Contrasting monetary policies within the MERCOSUR experiment*

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RESUMO

A formação de mercados globais tornou-se tópico de extrema relevância para muitos países em desenvolvimento, temerosos com suas próprias sobrevivências, econômica e política, como entidades autônomas na 'nova ordem econômica internacional' Em decorrência dessa preocupação, inúmeros países emergentes têm buscado segurança na formação de blocos econômicos regionais envolvendo acordos comerciais e, em alguns casos, planos para eventuais constituição de uniões monetárias. Este artigo examina a experiência latino-americana, especificamente o MERCOSUL, focalizando, de forma mais especial, as políticas monetárias que vêm sendo implementadas em dois dos seus principais membros   Argentina e Brasil.

Palavras-chave: coordenação macroeconômica, política monetária, MERCOSUL.

ABSTRACT

The formation of global markets has become, not unsurprisingly, a matter of intense concern for many developing countries, fearful for their own economic and political survival as autonomous entities in the "new world economic order". As a result of this concern, many developing countries are seeking security by forming regional economic blocs, involving trading agreements and preferences and, in some cases, plans for eventual monetary union. This paper examines the Latin American regional integration experience, specifically the Common Market of the South (Mercado Comun del Sur or MERCOSUR), focusing on macroeconomic monetary policies implemented by Argentina and Brazil   the major MERCOSUR's member countries.

Key words: macroeconomic coordination, monetary policy, MERCOSUR.

JEL classification: C32, E58, O57.

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1 Introduction

The emergence of new regional blocs, following the example of the European Union (EU) will certainly greatly affect developing countries' future patterns of growth and development. Among the more important events of the 1990s, in this context, has been the attempt of Latin American countries, aware of the new international economic situation, to strength relations among themselves. The main agreement, signed in 1991, involving Argentina, Brazil, Uruguay and Paraguay, created the Common Market of the South (Mercado Comun del Sur, or MERCOSUR). The final outcome is intended to be, as with the EU, the formation of a full economic union, including monetary union.

In the case of Latin America the process of economic integration has the unusual aspect that the members of MERCOSUR have been accepting the idea, as far as monetary policy is concerned, that their currencies, or their common currency, ought to be linked to an outside currency, the US dollar, in a fixed-rate or a target-zone type of arrangement. If this occurs, as expected, the greatly diminished role of national monetary policies immediately raises the question of the appropriate role for national fiscal policies within the MERCOSUR union. This question is of special significance because MERCOSUR consists of countries which to date have a record of chronic budget deficits. And the problem of these deficits remains to be solved, and may involve some MERCOSUR members in painful and unpopular adjustments.[1]

De Grauwe (1992) has suggested how complicated these processes of economic integration are, and he describes the problems involved in the transition to monetary unification and the workings of incomplete monetary unions inspired by the example of the European Monetary System (EMS) case.

Although much has been written about the topic there remains considerable scope for a more general evaluation of the theme. Several questions to date have been given no satisfactory answer. Old questions such as the one raised by Mundell (1961) about the existence of certain characteristics in a country, or group of countries, that predispose them to adopt a fixed or a flexible exchange-rate regime remain with still no unambiguous response. Some of the early literature dealing with a country's freedom to choose the exchange-rate regime best suited to its needs or, in the context of currency areas, the

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1   De Grauwe (1992, chap.8) tries to answer questions about the role of fiscal policy in a monetary union; independency of national fiscal policy; fiscal policy discipline. This is also the theme of Jacob A. Frenkel and Assaf Razin (1992).

arrangement more appropriated to the member countries, pioneered by Mundell (1961) sought to identify key characteristics thought to be decisive in choosing an exchange-rate regime: countries' size, degree of openness of the economies, degree of factor mobility, diversification of the external sector, geographic concentration of trade, degree of divergence in the inflation rate and all sorts of asymmetries including the degree of economic development.[2] The definition of characteristics for an area over which it should be optimal to have a single currency or, in other words, a fixed exchange-rate system with guaranteed convertibility, was also the theme of McKinnon (1963). This literature gave rise to empirical work of which the most frequently cited works are Heller (1978) and Holden *et al.* (1979).

Heller's (1978) econometric analysis of the choice between pegged and floating exchange rates, using a sample of eighty-six countries, concluded that five characteristics tend to be associated with floaters: (1) a large size, (2) a relatively small foreign trade sector, (3) a high degree of international financial integration, (4) an inflation rate that differs from the world average, and (5) a well diversified foreign trade pattern. The opposite characteristics tend to be associated with peggers. In fact, he reinforces his own conclusions when he says that there are *"certain identifiable economic characteristics that determine the choice of an exchange-rate system by an individual country, and that there is a considerable degree of order and predictability in the current international monetary arrangement."* (*op. cit.* p. 320)

Holder *et al.* (1979) attempted to develop an indicator of the flexibility of exchange-rate policy which was intended to provide an analytical description of the extent to which monetary authorities should finance payments imbalances and disturbances rather than allowing the exchange rate to be determined by market forces. They used their index to test whether the factors that optimum currency area theory indicates as fundamental in determining exchange-rate policy had in fact influenced the policy choices of 76 countries. The results of their cross-sectional analysis suggest that 42% of the variance of the flexibility measure is explained by the variables identified by the optimum currency area theory, thus providing empirical support for it. In other words, they concluded that *"the optimum currency area approach to the question of exchange-rate flexibility can contribute important insights into the formulation of exchange-rate policy."*[3]

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2   The approach of this topic in the context of currency unification has been well summarized by Corden (1972), Ishiyama (1975), Tower and Willet (1976), and others.

3   For further details see Holden *et al.* (1979, p. 328-332).

However, the early literature has been criticized and is today under much discussion. According to Eichengreen (1994), *"International Economics is replete with theories predicting differences in the behavior of real and financial variables under different exchange-rate regimes. The predictions of competing theories are contradictory and impossible to verify on the basis of logical consistency alone."* When this happens empirical evidence is required, and international macroeconomists trying to confront theories with data are driven to search for historical evidence. In Eichengreen's words: *"ineluctably, empirical research on alternative exchange-rate systems is historical research."*[4]

This paper pursues this line of reasoning. We defend the proposition that the new political momentum requires cooperation among nations. As a matter of fact, the theoretical case for international coordination of economic policy is now well established. A world in which domestic policies have significant spill-over effects on other economies, where economies are to different degrees sensitive to external shocks, and where governments typically have more policy targets than instruments, co-operation is required to reach an efficient outcome. A comparison of outcomes under non co-operative and co-operative policymaking, developed by Hallet (1989), working with a sample of seven models, suggests that they are more uniform across models in the co-operative case. However, he points out that:

> *the major criticism of recent work aimed at designing co-operative policies for the industrialized economies, and at identifying the sources and extent of those gains, has been that the results are thought to be highly model dependent.* (Hallet, 1989)

This is a major obstacle since policymakers are typically uncertain about the policy responses of the economies which they are attempting to steer: if the actual economic structure is imperfectly understood, the models used will be subject to a large degree of uncertainty and to errors. These potential errors impose substantial risks on the policy-making process. *"Feldstein (among others) has argued that countries should not coordinate their policies rather than run the risk that model errors will turn all the coordination gains into coordination losses."*[5] As we can infer, the coordination of macroeconomic policies deserves a more profound analysis than has been also offered by modern theorists.

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4   Eichengreen (1994, p.153).

5   See Hallet (1989, p. 307).

At the same time, the problems related to the process of economic and monetary integration are magnified when countries are, in addition, pursuing disinflation stabilization programs, against a background of regional integration and world globalization. It is inevitable that these countries will soon have to face a number of key questions on competition policies, foreign exchange-rate policies, labor and capital market organizations and controls, and on a number of other critical issues that the integration process will bring to the fore. Policymakers cannot neglect major transnational asymmetries, and the need for coordination will rapidly lead to discussion revolving around the considerable differences among preferences and technology between members. The precise economic role of formally sovereign national states during the period of transition, and immediately thereafter, is still not at all clear, as well.

This paper concentrates on examining one aspect of the MERCOSUR experiment. Specifically it aims at comparing the alternative monetary policies adopted in the recent period by the two major economies that comprise the bloc - Brazil and Argentina. Since monetary policies and exchange-rate regimes are closely linked, Brazil's and Argentina's stabilization programs are evaluated from the perspective of alternative monetary arrangements. An attempt is made to suggest how the differences among these arrangements my hinder the integration process.

