MONETARY POLICY AND EXTERNAL VULNERABILITY IN BRAZIL

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Resumo

Este artigo analisa a política monetária no Brasil, investigando porque as taxas de juros foram tão elevadas e voláteis de 1995 a 1998. Identificamos na política monetária uma reação excessiva aos choques externos, onde mudanças exógenas na liquidez internacional provocavam movimentos bruscos nas taxas de juros domésticas. Também mostramos que a resposta da política monetária no Brasil a estes choques era muito mais intensa do que na Argentina e México. Argumentamos que o Brasil foi preso em armadilha de juros altos, que culminou na crise cambial de Janeiro de 1999.

Palavras-chave: política monetária, taxa de juros, fluxos de capital, vulnerabilidade externa.

Abstract

This paper analyses monetary policy in Brazil, investigating why interest rates were so high and volatile from 1995 to 1998. We identify in monetary policy an overreaction to external shocks, where exogenous changes in international liquidity triggered sharp movements on domestic interest rates. We also show that the Brazilian policy response to these shocks was far more intense than in Argentina and Mexico. We argue that Brazil was caught in a high interest rates trap, which culminated in a currency crisis in January 1999.

Key words: monetary policy, interest rates, capital flows, external vulnerability.

Monetary Policy and External Vulnerability in Brazil[1]

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"No trap is so deadly as the one you set for yourself"
(William Manchester)

1. Introduction

Monetary policy in Brazil after price stabilisation was characterised by an excessive tightness. For several years real deposit interest rates were often higher than 20% and, in the most critical moments, even reached figures above the 40% level. The financial and macroeconomic imbalances produced by those towering rates undermined Brazilian stability, leading to the currency crisis of January 1999.

This paper tries to explain why Brazil had such high and volatile interest rates up to its crisis. We identify in monetary policy an overreaction to external shocks, where exogenous changes in international liquidity triggered sharp movements in domestic interest rates. We also show that the Brazilian policy response to these shocks was far more intense than in Mexico and Argentina. We argue that Brazil was caught in a high interest rates trap, which culminated in the currency crisis.

The paper is organised as follows: the next section analyses the determinants of Brazilian interest rates, estimating policy rules for the soft peg and inflation target periods. We show that an overreaction to the country risk premium and the contagion from other crises explain the high and unstable deposit interest rates observed in the soft peg regime. We also analyse how the impact of a large currency risk premium towards the end of the regime made these interest rates even more volatile.

In the third section we estimate a VAR for the country risk and deposit interest rates of Brazil, Argentina and Mexico. We show that movements in the country risk premium of these three countries followed a common trend, which was driven by changes in the US Junk bonds markets. The impact of these external shocks on domestic interest rates, however, was much sharper in Brazil than in the other Latin American economies, revealing that the overreaction was a specific feature of the Brazilian soft peg regime. The fourth section concludes.

2. Policy Rules and Monetary Regimes after Price Stabilisation

In July 1994 the introduction of the Real Plan managed to interrupt a long period of price instability in Brazil. In order to bring inflation down quickly, a very tight monetary policy was adopted as a key component of the stabilization strategy. Towering interest rates not only constrained aggregate demand but also led to a sharp appreciation of the nominal exchange rate in the weeks following the monetary reform. The booming impact this appreciation (along with the reduction of tariffs) had on imports helped to accelerate the fall of inflation rates by putting pressure on domestic producers of tradable goods.

Very high interest rates had also the objective to discourage speculative movements, such as a run from domestic liquid assets to foreign currencies or the creation of a consumption boom and asset bubbles. Last but not least, there were strong political incentives for a fast disinflation, as presidential elections were due in October that year. All these aspects contributed to the decision to keep deposit interest rates over 50% for several months after the monetary reform.

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[1] This paper is part of my PhD dissertation, submitted to the University of Cambridge in December 2003. The paper was improved by the comments of my supervisor, Dr. Gabriel Palma, the examiners, Professors Ajit Singh and John Sender, and my colleagues Antonio David, Antonio David, Costis Repapis, José Antonio Pereira de Souza, Mutita Akusuwan and Rodrigo Caputo. The usual disclaimer applies.
[2] BNDES.

Despite the swiftness of price stabilisation, deposit interest rates remained very high up to 1999, as shown in Table 1. This long persistence of high real interest rates had harsh consequences on output growth rates, not to mention the severe imbalances it caused on public finance, leading to a sharp increase of the public debt.

Table 1: Interest Rate, Inflation, GDP Growth and Net Public Debt (%)

	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Deposit Interest Rate	53.1	27.4	24.8	28.8	25.6	17.4	17.3	19.2
CPI Inflation	22.4	9.6	5.2	1.7	8.9	6.0	7.7	12.5
GDP Growth	4.2	2.7	3.3	0.1	0.8	4.4	1.4	1.5
Net Public Debt/GDP	30.8	33.2	34.3	41.7	49.4	49.4	52.6	57.4

Brazil had two very distinct monetary policy regimes after price stabilisation: a soft peg from early 1995 to December 1998 and an inflation target from July 1999 onwards. There is a clear difference between the earlier period, characterised by stable real exchange rates and volatile interest rates, and a later period where interest rates were lower and more stable, at the expenses of greater exchange rate volatility. Furthermore, we can identify a close association between instability of these indicators and specific external shocks. In the soft peg regime, the contagion effects from Mexico, East Asia and Russia led to interest rate hikes, whilst in the inflation target regime the contagion effects from Argentina led to a sharp exchange rate depreciation.

In order to understand why interest rates were kept so high for so long after price stabilisation, we propose to estimate a monetary policy rule for the Brazilian Central Bank. We include in this estimation the following variables: deposit interest rate[3] **(i)**; expected CPI inflation[4] **($\mathbf{p^e}$)**; output gap[5] **(y)**; real exchange rate gap[6] **(j)**; the short-term US interest rates[7] **($\mathbf{i^{US}}$)**; and the Brazilian country risk premium[8] **(r)**. The sample period starts in January 1995 and ends in March 2003, comprising 99 monthly observations.

The next step is to determine the order of integration of these series, and the ADF tests establish that all variables are stationary[9]. Our estimation of a policy rule starts from the generic specification depicted in expression 1, which includes all the variables referred above. In order to use Least Squares methods for the estimation, we define all variables in the RHS of expression 1 such that they belong to the information set at period t-1[10], thus not correlated with the error term ξ_t.

$$\mathbf{i_t = \alpha_1 . i_{t-1} + (1-\alpha_1).(\alpha_0 + \alpha_2 . p^e_{t+3|t-1} + \alpha_3 . y_{t-1} + \alpha_4 . j_{t-1} + \beta_1 . i^{US}_{t-1} + \beta_2 . r_{t-1}) + \xi_t} \quad \mathbf{(1)}$$

Note that several monetary policy regimes are nested in the term within brackets in expression 1, which corresponds to the short-run equilibrium interest rate. If only domestic objectives are taken into account

3 The Brazilian Central Bank provides a series of the SELIC.

4 IPEA provides a series of the Prospective Trend of IPCA, which is a moving average of inflation forecasts up to 4 months ahead, calculated using a structural model of inflation. We use this publicly available information as a proxy for inflation expectations. The statistical model (and the estimation using Kalman Filter techniques) that produces this series is presented in Moreira e Migon (2001:22).

5 We use the seasonally adjusted index (calculated by IPEA), and define the output gap as the log deviations of this series from its trend (generated by the Hodrick-Prescott filter).

6 We use the CPI-deflated index (calculated by IPEA), and define the exchange rate gap as the log deviation of this series from its trend (generated by the Hodrick-Prescott filter).

