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## Capital flows, capital controls and currency crisis: The case of Brazil in the nineties

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Nº. 389

CAPITAL FLOWS, CAPITAL CONTROLS AND CURRENCY CRISIS:  
THE CASE OF BRAZIL IN THE NINETIES

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# Capital Flows, Capital Controls and Currency Crisis: The Case of Brazil in the Nineties

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## Abstract

The resumption of capital flows to developing countries in the nineties is intertwined in the Brazilian case with the attempts to achieve inflation stabilization. A very restrictive monetary policy has offered probably the world's highest yield to fixed income investments. In the context of favorable external factors to capital flows, the huge interest rate differential caused massive short term capital inflows to Brazil. After 1995, foreign direct investment, mainly associated with the privatization process, has become more important as a source of foreign capital. During the first period, the magnitude of those flows exacerbated two main macroeconomic problems: an increase in the quasi-fiscal deficit due to the interest payments on the debt used to sterilize the inflows, and, after the Real Plan, also the overvaluation of the currency. The restrictions to capital inflows are described and analyzed, as well as the main "financial engineering" strategies used to circumvent the restrictions. Given the advanced stage of domestic financial markets—including a powerful derivatives market—the restrictions imposed have not been fully effective in preventing the inflows of short term foreign capital to invest in the high-yield-public debt, but they probably had a temporary effect. Given the small progress achieved so far in the fiscal side of the reforms, it is also doubtful that the capital inflows' restrictions have been effective in a broader sense, that of allowing the government to buy time to implement the essential structural reforms. By reducing the urgency of the politically costly structural reforms aimed at increasing domestic savings, capital inflows have detrimental incentive effects on the government's resolve to push forward the stabilization plan, as shown by the lack of commitment in carrying out the fiscal package promised during the Asian crisis. If the external finance package is successful in deterring the current daily losses of foreign reserves and in regaining the market's confidence, it remains to be seen if the current crisis was strong enough to make the newly reelected Brazilian government live up to its renewed promise of fiscal austerity.

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## **I. Introduction**

The history of the resumption of capital flows to the Brazilian economy since the early nineties is intertwined with the success of the current stabilization plan, the Real Plan of July 1994. The very large volume of reserves worked and still works as the (short term) insurance policy of the exchange rate, which anchored the new currency. Nevertheless, the large volume of capital flows has prompted the government to try to fine-tune its size and composition.

Here we characterize those flows, and analyze their main determinants. A simple econometric model finds that the interest rate differential has been, since 1991, the main determinant of the short term capital inflows. We then carefully review the empirical evidence on the interest rate differential between the Brazilian bond markets and abroad. We also discuss the reactions to the three crisis: The Mexican (94), the Asian (97) and the current Russian (98) crisis.

The restrictions on capital flows are reviewed and their effectiveness is analyzed. Finally, we sum up with a discussion of the macroeconomic causes and consequences of the capital flows, and the uncertain prospects for the future, emphasizing the possibly negative political economy interactions between capital flows and the fiscal adjustment process, without which the stabilization plan can not be ultimately successful.

## **II. Capital Flows to Brazil in the nineties: Size and Composition**

This section analyzes the capital movements to and from Brazil in the nineties. Data from the late eighties is also included to allow a comparison between these two periods. This shows a very sharp increase of the capital flows in the nineties in contrast to the previous period—when the foreign debt problem was a huge constraint on the Brazilian economy. The resumption of capital flows, together with the foreign debt renegotiation significantly relieved the external constraint, vis-à-vis the earlier period. Three crisis

were faced during the nineties: the Mexican crisis of December, 1994; the Asian crisis which started in July, 1997; and the Russian crisis which started in May 1998. The first two crisis produced capital outflows that were eventually reversed; the third crisis is currently progressing and massive capital outflows are still under way until the moment this document is being closed (October, 1998).

## **II.1.Size**

As many emerging markets, Brazil witnessed a revival of capital inflows in the nineties, after a long period of suspension of external credit. Chart 1 shows the capital account balance since 1987 (both in US\$ millions and as % of GDP), displaying the remarkable reversal since 1992. After a decline in 1993, there is an upward tendency only interrupted in the last quarter of 1997, when the capital flows pattern was sharply reversed due to the Asian crisis. Table 1 illustrates that reversion from a quarterly average capital account surplus of US\$8,5 billion during the first three quarters of 1997 to only US\$0,78 billion in 97.IV. In the beginning of 1998, the after-crisis pattern observed in 1995 repeated itself: massive capital inflows more than offset the outflows during the crisis, and foreign reserves resumed its upward path (see Chart 16). During the first half of 1998, more than US\$31 billion flowed in through the capital account, against US\$15 billion during the same period of 1997.

Chart 2 shows the aggregate net transfers to Brazil, defined as the sum of the capital account balance, the interest payments (negative, because Brazil is a net debtor), and the change in short term liabilities flows (basically arrears). One can detect the same patterns as in the capital account (reversal since 1992), but with a much more marked increase in 1995. This is because in 1992, US\$16.6 billion of the inflows took the form of refinancing,<sup>1</sup> which were used to pay back the arrears (US\$14,253 million of arrears were repaid in 1992). In 1993 the change in short term liabilities flows was positive but

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<sup>1</sup> The main items refinanced were US\$9.5 billion with the Club of Paris, and US\$7.1 of unpaid interest to banks (through IDU bonuses) [Banco Central do Brasil, 1992].

there was a reduction in the capital account surplus. The same 1992 pattern occurred in 1994, now on a reduced level, as the higher capital account surplus was counterbalanced with a higher repayment of arrears. From 1992 to 1994 the aggregate net transfers remained stable, as the higher (lower) capital account surplus was offset by the higher (lower) repayment of arrears. After 1995 the repayment of arrears became extremely reduced, and the high capital account surpluses resulted in a higher aggregate net transfers<sup>2</sup>.

After a net inflow of US\$18,834 million in short-term capital in 1995, this flow decreased to US\$5,752 million in 1996 and became negative in 1997 (deficit of US\$17,516 million). This trend remained in the first half of 1998, when US\$10,267 million of short-term capital left Brazilian economy. One can detect the new pattern of the aggregate net transfers in 1995 and 1996, when around 3% of GDP was transferred to Brazil. Again, due to the Asian crisis these transfers fell in 1997 to around 2% of GDP.

In summary, since the early nineties, Brazil has been receiving increasing inflows of foreign private capital. During the period between the recovery of the Mexican crisis and the start of the Asian Crisis (roughly 95.III to 97.III) those flows have become excessive, creating many problems for monetary and exchange rate policy, as analyzed below. The recovery of the Asian crisis took place during the first half of 1998, with massive short-term capital inflows, but was also very short-lived. The datum for 1998.III, not yet available, will show massive short-term capital outflows, with the consequent loss in foreign reserves.

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<sup>2</sup> For capital movement data see table 1.

## **II.2.Composition**

Chart 3 displays the behavior of medium and long term capital movement.<sup>3</sup> The net figures are presented for the three main components, investments, financing, and currency loans (explained below). Those net figures, together with the net total of medium and long term capital movement, are presented in bars referring to the first axis scale. The gross movements are presented in lines, referring to the second axis scale.

The foreign investments and currency loans caused the reversal of the total net figure in 1992, while the burden of the foreign debt shows up in a steadily negative figure for the item financing, except in 1997, when this account became extremely positive. Both the inflows and outflows grew substantially during the nineties, with the latter reaching almost the US\$106 billion figure in 1997.

### **II.2.1.Investments**

Chart 4 displays the behavior of net foreign investment (direct and portfolio) and reinvestment in Brazil. For the net figures, 1992 is once again a turning point. The decrease in the 1995 figure may be attributed to the effects of the Mexican crisis. In the first quarter of 1995, US\$ 3,352 millions of foreign investment (mainly portfolio investment) flowed out of the country (the year end figure was positive, US\$ 4,670 millions). The same movement was noticed in 1997, however, this time the decline in the foreign investment was explained completely by the portfolio outflows of the last quarter of the year, in opposition to the foreign direct investments, that even at the hardest times remained intensively positive (mainly due to the privatization process).

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<sup>3</sup> These figures come from Table IV.12, Capital Movement, of the Brazilian Central Bank Bulletin (April 1998), and are not directly comparable to those presented in the Capital Account of the Balance of Payments (Table IV.1). The main differences are that the following items are not included in Table IV.12: short term capital flows; inflows due to refinancing; and inflows and outflows of Brazilian residents (except for the item investments). Note also that the Brazilian Central Bank includes portfolio investment in medium and long term capital movement.

Chart 4 presents two striking features: the first is the enormous growth in both inflows and outflows; the second is the also enormous growth in net investment. As Charts 5 and 6 make clear, the main source of growth for the two gross series (inflows and outflows) was the portfolio investment. However, the main source of growth for net foreign investment was portfolio investment only until 1994, with direct investment being the main responsible for the increase in net foreign investment after 1995. Chart 4 also shows the decomposition of net foreign investment into net foreign portfolio investment and net foreign direct investment; it is clear how there has been a change in the composition of the net foreign investment flow toward direct investment in the last two years. We now analyze the foreign direct investment.

Foreign direct investment (see Chart 6) also displayed an upward trend since 1994, with a marked increase in 1996-98. The first half of 1998 attracted approximately US\$16,7 billion and more than US\$37,7 billion were invested in 96 and 97. The main determinant of this enormous inflow was the success of the privatization program<sup>4</sup>. The net foreign direct investment figure for 1998 will display a sharp increase due to the privatization of the largest telecommunication companies. In the following years, the continuation of this trend will depend on the strength of the privatization program and the public-private partnerships in areas previously restricted to state-owned firms (mainly oil and electrical energy).

## **II.2.2.Financing and Currency Loans**

The performance of the Financing item is shown in Chart 7, composed by the multilateral organizations (BIRD, IDB and IFC), bilateral organizations and suppliers and buyers' medium and long term credits.<sup>5</sup>

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<sup>4</sup> Changes in taxes on foreign direct investment also helped those inflows, see Garcia and Barcinski (1998)

<sup>5</sup> The suppliers and buyers' short term credits (less than 360 days) enter the short term capital account of the balance of payments.



The improvement of the capital account performance in the nineties made it possible for Brazil to have a steadily negative Financing account in recent years until 1996, with the amortizations payment surpassing the disbursements. However, in steady state, one would expect that a developing country like Brazil should be a net receiver of official transfers. This reversion was noticed in 1997 and was caused by a large expansion of the suppliers and buyers' medium and long term credits. These credits expanded from US\$1,120 million in 1996 to US\$15,722 million in 1997 (see table 1 for net values). This increase was due to a change in legislation (*provisional measure 1569/97, of 03-25-97*)<sup>6</sup>.

Currency loans, on the other hand, substantially increased as a result of the resumption of capital flows in the nineties, as shown in Chart 8. The decomposition of those disbursements reveals that the main instrument for this increase was the issuance of notes in the international markets, with large volumes starting in 1992. This stands in sharp contrast with the previous decades, when bank loans accounted for most of the disbursements. The decrease of the currency loans in 1997 was caused by an enormous increase in the payment of amortizations in the last quarter of the year, from an average of US\$2,827 million in the first three quarters to US\$11,077 million in the last one, mainly notes and bond amortizations. However, currency loans returned massively in the first half of 1998, for a total of US\$20,2 billion. Once more, the issuance of notes accounted for more than 50% of this total.

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<sup>6</sup> Due to the high interest rates in Brazil, importers tended to postpone the repayment of their short-term import credits in order to profit from the interest rate arbitrage. This interest rate arbitrage gain helped the imports vis-à-vis the domestic import substitutes, worsening the trade balance. To alleviate this problem, the Brazilian government obliged the importers to pay for the goods they intend to buy no less than 180 days before the goods' arrival in Brazil. As this rule was not applicable to imports financed for a period over 360 days, this kind of credit increased largely, which was reflected on the suppliers and buyers' medium and long term credits. These credits, that accounted for only 3% of total imports, increased to a total of 45% after the measure. Some other measures were taken to avoid ways to postpone the payments. Therefore, the positive Financing account represents an alternative (better) source of external savings to the short term capital flows that have entered the Brazilian economy in the first half of the nineties, with positive impact to the stabilization plan. Data for the first half of 1998 show that Financing remained positive, with a total of US\$5,5 billion, caused once again by the large suppliers and buyers' medium and long term credits surplus.

Chart 9 summarizes the main facts regarding the composition of capital movements to and from Brazil since the late eighties. The solid line is the total medium and long term capital movements (footnote 2 explains the difference between this figure and the capital account balance), presenting the same pattern of some other capital flows indicators, becoming very positive and increasing after 1991. The main factors that compose this line are shown in the columns. The chart shows that until 1996 the main explanatory factors for the growth of medium and long term capital movements in the recent years were Foreign Portfolio Investments, Currency Loans - Notes, and Foreign Direct Investments. On the negative side, the main factors were Financing (repayments to official agencies), Currency Loans - Banks (repayments to Banks), and Brazilian Investments abroad. Also, the short run capital inflows presented an upward tendency. In 1997, however, there were two main changes. Firstly, both the commercial loans (positive in the previous years and negative in 1997), and financing (negative before 1997 and highly positive then, see section 2.II.II). Secondly, the dotted line that represents the short term capital movements, which also turned positive in 1992, and reached the very high level of almost US\$20 billion in 1995 (thereby surpassing the medium and long term capital movements in that year), became extremely negative in 1997, after decreasing substantially in 1996. As we shall analyze, this abrupt increase in 1995 of short term capital flows was a response to capital controls. On the other hand, the medium and long term flows increased since 1995, indicating a better quality in the capital flows composition. Note that the Brazilian Central Bank bulletin classifies the portfolio investments as medium and long term capital movements, not short term ones. If we classify portfolio flows as short term capital movements, the predominance of short term capital inflows in 1995 becomes much more striking, but decreases just after that.