2 Latin American regional integration experience: macroeconomic background

Given Latin America's previous integration efforts, and the small degree of economic interdependence among the countries in the region, analysts, in the second half of 1987, seemed very pessimistic about the success of the integration experiment.[6] Munhoz (1987) and Sant'Ana (1987) focus on the problems that could arise when the integration process happens in an environment where the partners are severely indebted. And Lerda and Mussi (1987) argue that differences in the economic decision-making processes of Brazil and Argentina, the leader countries, are obstacles to the integration process. The need for significant sectorial adjustment was the theme of Baumann (1987). Given this initial skepticism, the recent growth of exchange among the countries that comprise MERCOSUR and the rapid progress of the regional integration process surprised Latin American theorists as well as policymakers

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6   See Baumann and Lerda (1987).

Fiscal harmonization: the need for fiscal coordination

During the 1980s the world economy was subject to large and unsynchronized changes in fiscal policies, high and volatile real interest rates, large fluctuations in real exchange rates, and significant variations in private-sector spending. When monetary autonomy is relinquished within a monetary union, the fiscal stance then acquires fundamental importance.

One conventional argument favoring fiscal coordination among countries engaging in ambitious schemes of economic integration has to do with international externalities. In fact, market and political interdependence among countries is one expected result from growing economic integration. Indeed, by tightening the constraints of each national economy, integration puts implicit and explicit bounds on ultimately irresponsible fiscal behavior of any one of the partners. This is why it is generally assumed that economic integration restricts the scope for permanent and/or large public deficits. The theoretical argument here has to do with the international spill-over of domestic fiscal policies. Since the latter affects other economies' activity levels it follows that fiscal policy should be coordinated in order to internalize the corresponding third party effects. A second conventional reason to seek fiscal coordination is to limit tax/subsidy competition among possibly non co-operative governments that may try to lure corporations from neighboring jurisdictions by lowering effective tax rates or by increasing the supply of effective subsidies.[7]

In the context of MERCOSUR there is plenty of room for effective tax harmonization. Both, in the area of domestic consumption taxes (mainly VAT and a few excise taxes), and also of income taxes. The study of national legislation is still under way, and at this point in time no progress has been made in implementing steps to avoid price distortions due to domestic indirect taxes that interfere with inter-regional trade. The experience of the European Union teaches us the important lesson that this process can take many years and that, politically, it is not an easy business to re-structure taxes that affect historic patterns of relative prices.

The elimination of indirect taxes on primary and semi-manufactured products will improve their competitiveness and will affect one third of the main tradable products.

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7   This is a serious problem that the larger established EU is not attempting to solve.

Instead of changing the exchange rate there would be a change in the internal-tax system. According to several analysts' estimations the elimination of these taxes would correspond to a devaluation of 7 percent approximately.[8]

Macroeconomic limits to integration

Part of the procedures for economic integration in MERCOSUR is the development of a common target-band foreign-exchange regime among the members. This commitment could not be fulfilled, however, due to disagreements between Argentina and Brazil about the nature of the band limits. The former has supported nominal bounds while the latter has insisted on real bounds. This dispute since the early 1990s reveals the importance of macroeconomic convergence for economic integration.

Two propositions dealing with the sustainability of the integration process can be examined:

A weak proposition: There should be a minimum level of macroeconomic convergence.

A strong proposition: There should be stability of prices and equilibrium in government budgets.

As a matter of fact some macroeconomic convergence seems to be necessary for the stabilization of the real exchange rate. It is doubtful whether the strong proposition of price stability and budget equilibrium will ever be met as a prior condition to integration. It is also controversial whether such a step should be even a necessary condition to foster integration.[9] What should be the optimal degree of fiscal discretion among (country) members of an economic area is a fundamental question.

Misalignments of real exchange rates, due mainly to inflation differences, especially when nominal exchange rates are pegged, may produce severe and damaging effects on trade. Exchange-rate volatility is also related to exchange-rate misalignments. Moreover,

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8   A preliminary evaluation is published by *Revista VEJA*, September 4, 1996, p. 89, drawing on previous estimations of several specialists.

9   Glick and Hutchison (1992) present convincing empirical and theoretical arguments that budgetary policies must not be aligned to guarantee success of economic integration. They use a two period Diamond type model to focus on the European Integration.

persistent deviation from long-term equilibrium parities affects the allocation between tradables and non tradables. On the other hand, persistent disequilibrium in trade balance may induce serious uncertainty and enhance speculative behavior.

## The evidence on current macroeconomic stabilization attempts

Looking at the data on inflation, real exchange rates and fiscal deficits it becomes evident that some progress has been made as far as the convergence of some of these economic variables (inflation rates and real exchange rates) are concerned. In the mid-1990s, the performance of all member countries has improved, with the exception of Brazil that has only had better results since the implementation of the **Real Plan** in 1994. Figures 1, 2 and 3 displayed below illustrate this issue.

Figure 1
MERCOSUR: Inflation Rates of Member Countries
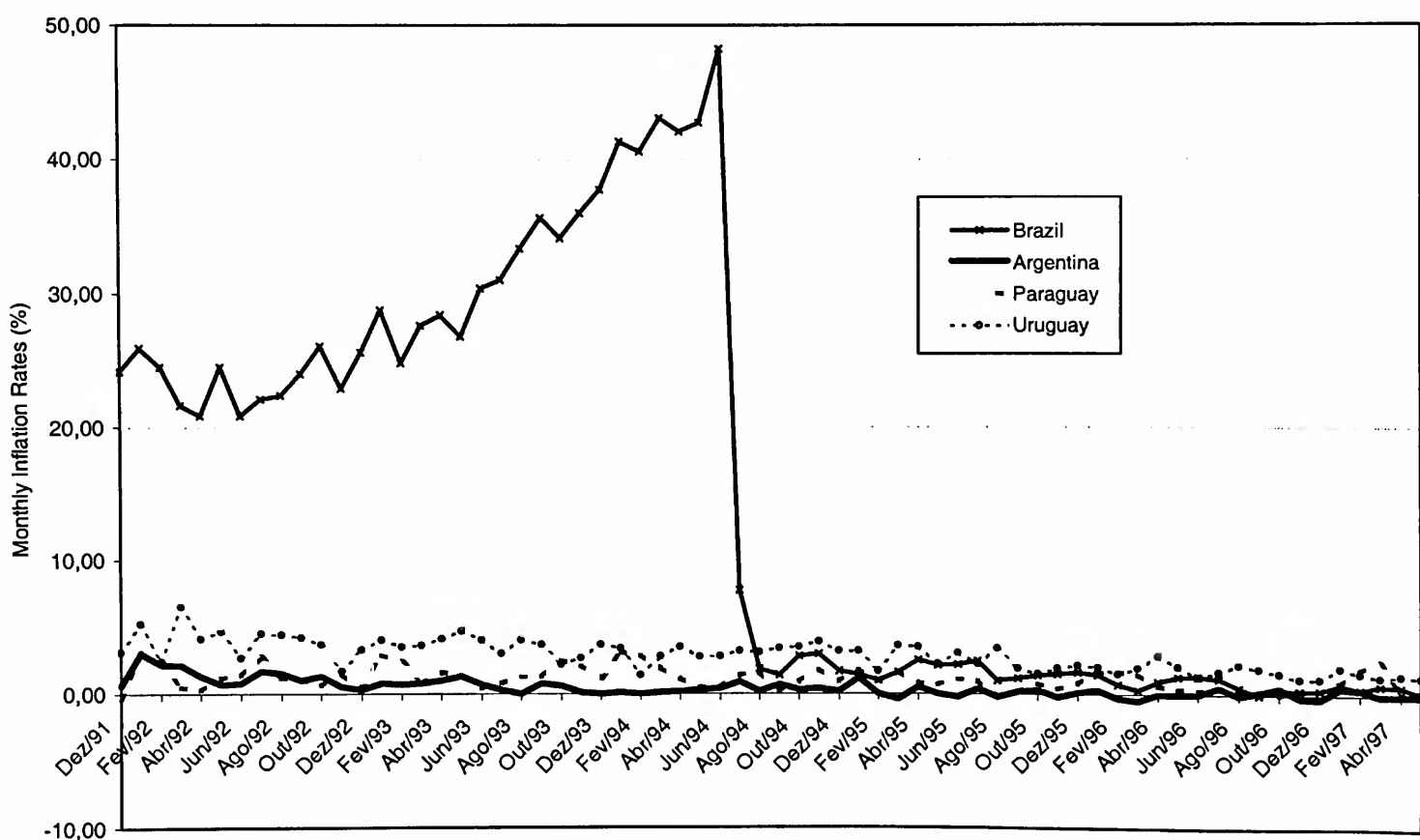
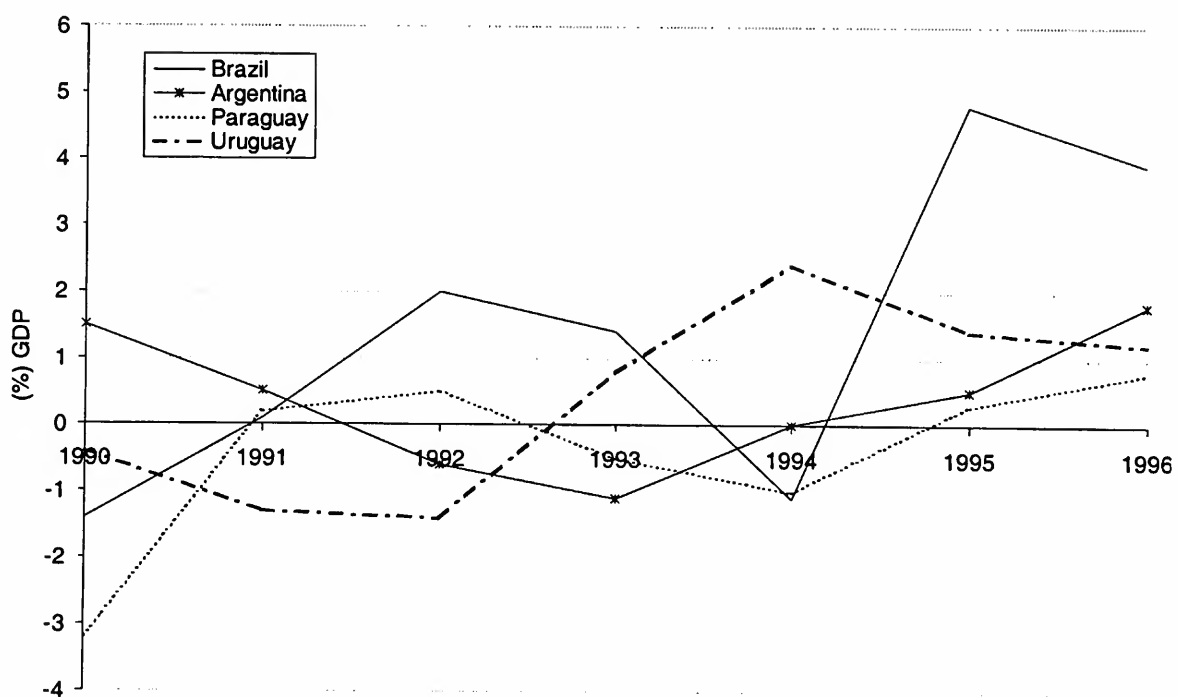Source: Data base of the Central Banks of the different member countries.

