by the slower pace of the preset devaluation rate. In fact it may even had worsen the incentives to the production of tradable goods, since real wages were increased, at least in the short run, by the higher periodicity of wage adjustments. The mechanism of dollar deposits allowed the automatic transfer to the government of the loss to external debtors caused by the maxidevaluation.

We argue throughout this work that the main tension of the exchange rate policy is that a more appreciated exchange rate is good for inflation and bad for the balance of payments, while the opposite is true for depreciated exchange rate. Delfim tried to avoid this dilemma with his heterodox approach. The short run maxidevaluation should provide incentives to the balance of payments while the preset lower rate of devaluation should influence expectations and reduce inflation. However, the failure of his policy on the inflation front undermined the balance of payments incentives. As we will see, the same pattern for the real exchange rate path would be followed in most heterodox stabilization attempts, as democracy was reestablished.

II.5. External Adjustment as a Priority: 1981-1985

During the year of 1980 the government was gradually abandoning the heterodox policy in favor of the orthodox approach. The exchange rate policy was reverted to the old policy of minidevaluations with base on the differential of inflation, which maintained the real exchange rate stable. Among the restrictive measures on the monetary side were the suspension of the interest ceilings, and quantitative limits to credit expansion of financial institutions, which were imposed on March 1980 and renewed for 1981 and 1982 (see Bonomo, 1996). Several other measures were aimed at controlling the expenditures of the government and state enterprises. The result of the radical policy reversal was a reduction in GDP of 5%, and a brutal retraction of the industrial production, 10%, without substantial gains on the inflation side. However, partially as a consequence of the recession, the trade balance improved, going from a deficit of US\$2.8 billions to a surplus of US\$1.2 billions. The result was not spectacular because of the substantial deterioration of the terms of trade. However, the continued increase in the interest rates partially compensated the improvement in the trade balance, resulting in a modest reduction of the current account deficit from US\$12.8 billions to US\$11.7 billions. The policy reversal brought results both in the demand and supply side of foreign loans. On the demand side, the credit restrictions, the return to a sensible exchange rate policy, and the lifting of interest ceilings seemed to have induced the increase in foreign loans. In the supply side, the return to the orthodox approach improved the credibility of the government policy at the international level. As a result, the external debt increased in 14%. The inflow of resources in the capital account barely compensated for the current account deficit, leading to a very small increase in reserves, which were already at a level dangerously low.

In August 1982, the world recession and the Mexican moratorium aggravated the Brazilian situation. Since Brazilian exports decreased US\$3 billions, the payment of interests continued to increase, the supply of foreign loans practically disappeared, and the level of reserves were further decreasing, the government had no alternative than to look for an agreement with the IMF. This was announced only in November, after important elections for parliament seats and state governors. The elected parliament would choose four years later the first civil president since the military coup. The governor elections were direct for the first time since 1966.

In February 1983, the government devaluated the currency in 30%, by the second time in a little more than three years. However, this time the policy was not part of an intertemporal strategy of substituting lower future devaluations for the maxidevaluation. The policy of devaluating continuously the currency in order to maintain the real exchange rate constant would continue, assuring the endurance of a more devaluated currency in real terms. At the same time, the very strict fiscal and monetary policies negotiated with the IMF, and the reduction in wage indexation should at least counteract the inflationary impact. The result was another year of sharp recession and a substantial increase in the inflation rate, from 100% to 211%. Both the level of activity and the inflation rate had remained approximately constant during 1982. Now, the new wage policy should contribute to the reduction of real wage, which jointly with the restrictive monetary and fiscal policies would contribute to contract the aggregate demand. The increase

in inflation rate was ignited by the maxidevaluation of the exchange rate, and further fueled by the negative shock in the supply of aliments. (see Modiano and Carneiro, 1990). For the sustained increase of the inflation level contributed the high level of formal and informal indexation, and the insensitivity of the inflation rate to aggregate demand, which characterizes high inflation economies (see Bonomo, 1997).

The external sector had an extraordinary performance in 1983 as the trade surplus amounted to US\$6.5 billions. As in 1981, it was aided by a sizable recession. However, this time the recovery of the American economy helped the demand for exports, and there was only a slight deterioration of the terms of trade. The stimulus given by the depreciation of real exchange rate in more permanent terms could have been important to such an amazing performance of the tradable sector. And the decrease in real wages, influenced both by the recession and the new wage policy, further contributed to the profitability of the sector.

Why did the government opt for a maxidevaluation of the exchange rate? The low and decreasing level of reserves and the retraction of the international capital markets imposed an urgent adjustment of the current account deficit, which amounted to 5.89% of the GDP in 1982. The maxidevaluation, followed by a policy of maintaining the higher (more depreciated) level of the real exchange rate through the continuing policy of minidevaluations, should increase the price incentives to the production of the tradable sector. Thus, it complemented the stimulus given by the contraction of aggregate demand, and the fiscal incentives, and the favorable credit conditions granted to the production of exports and import substitutes.