### **III. Main Determinants**

In addition to the improved economic prospects of Brazil in the medium and long run, its extremely high interest differential in comparison with the developed economies,

was essential to attract the massive portfolio and direct investments observed in the nineties.<sup>7</sup> Therefore, we start by considering the interest rate differentials between Brazil and the US.

### ***III.1. Interest Rate***

After devaluing the Brazilian currency by 15% on the last day of September 1991, when foreign reserves reached the lowest legal limit, the Brazilian Central Bank adopted the strategy of raising the interest rates to very high levels. After the devaluation, the Brazilian authorities adopted a daily crawling-peg, thereby conveying to investors the message that a stable real exchange rate was being aimed.<sup>8</sup> The large interest rate differential between the Brazilian and international rates attracted an intense short term capital flow in order to gain arbitrage profits.<sup>9</sup>

We follow Frankel [1991] in using the covered interest parity differential (CID) as our measure of attractiveness of domestic bond markets to foreign investors. The CID is defined here as the remaining US\$ yield once both the forward discount and the international interest rate are deducted from the domestic interest rate. Note that this extra gain does not lead the foreign investor to incur an exchange rate risk, since the investor is already covered in the futures exchange market.

In a fully integrated international capital market, we would expect arbitrage to drive this differential to zero. That's why Frankel [1991] sees the CID as the most adequate measure of capital markets' integration. His empirical results shows that positive measures of CID are related to restrictions to capital inflows, while negative measures of CID are related to restrictions to capital outflow.

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<sup>7</sup> Calvo et al. (1992) conclude that external factors (basically low interest rates in the US) have been dominant for the capital flows to Latin American countries, up to 1992.

<sup>8</sup> The ex post result was a real appreciation, which further increased the arbitrage gains.

<sup>9</sup> For a detailed description of this period, see Carneiro and Garcia [1994].

### III.1.1. The Covered Interest Differential

Many considerations must be made before implementing a theoretical concept as the CID. Firstly, monthly data is considered for the period 1991 to 1997 (see Chart 10). We use the monthly overnight interest rate as Brazilian domestic interest rate ( $i$ ). The US dollar futures market in Brazil is used in order to compute the forward discount, since no liquid forward market exists. For each month, we use the expected devaluation signaled by the futures market at the first day of that month ( $f$ ).<sup>10</sup> The foreign interest rate is the US Treasury bill ( $i^*$ ). The equation that estimates the CID (in % per year) is computed through (1) below.

$$CID = \left[ \frac{(1+i)}{(1+f) \times (1+i^*)} - 1 \right] \times 100 \quad (1)$$

Chart 10 exhibits the results, with the domestic interest rate and the expected devaluation being represented in the left-hand scale in % per month and the US T-bills rate and the CID in the right one, both in % per year.

The policy earlier described is clearly noticed in Chart 10 when, starting by the end of 1991, interest rates were raised to very high levels. Adding to this high interest policy, the exchange rate policy (until the Real Plan) of targeting the real exchange rate gave foreign investors a very high yield, especially with the unattractive low interest rates abroad in the early nineties and, less so, nowadays. The massive capital inflows caused by this interest rate not only solved the shortage of foreign reserves problem, but also posed the opposite problem, that of an overabundance of foreign reserves.

At the beginning of the Real Plan, in July 1994, the exchange rate was allowed to float for a short while and, due to the high interest rate that prompted incipient capital

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<sup>10</sup> As is well known, futures prices are not unbiased expectations of the future spot price [Hodrick, 1987, has a very comprehensive review of the unbiasedness tests for exchange forward prices until then]. However, what we need to compute the CID is exactly what is provided by the futures market, a hedge against the exchange rate risk.

inflows, it appreciated considerably, both in real and in nominal terms. This gave extremely high gains to foreign investors who had their money in Brazilian markets. However, not all this extra gain is shown up in Chart 10, because even during the currency appreciation period, a positive forward discount prevailed in the futures market. The CID shows that the Brazilian markets, except for December 1994, offered very attractive arbitrage opportunities to foreign investors.

The CID is the best measure of the country risk premium, (...) *because it captures all barriers to integration of financial markets across national boundaries: transaction costs, information costs, capital controls, tax laws that discriminate by country of residence, default risk, and risk of future capital controls* [Frankel, 1991]. The CID can be calculated through different ways, once it can reflect one of the many different options the foreign investors have to invest in fixed income in the Brazilian market Brazil without incurring in the exchange rate risk. Daily data since August 1994 will now be used to compute the CID. Three different ways of computing the CID, and their systematic differences will be studied.

#### ***III.1.1.1. The CID Computed with US\$ futures***

The futures market data are used to compute both the internal interest rate and the forward premium. In Brazil, the most liquid private interest rate market is a futures market, at the Brazilian Commodities and Futures Exchange (BM&F – <http://www.bmf.com.br/>). Therefore, the domestic interest rate is computed through the annualized daily expectations on the compound interbank rate (CDI) over the next three months.

For the forward premium (the “nominal expected devaluation”), the exchange futures market data are used. Chart 11 displays these data. The thick solid line at the bottom is the spot exchange rate (R\$/US\$). Each of the other lines that converge to the spot rate is the futures price series for a given contract maturing at the first day of the respective month. That is, the sequence of futures prices “forecasting” the exchange rate on<sup>12</sup>

October first, 1998 is the jagged line that joins the spot rate series on October first, 1998.

Note the distinctive pattern of convergence from above of the futures to the spot price. In the jargon of the futures market, this is called *contango*, although this term may mean something else (Duffie [1989]). The fact that the futures prices are on average higher than the spot price at maturity is consistent with the exchange rate being positively related with the aggregate risk of the economy. Long exchange rate futures positions provide a hedge against the Brazilian systemic risk. Therefore, the return on such investments must provide very low (even negative) average returns.

To finish the computation of this domestic CID, the foreign interest rate used is the LIBOR (in US dollars). In Chart 12, the results are shown by the solid (green) line above the others most of the time.

### ***III.1.1.2. The CID Computed with Brazilian Bonds issued in US\$***

The Brazilian government bonds issued and negotiated abroad, whose yields are already in US\$, can also be used as a measure of country risk or CID, simply deducting the foreign interest rate (LIBOR, in this case) from the secondary market yield for these bonds. For this purpose, we use the most liquid Brazilian bond for the whole period studied, the IDU.<sup>11</sup> The CID computed with the IDU is the smooth dotted (red) line that is below the others for most of the time. For the more recent period, we include the CID computed with another Brazilian Brady Bond, the “C-Bond” (capitalization bond), which became the most liquid security among all emerging market Brady bonds. It is the (blue) solid line.

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<sup>11</sup> The IDU Bonds are bonds issued by The Federal Republic of Brazil under the terms of the Brady refinancing agreement. The issue size was US\$ 7,200 Millions and the issue date was November 20, 1992. The maturity is January 1, 2001, and the average life was 5 years.

### ***III.1.1.3. The CID Computed with Brazilian Bonds indexed to US\$***

Bonds indexed to US\$ are also offered in the domestic market. The most liquid bond with such indexation is the NTN-D, which are indexed to the US dollar, but redeemed in domestic currency (R\$), unlike the Brady bonds. The NBC-E has similar characteristics.<sup>12</sup> This offers a third possible way to compute the CID, just deducting the foreign interest rate from the yield paid on this securities. We were only able to find the data for the rates paid on these securities at the auctions, which are usually held every fortnight. Maturities range from three to 24 months, the latter being placed fully in the Central Bank portfolio. We omitted the rates for the securities placed directly with the Central Bank, thereby considering only the placements with the public. These are the (black) columns in Chart 12.

### ***III.1.1.4. Comparison of the three different proxys of the country risk for Brazil***

The three different CIDs explained above are illustrated in Chart 12: the first (solid line) uses the exchange futures market to cover for the exchange rate risk implicit in Brazilian domestic bonds and deducts the LIBOR (US\$); the second takes the spread between the rate of internationally traded Brazilian foreign debt (IDU and C-Bond) and the LIBOR (US\$); and the last (bars) take the spread between the rate of exchange-rate-linked domestic debt (NTN-D and NBC-E) and the LIBOR (US\$).

There is a systematic difference between these three different measures. Note that, except for the periods after the Mexican crisis of (first semester of 1995) and the Asian crisis (second semester of 1997), the measure of CID constructed with the domestic futures market lies above all the others. This difference has decreased substantially, and, since the Russian crisis has been reversed.

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<sup>12</sup> For a description of the Brazilian domestic debt market, see Bevilaqua, Carneiro, Garcia and Werneck [1998].

This difference can be explained by default risk, taxes, exchange-rate-spread risk and the effect of the term structure. As the NTN-Ds are usually longer than the longest futures contract available (three months), if NTN-Ds' CID (the bars) are lower than the domestic futures' CID (the solid (green) line), this may reflect the agents' expectations of a future decrease in the interest rate differential, as has indeed happened over a large portion of the period studied.

Other three factors can explain the differential between the IDU CID and the two other measures. Entrance tax (IOF) and income tax (15% and, since 1/1/98, 20% on domestic fixed income investments) are among the restrictions analyzed in this paper that may have important role in this difference.

The second factor is the basis risk under which is incurred the foreign investor who enters the Brazilian market through the "floating" market. Brazil still has a dual exchange rate market: the "free" (or commercial) and the "floating" rates. The only liquid futures market in Brazil uses the commercial ("free" segment) US dollar. Therefore, investors who must buy "floating" US\$ at the time they withdraw the money from Brazil might lose if the government decides to devalue at a faster rate the "floating" vis-à-vis the "free" US\$. Although both of them, in the recent years, have been kept by the Central Bank very close one to another, this may change in the event of an exchange rate crisis. Therefore, this "exchange-rate-spread" risk may be responsible for part of the differential between the measures of CID. Again, if this hypothesis is true, one may learn about the investors' expectations on the sustainability of the exchange rate by the behavior of this spread over time. A few investment banks offer a special convertibility futures OTC contract, which insures the holder from this risk.



The third factor, the default risk, may signal that investors see the Brazilian government more committed to honoring the securities traded abroad (e.g., the IDU) than those traded at home (e.g., the NTN-D).<sup>13</sup>

#### III.1.1.5. *The CID During the Mexican, Asian and Russian Crisis*

The behavior of the differential between the IDU CID and the other two measures of the CID after the “tequilazo” and the Asian Crisis are very similar. To study what happened with the different CIDs during the crisis, we use logarithms to decompose equation (1), getting equation (2) below:

$$\ln \text{CID} = \ln(1+i) - \ln(1+f) - \ln(1+i^*) \quad (2)$$

Chart 13 compares the three measures of risk during the Asian crisis, all of them measured in logarithms. The components of the CID are the three areas, represented on the left axis. The first area, at the bottom of the chart shows the foreign interest rate  $\ln(1+i^*)$ . The area over the  $\ln(1+i^*)$  represents the forward premium (“expected devaluation”) signaled by the US\$ futures market  $\ln(1+f)$ , and the upper area shows the CID  $\ln(\text{CID})$ , i.e., the difference between the  $\ln$  domestic interest rate and the other two areas. Therefore, the sum of the three areas is exactly the interest rate signaled by the futures market  $\ln(1+i)$ . The lines are measured on the right axis (also in logarithms) and represent the CID with futures data (which is the same as the upper area on the left axis), with the C-Bond CID and with the IDU CID.

The most important date is 30-10-97, when the Brazilian central bank more than doubled the basic interest rate (the SELIC rate). Note that just before this interest rate increase, the CID constructed with the domestic futures market was below the IDU

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<sup>13</sup> This conclusion seems to disagree with the practice of the credit rating companies. In most cases those companies give a better credit rating to the “sovereign risk” of government securities issued in domestic currency than to the “sovereign risk” of government securities issued in foreign currency. For example, the “sovereign rating” for Portugal securities issued in foreign currency is AA-, while it is AAA for Portuguese securities issued in domestic currency (Silveira, 1996).

CID. The last time this phenomenon had occurred was during the Mexican crisis of 1994/95, showing the similarity between these two periods. This happened because the IDU rate increased after the crisis, reflecting the natural increase of the risk premium required by investors to hold Brazilian bonds. The CID computed with the domestic rates, however, falls, denoting that during the aftermath of the crisis Brazilian domestic interest rates did not rise enough to counterbalance the negative effect of the increase of the expected devaluation (signaled by the futures market) over the CID. As the Brazilian Brady bonds issued in US\$ provided then a higher yield than the internal one, there is a natural capital outflow from the internal market to the external.

Chart 14 shows that the capital started to exit the country. This evidence is consistent with the claim that the CID is the best proxy for the attractiveness of domestic fixed income investments to foreign investors. After increasing the interest rate in 30-10-97, there was a reduction in the expected devaluation and the domestic CID became higher than the IDU CID, at a level 10 percentage points over its level before the crisis, attracting again large sums of capital inflows.

Again, in the period after the Russian crisis, the domestic CID fell below the IDU and the C-Bond CIDs. Since that period until the moment of this writing, capital has been steadily flowing out of the country, even after interest rates have been once more raised to levels above 40%.

Therefore, we claim that there is a stylized fact (which we have not yet been able to confirm econometrically) that whenever the domestic CID falls below the international (IDU and C-Bond) CID, capital tend to leave the country. Our interpretation for this is the following. The yield relevant for the domestic CID is the interest rate determined basically by the Brazilian Central Bank, while the yield relevant for the international CID is the secondary market yield of the Brazilian bonds (IDU and C-Bond). During crisis, the Brazil risk increases, and this is fully reflected by the increase in the Brazilian external bonds' secondary market yields. However, domestically, the interest rates

may not rise enough to fully reflect the increase in the Brazil risk, since the Central Bank interferes with the domestic interest rate. In such cases, capital started. to flee the country as it seems to have happened in the three crisis analyzed.