Figure 2
MERCOSUR: Real Exchange Rates of Member Countries*
(1991=100)
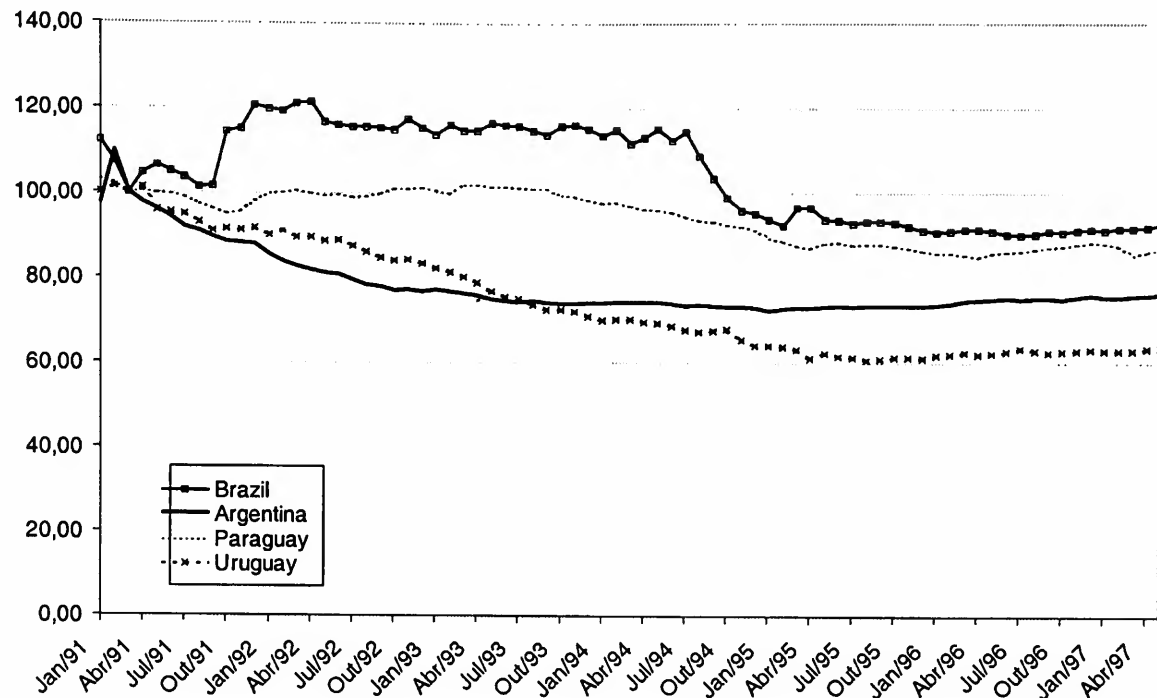
*Deflated by consumer price indices of each country

Source: Data base of the Central Banks of the different member countries.

Figure 3
MERCOSUR: Public Sector Borrowing Requirements

Sources: BID - Progresso Sócio- Econômico na AL - ed. 1990 e 1995

FMI *International Financial Statistics - ed. Yearbook - 1993*, nov/93, may/94, jun/94 and aug/95.

From the brief analysis presented above, and drawing on the works of several specialists it is interesting to distinguish some characteristics of stabilization processes implemented within MERCOSUR's member countries:[10]

The main features:

1. Significant drop of inflation rates;

2. Use of nominal anchors;

3. Overvaluation of the exchange rate with repercussions upon the countries' trade balances;

4. Weak fiscal adjustment;

5. Large inflows of foreign capital.

Basic Macroeconomic Scenario:

1. Economic stabilization without fiscal adjustment;

2. Foreign capital inflows;

3. Monetary policy: currency-board type of arrangement in Argentina, and moving-target-zone type in Brazil.[11]

1+2+3 defines the "fundamentals" for the exchange-rate behavior.

The main implications of these stabilization approaches can be presented as follows:

1. growing indebtedness → effects on the interest rate, growth and employment;

2. dependence on foreign capital inflows → divergence between domestic and foreign interest rates, and increasing vulnerability;

3. instability effect → speculative attack;

4. contagious effects → *tequila* effect and *MIT's* (Malaysia, Indonesia, Thailand) effect, Russia's effect, and Brazil's effect as well.

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10 See, for instance, Silva (1999) for a detailed analysis of stabilization plans implemented in the recent period by several Latin American countries. For the cases of Argentina and Brazil specifically we refer to Silva (1997) and Silva and Andrade (1996).

11 Until January 1999, when Brazil suffered a major speculative attack and the domestic currency value was forcedly allowed to float.

Adding up, what can be noticed is that stabilization (understood as low inflation rates) was attained basically with nominal anchors, leading in all cases to overvaluation of the exchange rates. Continuing disequilibria in the trade and current account balances were made possible by large inflows of foreign capital. The data confirms the presumption that the stabilization experience of these countries still lacks fiscal adjustment, especially in the Brazilian case (Figure 3).

The implications of individual exchange-rate-based stabilization plans (ERBSP) have been the growing levels of external and internal debts, reinforced by high interest rates.[12] On the other hand, the weak fiscal adjustments and current account deficits have made these economies become extremely vulnerable to speculative attacks.

In the section that follows, it will be examined the alternative experiments of exchange-rate regimes implemented within the regional bloc, using as a framework the basic elements of the stabilization mechanisms currently in use by the two leading members of MERCOSUR - Argentina and Brazil.

3 The empirical evidence of recent monetary policy in Argentina and Brazil

Argentina and Brazil are the main countries to be examined when dealing with the integration process within MERCOSUR. This process increases the macroeconomic interdependence between the two countries. It has to be recognized that policy coordination is not only desirable in itself but it is a requirement for the sustainability of the integration effort. And regardless of the remarkable improvement in commercial relations among the two countries, it is necessary that they continue to pursue policies in the direction of a better coordination of their monetary and exchange-rate arrangements. The analysis below suggests that there is much room for improvement in minimizing the uncertainties related to the interdependence between these two countries.