When the maxidevaluation was chosen, the objective of improving the balance of payments was selected as priority in detriment of fighting inflation. The policy had clearly distributive effects. By decreasing real wages and increasing real exchange rate, income was redistributed from workers to entrepreneurs of the tradable sector.

In 1984 the vigorous growth of the American economy, 6.8%, and the substantial improvement of the terms of trade, 9.4%, helped the exports to achieve an exceptional performance: a level 23.3% larger than that of the preceding year. This performance was led by the manufacture exports, and induced the recovery of the Brazilian industry, which grew 7%. The trade balance reached the extraordinary number of US\$13.1 billions, which was sufficient to balance the current account and allowed an addition of US\$7 billions to the foreign reserves. The increase in production of import substitutes also contributed for this result, as well for the industry growth. The import ratio decreased from 9.2% of GDP in 1980 to 6.3% of GDP in 1984, as the participation of domestic oil production on consumption increased from 21% in 1981 to 42% in 1984. (see Carneiro and Modiano, 1990). The main macroeconomic problem was the continued high inflation rate, which remained practically at the same level as in 1983.

II.6. The New Republic and Inflation Fighting: 1985-1992

The return to democracy was accompanied by a long period of real exchange rate appreciation. During the first seven years of democratic governments the country suffered through five failed stabilization attempts. The trial periods typically entailed a real exchange rate appreciation as exchange rate was fixed, followed, in most episodes, by a partial recovery, as a preparation for the next plan. Nevertheless, there was a substantial real exchange rate appreciation over the whole period, indicating that the government prioritized price stabilization in detriment of the balance of payments. It is likely that the return to democracy changed the relative weights in the policy objectives with inflation stabilization becoming relatively more important than the balance of payments. Moreover, the comfortable situation of the

current account after the adjustment implemented at the beginning of the decade, allowed the government to prioritize inflation.

a. The failure of the gradualist trial and the formula for the minidevaluations: 1985

In March 1985, the first civil government is empowered. The opposition won the indirect election in an alliance with a group of former supporters of the military regime. However, the president elected, Tancredo Neves, who was for the whole military period a member of the opposition, died without governing. The vice-president elected, José Sarney, who was formerly the president of the party that supported the military government, became the first civil president in twenty-four years. The fact that he took power and not the elected president, who had widespread popular support, reduced the ability of his government to face political pressures. His search for legitimacy would influence his economic decisions towards the way of lower resistance.

The ministry inherited from Tancredo Neves had an orthodox, his nephew Francisco Dornelles, as Minister of Finance and a Keynesian, João Sayad, as Minister of Planning. Tancredo wanted Dornelles to be the strong man in the economy. However, his policy of severe government expenditure and monetary control could not achieve substantial short-term inflation reduction and was not politically very palatable. Sarney, as opposed to Tancredo, had not much political capital to spend with unpopular or politically costly measures without a clear and immediate reward. Thus, the failure in bringing inflation down in six months produced the substitution of Dornelles by Dilson Funaro. Funaro was more tuned to the Minister of Planning, and with the presidential aspiration of short run popularity.

During the first year, the inherited exchange rate policy of minidevaluations was kept. However, the basis for the exchange rate adjustment, as well as the basis for the monetary correction of contracts, was immediately changed by Dornelles. The formulas of adjustment for a month would be based on the geometric mean of the inflation during the last three months, when until then it was based on the inflation of the month. The minidevaluations continued to be done in a daily basis. Since the inflation of the month would only be known at the end of the month, there was substantial uncertainty over future nominal minidevaluations. As a result of the change, nominal minidevaluations for the month would be known in advance. As a counterpart, real exchange rate would become more sensitive to inflation movements, appreciating with inflation acceleration, and depreciating with inflation reduction. When Funaro took office, it was clear that the government was more worried about the effect of the exchange rate movements on inflation than about the effects of inflation on real exchange rates. From this point of view, which prioritized inflation reduction, the new rule appeared to have bad dynamic properties, since high past inflation would feed back on future inflation through the minidevaluations, increasing inflation inertia. Funaro decided to restore the old rule of basing devaluations of the exchange rate and monetary correction on the inflation of the month. By doing so after the inflation peak of 14% in August, he had an opportunistic gain of preventing this high rate from feeding back into future inflation through the future devaluation of the exchange rate. Opportunistic change of rules of this kind would occur very often during the Sarney government.