### ***III.2. Other Determinants: An Econometric Exercise***

In addition to the interest rate differential, many other factors helped to attract foreign capital to Brazil. The solution of the external debt problem (by the Brady plan) together with the success of the Real Plan in keeping a low level of inflation for already four years encouraged foreign investors to make more permanent investments in Brazil. Despite the very bad rate attributed to Brazil by the main international credit rating agencies, Moody's and Standard & Poors' (Silveira, 1996), massive direct investments have been flowing into Brazil, as discussed in Section II.2.1.

To study which were the main determinants that moved these capitals toward the Brazilian economy, we followed the suggestion of Labán and Larraín (1994)<sup>14</sup>, and used the following variables as regressors: the covered interest differential (CID), the average investment/GDP ratio in the previous four quarters (IGDPR4Q), the rate of GDP growth (GDPGR), and the current account deficit/GDP ratio (CADGDPR). Another variable of interest would be the foreign debt/GDP ratio as a proxy for the country risk. However, those data could not be collected as long as the Central Bank stopped computing it in a regular basis in the nineties.

The results of the econometric exercise are presented in Appendix 1, with quarterly data from 1985:1 to 1997:4. OLS with the standard errors corrected by White's (1986) heteroskedasticity-autocorrelation consistent covariance matrix estimator is used. In Appendix 1, there are 40 regressions consisting in eight combinations of the regressors

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<sup>14</sup> *Both GDP growth and the investment GDP ratio are expected to have a positive effect on capital inflows. Clearly, capital would be more attracted to come into a growing economy, and one that is investing strongly. Finally, the coefficient on the current account deficit is expected to be positive, because a higher deficit will likely require more external financing* (Labán and Larraín, 1994, p. 12). **18**

for each of the five dependent variables: TOTLRUN (total of long and medium run net flows, including official loans and portfolio investment), SRCF (short run capital flows, excluding portfolio investment), TOTNOF (total of long, medium, and short run net flows, excluding only official loans), TOTSR (total of short run capital flows, including net portfolio investments), NOFLR (total of long and medium run net flows, excluding official loans and portfolio investment). The regressions in which all regressors are used are displayed in Table 2.

The creation of the Annex IV (see explanation in Section IV below) in 1991 expanded substantially the integration of Brazil with the world financial markets. This and some other measures provided the liberalization of portfolio flows through the capital account. So we created a dummy for it (DANNEXIV), that consists of 0 for all quarters before 1991:1 and 1 afterwards. In view of the possible impact of liberalization on the effect of the explanatory variables on the capital flows (the slopes), we also introduced in the regressions the interaction (the product) of this dummy variable (DANNEXIV) with each explanatory variable. Those have the same name as the original variable with a D at the beginning.

In the Appendix 1 each regression occupies two lines, and is identified by a number from 1 to 40. They differ in terms of the dependent variable, whose acronym is displayed immediately after the number, and the combination of regressors used. When a coefficient and respective t-statistic do not appear, that means that it was excluded from that regression. Besides the coefficients' estimates and respective t-statistics, we report the R squared, the R bar squared, and the Durbin-Watson statistic for first order autocorrelation. The level of significance of the F test (p-value), whose null hypothesis is that all coefficients are zero, is reported under the Durbin-Watson statistic. One can easily see that nearly for all the cases, the null hypothesis of joint insignificance of all variables is easily rejected at the 1% significance level.

Regressions 1 to 8, which report the results for the dependent variable TOTLRUN (total of long and medium run net flows, including official loans and portfolio investment) show that only the covered interest differential and the current account deficit/GDP rate shows up significantly after 1991 in a few regressions (DCID and DCADGDPR). No other variable shows up significantly.

Regressions 9 to 16, which report the results for the dependent variable SRCF (short run capital flows, excluding portfolio investment), show that besides covered interest differential and current account after 1991 (DCID and DCADGDPR), also the investment/GDP ratio is significant, both for the whole period (IGDPR4Q) and for the change in the slope in 1991 (DIGDPR4Q). For that variable, the highest  $R^2$  and  $\bar{R}^2$  are achieved. This is consistent with the fact that the short run capital flows are precisely the kind of capital flows most sensitive to interest rate variations.

Regressions 17 to 24, which report the results for the dependent variable TOTNOF (total of long and medium run net flows, excluding official loans but including portfolio investment), also show that besides covered interest differential after 1991 (DCID), also the GDP growth ratio is significant, for the change in the slope in 1991 (DGDPR4Q), however with a negative influence. The constant and its dummy (DANNEXIV) also show up significantly in a few regressions.

Regressions 25 to 32, which report the results for the dependent variable TOTSR (total of short run capital flows, including net portfolio investments), show that besides covered interest differential after 1991 (DCID), also the investment/GDP ratio (IGDPR4Q) is significant, but the hypothesis of no slope change in 1991 for the investment variable is not rejected.

Regressions 33 to 40, which report the results for the dependent variable NOFLR (total of long and medium run net flows, excluding official loans and portfolio investment), show that the covered interest differential after 1991 (DCID) shows up significantly in all eight regressions. Both the investment/GDP rate for the whole period and the GDP

growth after 1991 (IGDPR4Q and DGDPRGR) shows up significantly in all regressions in which it is included.<sup>15</sup>

Table 2 summarizes the main econometric results commented above. It presents only the regression with all independent variables for each measure of capital flows. As shown, the most important variable explaining capital flows is the covered interest differential after 1991. The fact that only after 1991 the interest rate differential shows up significantly in the regressions (through the variable DCID) proves that there has been a change of regime. The main changes can be attributed to the renegotiation of the external debt and the opening of the Brazilian economy to foreign investors after the creation of Annex IV (and other measures). The covered interest differential can only become significant when capital mobility is allowed. Note also that the CID has components of both “pull” (the domestic interest rate) and “push” (the international interest rate, with a negative sign) factors.

Chart 15 illustrates the effect of the interest rate differential along the periods. We perform a rolling regression (regression 9 on Appendix 1), with observations until the quarter shown on the X-axis. The solid line is the series of estimated coefficient for the variable DCID. The dotted line is the upper limit of the bilateral hypothesis test that the coefficient is zero, with size equal 5%. Chart 15 shows that the hypothesis that this variable had no effect on capital flows was not rejected until the third quarter of 1996. From this time on, the interest rate differential became significant. If anything, this evidence shows that the short-term flows to Brazil are becoming increasingly dependent of the interest rate differential. One should bear in mind that, as shown in Section II, the capital account is now much more dependent on direct investments than on short term flows.

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<sup>15</sup> To partially address the criticism that the estimates may suffer from simultaneous equations bias, all regressions were rerun with the dependent variables lagged one quarter. The qualitative results did not change.

## **IV. Capital Controls**

As we have shown in Section II, since the last quarter of 1991, Brazil started attracting large capital inflows. Section III documented econometrically that the very high domestic interest rates were a decisive factor in attracting short term capital. The excessive amount of short term term inflows towards investments in fixed income started posing macroeconomic problems to the government, as we will analyze later. The restrictions on the capital inflows imposed by the government starting in the second semester of 1993 had the dual objective of changing the composition of the inflows away from fixed income and towards stocks and fixed investment, and to decrease the inflows aimed at arbitraging short term interest rates.

Firstly, the measures aimed at reducing the excessive inflow of short term foreign capital are described, and then their effectiveness in achieving the macroeconomic goals is studied. As will be shown in this Section, in the nineties all the legislation regarding the foreign sector was aimed at restricting capital inflows, in sharp contrast to the previous capital outflows restrictions. However, instead of simply eliminating the previous capital outflow restrictions, many of the measures described below just relaxed the previous limits, but kept them in place, probably as an insurance against a return to the previous situation of recurrent exchange rate crisis.

### ***IV.1. Description of Legislation***

The liberalization process that started during the late eighties continued in the nineties, as the main changes in regulation were still aimed at further opening the capital account. Since 1987, portfolio investment was fostered by the creation of specific channels, through the establishment of resolution 1289, that created annexes I-III. That gave foreign investors exemption from domestic income tax on capital gains. However, given the high capital inflows in the nineties, the need to revise the legislation was flagrant.

So, in May 1991 is created the so-called Annex IV—Securities Portfolios for Institutional Investors—, which became very attractive to foreign investor because, in contrast with the previous channels, provided many ways of allocating the investment without further requirements. Annex IV became the most widely used vehicle to invest in Brazilian stock and derivative markets. Only foreign institutional investors, such as Pension Funds, Portfolios belonging to Financial Institutions, Insurance Companies, and Foreign Investment Funds may invest in those portfolios. Despite the regulation, wealthy investors are known to have “individual funds” under Annex IV.

In 1992, the additional income tax on profit and dividend remittance abroad was abolished. More options were given to foreign investors, who were then allowed to invest in derivative markets, and to firms which were then allowed to issue securities convertible into stocks abroad. Also, there was a reduction in the minimum length of stay of foreign capital invested through privatization auctions, from 12 to six years. Regarding reinvestments in Brazil, foreign investors were no longer required to wait for two years before being able to sell assets purchased through the privatization process [Banco Central do Brasil, 1993].

In 1993, together with the implementation of several liberalizing measures on exchange markets, the government started a gradual process of reducing the participation of short term capital inflows directed to fixed income securities, in order to prevent further increases of the domestic government debt. According the Brazilian Central Bank Annual Report [1994]: *The impossibility of a more drastic reduction of the rate differential between domestic and foreign interest which would naturally discourage the inflow of foreign financial savings, resulted in measures that would make it possible to attenuate the monetary impact of the foreign sector, without interrupting the process of integration with international financial markets.*<sup>16</sup>

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<sup>16</sup> Interest rates were kept at very high levels to control aggregate demand in view of the lack of further fiscal adjustment.



Some measures in order to diminish the short term capital flows were taken in June 1993, when the Central Bank expanded the minimum average amortization term of financial loans from 30 to 36 months. Furthermore, for purposes of the fiscal benefits related to the income tax on remittances of interest and other charges, the periods of these operations were increased from 60 to 96 months. Other measures were taken to delay the inflow of export revenues, by increasing the period for exchange contracting from 45 to 180 days after the actual shipment. In the case of export credit (advances on exchange contracts -- ACCs), the maximum period between the inflow of resources and the shipment of the merchandise was decreased to 180 days (from 360). Regarding imports, it also allowed the anticipation of the exchange contracting in relation to the maturity of the liability abroad up to 180 days (before it used to be 45 days), unsuccessfully trying to make importers pay their dues in advance.

Banking regulation was also changed to prevent dollar denominated liabilities and allow for larger amounts of dollar denominated assets; the selling positions (dollar liabilities) defined on the basis of each bank's net worth were reduced by 50%, while buying positions (dollar assets) were increased from US\$2 to US\$10 million (excesses must be deposited at the Central Bank).

Since 1987, portfolio investment was fostered by the creation of specific channels that gave foreign investors exemption from domestic income tax on capital gains. However, given the high capital inflows in the nineties, the need to revise the legislation was flagrant. So, in May 1991 is created the so-called Annex IV—Securities Portfolios for Institutional Investors—, which became very attractive to foreign investor because, in contrast with the previous channels, provided many ways of allocating the investment without further requirements. So, Annex IV became the most widely used channel to invest in Brazilian stock and derivative markets. Only foreign institutional investors, such as Pension Funds, Portfolios belonging to Financial Institutions, Insurance Companies, and Foreign Investment Funds may invest in those portfolios. Despite the regulation, wealthy investors are known to have “individual funds” under Annex IV.

Nonetheless, by the use of financial operations, investments were made through Annex IV in order to provide fixed income gains. Given the tax exemptions of the investments under Annex IV, in August 1993 the National Monetary Council (CMN) forbade funds channeled through Annexes I to IV from being invested in fixed yield bonds, including exchange NTN (a dollar linked Treasury bond) and commodity investment funds (which actually worked as fixed-income-like funds). The effects of this regulation can be immediately noticed in Table 3. In August 1993 there were US\$ 1,734 million of Annex IV funds invested in fixed-income-like securities and funds when those investments were forbidden (the item “others” in Table 3). By September 1993 this figure had already dropped near to zero. However, at this time, debentures were the alternative found by the market to circumvent the regulation and keep investing in fixed income. The figures for this investment item rose from US\$ 275 million in August to US\$ 1,284 in September, US\$ 2,183 in October, and US\$ 3,011 in November. Table 3 clearly shows how the item “debentures” replaced the item “others” (mainly the fixed-income-like securities and funds). In November, the CMN moved to close this loophole by also forbidding investments in debentures (only those already purchased with maturities longer than five years could be kept until maturity). A specific channel for fixed income investments was also created, the Foreign Capital Fixed Yield Funds, which levied a 5% “entrance” tax (IOF) on the initial exchange rate transaction. Financial loans in currency also started paying a 3% “entrance” tax (IOF).

Investments through derivative markets were the responsible for the new round in the game between regulators and investment banks. As these markets were fairly well developed in Brazil, one could easily use them to provide fixed yields.<sup>17</sup> By December a new Central Bank measure was enacted forbidding a broader range of fixed-income-

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<sup>17</sup> For a description of derivatives markets in Brazil, see Braga (1996).

like securities, including investment strategies involving derivatives that lead to predetermined returns, e.g., a box.<sup>18</sup>

The evaluation made then by the Brazilian Central Bank of those measures was that they (...) *placed obstacles in the path of foreign capital entering the country with the exclusive purpose of seeking the earnings made possible by interest rate levels. At the same time, the structure that favors the inflow of resources to the stock market was preserved* [Banco Central do Brasil, 1994].