Argentina's recent experience with a quasi-currency-board arrangement[13]

On 1st April 1991, Argentina's Congress approved a convertibility law (Law number 23.929), institutionalizing a quasi-currency-board rule for monetary base creation. This law embodied the basic aspects of a currency board:

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12 See Silva and Torrance (1998) for a description of the main characteristics of ERBSP.

13 This sub-section follows closely Silva (1997).

• it forced the central bank to issue domestic currency (the peso) almost exclusively against the dollar value of foreign reserves ;

the official rate established between the peso and the US dollar, the anchor currency, was the fixed parity of one-to-one;

the Central Bank of Argentina committed itself to guarantee with its foreign exchange reserves the convertibility of "peso notes and coins" into the anchor currency at the official rate.

The departure from the classical-currency-board arrangement, that qualifies Argentina experiment as a quasi-currency board, can be depicted in Figure 4. The Figure shows the evolution of the monetary base and foreign reserves in Argentina between March 1991 and February 1998.

Figure 4
Argentina: Monetary Base and Foreign Reserves
March 1991 - February 1998
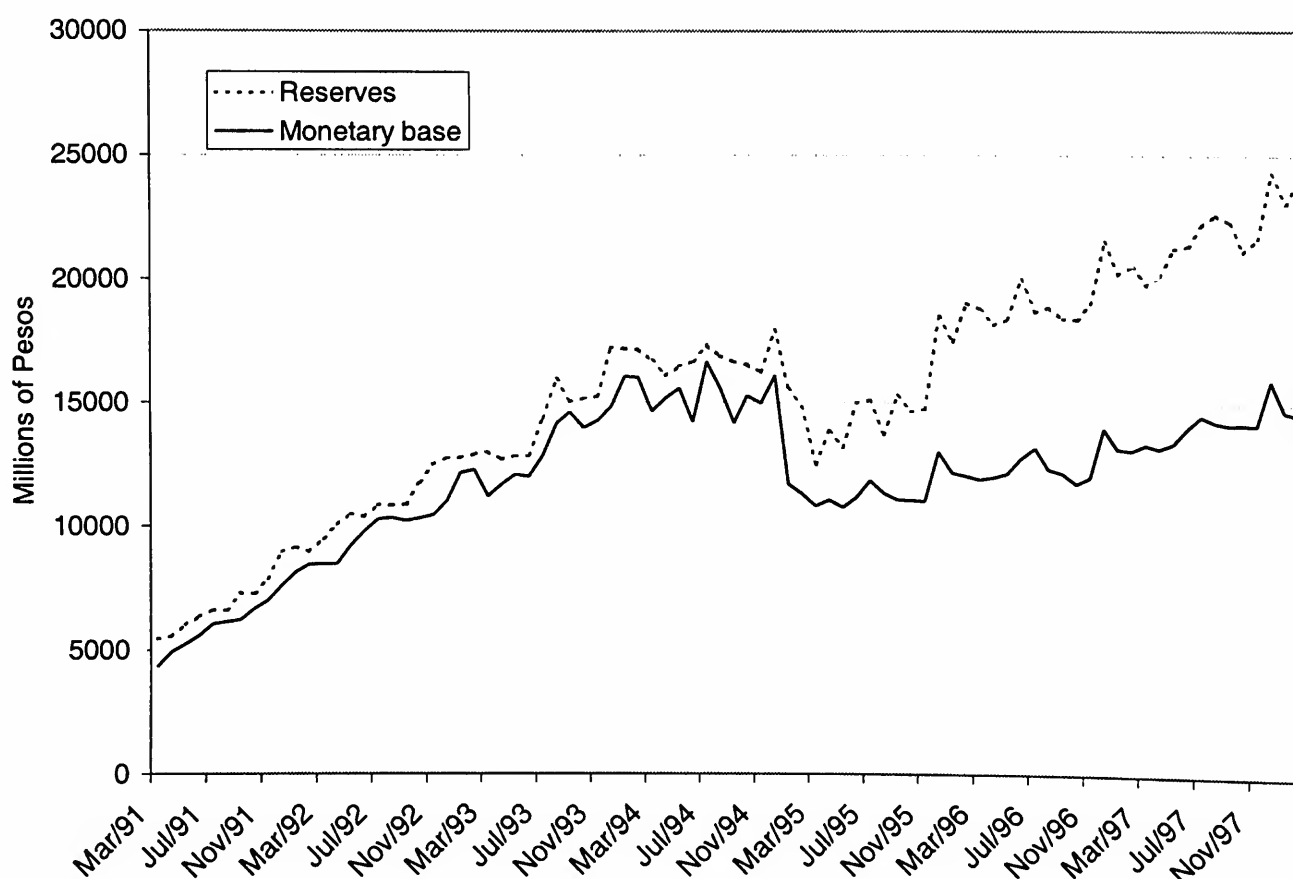
Source: Banco Central de la Republica Argentina, *Bulletins*, several issues.

During several periods, July - September 1993 and at the beginning of January 1995, for example, the amount of foreign reserves approached the amount of the monetary base such that the ratio of the monetary base (MB) to the foreign reserves amount (FR) was very close to one, and Argentina's monetary rule for money creation approached a pure-currency-board rule.[14] However, the fact that the distance between the two lines change several times since April 1991 (Figure 4), suggests that the Argentina's convertibility law only resembles a pure (orthodox) currency board. Unlike it, Argentina's central bank is left with some flexibility to act as a lender of last resort. It can issue money for that purpose up to the level that would push the k ratio (MB/FR) above 1.25. (Zarazaga, 1995, p.16). In other words, the convertibility law does not require 100 percent backing of the monetary base by foreign reserves, at the fixed 1:1 exchange-rate parity, but only 80 percent. This allows some degree of flexibility for monetary policy in the short run. However, the data suggests a co-movement between the monetary base and the foreign reserves during the period, as can be depicted from Figure 4. It is interesting to notice that the gap between the foreign reserves and the monetary base increases since the Mexican crisis of December 1994. This suggests at least that monetary policy has been more strict than the quasi-currency-board arrangement required.

Argentina's reaction to the main 1990's crises

When the panic spread throughout Latin America, in the aftermath of Mexico's 20 December 1994 crisis, the quasi-currency board was not sufficient to insulate Argentina against speculative attacks on its currency. The effects of the Mexican peso devaluation led the Central Bank of Argentina to take several measures to reduce the shortage of liquidity, and avoid the systemic character of the crisis. The main instruments used were reduction of reserve requirements, incentives to redistribution of liquidity among the banks through inter-bank lending, insurance system for the deposits, and more flexibility in its discount-window policies.[15] Indeed, the Central Bank used its discount window to reduce the effects of the financial panic. The amount of lending was kept to a minimum in the last quarter of 1994. But, on 20th December, when the Mexican crisis was explicitly recognized in the world

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14 If a pure-currency- board regime was in operation, the two lines, in Figure 4, should overlap throughout the whole graph.

15 See Banco Central de la República Argentina, *Informe Anual al Congreso de la Nación*, 1995, p. 3-5.

financial markets, and the Mexican currency devalued, more flexibility was attached to Argentina's central bank discount window policies. Loans to banks facing liquidity problems jumped to US$62.5 million by the end of December 1994, and reached US$ 292.5 million at the end of January 1995. The development of liquidity crisis of the financial system led the discount window to a balance of US$ 1,234.6 million in March, and US$ 1,634 million in April of the same year.[16]

The degree of flexibility in the monetary policy to handle the crisis is reflected in the deviation of the monetary base from the foreign reserves during the first two quarters of 1995, as is evident in Figure 4. It was not sufficient, however, and the drain of bank deposits during the first quarter of 1995 was monumental. By the end of April 1995, Argentina's financial system had lost 18 percent of the deposits it had before the Mexican peso devaluation. As a measure of the severity of this contraction, Argentina experienced in just three months the same proportional contraction in deposits as the United States did during the first two years of the Great Depression. (Zarazaga, 1995, p. 17) The run against the banks became a run against the domestic currency leading to capital flight, and a sharp decline in foreign reserves. The effects upon the monetary base are clearly depicted in Figure 4.