b. The Cruzado Plan: 1986

Inflation continued to accelerate during the second semester of 1985, reaching approximately 15% a month, partially as a result of a dry that hit the crop. Since the orthodox gradualist approach was rejected, and there would be governor and parliament elections in November 1986, the alternative of a heterodox stabilization plan became politically appealing. The Austral Plan of Argentina and the stabilization program of Israel were examples of heterodox stabilization plans where prices were frozen in order to coordinate the price setting to a new equilibrium with low or zero inflation. However, in both

plans the inflation fall was accompanied by a recession. So, in order to make the Brazilian plan palatable, ingredients were inserted to assure that growth would continue at high rates: very expansionist monetary and fiscal policies, and a rule of conversion of wage which would assure substantial immediate real gains. Furthermore, the gains in real wages would be protected against erosion by inflation through an escalator clause in the wage adjustment formula. The nominal exchange rate was fixed at the prevalent level the day before the plan. The Cruzado Plan was unexpectedly announced on February 28, with a discourse that appealed to the citizens, which would guard the Plan against illegal price rises. As the real interest rates became negative and real wages increased 12%, the result was an enormous excess of demand. Sales increased 22.8% in the first six months of 1986 with respect to the same months the year before, the consumption of durable goods increased 33.2% in one year, and the practice of charging a premium over the legal price was becoming widespread (see Modiano, 1990).

As a consequence of the inflation repression, the premium in the black market over the official exchange rate increased from 26% to 50%. The exchange rate was kept constant in order to help the stabilization. A fixed exchange rate should help fighting inflation by two mechanisms: by preventing an increase of the price of imports in domestic currency and by signaling commitment to low inflation rates.

The excess of demand did not cause much damage to the trade balance during the first six months, in part due to favorable external conditions, as the depreciation of the dollar with respect to the other strong currencies. From September on, exports started to fall and imports continued to rise, which caused substantial reduction on the trade balance. The reduction on the trade balance fed the speculation of a maxidevaluation, which itself fed back into the trade balance, through the postponement of exports and the anticipation of imports. As the premium on the black market increased to 90%, the government broke up with the rule of fixed exchange rate by devaluating it in 1.8% in October. It was also announced a return to the policy of minidevaluations, although without specifying the exact timing of devaluations (see Modiano, 1990). However, the exchange rate was still considered appreciated - between February and November the real exchange rate ($e \cdot WPI/CPI$) appreciated 12%. The break of rules, without a clear alternative, in a context where the exchange rate was considered overvalued, only contributed to increase the perceived likelihood of a maxidevaluation, with further negative impact on the trade balance.

The rigidity of the exchange rate contributed to the increase in real wages. Since the protection was high in the sector of tradable, producers could redirect production towards the domestic market, which was overheated. As they would certainly loose in price, particularly if the freezing of prices were respected, the increase in production could possibly compensate for that. The problem was that the situation was not sustainable in many aspects. The producers had stimulus to increase prices and increase profits, increasing inflation, and eroding real wage gains. The deterioration of the current account, which would be aggravated without the price controls, would make unsustainable to maintain the exchange rate fixed. However, there is evidence that the government was able to provide some credibility for the unsustainable regime, since it won the November elections by landslide (see Stein and Streb, 1997, for a theoretical framework that fit those facts). If the policy were believed sustainable, so would be the gains. The fact that there were no losers in the short run contributed for its electoral success.

One week after the elections a new bundle of measures was announced, aiming at correcting the disequilibria generated by the Cruzado Plan. The measures aimed at controlling aggregate demand through an increase in government revenues of 4% of GDP. The higher revenues should be obtained through the increase in some prices of goods produced by state enterprises and indirect taxes over some products. The repressed inflation was stimulated by the increase in important prices implicit on those measures.

At the same time the government would restart the daily devaluations of the exchange rate. The trade balance became negative starting in October. As reserves were being quickly eroded, decreasing from

US\$10.4 billions to US\$5 billions from June 1986 to February 1987, the government decided to stop paying interests on the part of the external debt owned by the private banks. This decision, which had in part the political intention of recovering some of the lost popularity by exploiting the nationalist feelings, failed completely. The popularity of the government was not recovered, and better conditions for the payment of the external debt were not obtained.

c. The Bresser Plan: 1987

In February 1987, price controls were lifted. When in April, inflation reached the level of 20% a month, Funaro left the Ministry of Finance, being substituted by Bresser Pereira. The new minister was more conservative: announced a deceleration of the production growth and that he would evaluate the convenience of negotiating with the IMF. He devaluated the currency in 7.5% on May 1st. On June 12 he introduced a Plan with both orthodox and heterodox features. The idea was to superimpose rigid monetary and fiscal control to heterodox rent control and deindexation measures in order to prevent the mistakes of the Cruzado Plan.