Another way to gain fixed yield through Annex IV was purchasing a government security (NTN-National Treasury Notes) under a broad interpretation of a Decree that listed the NTN as a privatization currency. Table 3 shows the growth in the volume of privatization currencies after August 1993. So, in January 1994, a new restriction was enacted on these investments. Two months later, the “entrance” tax levied on the Foreign Capital Fixed Yield Funds was extended to all portfolio investments, although the tax rate was initially set to 0% for Annex IV funds. This was meant as (...) *clear signal as to the possibility of taxing these operations* [Banco Central do Brasil, 1995]. The mechanism of automatic prior authorization of foreign loans was suspended, and renewal or extension of previous loans were also subject to the minimum terms of 36 or 96 months, which prevailed for new loans.

On the eve of the Real stabilization plan—June 30, 1994—several additional restrictive measures were taken: *a) prohibition of transformation of advances on exchange contracts (ACC) into anticipated (sic) export payments (short-term), when this results in the postponement of the regulatory period for shipment of the merchandise; b) the minimum period of amortization of anticipated export payment operations registered at the Central Bank was increased from 360 to 720 days; c) 90 day suspension of inflows*

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<sup>18</sup> A box strategy consists of trading four options, two calls and two puts, so that the payment at the maturity date is fixed. Since the payment is fixed at the maturity date, a no-arbitrage argument leads to the conclusion that the return on the whole strategy must equal the riskless rate of return. In the Brazilian case, this is the rate on the interbank funds market (CDI).

*of foreign resources to be used in future capital increases and bridge investments for later conversion of debt into investments and, following that, indefinite suspension of such operations; and d) 90 day suspension of the taking of foreign loans by public sector entities [Banco Central do Brasil, 1995].*

In the beginning of the Real plan of July 1994, the exchange rate was floated. With the high interest rates prevailing at that time, a nominal (and real) appreciation of the real took place. New measures were taken, as the increase from US\$10 to US\$50 millions in the banks' buying position in the free rate market (before they had to deposit any excess at the Central Bank).

New measures aimed at liberalizing exchange outflows were undertaken in August, 1994, a: *a) the possibility of contracting exchange for future liquidation in operations of a financial nature, an alternative previously permitted only in commercial operations; b) dispensation from the import license for the contracting of import exchange operations; c) permission for anticipated liquidation of foreign liabilities related to financial loans and financing registered at the Central Bank up to August 31, 1994, independently of the resources having completed the minimum period of permanence in the country; and d) free negotiation among the parties of the percentage of the value of imports to be financed in operations with terms of more than 360 days, thus permitting a larger volume of on sight payments that were previously limited to a maximum of 20% [Banco Central do Brasil, 1995].*

Other measures trying to expand the demand for foreign currency were taken, such as the increase from US\$ 1 million to US\$5 million in the value of transfers that the banks were permitted to carry out without Central Bank authorization for purposes of investment abroad by private nonfinancial legal entities. Legal entities were also allowed to purchase real estate abroad, something previously restricted to individuals.

In September 1994, Brazilian investors were allowed to make special investments abroad. These investments should carry at least 60% of (internationally issued)

Brazilian government securities. Also in September, as the appreciation of the real continued taking place, the Central Bank was led to intervene in the exchange markets, preventing further appreciation of the currency, and ending the (short) period of floatation.

At that time, better quality capital was sought by the Brazilian Central Bank. By late October, 1994, new restraints on capital inflows were enacted: *a) reduction in the maximum period for the contracting of exchange prior to shipment and, consequently, of ACC operations, which dropped from 180 to 150 days in the case of exporters with a total value of contracted operations equal to or less than US\$10 millions in the last 12 months (small scale); for medium and large scale exporters, the maximum period was reduced from 180 to 90 days; a maximum period of 30 days was set for products considered essential to internal supply; b) the earmarking of exchange contracting operations to registration of exports, without permitting alteration of the merchandise to be exported. The purpose of this measure was to make it difficult to practice negotiation of export performance* [Banco Central do Brasil, 1995]. Several other restrictions tried to prevent the increase in outstanding credit to Brazilian exports, a well-known channel to avoid capital controls on inflows, including a 15% reserve requirement on ACCs to be deposited at the Central Bank. A 30% reserve requirement was imposed on contracts involving the taking over of the importer's obligations. The aim was to discourage importers from resorting to this financing mechanism offered by banks through withdrawals against credit lines abroad. On November, the reserve requirement rate was increased to 60%.

Furthermore, the "entrance" tax was raised on most portfolio investments and loans: *a) from 3% to 7%, in the case of loans; b) from 5% to 9%, in the case of investments in Foreign Capital Fixed Yield Funds; and c) from zero to 1%, in the case of Annex IV investments. The minimum period for domestic loans under the Resolution # 63 (that regulates banks' foreign liabilities aimed at making loans for agriculture) was raised from 90 to 540 days, and stricter requirements were put in place. Annex IV funds*

could no longer invest in money market funds (FAFs) or fixed-income privatization currencies. Pension funds were allowed to place up to 10% of their reserves in investment funds abroad. Privatization Funds-Foreign Capital were forbidden to invest in domestic debt. A massive liberalization of exchange transactions was undertaken. All measures taken from the beginning of the real plan until the Mexican crisis in December 1994 showed the intention of improving the quality of the capital flows to Brazil, by trying to decrease the short-term capital and increase the long-term flows.

However, the drop in the foreign reserves just after the Mexican Crisis required the government to undo a few of the previous measures aimed at increasing the demand for foreign currency, reestablishing the term of 180 days for the closing of exchange prior to shipment (ACC), while the reserve requirement on that trade-finance instrument was suspended.

These measures were still modest in relation to the ones that would be taken some time later. With the worsening of the trade balance and the danger of a exchange rate crisis, a sharp increase in domestic interest rates was required, along with several other measures that undid the previous restrictions, such as a) the reduction of the “entrance” tax rate from 7% to 0% on foreign loans, from 9% to 5% on investments in Foreign Capital Fixed Yield Funds and from 1% to 0% on Annex IV investments; b) reduction of the minimum average term from 36 to 24 months for new financial loans and from 36 months to six months in the case of renewals or extensions of previous loans; and c) reduction of domestic relending under Resolution # 63 minimum period from 540 to 90 days. The banks’ buying position limit before they had to deposit any excess at the Central Bank was reduced from US\$50 to US\$5 millions.

After a nominal devaluation of 5,2% at the end of March 1995, a new exchange band regime had been implemented, with frequent Central Bank interventions. This new regime aimed at (...) *permitting a gradual devaluation of the “real” against the dollar,*

*without however providing the market any signals as to the speed or intensity of these devaluations* [Banco Central do Brasil, 1996].

Massive capital inflows to Brazil resumed shortly after the Mexican crisis, beginning in July 1995. This was the result of the markets' belief that the exchange rate regime was credible. The restrictions on capital inflows taken before the crisis—and suspended since December—were again put in place in August, 1995: a) foreign loans “entrance” tax was raised from 0% to 5%; Foreign Capital Fixed Yield Funds, from 5% to 7%; b) a 7% tax (IOF) on short term financial transactions between institutions in the country and abroad in the floating rate segment (which was being used to circumvent the restrictions); c) derivatives markets in Brazil were forbidden to foreign investors. Moral suasion was also a widely used method used by the Central Bank with the aim of controlling the inflows.

With the large flows after the crisis, the process of restricting the short-term inflows continued taking place. In September 1995, the “entrance” tax (IOF) on currency loans was changed to provide an incentive to longer loans. A decreasing scale of taxes was adopted, inversely related to the loan maturity: 5% (two years or less), 4% (three years), 2% (four years), 1% (five years), zero% (6 years or more).

In February 1996, another “package” of measures aimed at further restricting short term capital inflows was enacted. For investments under Annexes I to IV, it forbade investments on TDA, OFND, Siderbrás debentures and other securities that provided fixed income results not previously excluded. The minimum average term for currency financial loans was put back to 36 months (new, renewals or extensions). The funds under Resolution # 63, while waiting in a domestic bank to be lent, cannot be invested in NTN-D (exchange-rate-linked domestic debt). A 5% “entrance” tax (IOF) was imposed on investments in Privatization Funds. Foreign investors (individuals or legal entities) were allowed to invest in Real State Funds and Emerging Firms Investment

Mutual Funds, with a tax (10% or 5% for regular registered funds) on all withdrawals for periods shorter than one year.<sup>19</sup>

During 1996, a sharp reduction in the interest rate differential was observed and, given the 7% entrance tax, it became negative for investments under three years. Then, in April 1997, the entrance tax was reduced to 2%, making the domestic interest rate again attractive to foreign investors. Restriction on short-term credit to finance imports were taken during the first half of 1997. Importers were required to pay for the goods at least 180 days before the arrival of the goods or finance the operation for a period over 360 days. This last measure was mainly aimed at attacking the large commercial deficit that had developed after the Real Plan.

Once more, the measures in order to diminish the short-term credit had to be reverted as the Asian crisis hit all the markets. For the second time, measures had to be taken in favor of short-term flows. The minimum average term for currency loans was decreased from 36 to 12 months for new loans, and to only six months for renewals or extensions. The funds under Resolutions # 63 and # 2148 (loans to agriculture), under Resolution # 2170 (construction loans) and Resolution # 2312 (loans to exporters), could again be invested in NBC-E (exchange-rate-linked domestic debt) while waiting in a domestic bank to be lent. Also, the banks' buying position limit before they had to deposit any excess at the Central Bank was reduced from US\$50 to US\$5 millions.

In the beginning of 1998, as part of the "fiscal package" developed during the Asian Crisis, the income tax over fixed income funds for foreign investors was raised from 15% to 20%. This, together with the decrease in interest rates during the first half of 1998, made the covered interest parity differential become extremely reduced for short-term investments.

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<sup>19</sup> By the end of 1996, the government withdrew many of previous measures aimed at restricting the inflow of short term capital.



The next Section evaluates the effectiveness of the controls described above.

#### ***IV.2. Evaluation of the Effectiveness of Capital Controls***

As shown in the previous Section, many regulations regarding capital flows were created or changed since 1993. Although, except for the crisis periods, capital kept flowing steadily (and massively) into Brazil. The result was the continuous accumulation of foreign reserves at the Central Bank, as pictured in chart 16. From US\$10 billion in the beginning of 1991, foreign reserves increased sharply, to a total figure of more than US\$74 billion in April of 1998, almost 10% of GDP and 15 months of imports. The turning points at the end of 1994 and 1997 correspond for the two crisis, but the upward tendency did not seem to have changed until the Russian crisis.

Effectiveness may have several meanings.<sup>20</sup> But what we would like to know is what would have been the capital inflows had Brazil imposed no restrictions on them and had all other factor remained constant? Cardoso and Goldfajn (97) constructed an econometric framework to offer an answer to this question. Using data from January 1988 to December 1995, the main conclusion was that *government reacts strongly and positively to capital flows by changing control measures. Also, capital controls are effective in the short-run but have no lasting effects.*

The ways that are being found by the financial markets to circumvent the restrictions are the responsible for its long run ineffectiveness. Many of these “financial engineering” strategies could be detected. We have already referred to a few of those strategies in the previous Section. In 1996, there has been a massive increase in direct investment (US\$5.8 billion for the first three quarters of 1996). The financial press has

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<sup>20</sup> Surveying the academic literature on capital controls, Dooley [1995] writes: *Empirical work on the “effectiveness” of capital controls has suffered from the lack of a widely accepted definition of what constitutes an effective control program. At one end of the spectrum, evidence of effectiveness has been defined as the ability to detect over extended time periods different average behavior of selected economic variables for countries with and without capital controls programs. At the other extreme, effectiveness has been defined as the ability to maintain an inconsistent macroeconomic policy regime forever.*

attributed a great portion of this increase to fixed-income investments disguised into direct investments to avoid the restriction on capital inflows.

Therefore, it seems that neither the restrictions imposed on capital inflows nor the restrictions relaxed on capital outflows have been powerful enough to prevent massive net capital inflows, except for a very short period. Labán and Larraín (1997) develop a model to show that the liberalization of capital outflows (...) *may not be the appropriate policy to defend the real exchange rate in the presence of massive capital inflows because it is likely to strengthen those very capital inflows*. The Brazilian case seems to corroborate their theoretical result.

Nevertheless, the government claim seems to be that the combination of very high interest rates with those restrictions actually bought the plan enough time to sustain the “exchange rate anchor” until the fiscal and other reforms are implemented. This brings us to a new meaning of effectiveness, i.e., the possibility of achieving a “good” macroeconomic equilibrium that otherwise would not have prevailed in a multiple equilibrium model. Despite our previous argument against the success of the restrictions in preventing capital flows, this might indeed be a possibility, although one would like to have a formal political economy model and convincing data that the needed fiscal reforms are being implemented. For now, we waive our hands on the formal model, but present in the next Section arguments that cast a few doubts on this optimistic line of reasoning.

## **V. A few Macroeconomic Consequences of the Recent Capital Flows**

As an insurance of the Brazilian payment capability, the accumulation of foreign reserves was the main factor that allowed the exchange-rate-anchor strategy followed by the Real Plan. Until the necessary fiscal reforms are undertaken, the high foreign

reserves policy is required to maintain stability, mainly during external crisis periods, as the most recent Russian crisis has made once more clear.

The price paid to keep this strategy has been very high. The most important macroeconomic flaws—which are the real appreciation of the currency, with the detrimental effects on the current account of the balance of payments, and the very high interest rates, which hampers economic growth and cause a quasi-fiscal burden because of the massive sterilization undertaken—make the macroeconomic policy mix inconsistent in the long run. As we will argue, this macroeconomic policy mix only makes sense as a bargaining device to win the political fight necessary to obtain the fiscal adjustment.