7 The FED provides a series of interest rates on 1-year maturity Treasury Bills.

8 IPEA provides a series of spreads on the C-Bond.

9 The statistical results omitted in the text are presented in the Annex. Note that, as we are dealing with small sample sizes, we adopt throughout this paper a 10% confidence interval as the threshold for the statistic tests. All estimations and tests are performed using E-Views 4.

10 The inflation forecasts are based on the lagged variables up to t-1.

by the Central Bank (e.g. forward-looking Taylor rules), only the α coefficients should be significant[11]. Conversely, in a fixed exchange rate regime with full capital mobility monetary policy becomes passive, which implies that only the β coefficients are expected to be significant. Obviously, expression 1 also allows for a whole range of intermediary cases, such as policy rules including both domestic and foreign variables.

Following the general-to-specific methodology[12], our preferred policy rule will be determined by eliminating the variables that are not significant at each step of the estimation, and repeatedly testing the residuals to detect any evidence of misspecification, such as serial correlation, heteroscedasticity, non-normality or structural breaks.

We initially estimate the policy rule for the full sample, in order to verify if a single monetary policy rule can explain the determination of interest rates before and after the currency crisis. A plot of the residuals reveals two very large peaks, in April 1995 and November 1997. In fact, in those two occasions the BCB increased the Selic interest rate by more than 25 percentage points at once, responding to the contagion from the Mexican and Asian crises, respectively[13]. Each one of these peaks has the statistical effect of outliers[14], distorting the estimated coefficients and the tests for misspecification[15]. We create an intercept dummy variable $(\mathbf{d^i})$ to overcome this problem, which takes the value 1 for April 1995 and November 1997 and 0 otherwise.

We estimate again the policy reaction function, now including the dummy variable, and proceed to eliminate the non-significant variables. We first eliminate the output gap and, after another estimation, we eliminate the real exchange rate gap. All other domestic and foreign variables are significant. In order to investigate for misspecification, we test the residuals for the null hypotheses of no serial correlation (Breusch-Godfrey LM test), homoscedasticity (White Test) and normality (Jarque-Bera). Only the null hypothesis of no serial correlation is not rejected, thus revealing that the estimated residuals are both heteroscedastic and not normally distributed.

As the estimated model failed the in misspecification tests, we investigate if this failure can be explained by the presence of structural breaks. In fact, a CUSUM of Squares test rejects the null hypothesis of no structural break within the sample period. This statistical evidence corroborates that monetary policy in Brazil changed considerably in 1999, and we can treat the period before the currency crisis (up to December 1998) and the period after the implementation of the inflation target (from July 1999 onwards) as two distinct monetary regimes. Consequently, it is more appropriate to estimate a policy rule for each one of these periods, and we now proceed on these lines.

2.1. Policy Rule in the Inflation Target Regime

In order to estimate a policy rule for the inflation target regime, we start one more time with the general specification of expression 1, and proceed by eliminating non-significant variables and testing residuals

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11 Forward-looking Taylor rules are analysed in Clarida, Gali and Gertler (1998). See Ball (2000) for specifications including the real exchange rate gap.

12 For a discussion of this methodology, associated with the work of David Hendry, see Cuthbertson, Hall and Taylor (1992: chapter 4) and Favero (2001: chapter 5).

13 The subsequent interest rate hikes in 1998 and 1999 were preceded by sharp increases in the country risk premium, and thus were captured by the coefficient β_2.

14 Note, however, that unlike the usual connotation of outliers (e.g. errors of measurement), these two interest rate peaks were policy decisions that require an economic interpretation. We use the dummy instrument for statistical purposes, isolating these two extreme occasions from the ordinary monetary policy response to domestic and foreign variables. Nevertheless, in the policy discussion we will see that these two interest rate hikes can be understood in the context of an overreaction of monetary policy to external shocks.

15 Cuthbertson, Hall and Taylor (1992: 118) argue that normality tests (such as the Jarque-Bera) are very sensitive to the presence of outliers, and suggest the use of dummy variables in these situations.

until we find a well-specified policy rule. We restrict our sample to the period starting in July 1999 and ending in March 2003, comprising of 45 observations. At each step of estimation we eliminate the output gap, the US interest rate, the country risk premium and the real exchange rate gap. We also included a second lag for the interest rate in order to eliminate serial correlation in the residuals. The estimated coefficients of expression 2 are shown in Table 2.

$$\mathbf{i_t = \alpha_{11}.i_{t-1} + \alpha_{12}.i_{t-2} + (1 - \alpha_1 - \alpha_{12}).(\alpha_0 + \alpha_2.\, p^e_{t+3|t-1}) + \xi_t} \qquad \mathbf{(2)}$$

Table 2 – Coefficients for Policy Rule (1999-2003)

	Coefficient	Std. Error	t Stat.	Prob.
α_0	11.02	0.99	11.16	0.000
α_{11}	0.97	0.10	9.71	0.000
α_{12}	-0.18	0.07	-2.60	0.013
α_2	0.95	0.12	7.94	0.000

The regression has a very good fit, with the R^2 and the Adjusted R^2 above 95%. The diagnosis statistics reveal that residuals are normal, homoscedastic and serially not correlated. Moreover, the CUSUM of Squares Test shows no evidence of structural breaks. We can be confident that the estimated coefficients in Table 2 provide a good representation of the monetary policy in the inflation target period.

The policy rule reveals a considerable degree of interest rate smoothing, as $\alpha_{11} + \alpha_{12} = \mathbf{0.79}$. This indicates that, in the inflation target regime, the Central Bank is concerned in reducing interest rate volatility. The most important variable affecting monetary policy is expected inflation, and domestic interest rates react to it with a coefficient not significantly different from 1[16]. This indicates that the BCB is not strongly reacting to inflation; it suggests that its role was to prevent that an increase (decrease) in expected inflation reduces (augments) real interest rates[17].

If we assume (akin to Clarida, Gali and Gertler, 1998) a theoretical policy rule $\mathbf{i_t = i^* + \alpha_2.(p^e - p^*)}$, the constant term in expression 2 can be expressed as $\mathbf{\alpha_0 = i^* - \alpha_2.p^*}$, a linear combination of the equilibrium nominal interest rate **(i^*)** and the inflation target **(p^*)**. As the estimated coefficient for inflation is not significantly different from 1, it follows that the constant term $\mathbf{\alpha_0 = 11}$ corresponds to the implicit equilibrium real interest rate.

Summing up, the estimated policy rule reveals that inflation is the main determinant of movements in the nominal interest rate, as neither other domestic objectives nor foreign variables are taken into account by the BCB. Furthermore, the large smoothing component reduces interest rate volatility, which indeed remained roughly stable after 1999. Although the implied real interest rate in this policy rule is high for international standards, it is certainly much lower than the levels observed before the implementation of the inflation target regime.

We use the policy rule in expression 2 as a benchmark to assess what would be the benefits of an earlier exit from the exchange rate peg. In order to do so, we simulate an interest rate series $\mathbf{i^{IT}}$ from January 1995 to December 1998 using the prospective series of inflation for this period and the estimated coefficients in Table 2. This simulation corresponds to a counterfactual trajectory of interest rates, had the Central Bank adopted the inflation target policy rule as early as in January 1995.