The exchange rate was devaluated in 9.5% on June 12, while the government continued to devalue the currency at daily basis. However, the rhythm of minidevaluations was reduced during the first months of the Plan. Since Bresser took office in April, the real exchange rate was devaluated in real terms by approximately 10.5% until July. From then on this movement was reverted, with the total appreciation amounting 6.4% until December. Thus the idea seemed to generate some real depreciation of the exchange rate before the Plan, and to use the slack generated to decelerate the devaluation during the implementation of the Plan. The lower rate of exchange rate devaluation should help to obtain inflation reduction. However, the stabilization attempt failed and inflation gradually increased to reach 14% in December, when Bresser Pereira resigned. On the whole, when his term was finished the real exchange rate was slightly depreciated than before.

d. Rice and Beans Policy, and the Summer Plan: 1988- February 1990

Minister Mailson da Nóbrega took office promising to attain to a simple policy of monetary and fiscal control, denominated "Rice and Beans Policy" as a reference to the workers' traditional dish. After the failures of the former stabilization trials, the main objective seemed to be to prevent hyperinflation. During the first semester inflation was kept below 20% a month during the first semester. At the same time, on the external front, the country normalized in January the payments of the external debt, paying part of the arrears produced by the 1987 moratorium. In June a preliminary agreement with respect the external debt was accorded.

During the second semester inflation started to accelerate very quickly, reaching 27.3% in October. As the "Rice and Beans Policy" was unable to prevent the inflation acceleration to levels considered dangerously high, a social pact between entrepreneurs, workers and government was negotiated. According to this pact, public and private price and wage adjustments should be gradually slowed, not surpassing 26.5% in November and 25% in December. Inflation rate in November was similar to October: 26.9%. However, in December it started to increase again, despite the pact, reaching 28.8%. As a consequence, in January 1989, the Minister gave up his initial pledge and formulated a new heterodox plan, called Summer Plan.

The Plan was similar in spirit to Bresser Plan, in the sense that heterodox deindexation and rent controls were associated with orthodox measures of monetary and fiscal control. However, it was more ambitious, in the sense that it did not propose softer forms of indexation to replace the old ones. The new indexation formulas should be negotiated after some initial period when inflation rate would reach a lower level. Also the price freeze did not have date to finish (for details see Modiano, 1990).

As part of the plan, the exchange rate was devaluated in 18%, to reach the parity of one new Cruzado for one dollar. Since the real exchange rate had depreciated 4.5% during the "Rice and Beans" period, when there was a surplus in the current account of 1.37% of GDP, this would bring the exchange rate to a comfortable level. This slack would be used to fix the exchange rate for an undetermined period. As in the Cruzado Plan, the rigidity of the nominal exchange rate would be used to affect future inflation. Differently from that, however, the exchange rate was devaluated beforehand to very comfortable level. Furthermore, the parity of one to one was chosen to influence psychologically expectations of further devaluations. First, since this was a focal level, it should remain there for some time. Second, it could give the impression that the domestic currency became "as strong as the dollar".

The plan failed due to the lack of credibility of heterodox plans caused by the defeat of its predecessors. Inflation was already up to 6.1% in March. The exchange rate was devalued in 3.2% on April 18, but it was not enough to prevent speculation of further devaluation. The premium over the dollar in the black market, which was stable in 70% during the first two months of the plan, reached 200% in May. Thus, on June 15, the government decided to devalue the currency in 4.5%, and to announce the return to the minidevaluations and the rule of adjustments. The total devaluation rate would be equal to the inflation rate of the month, being achieved through six minidevaluations during the month without established dates.

The general pattern of the real exchange rate path during the Summer Plan was similar to the Bresser Plan: a preparatory real devaluation followed by a real appreciation, which on this case amounted to 22% from January to June.

e. The Collor Plan

[To be written]

The period after the failure of Collor Plan II and before the successful Real Plan was marked by a slow real exchange rate appreciation, with low volatility.

II.7. The Real Plan: 1994-1997

a. Antecedents

After the failure of several Plans based on intervention of the government on individual economic decisions on either price setting or wealth allocation, a new stabilization plan, less interventionist, was implemented. The Minister of Finance was Fernando Henrique Cardoso. The nature of the democratic process placed inflation stabilization as a priority, as its level reached 40% a month and continued to increase. If a government were successful in this endeavor would enjoy years of popularity. Fernando Henrique Cardoso, who was part of a government which was supported by the majority of the congress, had great political ability, and chose his technical team among the best available economists in Brazil. He was himself candidate to succeed Itamar Franco in the presidential elections of October 1994. The candidate of the opposition, the leftist Luís Inácio da Silva, was leading the polls of beginning of 1994 by a comfortable difference.

The stabilization had a preparation phase that had two aspects. A fiscal adjustment, denominated Fundo Social de Emergência, which was negotiated in the Congress. By this measure part of the revenues of the government that were matched with specific expenditures by the Constitution of 1988, were freed. This would allow the government to reduce expenditures and improve the fiscal budget.