The Mexican crisis was followed by several crises arising from South-East Asia around October 1997. The contagious effects of Asian crisis of October 1997 affected Argentina's less than the Mexican crisis because the country had re-structured its financial system in the period post - Mexican crisis. At the same time, using the small degree of freedom that the quasi-currency-board arrangement permitted Argentina's Central Bank acted, as pointed out above, in a way that international reserves grew in a faster rate than the monetary base (Figure 4).

The monetary rule implied by the fixed exchange rate with currency-board arrangement establishes that the monetary base should follow closely the amount of reserves. Currency-board arrangements imply an abdication of monetary policy. The analysis of the Argentine case suggests a co-movement between the two time series. The investigation of the long-run properties of these time series (foreign reserves and the monetary base in Argentina), making use of cointegration analysis, is performed. The results are presented below.

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16 It is important to point out that "*in fact, during Argentina's financial crisis Art. 17 of that country's central bank charter was modified by presidential decree to give that institution more flexibility in its discount-window policies. That charter, approved by law number 24.144 of September 23, 1992, had enacted the central bank independence. But the presidential decree raised and justified the fears that the whole central bank charter and, therefore, central bank independence, would be repudiated.*" (Zarazaga, 1995, p. 19)

Cointegration analysis

For estimation purposes, the variables are measured by their end-of-period balances and are taken on a monthly basis from reports of the Argentine Central Bank. Monetary base (m) and foreign reserves (r) are considered in logarithmic form. Estimation is carried out for the period 1991:M3 to 1998:M2. From Table 1, all variables apparently yield an I(1) process under both the ADF and the Phillips-Perron tests.

Estimation of an autoregressive distributed lag (ADL) yielded the following solved static long-run equation (number in parentheses are standard errors):

$$m = 0.963\ r + Seasonals$$
$$(SE)\ (0.0853)$$

Autoregressive distributed lags have error-correction representations and our next step is to investigate the dynamic properties of our initial model using information from the preceding cointegration analysis. The Engle-Granger (1987) theorem establishes that if a group of variables form a valid cointegration vector then it is possible to obtain a valid error correction representation which is not liable to the problem of spurious regression. After some experimentation with the dynamic terms, following the general-to-specific modelling strategy, our estimates of a parsimonious version of the ECM equation are given below (numbers in parentheses are standard errors):

$$\Delta m = 0.111 + 0.4295\ \Delta r - 0.306\ \Delta m_{-2} - 0.084\ sD_{95:1} - 0.196\ iD_{95:1} - 0.279ECM_{-1} +$$
$$(SE)\quad (0.022)\ (0.0916)\qquad (0.0837)\qquad (0.0195)\qquad (0.0465)\qquad (0.0669)$$

$$+ Seasonals$$

where Seasonal are 11 monthly seasonal dummies and ECM is the error correction term, which is obtained from the ADL solution above. It is noteworthy the importance of the step and impulse dummies for January 1995. This confirms the impression that monetary policy became even more tight after the contagious effects of the Mexican currency crisis of the end of 1994. Also, the coefficient for the error correction term appears remarkably stable. The equation also presents numerous desirable statistical properties with favourable diagnostic tests; standard errors are in parentheses; $AR\ F(q, T - K\quad q)$ is the LM statistic for qth-order autocorrelation; $ARCH\ F(q, T - K - 2q)$ is the LM statistic for qth-order ARCH; RESET is Ramsey's statistic for mis-specification; and $NORM\ \chi^2 (2)$ is the Jarque and Bera's normality statistic (p-values appear in brackets).

AR 1- 5F(5, 59) = 1.7961 [0.1276]   ARCH 5 F(5, 54) = 0.592611 [0.7056]
Normality $\chi^2(2)$ = 0.802838 [0.6694] χ^2 F(19, 44) =   1.1371 [0.3511]
RESET F(1, 63) = 1.5989 [0.2107] R^2 = 0.750 RSS =   0.0869 F(16, 64) = 12.021   DW = 2.40

In the short run, changes in monetary base balances respond to past months' excess demand (supply) increasing (decreasing) by 28%, implying that short-run deviations from long-run *equilibria* are completely recovered after roughly 3 months.

Table 1
Unit Roots Tests

	m	r
I(0)		
DF	-0.056	0.524
ADF	0.051	0.559
I(1)		
DF	-3.703	-6.393
ADF	-3.434	-3.559

The critical values for 5% and 1% levels of significance are -1.951 and -2.634, respectively.

It should be noticed that regardless of the changes in the short-run behavior of the monetary basis *vis-à-vis* the foreign reserves, captured by the "dummies" added to the error correction model, the long-run relationship is preserved. This cointegration analysis strongly supports the idea that Argentina, in fact, followed the quasi-currency-board rules during the period examined.

Brazil's sterilization policy

The **Real Plan**, officially introduced on 1st July 1994, has been considered by several analysts as the most successful stabilization plan in Brazil's history. The main goal of this stabilization plan has been the achievement of price stability. The principal element of the Real Plan was the exchange-rate nominal anchor. According to the Law (Law number 9.069 approved in 29.06.1994) that created the Real (a new monetary unit), monetary policy was designed to keep in line with the dollar reserves. The relationship between changes in monetary base and movements in foreign reserves was not explicitly stated leading the way to some degree of discretion. However, Brazil's Congress established monetary targets for

the first quarter following the approval of the Law. For the next periods to come, quarterly monetary policies had to be submitted by the Central Bank to the *Conselho Monetário Nacional,* and once approved they should be submitted to the Senate for acknowledgement, and finally to Brazil's Congress for approval. In December 1994 the last Provisional Measure defining the new monetary unit clearly reinforced the Law on the issuance stating that the Congress should approve monetary targets. These measures were consistent with the exchange-rate policy based on a quasi-target-zone regime. An upper limit to the exchange rate of one-to-one was announced and the lower limit, regardless of no explicit written commitment, was perceived by the market as lying around R$ .85 per unit of dollar. Initially the authorities permitted the exchange rate to float below the upper limit. This was identical to the establishment of a regime having just a one side band. With the exchange rate appreciation (around September of 1994) that followed the plan and the increase in trade deficits, the economic agents started to face monetary authority's intervention on the foreign-exchange market. In October the Brazilian Central Bank informally indicated that it was willing to buy dollars at a minimum rate of R$.82/US$1, and sell at a maximum rate of R$.86/US$1, characterizing the adoption of an informal system of target zones that evolved to a formal regime of exchange-rate bands in March of 1995. From that period until January 1999, when the **Real** was allowed to float, the Central Bank announced formally the band limits, realigning from time to time - a system that resembles moving target zones. Inter-band interventions did occur, as well, leading analysts to associate the system with some sort of crawling peg.

What is clear is that in the Brazilian case, the monetary base, and most of the monetary aggregates did not follow the foreign reserves pattern during the period being examined (1980s and 1990s) and displayed in Figure 5. In particular, it should be noticed that the monetary base was kept almost constant during the critical period between January 1995 and April 1995.[17] Analyzing the conditioning components of the monetary base - domestic credit (CRE) and foreign reserves (RE) - it is noteworthy that open-market operations tried to offset the negative pressure of the decline in the foreign reserves. On the other hand, during the improvement of the foreign reserves position, in the second half of 1996, the monetary base was kept more or less constant. The insulation of the monetary base from the movements of the foreign reserves, depicted in Figure 5, is remarkable.

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17 Following the Mexican crisis of December 1994.

However, what is noticeable is the absence of co-movement between the two series confirming the **discretionary** character of the Brazilian monetary policy.[18] This monetary policy is consistent with the high inflow of foreign capital needed to finance imports.