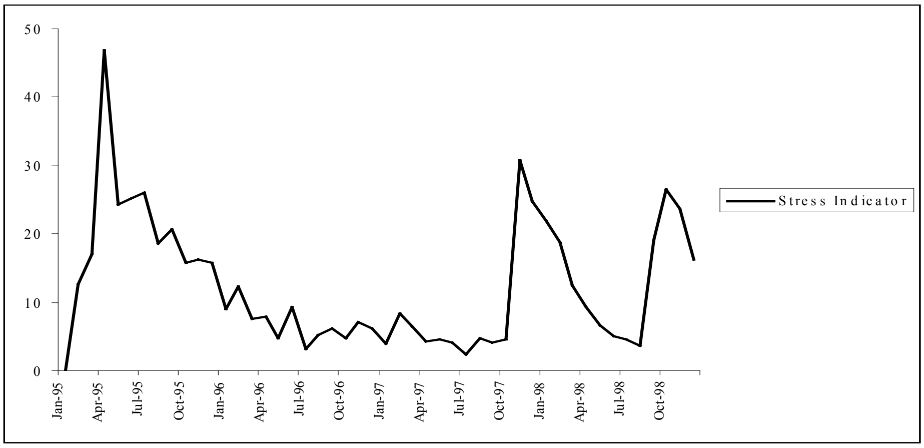
[16] A Wald test cannot reject the null hypothesis that $\alpha_2 = 1$.

[17] Other studies on the Brazilian inflation target regime report different estimates for the coefficient on expected inflation. Fraga, Goldfajn and Minella (2003) and Favero and Giavazzi (2002) find that the BCB responds strongly to inflation, whilst Silva and Portugal (2002) reports the opposite conclusion. These results are not directly comparable, however, as each study adopts a different indicator for expected inflation.

Following the suggestion in Clarida, Gali and Gertler (1998), a stress indicator is defined as the difference between the actual and simulated interest rate series ($\mathbf{s_t = i_t - i^{IT}_t}$). The stress indicator reveals the additional burden imposed on domestic interest rates by the pegged regime. As in any counterfactual exercise, it has evident limitations, as it ignores institutional context underlying the Central Bank decisions. Nevertheless, we follow Clarida (2001:20) in his assessment that the "stress indicator is a simple to compute - and easy to understand - way to gauge how much different interest rates might have been but for a binding commitment to an exchange rate arrangement, monetary union, or currency board".

We plot in Figure 1 the stress indicator from January 1995 to December 1998, which shows that actual interest rates were far above those that would be implied by an inflation target policy rule. For the whole period the average value of the stress indicator is 12.3 percentage points, confirming that monetary policy adopted in Brazil during the soft peg regime put domestic interest rates under severe stress. It also suggests that an earlier move to more exchange rate flexibility would have reduced not only interest rate volatility but also, in a considerable extent, its average levels.

Figure 1- Stress Indicator



2.2. Policy Rule in the Soft Peg Regime

We now proceed to analyse monetary policy in the earlier period, investigating why it produced such high and volatile interest rates. We are particularly interested in the period between January 1995 and December 1998 (48 observations), comprising the soft peg regime that existed up to the Brazilian currency crisis. Once more, we start with the general specification of expression 1, added by the intercept dummy ($\mathbf{d^i}$), and test it by eliminating the non-significant variables. We sequentially drop the output gap, the real exchange rate gap and the US interest rate, determining the preferred policy rule in expression 3. In order to overcome the heteroscedasticity problem revealed in the diagnosis statistics, the standard errors reported in Table 3 are already adjusted using White heteroscedasticity-consistent coefficients covariance.

$$\mathbf{i_t = \alpha_1 . i_{t-1} + (1-\alpha_1).(\alpha_0 + \alpha_2 . p^e_{t+3|t-1} + \beta_2 . r_{t-1}) + \gamma . d^i + \xi_t} \tag{3}$$

Table 3 – Coefficients for Policy Rule (1995-1998)

	Coefficient	Std. Error	t Stat.	Prob.
α_0	4.43	2.78	1.59	0.119
α_1	0.45	0.13	3.54	0.001
α_2	1.03	0.32	3.22	0.003
β_2	2.43	0.67	3.64	0.001
γ	26.53	0.95	27.80	0.000

The regression has a very good fit, with the R^2 and the Adjusted R^2 above 90%, and the null hypotheses of lack of serial correlation and normality of residuals cannot be rejected. There is evidence of heteroscedasticity, which in OLS regressions imply that although the coefficients are still unbiased and consistent, the standard errors are biased. Nevertheless, the aforementioned adjustment in the standard errors corrects this problem[18]. The stability test of the CUSUM Squares is inconclusive, as the statistic moves towards the confidence level boundary. We will analyse the possibility of structural breaks within this period later on in this paper.

In order to check for the robustness of the estimated coefficients, we proceed with two alternative estimations. First, we exclude the intercept dummy $\mathbf{d^i}$ in order to verify how it changes our results. This exercise confirms that introducing the intercept dummy considerably improves the statistical properties of the residuals without affecting either the signal or the order of magnitude of the estimated coefficients in the policy rule of expression 3. The Jarque-Bera on this specification without the dummy, however, rejects a normal distribution for the residuals even at the 1% level of confidence.

As a second exercise, we extend the sample up to the month before the implementation of the inflation target regime (June 1999). We repeat the same steps of estimation for the extended sample (54 observations), arriving to the same specification as in expression 3. The estimated coefficients were also very similar to those shown in Table 3, revealing that there is no substantial change in monetary policy in the immediate aftermath of the currency crisis. The gains in having a larger sample, however, are outweighed by a poorer specification, with the residuals revealing additional problems such as serial correlation. We proceed with our analysis focusing on the estimated policy rule for the soft peg regime.

Expression 3 reveals an unconventional policy rule, combining elements of Taylor rules (the α coefficients) and fixed exchange rate regimes (the β coefficient)[19]. Finding significant coefficients for both domestic and foreign variables in a monetary policy rule has been referred in the literature as an indication of imperfect capital mobility[20], and in fact Brazil imposed taxes on capital flows. In this context, the Brazilian soft peg regime looked for a compromise between adopting the exchange rate as a nominal anchor and keeping some degree of autonomy for monetary policy[21].

The coefficient for expected inflation is not significantly different from one, as confirmed by a Wald test for $\boldsymbol{\alpha_2 = 1}$, revealing a similar response to inflation in both monetary regimes. The policy rule for the soft peg regime also indicates a component of interest rate smoothing, but in a lesser degree than in the inflation target period.

Unlike the inflation target regime, however, there were two components in the policy rule for the soft peg regime that increased the volatility of real interest rates. Firstly, the contagion from the crises in Mexico and East Asia led to the two interest rate hikes captured by the dummy. Note that it took months for the impact of those hikes to die out, as interest rates were raised at once but reduced gradually[22]. Secondly, interest rates also responded to movements in the country risk premium. The fact that the β_2 coefficient is

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[18] Cuthbertson, Hall and Taylor (1992: 31).

[19] We are not aware of any other comparable exercise for the Brazilian monetary policy in this period. Other econometric evaluations either takes by assumption a passive monetary policy (e.g. Garcia and Didier, 2001) or a Taylor rule including only domestic objectives (e.g. Silva and Portugal, 2002).

[20] Edwards and Khan (1985) argue that, in an imperfect capital mobility framework, both domestic objectives and the foreign interest rate are relevant to the determination of domestic interest rates.

[21] Franco (2000) reveals that a currency board was one of the possible arrangements proposed in the preparations for the monetary reform, and that it was discarded because there was no political willingness to completely abdicate from monetary autonomy.

[22] Adopting the estimated smoothing coefficient α_1 as the factor by which these interest rate peaks γ were transmitted to the future, it would take 5 months for its impact to fall below one percentage point.

significantly greater than one, as confirmed by a Wald test, denotes an overreaction of domestic interest rates to the country risk premium.

The relative autonomy of monetary policy did not imply that the BCB was able to mitigate the impact of external shocks. On the contrary, these shocks were amplified domestically through interest rates, resulting in the severe stress observed in Figure 1. Although imperfect, capital mobility was high enough to render domestic interest rates captive to foreign variables, revealing that the aforementioned rigidities in the capital account were not effective in insulating monetary policy from external pressures[23].