The second aspect was a hyperindexation phase, which would prepare the deindexation. On March 1994, the government created an alternative unit of account, URV, indexed by inflation. Since the degree of dollarization was low in the Brazilian economy, it was necessary to create a new unit of account with stable power of purchase, and stimulate its use. The use of this unit of account became widespread in a few months. Its value in domestic currency was initially fixed as the same amount as the value of one dollar. However, from then on it was the value of the dollar that will follow the value of the URV and not the contrary. The government would intervene in the dollar market whenever the value of the dollar would become greater than the value of the URV during this preparatory phase. As we will see, although the exchange rate policy was important to fight inflation, this was not an exchange rate based stabilization, since some flexibility in the exchange rate policy was preserved. The plan was to extinguish the old unit of account on July 1, and to transform the URV into the new currency. From then on the value of the dollar could departure from the value of the new currency (see Bonomo, 1997).

An interesting issue is why this kind of stabilization was chosen instead of an exchange rate based stabilization where the value of the currency would be pegged to the dollar. Stabilization with a system of free convertibility regime with fixed exchange rate, as in the Cavallo Plan, could buy credibility but would reduce the policy instruments in the future. Since Brazil is a big country with a relatively closed economy and low dollarization, this kind of stabilization in principle is not as appealing as in small open dollarized economies. Second, since a possible victory of the left would lead to a substantial capital outflow, it was not prudent to have a policy of free convertibility.

b. Floating exchange rate and real appreciation: July 1994-February 1995

As a result of the creation of the new currency, inflation fell abruptly from rates of more than 40% before July to rates around 3.5% during the third quarter of the year. As a result the Minister Fernando Henrique Cardoso was elected president in a landslide victory.

When the new currency, Real, was introduced, the initial parity was one to one. The government decided not to intervene, by letting the currency to appreciate up to R\$0.83 at the end of October as a result of capital inflows. For the next months the government would intervene to maintain the currency in an informal miniband with limits 0.83-0.86. This policy lasted until February 1995. At this point the real appreciation of the exchange rate during the Real Plan amounted 18%.

There was an important discussion about the exchange rate level in Brazil during this period. Entrepreneurs and exporters through the CNI (National Industry Confederation) and AEB (External Trade Association) complained about the exchange rate policy. It was affecting exporters and producers of goods who were suffering from external competition. On the other hand, the lower real exchange rate could benefit consumers through lower price of imports, and induced lower prices for tradable. This effect differs from what happened during an appreciation of the currency in the sixties, because now the level of protection was much lower. The society as a whole would benefit from some reduction on inflation rate caused by the lower exchange rate level. Elections and democracy allowed the dispersed interest of millions of persons to be prevalent over the organized and concentrated power of the tradable industry. In the medium run a more appreciated exchange rate would stimulate an increase in industry efficiency.

As a result of the real appreciation of the exchange rate and of the boom during the second semester of 1994, the trade balance started to deteriorated with monthly surplus of US\$1 billion turned into US\$700 millions deficit. The Mexican crisis at the end of December, brought uncertainties about the possibility of financing large future current account deficits. The exchange rate policy is changed in March 1995, with the formal creation of the regime of bands and the devaluation of the currency.

c. The return of the minidevaluations: 1995-1997

In March 1995 an exchange rate band regime was announced. The real was allowed to float in a band of roughly 5%. This band changed from time to time. Although there is still a nominal band of fluctuation, in practice exchange rates became very stable since the government established periodic spread exchange rate auctions in July 1995. As a result, the Central Bank signalizes a very small band, which has been effective. In practice the Central Bank has been able to fix the exchange, within very narrow limits, and the wider band, although still exists, lost its importance.

[To be continued]

Until 1989 the exchange rate was administered by the government: the Central Bank announced the exchange rate, and every legal transaction involving exchange Brazilian currency and foreign currency had to use that rate. The system had evolved, at first by liberalizing the exchange rate for some restricted types of financial transactions² in a separated market denominated floating (*flutuante*), while keeping the main transactions under the administered regime. On March 19, 1990, four days after the President Fernando Collor de Melo was empowered, the administered regime was finished. From then on, Brazil would have two official markets: one for all commercial transactions and most financial transactions, denominated commercial, and floating market, for the other financial transactions. Nevertheless, the Central Bank intervened frequently in the market in order to maintain the real exchange rate stable. It is important to notice that there was also an active black market for dollars.

III. Exchange rate levels as regimes: a quantitative assessment

Over the time period studied, exchange rate regime in Brazil has always been a crawling peg. There was no change in exchange rate regime in the conventional sense, i.e., alternation of fixed rates, flexible rates, exchange rate bands, or crawling pegs. Therefore, it is not possible to study exchange rate regime change in Brazil in the conventional sense. There were clear changes in the administration of the peg, however. The frequency and size of exchange rate adjustments have changed over time, resulting in the alternation of periods of appreciation and periods of depreciation of the real exchange rate. Actually, the choice of exchange rate adjustment procedure was intentional, aiming the desired path of the real exchange rate. Therefore, what we will define as exchange rate regime is the resulting real exchange rate path.