### ***V.1. Real Exchange Rate Appreciation***

The capital inflows that occurred both before and after the Real Plan caused a sizeable real appreciation. Although, after stabilization plans it is common to have some degree of appreciation, in the Brazilian case this movement was exacerbated in the first years of the stabilization plan, and has decreased in the last two years.

In order to compute the real exchange rates, proxies for domestic and international inflation must be chosen. CPI or WPI are the most used, although using one or another can lead to different measures, given the well known disparity between the price of tradable and non-tradable goods in the early stages of the stabilization's (see Bruno, 1993). We will not provide any measures of real appreciation, since to measure the degree of overvaluation is not the subject of this paper.

Since the stabilization plan, the external accounts have gradually deteriorated. From a situation of no current account deficit before 1994, this account became extremely negative after the real plan. In the three year period 1995-97, the deficit added up to more than US\$70 billion, and what is even more serious, showing an upward trend. In<sup>34</sup>

1997, the US\$33,4 billion represented more than 4% of GDP. This is clearly a risky strategy in a world of volatile capital flows, as the Russian crisis once more made clear. On the other hand, if further progress is not attained on the fiscal side, a devaluation of the Real would not save the stabilization plan. Of course, if fiscal deficits of the magnitude of the recent ones persist (nominal deficit of 6.1% GDP for 1997 and 7.27% for the first half of 1998), no nominal anchor will prevail in the long run.

## ***V.2. Increase in the quasi fiscal deficit and in the domestic debt because of massive sterilization***

The sizable accumulation of foreign reserves, which were sterilized in order to avoid a large increase in the money supply poses another macroeconomic problem. As the foreign reserves held at the Central Bank were invested at international rates, this massive sterilization implied a higher net interest rate expenditure, which can approximately be measured by the CID (the CID has actually been much lower, since the forward discount has been much higher than the actual devaluation of the Brazilian currency). The real interest rate payments<sup>21</sup> remained extremely high in the nineties, with an yearly average of 3,8% of GDP from 1992 to 1997. However, the last years worsening in the fiscal position can not be attributed only to the interest rate payments. These were responsible only for one fourth of the massive negative fiscal shift that occurred in 1995 (the operational fiscal balance moved from a 1.3% of GDP surplus in 1994 to almost 5.0% deficit in 1995). The other three fourths occurred because of the worsening position of the accounts that enter the primary surplus, which fell from 5.2% of GDP in 1994 to only 0.4% in 1995. More important than the inverse Tanzi Effect observed in Brazil after the real plan<sup>22</sup>, was the expenditures' increase after Cardoso's government. In 1996, despite the falling interest rates, which corresponded to an expenditure of 3,66% of GDP in real terms (low compared to the 5,4% in 1995), the total budget deficit was still very high, at 5,87% in nominal terms, as the primary deficit worsened even more, to a surplus of merely 0,09% of GDP. This same picture was observed in 1997, with real interest rates expenditures falling to 3,39% of GDP but the total deficit remaining stable at 5,89%. The nominal deficit worsened further in the first

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<sup>21</sup> It is the difference between the operational and the primary deficits.

<sup>22</sup> The Tanzi effect states that low inflation has positive effects on the public sector budget, because expenditures are indexed but receipts not. In Brazil, the opposite is observed, as inflation improves fiscal situation.

half of 1998, surpassing the 7% of GDP, despite the fiscal package released to counteract the Asian crisis.

Chart 17 shows the growth in the domestic net federal debt.<sup>23</sup> Until mid-1995, all the growth in the debt since January 1991 could be fully explained by two factors: the unfreezing of the blocked bank accounts which occurred in the Collor administration,<sup>24</sup> and the accumulation of foreign reserves. Note how this changes dramatically after July 1995. Until December, 1996, a gap of almost US\$70 billion opened up between the net federal debt and the sum of the other two series, and this gap exceeded US\$100 billion in 1998, after the negotiation of São Paulo's biggest bank debt (Banespa), which increased the federal debt in over US\$50 billion. This is the consequence of the deterioration of the fiscal accounts, although some outlays may not show up immediately in the fiscal accounts, as loans to troubled financial institutions.<sup>25</sup>

<sup>23</sup> This is the "Dívida Mobiliária Federal" minus the securities traded with the states and municipalities (LBC-Es).

<sup>24</sup> That is, compulsory savings were transformed into voluntary savings.

<sup>25</sup> The deterioration of the fiscal accounts may be evaluated from the below table extracted from Bevilaqua and Werneck [1998].

## PUBLIC SECTOR NET DEBT AS % OF GDP: BRAZIL

Item	Dec-94	Dec-95	Dec-96	Dec-97
(1) Federal Government Net Debt	12.3	13.0	16.4	18.2
Gross Debt	31.7	34.0	40.9	45.7
Domestic Debt	19.9	23.6	31.4	37.3
Foreign Debt	11.8	10.4	9.5	8.4
(-) Foreign Reserves	5.8	7.0	7.8	6.4
(-) Other assets	13.7	14.0	16.6	21.1
(2) States and Municipalities Net Debt	9.5	10.4	11.9	13.5
Domestic Net Debt	9.2	10.1	11.5	13.0
Foreign Net debt	0.3	0.3	0.4	0.5

## VI. Conclusion

Capital flows to Brazil resumed in the early nineties. Brazil, as many other developing economies, profited from favorable external factors (see Calvo and al. [1992]). The liberalization of exchange flows and the renegotiation of the foreign debt allowed the economy to place itself as one of the main recipients of foreign capital flows. With the success of the current Real Plan, this trend became even stronger.

Nevertheless, the main determinant of short term foreign capital flows has been the huge interest rate differential between domestic and international interest rates. This differential, which is maintained to guarantee the domestic consistency of the stabilization plan until further fiscal reforms are enacted, has attracted massive flows of short term speculative capital. After 1995, however, direct investment has been progressively more important as a source of net capital inflows to Brazil, especially those flows associated to the privatization process.<sup>26</sup>

We use the covered interest differential (CID) as the preferred measure of the attractiveness of Brazilian bonds to foreign investors. The CID represents the extra gain

(3) Public Enterprises Net debt	6.7	6.5	6.1	2.8
Domestic Net Debt	4.9	4.8	4.0	0.9
Foreign Net debt	1.9	1.7	2.0	1.9
Public Sector Net Debt (1+2+3)	28.5	29.9	34.4	34.5

The Table shows that from the 1740 basis points (bp) increase in the net federal debt in domestic securities from December 94 and December 97, only 600 bp were attributable to the fiscal deficit during that period (this is the increase in the net federal debt). The remaining 1140 bp were attributable to the decrease in the less expensive foreign debt (340), and the purchase of assets by the federal government in the form of loans to public and private domestic financial institutions (740 bp) and foreign reserves (60 bp).

<sup>26</sup> As a percentage of the capital account balance, the foreign direct investment has the following behavior:

Year	1992	1993	1994	1995	1996	1997
FDI/CAB (%)	6	6	13	13	29	63

that an investor would have by investing in the Brazilian bond market instead of investing in fixed income abroad, **already discounting the exchange rate risk**. The econometric results show that, until 1997, the huge interest rate differential has been the main factor responsible for the short term capital flows to Brazil in the nineties.

We surveyed and analyzed the restrictions to those short term capital inflows. The main conclusion is that those restrictions have not been able to prevent foreign capital from profiting from arbitrage opportunities with Brazilian bonds, although there are not enough observations to determine how much capital would have flown in had the restrictions not been in place.

Capital flows have exacerbated the substantial real appreciation of the domestic currency since the Real Plan of July 1994. This has harmed the current account balance, bringing doubts as to the long term sustainability of the exchange-rate anchor. Given the very high level of foreign reserves (US\$ 70 billion on the eve of the Russian crisis), the government used to claim to have enough buffers to confront a reversal of capital flows. The current negotiations with the IMF and the G-7 to provide an external package to sustain the exchange rate proved that even that high level of reserves were not sufficient to counteract the reversal of the capital flows, although the foreign reserves are buying Brazil the time to negotiate its way out of the current crisis. It is not clear at this point if the package under negotiation will suffice to prevent a devaluation. The only sure thing is that the current fiscal deficit is not consistent with inflation stabilization in the long run.

In sum, since the end of 1991, with only a few minor interruptions, Brazil has received massive foreign capital inflows. Until 1995, those flows were not predominantly caused by bright investment opportunities in fixed capital or even in the stock market, but by an enormous interest rate differential that was generated both by very high domestic rates in Brazil and by low domestic rates abroad in the major part of the last five years. After 1996, foreign direct investment became the main source of net capital inflows. Those



flows resulted in a major accumulation of foreign reserves. Those reserves worked as an insurance policy of the Real Plan, permitting the Brazilian government to keep an exchange rate anchor for very long.

However, the easy (but costly) access to foreign savings had a detrimental incentive effect on the government as to its determination to push forward economic reforms needed to balance the budget, open the economy, reform the tax and pension systems, privatize state-owned companies and banks, allow free entry in sectors previously restricted to government enterprises (oil, telecommunications, and infra-structure), reform the public sector, among others. All those reforms, and above all the fiscal restriction needed to balance the budget, are very costly in political terms.

The capital flows to Brazil represent, therefore, a blessing and a curse. They are a blessing because without them the Real Plan would not have subsisted so far. They are a curse because, as the recent political economy literature has documented, structural reforms are usually a result of crisis, not good times. By making available foreign savings, the capital flows reduce the sense of urgency of the structural reforms, thereby jeopardizing the ultimate success of the stabilization plan.

To pursue the structural reforms despite the unfavorable short term political trade-off is, therefore, the main challenge to the current administration. As shown in the Mexican case of December 1994, investors may change their minds extremely fast as to the likelihood of the success of a stabilization policy, once the structural reforms are not being carried on. Brazil is currently paying the reputational price of having reneged on its promise of fiscal austerity, made after the Asian crisis.

Another important stylized fact of the Mexican experience is that the nationals, not the foreigners, were the first to leave Mexican investments (see, among others, Frankel and Schmukler [1996]). Until now, hopefully, the Brazilian nationals did not follow that path. Nevertheless, the capital flows that have served so far as a backbone of the stabilization plan may very well turn into a very hard punishment if the notoriously

volatile investors' confidence is threatened. If Brazil is lucky enough to survive the current crisis, our newly reelected government had better not waste this new chance, and carry out the recently announced fiscal package, unlike what was done with the previous one enacted after the Asian crisis.

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Chart 1  
CAPITAL ACCOUNT BALANCE