2.3. Explaining the Overreaction to External Shocks

In this section we propose an explanation for the acute external vulnerability that characterised the Brazilian soft peg regime. Its origin lies in the profound changes occurring in the Balance of Payments throughout the 1990s, as revealed in Table 4, which depicts accumulated balances for the pre-stabilisation (1991-1994), soft peg (1995-1998) and the post-currency crisis (1999-2002) periods.

Table 4 - Balance of Payments (US$ Billions, Accumulated)

	1991-1994	1995-1998	1999-2002
Current Account	2.2	-105.8	-80.5
Foreign Direct Investment	4.3	58.4	96.2
Official Loans (e.g. IMF)	-1.6	9.2	10.9
Portfolio, Debt and Other Flows	25.4	43.8	-33.0
Accumulation of Foreign Reserves	30.2	5.7	-6.5

The most striking change in the Balance of Payments after price stabilisation was the sharp deterioration of the current account, which moved from a small surplus in 1991-1994 to massive deficits from 1995 onwards. In the soft peg regime, the gap between the current account deficits and foreign direct investment had to be filled by other sort of capital inflows, which required domestic interest rates to remain attractive to foreign investors. In the inflation target regime, on the other hand, it was up to the exchange rate to respond to external shocks. As a consequence, movements in the capital account were offset by an endogenous adjustment in the current account deficit.

The main difference in the monetary regimes before and after the currency crisis was on which variable (interest or exchange rate) laid the burden to keep the external equilibrium of the Brazilian economy. In either case, the movements of the adjustment variable had to be very sharp in moments of distress of international financial markets.

The two interest rate hikes after the contagion from Mexico and East Asia are impressive not only by their sheer size but also because they were unrelated with tangible variables (e.g. country risk premium), such that we can only capture this movement with an intercept dummy. A possible explanation was an intention to send a signal to international markets that Brazil was willing to pay any price to sustain its soft peg regime[24]. Nevertheless, it is still remarkable that the BCB had to increase the deposit interest rates by more than 25 percentage points to gain credibility.

[23] Empirical studies report that taxes on capital flows were not effective in reducing volatility in Brazil (Cardoso and Goldfajn, 1998; Garcia and Valpassos, 2000). Note, however, that Brazil has no systematic mechanisms of capital controls, such as in Chile or Colombia. There is a stronger argument for the effectiveness of the latter (e.g. Palma 2003).

[24] Franco (2000) reveals that showing commitment was a key concern for the BCB at that time, arguing that this was very important to prevent speculative attacks: "when governments hesitate, they are weighting the relative costs of defending the currency and of agreeing to a divorce. This is the time for markets to increase the stakes" (*ibid.*: 42).

We suggest that this extreme reaction of interest rates[25] was an unintended consequence of launching the Real Plan with such high deposit interest rates, which set a reference for their "normal" levels over and above 50%. In this context, in the wake of the Mexican crisis the BCB might have considered that a credible signal required a sharp departure from those already very high interest rates. Similarly, when another major crisis unfolded in East Asia the BCB decided to display the same level of toughness as it had shown after the Mexican crisis, and thus interest rates were pushed up again to towering levels.

We also argue that credibility issues were also behind the overreaction to the country risk premium. The latter represents foreign investors' perceptions on the possibility of a sovereign default, but it does not take into account the risks associated with exchange rate depreciation. The additional rate of return required by foreign investors to offset this risk is called the currency risk premium. This is so because when foreign investors acquire bonds denominated in R$, an exchange rate depreciation reduces the value in US$ of these bonds. A possible explanation for β_2**>1** is that this coefficient is capturing both country and currency risk premiums[26].

In fact, both risk premiums were likely to be contemporaneously correlated during the soft peg regime in Brazil. As foreign credit was necessary to finance the Brazilian current account deficits, an eventual debt default would inevitably led to a cut-off from foreign lenders and, as a consequence, force the BCB to float the exchange rate[27]. This being the case, an increase in the country risk premium (higher probability of a debt default) would correspond to an increase in the currency risk premium (higher probability of an exchange rate devaluation)[28].

Nevertheless, one should not expect this relation between country and currency risk to be constant throughout the whole period of the soft peg regime, but to become more acute towards its end. The East Asian crisis is a suitable breakpoint for this relation, as it triggered a widespread reduction of credit towards emerging economies. In order to evaluate this possibility, we create a multiplicative dummy variable **(d^m)** that takes the value 1 for the period from December 1997 to December 1998 and 0 otherwise[29]. We include the multiple of this dummy with the country risk premium as a new variable for the estimation, as shown in expression 4. The estimated coefficients are revealed in Table 5.

$$\mathbf{i_t = \alpha_1.i_{t-1} + (1 - \alpha_1).(\alpha_0 + \alpha_2.p^e_{t+3|t-1} + \beta_2.r_{t-1} + \beta_3.d^m.r_{t-1}) + \gamma.d^i + \xi_t} \qquad \textbf{(4)}$$

Table 5 – Coefficients for Policy Rule with Break (1995-1998)

	Coefficient	Std. Error	t Stat.	Prob.
α_0	5.70	2.44	2.34	0.024
α_1	0.39	0.11	3.56	0.001
α_2	1.68	0.25	6.62	0.000
β_2	1.21	0.59	2.05	0.047
β_3	1.11	0.36	3.05	0.004
γ	27.31	0.97	28.28	0.000

The regression still has a very good fit, and the diagnosis statistics show that the residuals are serially not correlated and normally distributed. Again, there is evidence of heteroscedasticity, which is corrected in

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25 Or "macho monetarism", as it was dubbed by Palma (2002).

26 Unlike the country risk premium, which can be directly measured by the spreads on Brazilian foreign debt, the currency risk premium depends on an unobservable variable (the expected exchange rate depreciation). Therefore, it is not explicitly introduced in the regression for the policy rule.

27 The reverse is not necessarily true. Brazil did abandon the soft peg regime in January 1999 without triggering a debt default.

28 In a different context, Garcia and Didier (2001) also argue that the country and currency risk premium were highly correlated during the Brazilian soft peg regime.

29 This period comprises the interval between the BCB initial response to the East Asian crisis (the interest rate hike in November 1997) and the Brazilian currency crisis.

the reported standard errors using the White procedure. Moreover, the CUSUM of Squares test does not show evidence of a structural break.

The analysis of the coefficients for the country risk premium reveals that its impact on domestic interest rates doubled after the East Asian crisis, with **$\beta_2+\beta_3=2.32$.** This is consistent with our hypothesis that the excessive sensitivity to the country risk premium was, in fact, revealing the presence of a currency risk premium towards the end of the soft peg regime.

Finally, we must address why there were such speculations on the sustainability of the soft peg regime. These were associated with the cumulative deterioration of macroeconomic indicators throughout this period. By the end of 1998 current account deficits reached 4.2% of GDP and fiscal deficits reached 7.4% of GDP, from a balanced position just four years earlier. Ironically, it was the costs associated with the long endurance of high interest rates (through public debt service) and an appreciated exchange rate (through trade deficit) that drove these deficits up so fast.

Palma (2003) has already noticed that emerging economies seem only to get rid of one sort of instability by creating another, and we could say that Brazil replaced price instability by external vulnerability in the 1990s, as the same policies that successfully curbed inflation - high interest rates and an appreciated exchange rate peg - undermined public finance and the Balance of Payments position. We can identify a vicious circle where originally high interest rates created macroeconomic imbalances that, by undermining the soft peg regime sustainability, prevented the Central Bank from reducing interest rates. As the BCB could not find a way out of this high interest rate trap, the soft peg regime eventually collapsed.

3. Country Risk, Interest Rates and External Shocks

In the preceding section we have shown how movements in the country risk premium fed into Brazilian interest rates. In this section we analyse the determinants of these movements, comparing the evolution of Brazilian country risk spreads with other Latin American economies. Furthermore, we investigate whether the excessive sensitivity to the country risk was a common feature of these economies or, alternatively, if it was specific to Brazilian monetary policy.