If there were no nominal rigidities in the economy, the government would not be able to influence the real exchange rate by manipulating the nominal exchange rate. We are, then, implicitly assuming that nominal rigidities allow nominal exchange rate changes to affect its real value. The effect, however, is a short run one, because in the long run all nominal variables adjust so as to maintain the real exchange rate at its equilibrium level. This long run equilibrium level is determined by economic variables: external constraints and structural economic variables. The short-run misalignment produced by the exchange rate policy is chosen so as to fulfill the government's political economy objectives.

The policymaker will choose the optimal exchange rate policy so as to maximize its objective function. The Brazilian economic history for the past 30 years has been portrayed by two main sources of

² Initially mainly related to international travels of Brazilian residents

instability: the external constraint and domestic inflation. The solution for the external constraint calls for a depreciated real exchange rate, whereas inflation is fought with an appreciation of the rate. The trade off between these two opposing policy objectives then characterizes the exchange rate regime choice.

The government's problem may be represented by the maximization of the function:

$$(1) \quad U = -\alpha_E [CA(rer) - CA^*]^2 - \alpha_I [\pi(rer)]^2,$$

where α_E and α_I are the weights attributed to external constraint accommodation and inflation fighting, respectively. $CA(rer)$ represents the current account as a positive function of the real exchange rate e . CA^* is the value of the current account consistent with the intertemporal external constraint, and, finally, $\pi(rer)$ is inflation rate as a positive function of the real exchange rate.

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. In Latin American countries, when the balance of payments is out of equilibrium the current account is lower than the value it should be. The country is running a current account deficit larger than the one consistent with the country's intertemporal budget constraint. It is also the case for Brazil, so that approaching current account target means increasing its value, which is achieved by a devaluation of the real exchange rate.

As for the effect on the inflation rate, in order to keep the real exchange rate devalued, it is necessary to maintain domestic prices lower relative to external prices measured in domestic currency. The nominal exchange rate has to be devalued, and this devaluation feeds back into domestic prices, characterizing an inflationary spiral. Hence, to improve the objective function, the inflation target calls for an appreciation of the real exchange rate.

The traditional textbook policymaker would choose the proper mix of inflation fighting and external constraint accommodation so as to maximize utility of a representative consumer. Economic agents in real world economies, however, are not equally affected by changes in economic variables. In this particular case, the depreciation of the real exchange rate produced to solve the external constraint clearly benefit exporters and import competing domestic producers, in detriment of all consumers who will face a lower purchasing power. On the other hand, the appreciation of the rate in inflation fighting has exactly the opposite effect on economic agents. The government will choose economic policy not only to optimize economic aggregates, but also considering the political economy implications of the choice.

The weights attributed to the two economic policy objectives are determined by two main groups of considerations. First, by the effect of the policy on economic aggregates, such as GDP growth, overall consumption level, unemployment rate, and other variable that determines welfare in aggregate level. Second, by the effect of the policy on different economic agents, that is, by political economy considerations. A policymaker that favors exporters and import competing producers would place more weight on current account adjustment, whereas a policymaker worried with public approval would place more weight on inflation control. The former policymaker would use a more devalued exchange rate, and the latter a more valued one.

In summary, the government chooses the optimal real exchange rate so as to maximize its welfare function, balancing the trade off between balance of payments equilibrium, 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.

Different policymakers and asymmetry of information

For a given level of parameters α_E and α_I , current account target, and current account and inflation functions of the real exchange rate, there will be an optimal real exchange rate, solution to the problem. Exogenous shocks to the current account and to inflation rate alter the trade off between the two policy objectives, and, consequently, the optimal exchange rate level. An exogenous increase in the inflation rate, for instance, would lower the value of the objective function for any real exchange rate value, resulting in a lower optimal exchange rate level.

Let us consider the situation where there are two different types of policymakers: one type places a higher weight on the welfare of exporters and import competing producers, which will be denoted *opportunistic*, and the other places equal weight on welfare of all members of society, denoted *altruistic*. Their difference in taste will be translated into their objective function in such a way that the opportunistic policymaker will place relatively more weight on external balance than the altruistic one. Consequently, the opportunistic policymaker will choose as optimal exchange rate policy a more devalued real exchange rate compared to the altruistic policymaker.

In terms of equation (1), for each level of the independent variable, the resulting optimal exchange rate policy for the opportunistic policymaker will be more devalued compared to the optimal policy for the altruistic one. The situation may then be represented as the existence of two exchange rate regimes: one governed by opportunistic tastes (more devalued exchange rates), and the other one by altruistic tastes (more valued exchange rates).

If the policymakers' preferences were known by the public, exporters and import competing producers would be the only members of society voting for the opportunistic policymaker, therefore only the altruist policy would be elected. An interesting, and realistic, situation arises when the public cannot observe the policymakers' preferences. In such a situation, it may be worth for the opportunistic policymaker in office to mimic the altruistic one so as to have some chance of being reelected.