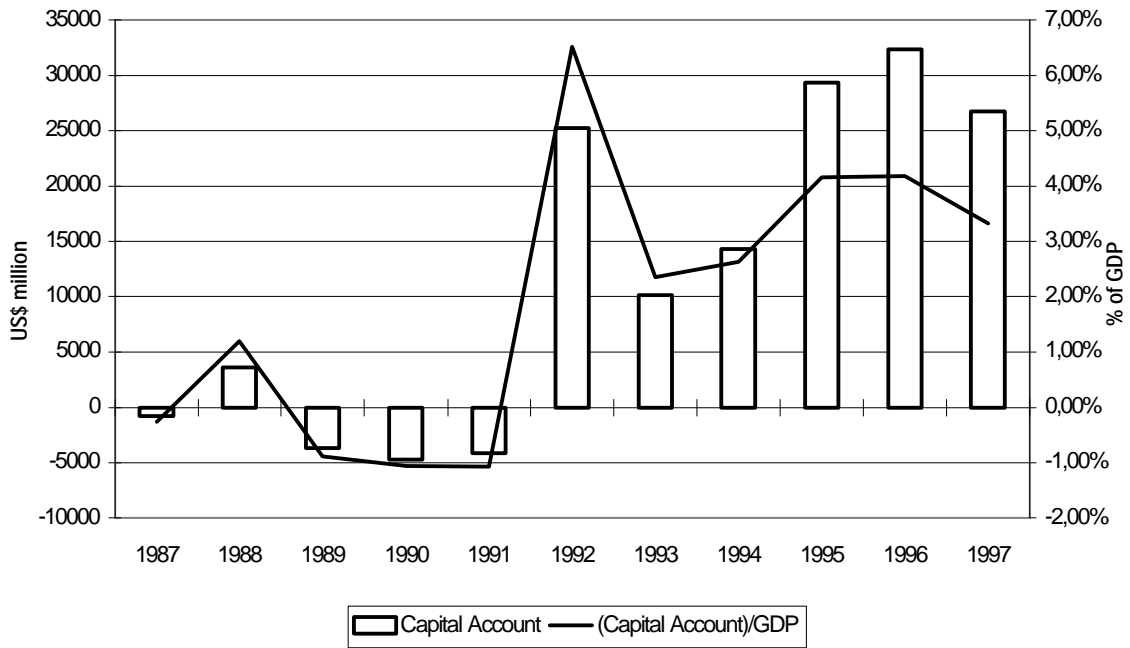
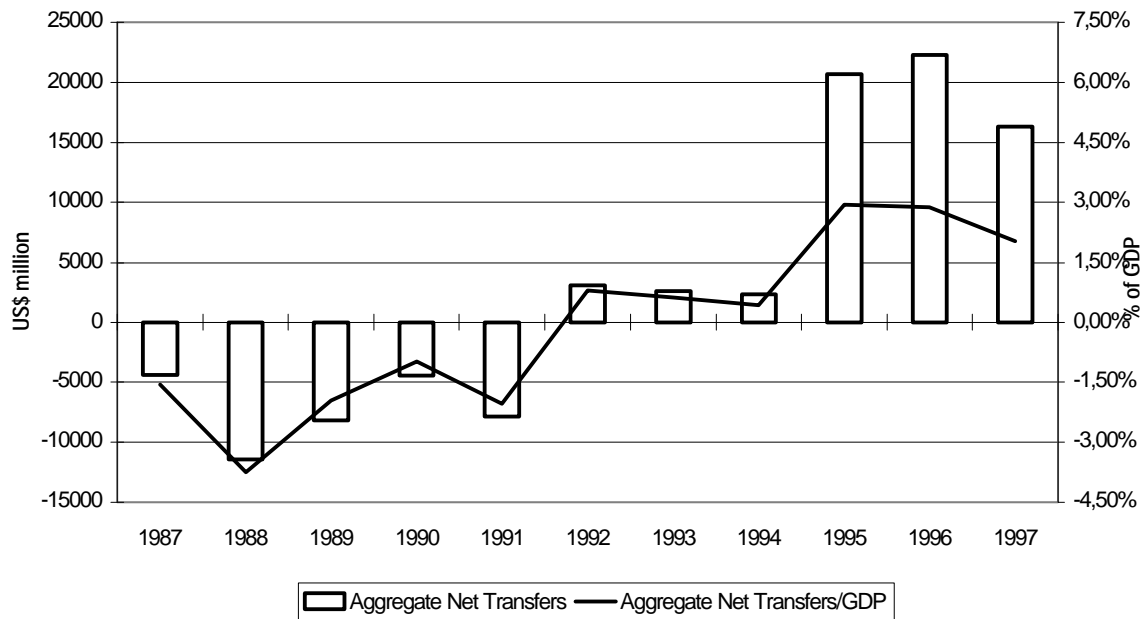
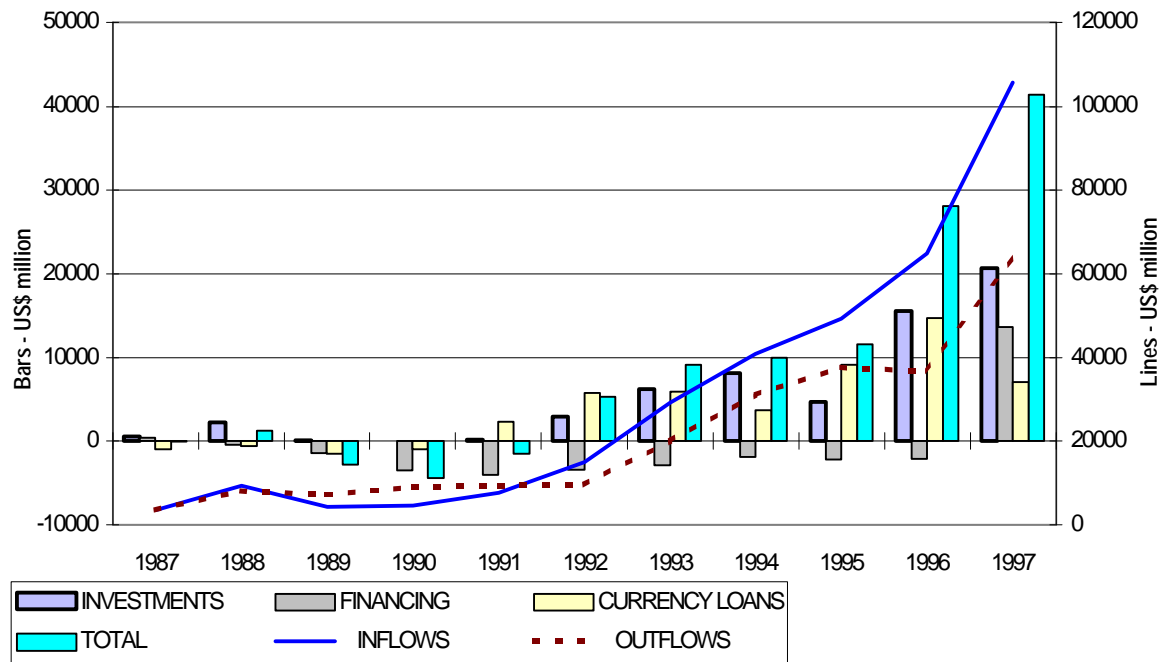


Chart 2  
AGGREGATE NET TRANSFERS  
(Capital account+Interest+Δ Short-Term Liabilities)



**Chart 3**  
**CAPITAL MOVEMENT**  
 (Medium & Long Term - Includes Portfolio Investment)



**Chart 4**  
**NET FOREIGN INVESTMENT**

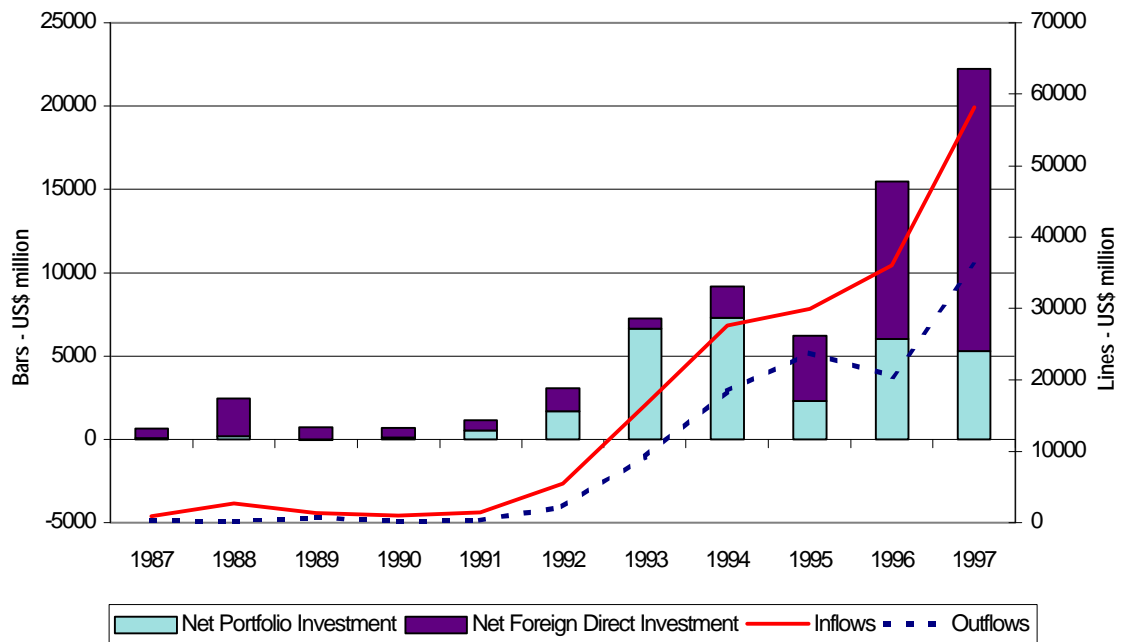


Chart 5  
FOREIGN PORTFOLIO INVESTMENT

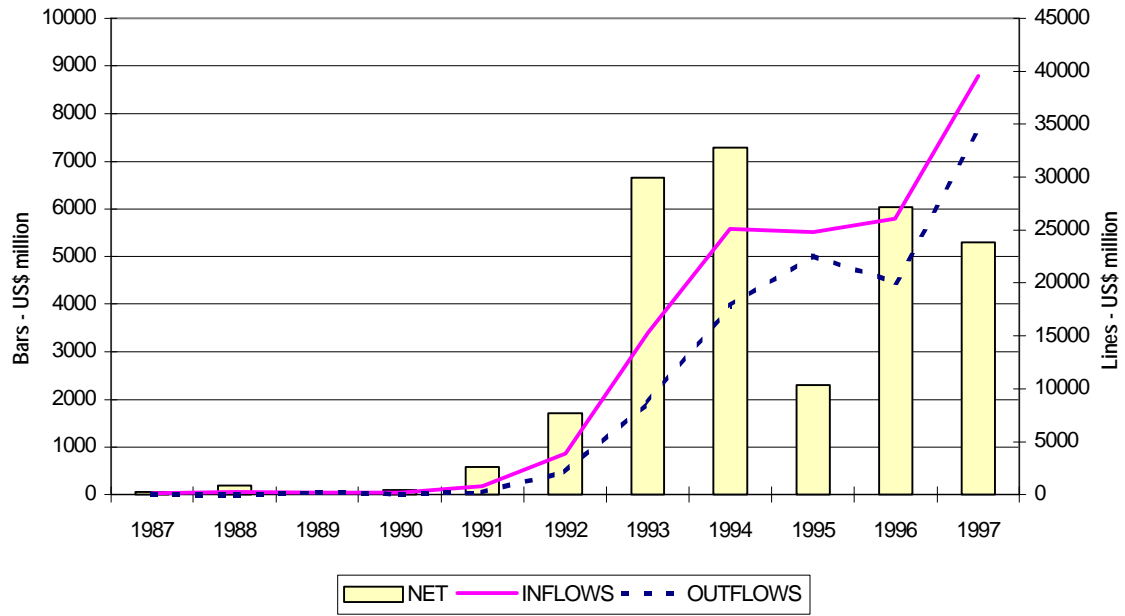


Chart 6  
FOREIGN DIRECT INVESTMENT  
(Includes Investments in Merchandise and Foreign Debt Conversion)