Here, as in the Argentine experiment, it is worth investigating the long-run properties of these time series before proceeding to a cointegration analysis of domestic credit and foreign reserves. For estimation purposes, the variables are measured in current US dollars by their end-of-period balances and are taken on a monthly basis from reports of the Brazilian Central Bank

Figure 5
Brazil: Monetary Base, Domestic Credit and Foreign Reserves
(1980-2000)
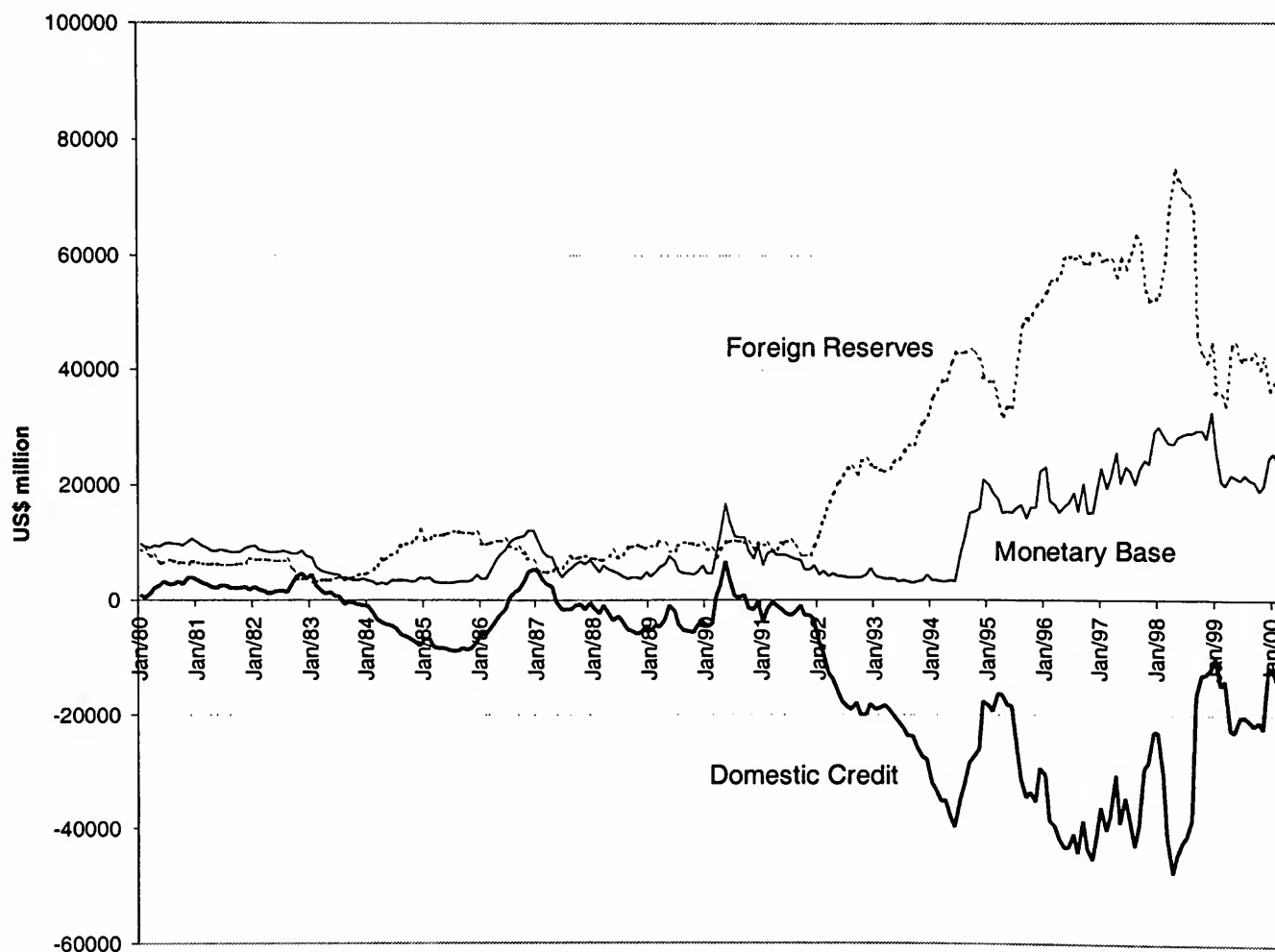
Source: Authors' elaboration based on data published in *Boletim do Banco Central do Brasil*, several issues.

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18 It should be noted, however, that the second half of 1994 was marked by the monetization phenomenon in which case the change in portfolio of agents should bear very little relation to the foreign reserves.

From Table 2, all variables apparently yield an I(1) process under both the ADF and the Phillips-Perron tests. Initially, estimation is carried out for the whole sample, 1980:M1 to 2000:M3. The estimated model yielded the following results:

$$cre = +17.33 -0.7202\ r +0.3237\ sD_{98:1}$$
$$(SE) \quad (1.186)\ (0.1252) \quad (0.3528)$$
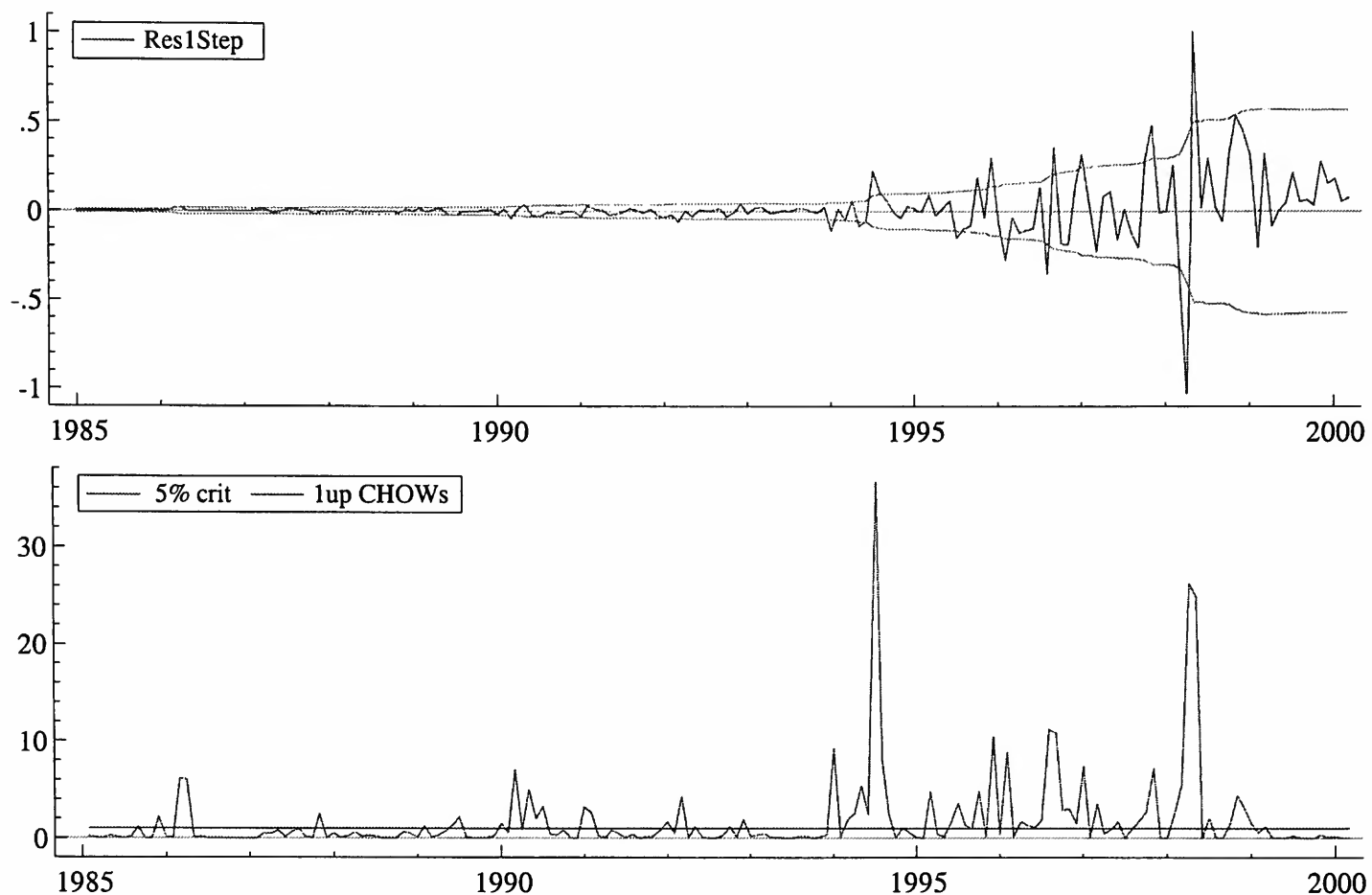
+ *Seasonals*

Nevertheless, observation of Figure 6 suggests a strong change of regime around 1990. For that reason we estimated the same model for two different samples. The first sub-sample encompasses the period 1980:M1 to 1990:M2 whereas the second sub-sample spans from 1990:M3 to 2000:M3. The assumption is that there was a significant change in monetary policy between these periods especially with the implementation of the **Real Plan** on July 1994. Surprisingly, the collapse of the exchange-rate regime in January 1999 that drastically affected the level of foreign reserves (Figure 5) did not represent a significant change in the monetary policy (Figure 6).

Table 2
Unit Roots Tests

	cre	r	Residuals cointegration
I(0)			
PP	-0.8637	0.4667	-9.6239
ADF	-1.0626	0.2495	-5.7732
I(1)			
PP	-8.8155	-6.7343	
ADF	-4.1249	-4.1610	

The critical values for 5% and 1% levels of significance are −2.88 and −3.49, respectively.