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. The paper that more closely relates to the idea presented here is Stein and Streb (1997). 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 (1997), 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, exchange rate policy is used to deal with the external and internal imbalances, and different policymakers will have different trade-off 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 (1997), before elections policymakers, independent of their tastes, would behave as the altruistic one and pursue a more valued real exchange rate.

The empirical carried out in this work tests this implication of the model: whether in elections periods policymakers pursue a more appreciated real exchange rate regime.

The Empirical Approach

In order to implement an empirical investigation on the theoretical analysis above, we characterize the policymaker policy choice as two possible exchange rate regimes. Two alternative definitions of exchange rate regime are used, and they are described below.

Definition of exchange rate regime

The choice of a particular exchange rate path is based on the effect of this relative price on the allocation of the economy. Hence, changes in other real variables in the economy would affect the choice of real exchange rate path. It is then proper to say that the variable that the government is aiming is not the real exchange rate itself, but, rather, its misalignment with respect to the equilibrium real exchange rate.

Other variables being constant, it would suffice to look at the behavior of the observed real exchange rate. 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. One alternative is then to estimate the evolution of the real exchange rate over time, and then calculate the difference between the real exchange rate and its equilibrium level, that is, the degree of real exchange rate *misalignment*. An exchange rate regime is defined as an appreciation or depreciation of the real exchange rate with respect to its equilibrium level.

The alternative definition of exchange rate regime used is the variation of exchange rate over time. When pursuing a positive or negative misalignment, the real exchange rate has to be increased or decrease. Therefore exchange rate variation would capture the policymaker's behavioral change, without the need of calculating the equilibrium real exchange rate.

In summary, two alternative definitions of regime will be used. In the first one, regime is exchange rate misalignment, that is, whether the real exchange rate is more appreciated or depreciated than the equilibrium real exchange rate. In the other definition, regime is the exchange rate variation, that is, a regime is either an appreciating or depreciating real exchange rate. Empirical estimation are made using the two definitions in turn.

The situation is described as a Markov switching model with two regimes, where the transitional probabilities are functions of variables that affect the regime choice. Next section describes the empirical model used.

Markov switching model

In Markov switching model, there are two possible states (or regimes), and the time series behavior of the dependent variable is different in each state. State transitions are governed by a first order Markov

The other objective is to test whether elections 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 function of a dummy variable that takes value one for the period preceding elections, and zero otherwise. In this specification, equation (3) becomes:

$$(3.b) \quad p_t'' = \frac{\exp(\beta_t + \lambda_t D_t)}{1 + \exp(\beta_t + \lambda_t D_t)},$$

where D_t is a dummy variable that takes value one for all periods up to a year preceding elections, and zero otherwise.

The probability of being in a valued exchange rate regime should increase during elections periods, whereas the probability of being in a devalued regime should be higher when there are no election in the short run.

Two different sets of estimation are performed. The first set uses as dependent variable the degree of real exchange rate misalignment, and the second set uses the real exchange rate variation. Each one will be presented in turn. All estimations were also performed under two different hypotheses with respect to the variance. One assuming regime varying variance, that is, allowing the variance to change across regimes, as in equation (2), and the other assuming the same variance in all regimes, that is, supposing that the variance is not a function of the regime as is equation (2).

Results with misalignment as exchange rate regime

Misalignment is calculated as the difference between the logarithm of the real exchange rate and of its equilibrium value. The equilibrium real exchange rate used is the series estimated in Goldfajn and Valdés (1996).

An appreciated regime means that the real exchange rate is being kept below its equilibrium value (i.e., more appreciated). In terms of expression (1), inflation stabilization is being favored in detriment of balance of payments equilibrium. The opposite is true for the depreciated regime.

The first simulation estimates the Markov switching model with constant transition probabilities, that is, using equation (3a) to define the transition probabilities. Table I presents the results for the simulation with equal variance across regimes. The simulation allowing variance to change across regime did not yield significative results, indicating that variance does not change across regimes. The t-statistics (shown in parenthesis) show that all coefficients estimated are significative, indicating the existence of two misalignment regimes. The mean of the overvalued regime is -0.081 , that is, the real exchange rate is approximately 7.8% below its equilibrium value during the overvalued regime. The mean of the devalued regime is 0.094 , which means that in that regime the real exchange rate is in average 9.9% above its equilibrium value. The estimated probabilities say that when the regime is the overvalued one, the probability the economy will remain in that regime is 0.846%, whereas when the regime is the devalued one, the probability the economy will remain there is 0.964%.

process, in which the transition probabilities may be assumed constant, as Hamilton (1989), or time varying, as proposed in Diebold et al. (1993).

The empirical approach adopted in this paper will characterize the time series behavior of exchange rates in Brazil as following a regime switching path, with time varying transition probabilities. The transitional probabilities are functions of the variables that affect the government's exchange rate regime choice.