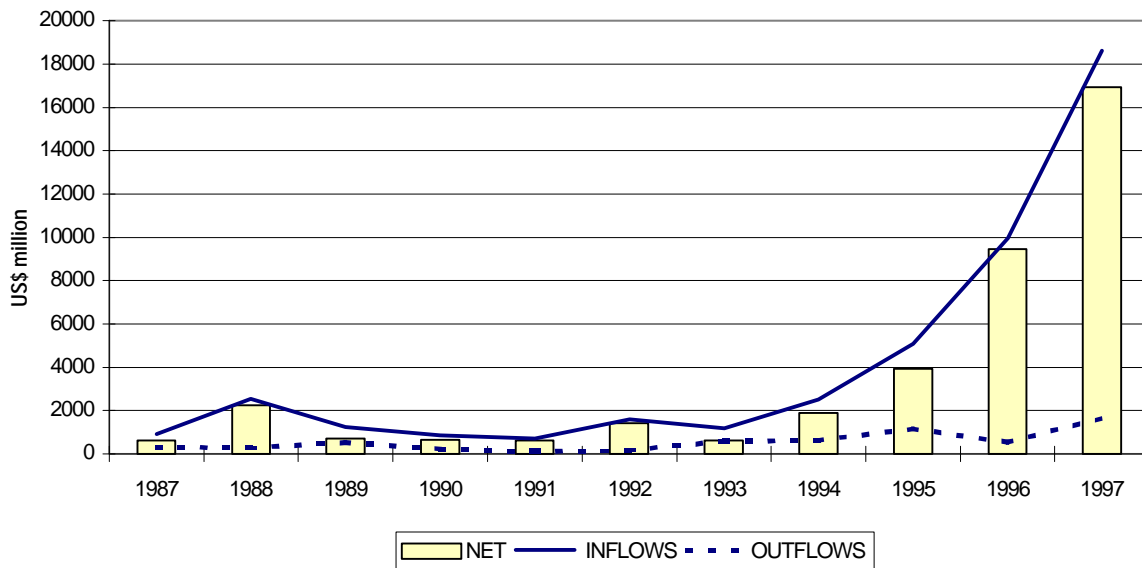


Chart 7  
CAPITAL MOVEMENTS - FINANCING

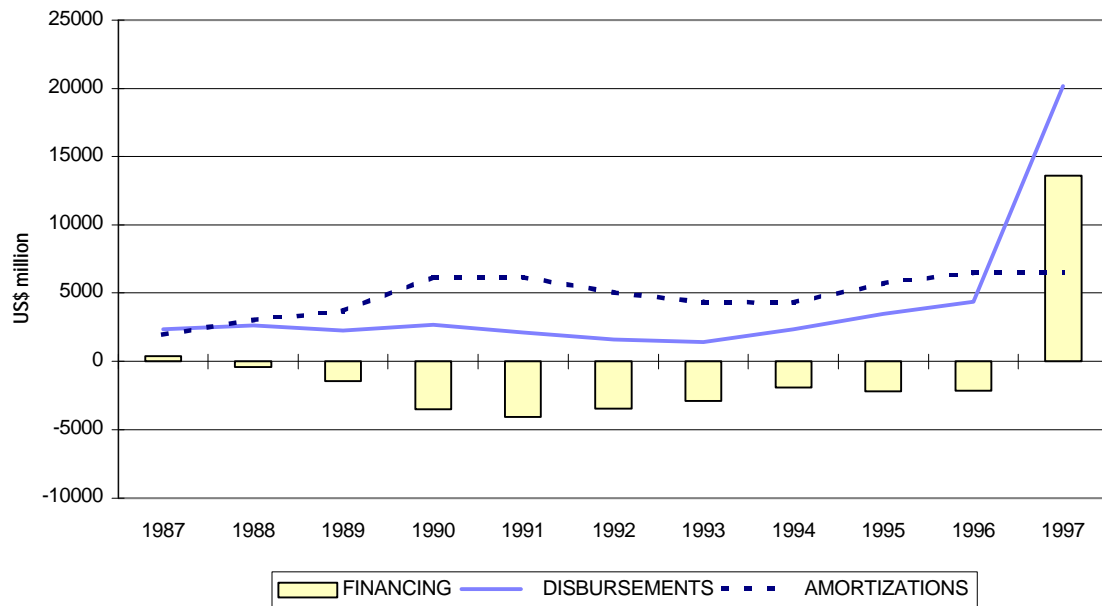


Chart 8  
CAPITAL MOVEMENTS - CURRENCY LOANS

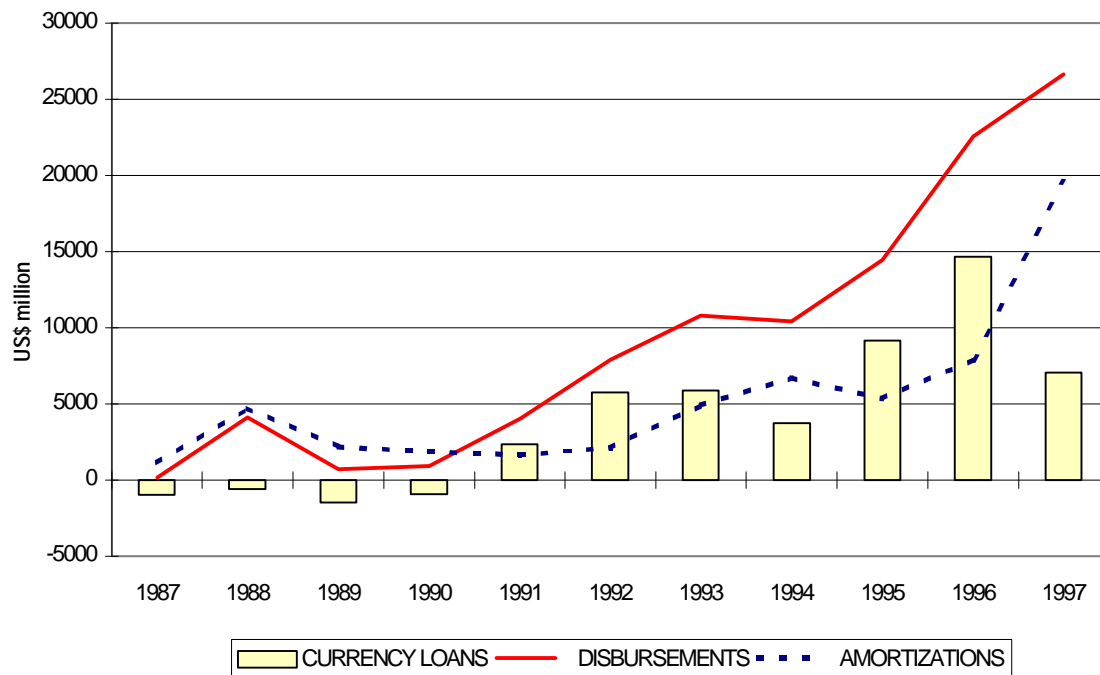




Chart 9  
CAPITAL MOVEMENTS MAIN COMPONENTS

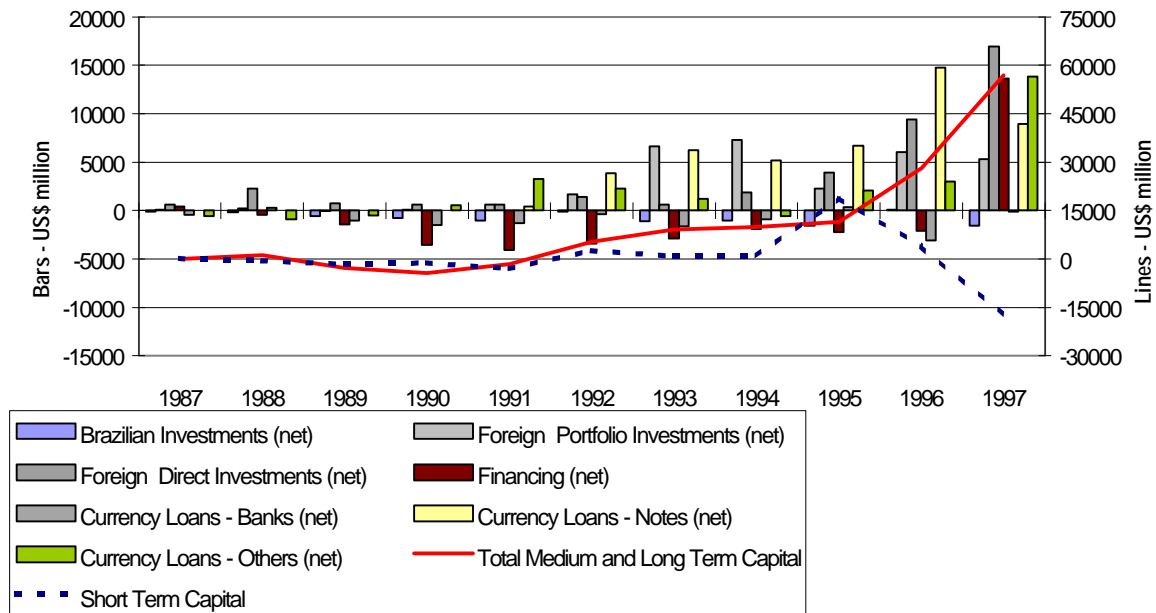


Chart 10  
COVERED INTEREST DIFFERENTIAL FOR BRAZIL

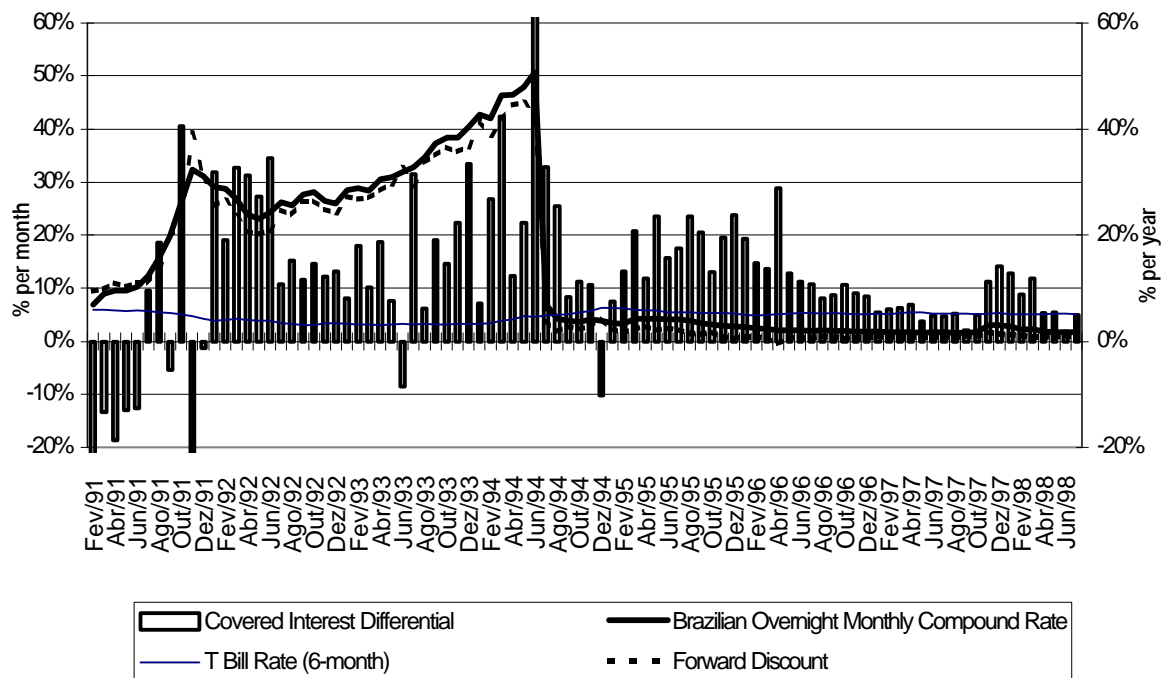


Chart 11  
Exchange Rate Spot and Futures Prices

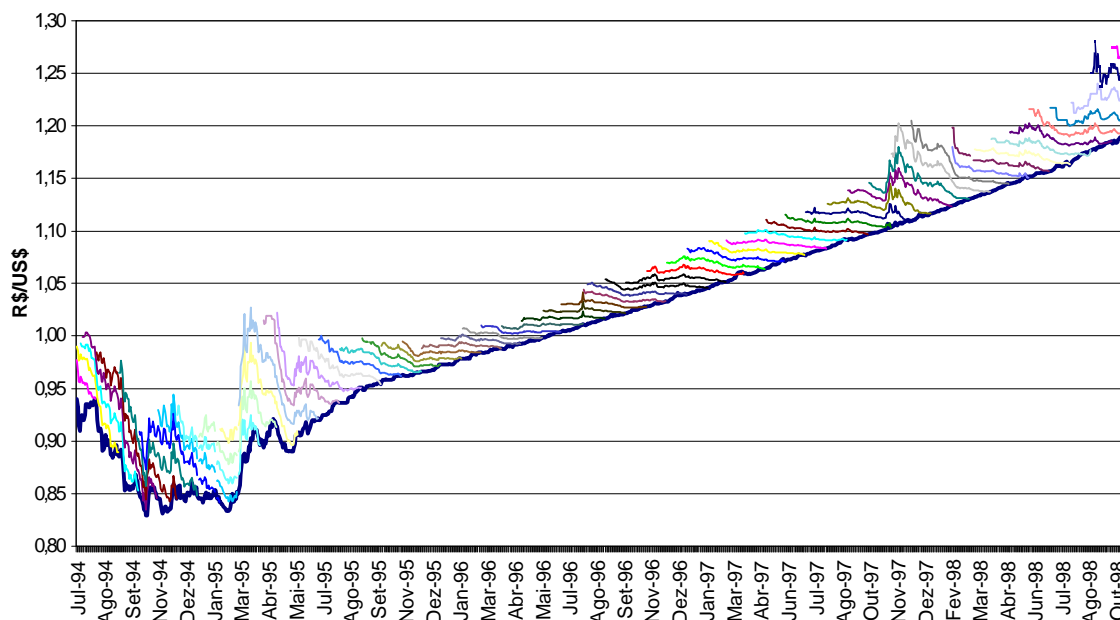


Chart 12  
Different Measures of Country Risk for Brazil

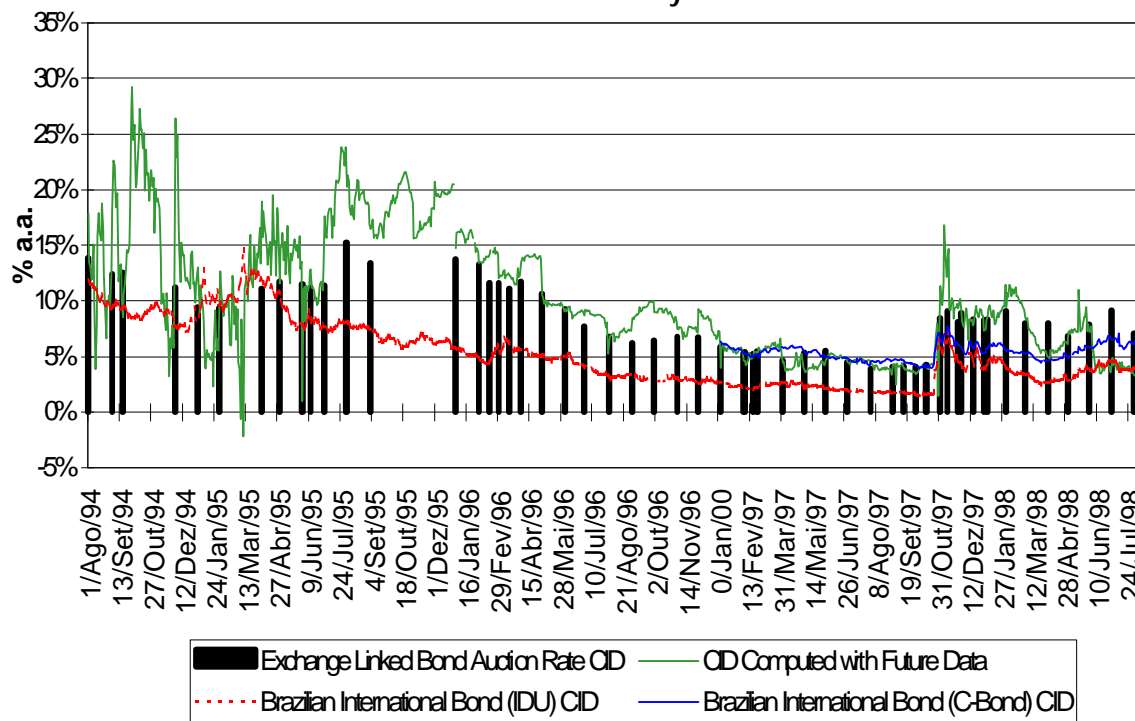


Chart 13  
Covered Interest Differential

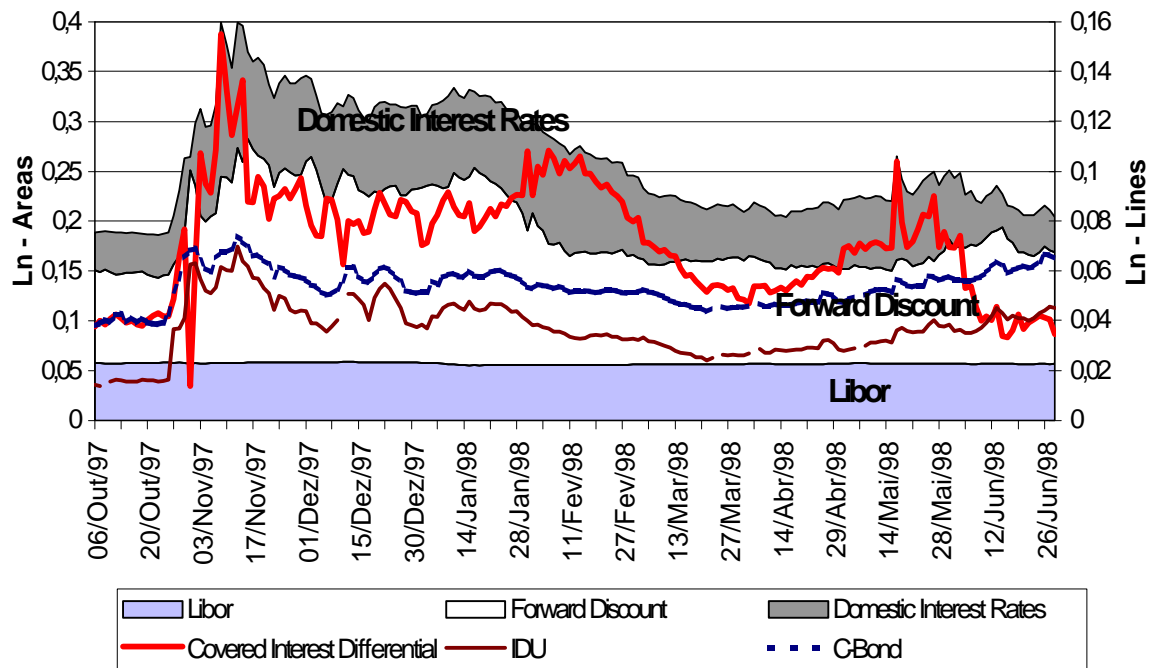
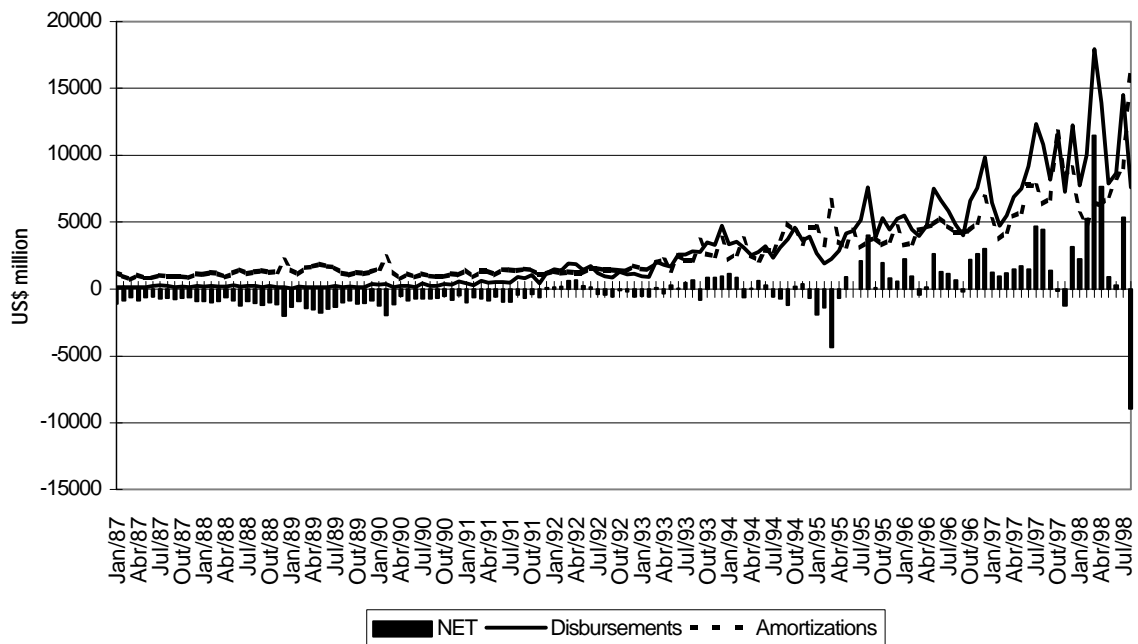
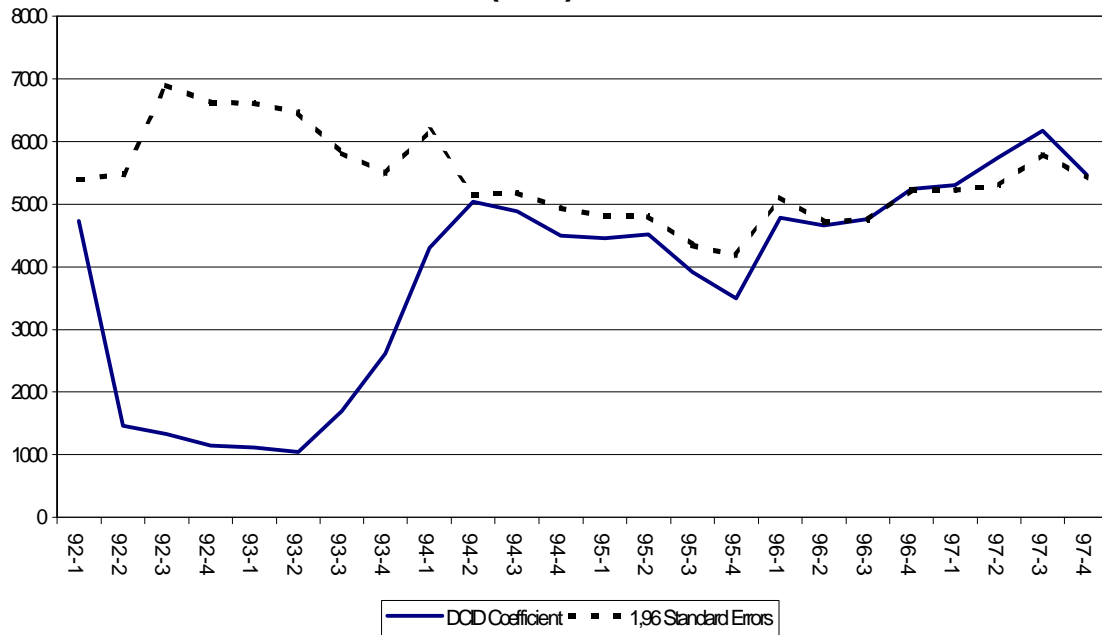


Chart 14  
FINANCIAL EXCHANGE CONTRACTS TRANSACTIONS



**Chart 15**  
**Test of Significance of the Covered Interest Differential Coefficient**  
**(DCID)**



**Chart 16**  
**BRAZILIAN FOREIGN RESERVES**

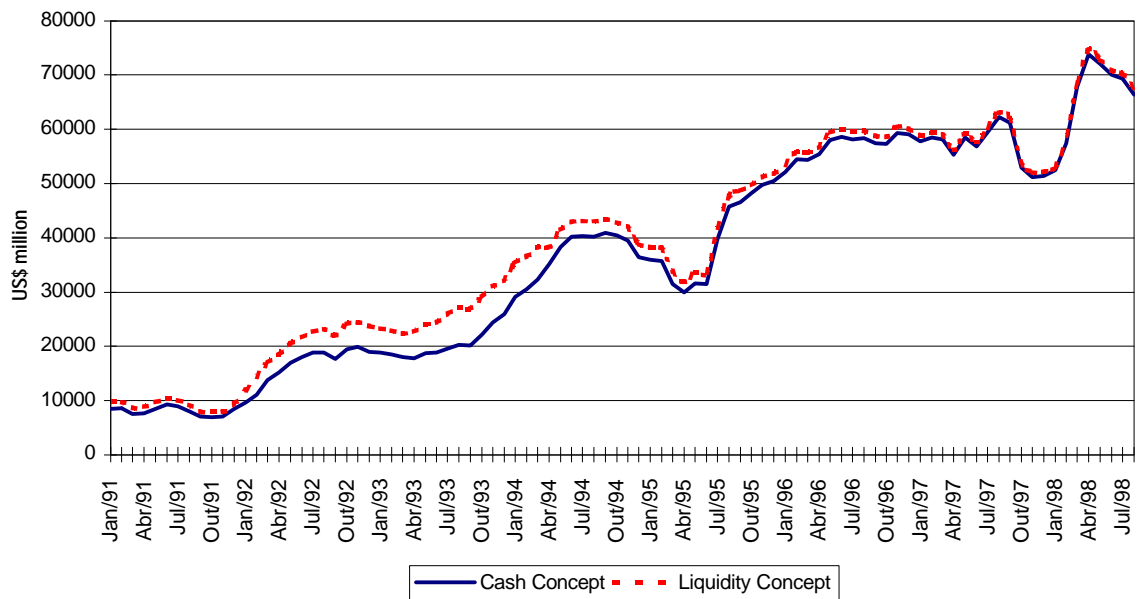


Chart 17  
DOMESTIC NET EFFECTIVE FEDERAL DEBT AND FOREIGN  
RESERVES ACCUMULATION

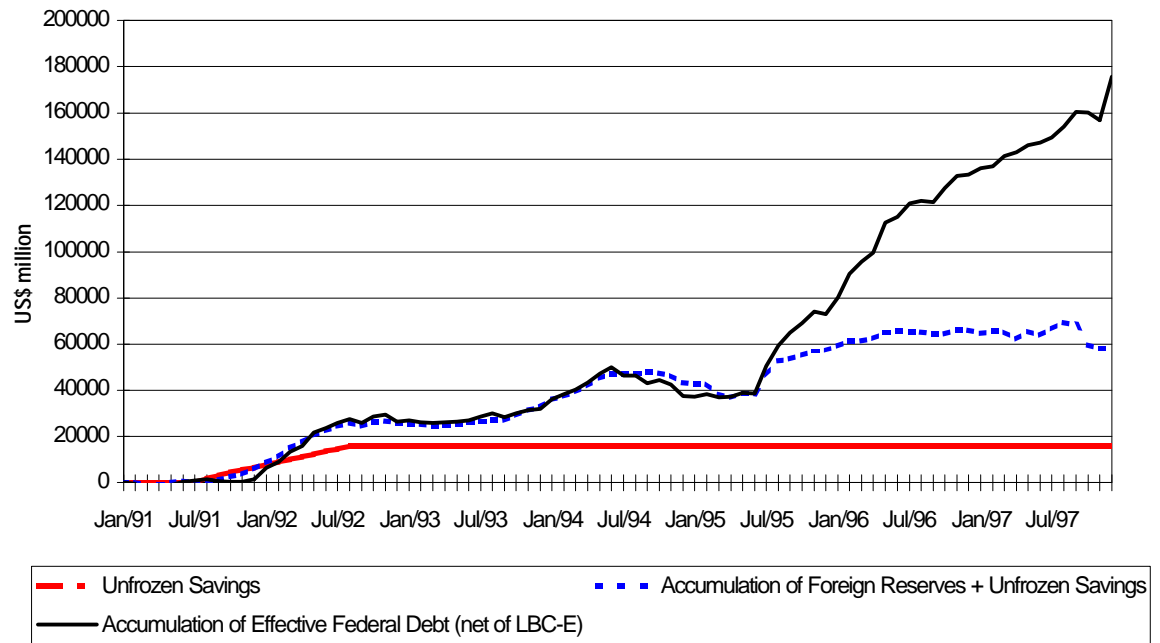


Table 1 - Capital Movement Selected Accounts - In US\$ Million

	1 996					1 997					1 998		
<i>Itemization</i>	I	II	III	IV	Total	I	II	III	IV	Total	I	II	Total
<b>Capital account *</b>	<b>7 203</b>	<b>8 583</b>	<b>3 895</b>	<b>12 710</b>	<b>32 391</b>	<b>6 767</b>	<b>8 156</b>	<b>10 383</b>	<b>781</b>	<b>26 087</b>	<b>21 691</b>	<b>10 167</b>	<b>31 858</b>