In Figure 2 we plot the country risk spreads of Brazil, Argentina and Mexico, the three largest Latin American economies, from January 1995 to June 1999[30]. These three countries were considered by credit rating agencies as having a similar risk profile[31] during this period, and accordingly, their country risk premium moved closely together.

This convergence of country risk spreads occurred despite the divergent paths on the solvency prospects of these countries' foreign debt. Table 6 depicts some indicators for Brazil, Argentina and Mexico in 1994 and in 1998. The ratio Foreign Debt/GNP shows the magnitude of each country's indebtedness, whilst the Debt Service/Exports ratio reveals the ability to cope with international obligations. Finally, the ratio Short-term Debt/Reserves indicates each country's exposure to a liquidity crunch.

[30] The Brazilian country risk premium is represented by the C-Bond spreads. The Argentinean and Mexican country risk premium are represented by their respective EMBI spreads. The Source is JP Morgan.
[31] In the Standard & Poors rating, for example, they were classified as BB for most of this period.

Figure 2 - Country Risk Premium (%)

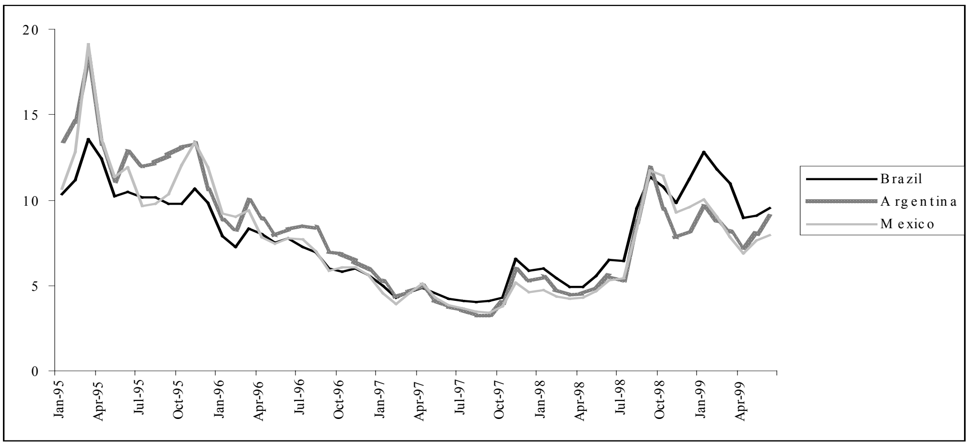

Table 6 - Foreign Debt Indicators[32] (%)

	Foreign Debt/GDP		Debt Service/Exports		Short-Term Debt/Reserves	
	1994	1998	1994	1998	1994	1998
Brazil	28.1	32.4	30.6	70.2	81.6	68.7
Argentina	29.6	48.6	25.1	57.5	44.6	124.4
Mexico	34.4	39.7	28.1	20.0	610.9	82.9

Table 6 reveals that, when Mexico suffered its crisis (late 1994), it had worse indicators than Brazil and Argentina, with a huge imbalance between the Short-term Foreign Debt and Foreign Reserves. Nevertheless, by the end of 1998 Mexico had managed to considerably reduce its foreign debt exposure[33]. Argentina, on the other hand, observed an overall deterioration in all foreign debt indicators, more notably a sharp increase in the Short-term Debt/Reserves ratio. In the case of Brazil, there is no substantial increase of foreign debt as a share of output, but the sluggish performance of exports determined that, by the end of the period analysed here, more than two thirds of export revenues were required to cope with the foreign debt service.

From 1994 to 1998 Mexico improved its foreign debt exposure while Brazil and Argentina went on the opposite direction. Nevertheless, comparing the information in Table 6 and Figure 2, it is evident that in the period analysed here international capital markets evaluated these three countries as if they were one and the same, despite their considerable differences in terms of the solvency prospects of foreign debt[34].

These observations are consistent with the findings of the empirical literature that the movements of country risk spreads are highly correlated to each other, indicating a common source of shocks rather than a response to individual country's indicators[35]. Therefore, the sharp movements in the Brazilian country risk premium from 1995 to 1999 were not due to domestic factors; instead they followed a common trend among emerging economies. These movements characterise external shocks rather than rational responses of foreign investors to events occurring in the Brazilian economy. It is noticeable that even in the verge of the January 1999 currency crisis the Brazilian country risk did not show any major departure from other Latin American economies.

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[32] Source: World Bank (2000).

[33] Note that, due to the output contraction and exchange rate depreciation in the aftermath of its crisis, the Foreign Debt/GNP ratio for Mexico in 1995 rose to 61.2\% of GDP, falling sharply in the subsequent years.

[34] Eventually Mexico was upgraded to investment grade (low risk) in 2000, and from there on its country risk premium uncoupled from the Brazilian and Argentinean ones.

[35] Mauro, Sussman and Yafeh (2002) analyse the time series properties of country risk spreads, identifying a large degree of co-movements throughout the 1990s. Eichengreen and Mody (1998) report that, although average levels of risk spreads are related with "fundamentals", movements of spreads over time are attributed to changes in "market sentiments".

In the remaining of this section we estimate Vector Auto Regressions (VAR) to analyse the relation between country risk premiums **(r^B, r^A, r^M)** and deposit interest rates **(i^B, i^A, i^M)** in Brazil, Argentina and Mexico. Besides these variables, we use in our estimation the aggregate country risk premium for Latin America **(r^{LA})**; the US short-term interest rate **(i^{US})** and the risk premium of Junk Bonds **(r^{JB})**[36]. The latter are high-risk corporate bonds negotiated in the US financial market, and are used here an indicator of risk aversion of foreign investors.

The primary data is monthly series of the aforementioned variables, starting in January 1995 and ending in June 1999. As previously analysed, this sample (54 observations) corresponds to the period where the country risk premium is significant for the estimated monetary policy rule in Brazil. We want to determine if this was a common pattern among Latin American economies or a specific feature of the Brazilian monetary policy.

We test the new variables **r^A, r^M, i^A, i^M , r^{LA}, r^{JB}** for unit roots, and the ADF tests do not reject the null hypothesis that **r^A, r^{LA}** and **r^{JB}** are integrated. We proceed to test all these variables in first differences, which are unequivocally stationary. We decide to specify the VAR in first differences, analysing how changes in those variables are related to each other.

Because our sample size is limited we rule out the option to include all variables together in a single VAR. Instead we choose to split our analysis in two different estimations, one focusing on the determinants of the country risk premium, the other focusing on the transmission of externals shocks to domestic interest rates[37]. In both VARs we keep interest rates and country risk premium as endogenous variables, and leave the US variables (short-term interest rate and Junk bonds premium) as exogenous.

3.1 - VAR for Country Risk Spreads

We estimate a VAR for the first differences of the country risk premiums of Brazil **(Δr^B)**, Argentina **(Δr^A)** and Mexico **(Δr^M)**, having as exogenous variables a constant, changes in the US interest rate **(Δi^{US})** and changes in the Junk Bond spreads **(Δr^{JB})**. The formal tests to determine the dimension of the VAR indicate a range from 1 lag (Schwarz information criterion) to 3 lags (Akaike information criterion). The latter is the smaller lag length that is statistically well specified, in terms of avoiding serial correlation in the residuals, and thus it is adopted here[38]. For identification purposes[39] we choose the following ordering sequence of the endogenous variables: **Δr^B, Δr^M, Δr^A**.

The exogenous variable **Δi^{US}** was not significant in any equation of the VAR, so we dropped it and estimated the VAR again with only the constant and **Δr^{JB}** as exogenous variables. The LM test confirms that the residuals are not serially correlated.