Figure 6
Analysis of the Residuals for the Period 1980-2000

A long-run relationship between credit and foreign reserves defines the monetary policy of the first period: 1980:M1 to 1990:M2 according to the following results:

$$cre = \quad +11.95 \quad -0.1158\ r\ -0.002862\ Trend \quad +0.172\ sD_{86:2} \quad +Seasonals$$
$$(SE) \quad\quad (0.1183)\ (0.01338)\ (0.0002271) \quad\quad (0.01455)$$

The short-run relationship confirms the existence of the long-run relationship pointed above. The error correction mechanism shows that the adjustment towards a long-run equilibrium takes about one year.

$$\Delta cre = 0.006 + 0.358\ \Delta cre_{-1} -0.182\ \Delta r +0.049\ \Delta r_{-1} +0.023\ \Delta r_{-2} +Seasonals +$$
$$(SE) \quad (0.004) \quad (0.08) \quad\quad (0.015) \quad\quad (0.02) \quad\quad (0.015)$$

$$+0.002\ sD_{86:2} -0.212\ ECM$$
$$(0.002) \quad\quad (0.04)$$

AR 1- 7F(7, 94) = 0.70593 [0.6670]   ARCH 7 F(7, 87) = 1.0442 [0.4066]
Normality χ^2 (2)= 0.03133 [0.9845] χ_i^2 F(22, 78) =   1.6797 [0.0501]
RESET F(1,100) = 0.73061 [0.3947]

This short-run relationship can be understood as a **policy reaction function** pursued by the monetary authorities. The short-run coefficient that relates the change of credits with the change of reserves indicates that about 17 percent of the inflow of reserves is sterilized. The existence of the long-run relationship alluded above might be expressing the effectiveness of the sterilization policy.[19]

The period that starts in March 1990, the beginning of a previous stabilization experiment - the Collor's stabilization plan, indicates a change in the long-run relationship between domestic credit and foreign reserves. The long-run coefficient of credit on reserves that was around (-0.12) jumps to (-0.9).

$$cre = +18.98 \; -0.8636 \; r \; +0.2293 \; iD_{98:1} + Seasonals$$
$$(1.553) \quad (0.1497) \quad\quad (0.236)$$

The short-run relationship confirms the existence of the long-run relationship pointed above and denotes a substantial change of the **credit policy reaction function**. The short-run sterilization coefficient reaches (-1.6).

$$\Delta cre = 0.126 \; + \; 0.191\Delta cre_{-3} \; - 1.589 \; \Delta r - 1.319 \; iD_{98:4} -0.518 \; iD_{98:3} +$$
$$(SE) \quad (0.068) \quad (0.067) \quad\quad (0.244) \quad\quad (0.193) \quad\quad (0.194)$$
$$+ \; 0.385 \; iD_{96:9} \; -0.758 \; iD_{96:10} -0.295 \; ECM \; + Seasonals$$
$$(0.195) \quad\quad (0.192) \quad\quad (0.052)$$

AR 1- 7 F(7, 73) = 2.7446 [0.0138]   ARCH 7 F(7, 66) = 1.5478 [0.1668]
Normality χ^2(2) = 1.5258 [0.4663] χ_i^2F(21, 58) =   1.0529 [0.4211]
RESET F(1, 79) = 8.0106 [0.0059]

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19 On sterilization policy and its effects on exchange rates and monetary aggregates see Edison (1993).

In the short run the Monetary Authorities tend to overshoot: on top of the 100% of the inflow of foreign reserves that is sterilized an additional amount of domestic assets is sold, corresponding to about 60% of the original inflow. Nevertheless, the adjustment to the long-run sterilization coefficient however is very rapid and takes only 4 months.

This analysis strongly confirms the scope and the nature of the sterilization policy. Moreover these results point to a significant structural change: recent stabilization plans were followed by a strong sterilization policy by the monetary authorities. The existence of a long-run relationship between domestic credit and foreign reserves suggests that elements of independent monetary policy may have been possible even with a moving target band.[20]

It is notorious that even after the adoption of the floating exchange-rate regime in the period - post January 1999 - the analysis above suggests a continuation of the sterilization policy. This result should be taken with caution given that the experience with floating is very recent.

As a result of public deficit finance and sterilization policy there was a steady rise of the quasi money, contained in the monetary aggregate M2 as well as in the extended monetary base.[21] Figure 7 displays the growing discrepancy between foreign reserves, M2 and the extended monetary base. The ratio of M2/Reserves goes from 1.8 to 4.4 during the period analyzed.

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20 It has been suggested that the exchange regime followed a crawling peg rather than target band.

21 Extended monetary base is defined as: Monetary Base + Reserve requirements + Total federal securities.

Figure 7
Brazil: Monetary Aggregates
(1994-1997)
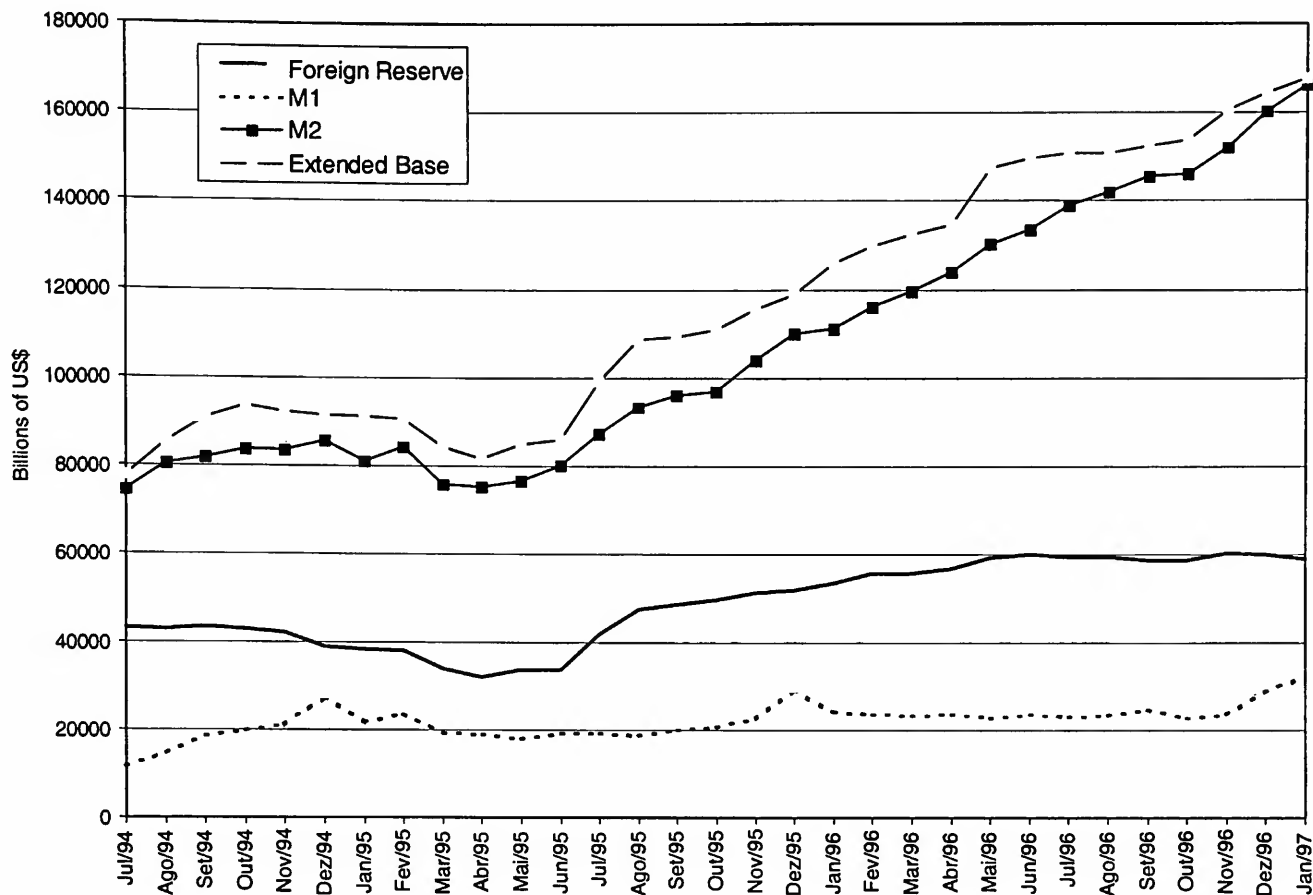
Source: *Boletim do Banco Central do Brasil*, several issues.