Let e be the either the degree of misalignment of the real exchange rate, or the logarithm of exchange rate change over time, depending on the exercise performed, and S is an unobservable variable that characterizes the regime. Then:

$$(2) \quad e_{t-1} - \mu(s_{t-1}) = \alpha(e_t - \mu(s_{t-1})) + \sigma(s_{t-1})\varepsilon_{t-1}.$$

where the mean ($\mu(s_{t-1})$) and the volatility ($\sigma(s_{t-1})$) are functions of the regime.

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

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

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

The probabilities of switching regimes are function of political economy variables. They will not be constant, as they will depend on the variables that affect the decision to alter the exchange rate regime. The specification of the effect of the explanatory variables on the probability transitions is:

$$(3) \quad p_t^{ii} = \frac{\exp(q_t^i)}{1 + \exp(q_t^i)}$$

$$q_t^i = \beta_i + \sum_{k=1}^K \lambda_i^k V^{*k} + \xi_t^i, \text{ for } i = 1, 2.$$

where V^{*k} is a explanatory variable of the transition probability.

Empirical implementation

The empirical investigation performed has two objectives. One is to identify whether the real exchange path may be characterized by this two-regime approach. Estimating the Markov switching model with constant probabilities does it. In this specification, the equation that specifies the transition probabilities, equation (3), becomes:

$$(3.a) \quad p_t^{ii} = \frac{\exp(\beta_i)}{1 + \exp(\beta_i)}.$$

Table I: constant probabilities

	Overvalued Regime	Devalued Regime
Mean - $\mu(S_t)$	-0.081 (-2.04)	0.094 (13.21)
Auto-regressive factor - α	0.964 (69.9)	0.964 (69.9)
Standard deviation - $\sigma(S_t)$	0.027 (23.99)	0.027 (23.99)
Constant part of probability - β_t	1.702 (3.84)	3.293 (9.62)
Constant probabilities - p''	0.846	0.964

The second simulation estimates the Markov switching model with time varying transition probabilities. with probabilities being defined as in equation (3.b). Figure I shows the evolution of misalignment and the value of the election dummies.

Figure I

Table II: Time varying Probabilities with elections dummy

	Overvalued Regime	Devalued Regime
Mean - $\mu(S_t)$	-0.083 (-2.17)	0.094 (12.77)
Auto-regressive factor - α	0.962 (68.63)	0.962 (68.63)
Standard deviation - $\sigma(S_t)$	0.027 (0.001)	0.027 (0.001)
Constant part of probability - β_t	1.272 (2.12)	3.902 (7.67)
Variable part of probability - λ_t	0.784 (0.89)	-1.692 (-2.40)

Table III: Time varying Probabilities with elections during democracy dummy

	Overvalued Regime	Devalued Regime
Mean - $\mu(S_t)$	-0.082 (-2.12)	0.093 (12.60)
Auto-regressive factor - α	0.963 (70.46)	0.963 (70.46)
Standard deviation - $\sigma(S_t)$	0.027 (0.00)	0.027 (0.00)
Constant part of probability - β_t	1.425 (2.54)	3.788 (8.45)
Variable part of probability - λ_t	0.431 (0.50)	-2.201 (-3.11)

Results with real exchange rate variation as exchange rate regime

Table I: constant probabilities

	Overvalued Regime	Devalued Regime
Mean - $\mu(S_t)$	-0.134 (-0.00)	0.182 (10.53)
Auto-regressive factor - α	0.255 (4.53)	0.255 (4.53)
Standard deviation - $\sigma(S_t)$	0.026 (24.75)	0.026 (24.75)
Constant part of probability - β_t	3.595 (9.30)	-0.989 (-1.52)
Constant probabilities - p''	0.973	0.271

Figure II

Table IV: Time varying Probabilities with elections dummy

	Overvalued Regime	Devalued Regime
Mean - $\mu(S_t)$	-0.015 (-2.29)	0.003 (1.50)
Auto-regressive factor - α	1.063 (2.10)	1.063 (2.10)
Standard deviation - $\sigma(S_t)$	0.034 (0.00)	0.034 (0.00)
Constant part of probability - β_t	-7.63 (-2.76)	15.00 (15.00)
Variable part of probability - λ_t	9.514 (2.23)	-35.00 (-0.00)

Table V: Time varying Probabilities with elections during democracy dummy

	Overvalued Regime	Devalued Regime
Mean - $\mu(S_t)$	-0.027 (-3.83)	0.003 (1.58)
Auto-regressive factor - α	1.020 (2.00)	1.020 (2.00)
Standard deviation - $\sigma(S_t)$	0.034 (0.00)	0.034 (0.00)
Constant part of probability - β_t	-8.050 (-5.50)	15.94 (4.35)
Variable part of probability - λ_t	9.139 (6.97)	-34.96 (-4.92)

IV. Conclusions

[To be written].

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Autor: Terra, Maria Cristina T.

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