We have suggested from Figure 2 that there is a large degree of co-movements between the country risk premiums of Brazil, Mexico and Argentina. We can now add more evidence on this by examining the Residual Correlation Matrix, depicted in Table 7. The values in this matrix indicate the contemporaneous

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[36] Data sources: Brazilian Central Bank, IPEA, IMF (World Economic Outlook), JP Morgan and SSB.

[37] Note that one should not expect that a country risk premium of one country affects the interest rates of another country (and vice versa), so there is no relevant information being lost by separating these variables in two VARs.

[38] Defining the lag structure of the VAR involves a compromise between including all information available (many lags) and increasing degrees of freedom (few lags). Canova (1995: 82) discusses the aspects to be considered for the choice of the VAR dimension.

[39] This recursive structure (Choleski Decomposition) imposes a restriction on how each variable affects the other contemporaneously. We define the sequence according to the participation of each country in the EMBI aggregate index, implying that the country with a larger share in the index (Brazil) feeds contemporaneously into to the country with a smaller share (Argentina), but the reverse effect does not hold. For a discussion on the identification procedures for VARs, see Favero (2001: chapter 6).

correlation between the endogenous variables in the VAR, and the large coefficients confirm that the country risk premiums of these three countries were indeed moving together throughout this period.

Table 7 - Residual Correlation Matrix (VAR Country Risk)

	Δr^B	Δr^M	Δr^A
Δr^B	1	0.71	0.79
Δr^M		1	0.82
Δr^A			1

The origin of these co-movements could be either a shock originated in an emerging economy and transmitted to the others or a shock originated in a developed economy that spills over to emerging markets[40]. The hypothesis of contagion among emerging economies can be evaluated with a Granger causality test of joint significance, reported in Table 8. The null hypothesis in this test is that a given variable is not significantly affected by the lagged values of the other two endogenous variables. The reported test results cannot reject this hypothesis for every single equation in the VAR, which implies that movements of each endogenous variable are explained by its own lagged values and by the exogenous variables. Therefore, we found no evidence of transmission of shocks from one economy to the others.

Table 8 – Granger Causality Test (VAR Country Risk)

Equation	Statistic	Probability
Δr^B	8.28	0.219
Δr^M	1.48	0.961
Δr^A	6.28	0.393

A cautionary note must be added to the interpretation of this result. Despite its name, the Granger test does not indicate that one variable *causes* the other, but that it *forecasts* the other's future movements[41]. The results in Table 8 show that changes in the country risk of one country are not preceded by changes in the others, thus indicating that they move together rather than sequentially[42].

We can now evaluate the other possible source of co-movements among country risk premiums, a common shock from abroad that affects them all. We have introduced the Junk Bonds as a proxy for this sort of shocks, and Table 9 depicts the estimated coefficients (and t tests) of Δr^{JB} in each equation of the VAR. One can see that the estimated coefficients are significant, with the same signal and order of magnitude, indicating that changes in foreign investors' demand for risk assets affects contemporaneously (and with similar intensity) the risk premium of those three Latin American economies.

Table 9 - Coefficient of Junk Bond (VAR Country Risk)

Equation	Coefficient	t statistic	Probability
Δr^B	1.38	4.39	0.000
Δr^M	1.65	4.67	0.000
Δr^A	1.73	4.73	0.000

We confirm that movements in the Brazilian country risk spread from 1995 to 1999 were shared among emerging economies, and that these movements originated from changes in the foreign investors' demand

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[40] See Kaminsky and Reinhart (2003) for a recent assessment of the different channels of contagion in international financial markets.

[41] This is especially relevant in forward looking variables. The classical example is share prices and dividends: expectations on future dividends is the cause of current movements in share prices, but a Granger test could be erroneously interpreted as indicating the reverse causality. See the discussion in Hamilton (1994: 305-7).

[42] Note, however, that as we are using monthly data this test cannot assess whether or not there is transmission of shocks taking place within days or weeks.

for risky assets. Having determined this common source of external shocks, we can now analyse how these shocks were transmitted to domestic interest rates in Brazil, Argentina and Mexico.

3.2. VAR for Interest Rates

We include in the VAR the deposit interest rates of those three countries, and keep the same exogenous variables. In order to reduce the number of endogenous variables (and thus increase degrees of freedom), we replace the individual country risk spreads by the aggregate EMBI index for Latin America[43]. We specify a VAR with four endogenous variables ($\mathbf{\Delta r^{LA}}$, $\mathbf{\Delta i^{B}}$, $\mathbf{\Delta i^{A}}$, $\mathbf{\Delta i^{M}}$) and three exogenous variables ($\mathbf{\Delta i^{US}}$, $\mathbf{\Delta r^{JB}}$ and a constant).

The formal tests to determine the dimension of the VAR indicate a range from 1 lag (SIC) to 6 lags (AIC). One more time we find that 3 lags is the smaller length that is statistically well specified, and thus we choose this option. We ordered the risk premium first and the deposit interest rates in the same sequence of countries as before: Brazil, Mexico and Argentina. The LM test confirms that the residuals are not serially correlated.

The exogenous variables are much less relevant in this estimation. The Junk Bond spread is only significant for the $\mathbf{\Delta r^{LA}}$ equation (as expected) and the US interest rate is only significant for the $\mathbf{\Delta i^{A}}$ equation, although with an unexpected negative signal. The Granger Causality tests of joint significance, reported in Table 10, confirm that the dynamics of this VAR is explained by its endogenous variables.

Table10 - Granger Causality Test (VAR Interest Rate)

Equation	Statistic	Probability
$\mathbf{\Delta r^{LA}}$	23.07	0.006
$\mathbf{\Delta i^{B}}$	61.10	0.000
$\mathbf{\Delta r^{M}}$	22.33	0.008
$\mathbf{\Delta r^{A}}$	31.75	0.000

The fact that the null hypothesis of no Granger causality is rejected for the three interest rate equations is evidence that shocks in the country risk premium were transmitted to domestic monetary policies. We have seen in the previous section that the BCB policy rule responded to changes in the country risk premium. The VAR shows that this was not an exclusive feature of the Brazilian economy, as external shocks also affected domestic interest rates in Argentina and Mexico[44].

Having identified the transmission of external shocks to monetary policy, we now want to compare the individual responses of Brazil, Mexico and Argentina to changes in the LA country risk premium. We plot in Figure 3 generalised impulse response functions[45] showing the dynamic effect in each interest rate equation of a positive shock in the risk premium $\mathbf{\Delta r^{LA}}$. Each dotted line represents the boundary of the 90% confidence interval, thus when it crosses the horizontal axis the impulse response is no longer statistically significant.