## Brazil's reaction to external shocks: contagious effects

A fundamental test of the stability of the Brazilian program was the Mexican crisis of December 1994. The government resisted a maxi-devaluation but in March 1995 introduced a system of 'expressly stated' bands, with the possibility of periodic revisions to avoid a misalignment of the exchange rate. In other words, a moving target-zone regime or some sort of crawling peg as mentioned before. Credibility was challenged, with all the consequences that the recent literature has raised about this important issue.

The size of the effects on the financial system, particularly on the foreign assets from one side, and on the monetary policy on the other, is of great importance for understanding the monetary regime and its commitment to limit discretionary actions.

The increase in the demand for reserves that characterized the spill-over of Mexican crisis (**Tequila effect**) is displayed in Figure 8. The total loss of reserves from December 1994 to March 1995 reached around US$ 7 billion.

The spill-over of the Mexican crisis seriously affected the net inflow of capital, particularly portfolio capital. According to Silva and Torrance (1998), between January 1995 and March 1995 there was a net capital outflow of US$ 2,052 million. This is a high figure considering the fact that in the first six months following the implementation of the **Real Plan** there was a net inflow of US$ 677 million. Brazil was losing reserves due to the speculative outflow of portfolio capital, and also due to a substantial deficit in the trade balance. The latter can be explained partly by the speculation in the trade of visible goods (postponement of exports and anticipation of imports *a la* Calvo's 1994 explanation) but the main cause flowed from the overvaluation of the exchange rate.[22]

Figure 8
Brazil: External Sector Operations (US$ million)
(1994-1997)
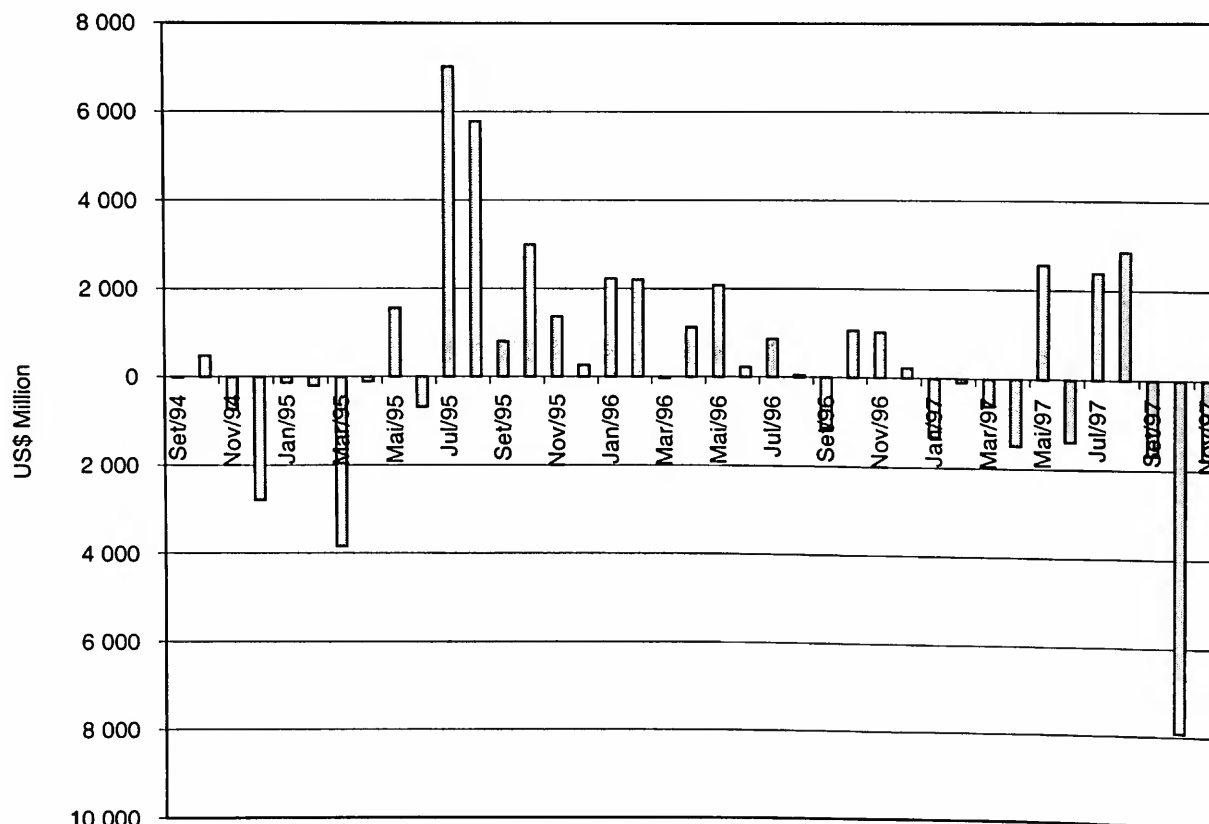
Source: Authors' elaboration from data published in *Boletim do Banco Central do Brasil*, several issues.

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22 The intertemporal substitution effect that Calvo (1994) points out (which in practice shows up most notably in durable goods) appears whenever there is lack of general credibility on the stabilization plan being not restricted to commercial liberalization policies.

To reduce liquidity, following the sudden fall on the foreign reserves, several decisions were taken by the monetary authorities: an increase in reserve requirements for time deposits, an increase in the tax rate on financial operations involving bank loans (from 6 to 18 percent), a prohibition on financial intermediation involving commercial paper by banks, and a mandatory 60 percent deposit with the central bank on bank assets used for collateral guarantees and selected loans. Nevertheless, a simple inspection of the behavior of the monetary base *vis à vis* the foreign reserves shows that liquidity fell less than foreign reserves (Figure 5).

Several measures were taken on the foreign front, as well, to act directly upon the outcome of the current balance. The results of this set of policies were: a slow down on the economic growth performance and, as expected, a recovery of the trade balance as the result of the recession and the currency devaluation. In August 1995, the country presented a trade surplus that remained until October 1995. This trade balance improvement was mainly due to the temporary recession, and disappeared in the second half of 1996 with the slight recovery of the economy. (Silva and Torrance, 1998)

The repercussions of the MIT economies (Malaysia, Indonesia, and Thailand) crises (May-November 1997) upon Brazil have been similar to the spill-over of the Mexican crisis. The data on external sector operations of the Central Bank shows a loss of reserves even more severe than the one that occurred in the aftermath of the Mexican crisis (Figure 8). Similarly, the monetary base did not fall as much as the fall in the reserves. On the contrary, the insulation of the domestic liquidity to the substantial outflow of capital was remarkable as it is depicted in Figure 5, denoting the nature of the sterilization policy.

Concluding remarks

As we have examined the integration process in Latin America possesses a unique feature in that the members of the MERCOSUR union are likely to attach their currencies (or a common currency) to an outside currency, the US dollar. The differences in exchange-rate regimes bring differences in monetary regimes. Accordingly, Argentina keeps their hands tied up following a currency board type regime, without autonomous monetary policy, and Brazil follows a target band with severe sterilization and more recently a floating system with an active monetary policy. This implies asymmetries of adjustment of these economies to monetary and real shocks. These asymmetries are likely to jeopardize the sustainability of the MERCOSUR integration arrangement.

Indeed, the empirical experiment based on cointegration analysis strongly supports the idea that Argentina follows a strict rule - there is a robust long-run relationship between foreign reserves and monetary base movements meaning that Argentina has abdicated from independent monetary policy. In the Brazilian case, a long-run relationship between domestic credit and foreign reserves suggests that monetary authorities pursue some degree of independence as far as monetary policy is concerned. A **credit policy reaction function** revealing an almost complete sterilization of foreign reserves indicates that Brazilian monetary policy is geared towards domestic price stabilization rather than to domestic growth.

As it is well known in the literature when countries within a bloc start adopting their own sterilization policy measures, such as it seems to be the case of Brazil, the tendency is towards an amplification of the shocks suffered by that country upon the other economies of the bloc that do not sterilize.[23] This is especially so when these economies adopt currency boards as it seems to be the case of Argentina. The insulation provided by sterilization policy is similar to the benefits of a floating exchange-rate arrangement. In the case of MERCOSUR, this constitutes an additional obstacle to be overcome: the contrasting monetary rules adopted by Brazil and Argentina.

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23 See, for instance, Argy (1994) and Krugman & Obstfeld (1994).

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