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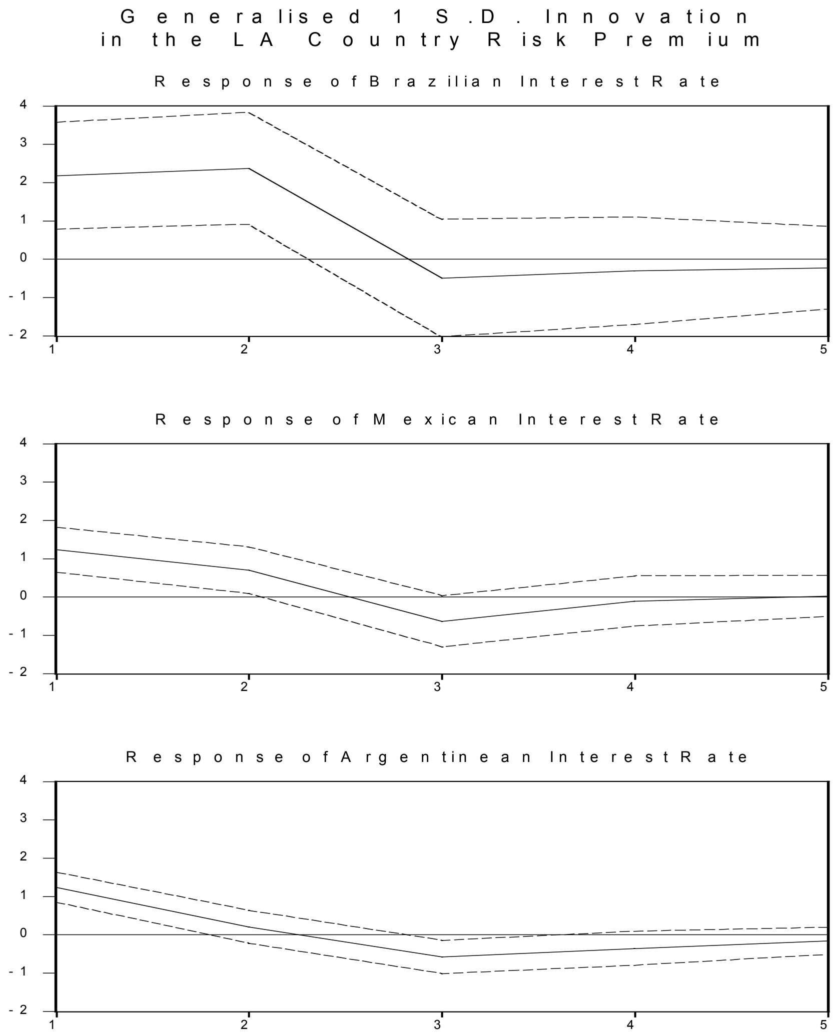
[43] The very high correlation between the coefficients of $\mathbf{\Delta r^{LA}}$ and $\mathbf{\Delta r^{B}}$ (0.94), $\mathbf{\Delta r^{M}}$ (0.89) and $\mathbf{\Delta r^{A}}$ (0.94) in our sample period makes the aggregate index a good proxy for the common shocks affecting the risk premiums of Brazil, Mexico and Argentina.

[44] The evidence of Granger causality in the equation $\mathbf{\Delta r^{LA}}$ has a less clear economic interpretation. It is possible that domestic interest rates also reacted in anticipation to future movements in the country risk premium.

[45] A generalised impulse response functions is calculated such that it is independent of the ordering of the endogenous variables in the VAR.

Figure 3 - Impulse Response Functions



There is a noticeable difference between the monetary policy response in Brazil and the responses in Mexico and Argentina. In these two countries there is a significant increase in the domestic interest rates after the shock, but its lasts for one period only. In Brazil, on the other hand, the response is not only higher in the first period but it also persists in period 2, vanishing afterwards. We conclude from the VAR evidence that the overreaction to the country risk premium in the Brazilian monetary policy rule is not observed in the other two Latin American economies.

This result sheds light on the shortcomings of the Brazilian monetary policy. The evidence of Figure 3 is that both the Argentinean currency board and the Mexican floating regime[46] were, in the period analysed here, more robust to external shocks than the Brazilian regime[47]. A possible explanation is that, as soft pegs are more vulnerable to speculative attacks, they have to cope with a large currency risk premium than the polar solutions of a hard peg or a floating regime. As we have previously seen, the presence of a currency risk premium explains the overreaction observed in the Brazilian policy rule.

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[46] In principle, interest rates in a floating regime did not have to respond at all to country risk movements. Nevertheless, Calvo and Reinhart (2000) report that many economies that are officially floaters use interest rates to offset external shocks and, thus, to reduce exchange rate volatility (a behaviour they dubbed “fear of floating”). The evidence of our VAR impulse responses indicates a similar behaviour by the Mexican Central Bank.

[47] Despite having more stable interest rates, Argentina also experienced severe financial imbalances that led to collapse of its currency board. For the differences between the Brazilian and Argentinean crises, see Palma (2003).

4. Conclusion

We have shown that the very high interest rates in Brazil up to its currency crisis were due to the overreaction of monetary policy to external shocks. This vulnerability was demonstrated in the sharp response to the contagion from crises elsewhere, as well as to movements in the country risk premium. This overreaction was associated with the presence of a large currency risk premium towards the end of the soft peg regime.

It has also been shown that movements in the country risk premium of Brazil and other Latin American economies (Mexico and Argentina) were highly correlated to each other, and strongly influenced by the US Junk Bond markets. The impact of these common external shocks on domestic interest rates, however, was much more intense in Brazil than in the other two large Latin American economies. It confirms that the overreaction identified in the policy rule for Brazil was not a general feature of economies in the region, but a specific response associated with the Brazilian soft peg regime.

We can draw some lessons from our results. Policy makers in Latin America often associate the abundance or scarcity of capital inflows to domestic policies, but our findings suggest that the country risk dynamics is strongly influenced by exogenous shocks. Ignoring this fact might lead policy makers to underestimate the risks inherent in policies that require a permanent abundance of capital inflows to be sustainable, such as exchange rate pegs (hard or soft).

Nevertheless, exchange rate based stabilisations are an effective way to end high inflation episodes, and one must acknowledge that the Brazilian soft peg was successful in doing so. When it is necessary to adopt a peg, though, it is of the utmost importance to have an exit strategy[48]. This strategy must take into account two contradictory objectives: allowing more time to consolidate price stability and avoiding waiting too much to promote an adjustment in the current account.

A further complication is that when foreign credit is abundant there are no pressing incentives to exit the peg, but when credit becomes scarce it is often too late for a smooth transition to a floating regime. The Brazilian experience fits in this pattern, as hindsight reveals a window of opportunity for an ordered exit between the crises in Mexico and East Asia (low inflation, high international liquidity) that was not used by the Central Bank.

Finally, Brazil shows that high interest rates can have lasting effects, as what should have been an initial monetary tightening to back a swift reduction of inflation became an enduring feature of the soft peg regime. From the point of view of late 1994 and early 1995, pushing up interest rates to towering levels might have been seen as a low cost strategy to achieve price stability. The severe macroeconomic imbalances caused by such policy, however, made monetary policy vulnerable to external shocks. In this context, the Central Bank was no longer able to ease monetary policy, caught in a high interest rate trap of its own making.

[48] A comprehensive discussion on exit strategies is presented in Eichengreen, Masson, Savastano and Sharna (1999).

Bibliography

Bacha, E., 2003, “Brazil’s Plano Real: A View from the Inside”, in A. Dutt and J. Ros, Development Economics and Structuralist Macroeconomics: Essays in Honor of L. Taylor, Edward Elgar.

Ball, L., 2000, “Policy Rules and External Shocks”, Cambridge MA, NBER Working Paper N. 7910.

Calvo, G. and C. Reinhart, 2000, “Fear of Floating”, Cambridge MA, NBER, Working Paper N. 7993.

Canova, F., 1995, “Vector Autoregressive Models: Specification, Estimation, Inference, and Forecasting”, in M. Pesaran and M. Wickens, Handbook of Applied Econometrics: Macroeconomics, Blackwell.

Cardoso, E. and Goldfajn, 1997, “Capital Flows to Brazil: The Endogeneity of Capital Controls”, IMF Staff Papers, V. 45, N. 1.

Clarida, R., 2001, “The Empirics of Monetary Policy Rules in Open Economies”, Cambridge MA, NBER, Working Paper N. 8603.

Clarida, R., J. Gali and M. Gertler, 1998, “Monetary Policy Rules in Practice - Some International Evidence”, European Economic Review, N. 42.

Cuthbertson, K., S. Hall and M. Taylor, 1992, Applied Econometrics Techniques, Harvester Wheatsheaf.

Edwards S. and M. Khan, 1985, “Interest Rate Determination in Developing Countries”, IMF Staff Papers, N. 32/3.

Eichengreen, B. and A. Mody, 1998, “What Explains Changing Spreads on Emerging Markets Debt: Fundamentals or Market Sentiments?”, Cambridge MA, NBER, Working Paper N. 6408.

Eichengreen, B., P. Masson, M. Savastano and S. Sharna, 1999, “Transition Strategies and Nominal Anchors on the Road to Greater Exchange Rate Flexibility”, Princeton University, Essays in International Finance N. 213.

Favero, C. and Giavazzi, 2002, “Why are Brazil's Interest Rates so High?”, Milan, Bocconi University.

Favero, C., 2001, Applied Macroeconometrics, Oxford University Press.

Fraga, A., I. Goldfajn and A. Minella, 2003, “Inflation Targeting in Emerging Markets Economies”, Cambridge MA, NBER Macroeconomics Annual 2003, V. 18.

Franco, G., 2000, “The Real Plan and the Exchange Rate”, Princeton University, Essays in International Finance, N. 217.

Garcia, M. and M. Valpassos, 2000, “Capital Flows, Capital Controls and Currency Crisis: the Case of Brazil in the Nineties”, in P. Larrain, Capital Flows, Capital Controls and Currency Crisis: Latin America in the 1990s, University of Michigan Press.

Garcia, M. and T. Didier, 2001, “Very High Interest Rates in Brazil and the Cousin Risks: Brazil During the Real Plan”, Rio de Janeiro, PUC Texto Para Discussao N. 441.

Hamilton, J., 1994, Time Series Analysis, Princeton, Princeton University Press.

IMF, 1999, World Economic Outlook, Washington, International Monetary Fund.

Kaminsky, G. and C. Reinhart, 2003, “The Center and the Periphery: the Globalisation of Financial Turmoil”, Cambridge MA, NBER Working Paper N. 9479.

Mauro, P., N. Sussman and Y. Yafeh, 2002, “Emerging Markets Spreads: Then Versus Now”, The Quarterly Journal of Economics, May 2002

Moreira, A. e H. Migon, 2001, “Core Inflation: Robust Common Trend Model Forecasting”, Rio de Janeiro, IPEA, Texto Para Discussao N. 824.

Palma, G., 2002, “The Magical Realism of Brazilian Economics: How to Create a Financial Crisis Trying to Avoid One”, in J. Eatwell and L. Taylor (eds.), International Capital Markets, OUP.

Palma, G., 2003, “The Three Routes to Financial Crises: Chile, Mexico and Argentina[1]; Brazil[2]; Korea, Malaysia and Thailand[3]”, in H-J. Chang, Rethinking Development Economics, Anthem Press.

Silva, M. and M. Portugal, 2002, “Inflation Targeting in Brazil: An Empirical Evaluation”, Venice, presented in the 57th European Meeting of the Econometric Society.

World Bank, 2000, Global Development Finance, Washington, World Bank.

ANNEX

ADF Tests Policy Rule Variables

Variable	t Statistic	Prob.
i	-2.67	0.083
p^e	-2.74	0.071
y	-3.89	0.003
j	-4.47	0.000
i^{US}	-1.77	0.073
r	-2.75	0.070

Coefficients Policy Rule (1995-2003)

	Coefficient	t Stat.	Prob.
α_0	-12.23	-1.15	0.254
α_1	0.76	18.71	0.000
α_2	0.87	2.10	0.038
β_1	3.38	2.43	0.017
β_2	1.42	1.89	0.062
γ	28.49	10.86	0.000

Diagnosis Policy Rule (1995-2003)

Test	Stat.	Prob.
R^2	0.93	
Adj. R^2	0.92	
LM (1 lag)	2.71	0.103
LM (4 lags)	1.18	0.326
White	7.72	0.000
Jarque-Bera	139.14	0.000

Diagnosis Policy Rule (1999-2003)

Test	Stat.	Prob.
R^2	0.98	
Adj. R^2	0.98	
LM (1 lag)	2.81	0.101
LM (4 lags)	1.07	0.383
White	0.24	0.961
Jarque-Bera	2.25	0.325

Wald Test Policy Rule (1999-2003)

Restriction	F Stat.	Prob.
$\alpha_2=1$	0.20	0.655

Wald Test Policy Rule (1995-1998)

Restriction	F Stat.	Prob.
$\alpha_2=1$	0.01	0.932
$\beta_2=1$	4.61	0.038

Diagnosis Policy Rule (1995-1998)

Test	Stat.	Prob.
R^2	0.94	
Adj. R^2	0.93	
LM (1 lag)	1.15	0.290
LM (4 lags)	0.29	0.878
White	3.56	0.005
Jarque-Bera	0.21	0.889

Diagnosis Policy Rule with Break (1995-1998)

Test	Stat.	Prob.
R^2	0.95	
Adj. R^2	0.94	
LM (1 lag)	0.65	0.426
LM (4 lags)	0.33	0.854
White	4.32	0.001
Jarque-Bera	1.30	0.522

ADF Tests VAR Variables

Variable	t Stat.	Prob.
Δi^A	-6.48	0.000
Δi^M	-7.88	0.000
Δr^A	-5.98	0.000
Δr^M	-5.14	0.000
Δr^{LA}	-5.31	0.000
Δr^{JB}	-7.21	0.000

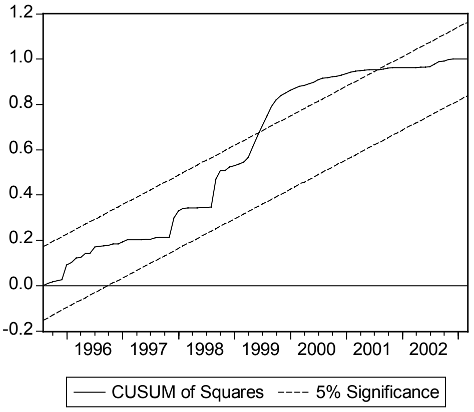
LM Test VAR Country Risk

Lags	Stat.	Prob.
1	12.88	0.168
2	14.50	0.106
3	11.01	0.275
4	6.42	0.698
5	10.56	0.307
6	3.49	0.942

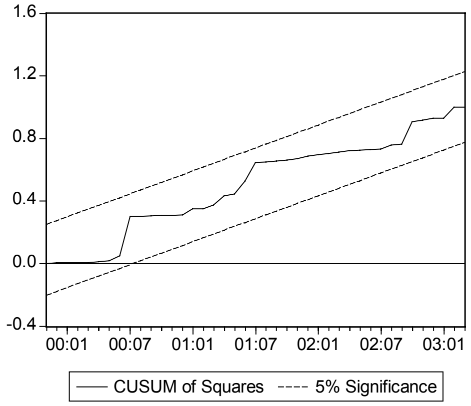
LM Test VAR Interest Rate

Lags	Stat.	Prob.
1	22.63	0.124
2	17.62	0.347
3	15.31	0.502
4	18.15	0.315
5	11.78	0.759
6	7.11	0.971

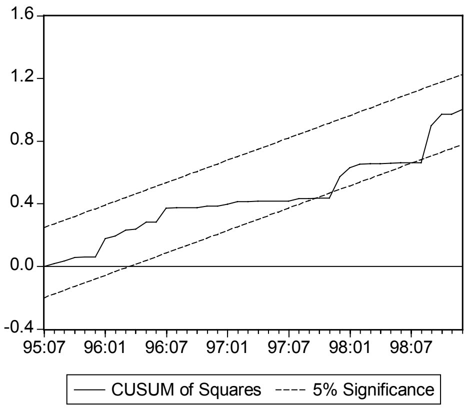
CUSUM Test Policy Rule (1995-2003)



CUSUM Test Policy Rule (1999-2003)



CUSUM Test Policy Rule (1995-1998)



CUSUM Test Policy Rule with Break (1995-1998)