<b>Foreign Investment</b>	3 138	4 214	2 592	5 537	15 481	5 810	7 722	6 137	2 564	22 232	7 369	9 348	16 717
<i>Currency</i>	3 053	4 203	2 555	5 351	15 162	5 592	7 454	6 074	2 399	21 518	7 111	9 092	16 203
<i>Net Portfolio</i>	1 877	1 004	1 245	1 913	6 039	2 899	3 283	1 886	-2 768	5 300	4 787	3 464	8 251
<i>Net Direct</i>	1 176	3 199	1 310	3 438	9 123	2 693	4 171	4 188	5 167	16 219	2 324	5 628	7 952
<i>Others</i>	85	11	37	186	319	218	268	63	165	714	258	256	514
<b>Financing</b>	- 649	- 419	- 721	- 336	-2 125	386	2 740	5 693	4 963	13 782	3 466	2 081	5 547
<i>Net Multilateral</i>	83	269	355	462	1 169	596	549	171	314	1 630	574	598	1 172
<i>Net Bilateral</i>	- 433	- 299	- 797	- 555	-2 084	- 286	- 515	228	18	- 555	- 441	- 552	- 993
<i>Net Suppliers/buyers</i>	- 299	- 389	- 279	- 243	-1 210	76	2 706	5 294	4 631	12 707	3 333	2 035	5 368
<b>Currency loans</b>	1 149	4 819	2 272	6 420	14 660	1 681	2 094	6 178	-2 888	7 064	13 000	7 252	20 252
<i>Net Intercompany</i>	384	378	166	295	1 223	322	374	643	1 228	2 567	1 733	824	2 557
<i>Net Commercial paper</i>	34	- 34	339	- 9	330	- 28	- 48	- 99	- 80	- 255	466	- 52	415
<i>Net Bonds</i>	222	57	- 17	430	692	498	139	284	-5 794	-4 872	1 040	511	1 551
<i>Net Banks</i>	-1 675	- 181	- 522	- 700	-3 078	- 295	- 166	221	104	- 136	3 216	438	3 654
<i>Net Notes</i>	2 036	4 328	2 079	6 306	14 749	1 175	1 976	4 147	1 670	8 968	6 308	5 069	11 377
<i>Net Securitization</i>	65	16	- 8	- 18	55	- 45	- 56	18	- 59	- 142	- 50	56	6
<i>Net Others</i>	83	255	235	116	689	53	- 126	964	43	934	287	406	693
<b>Total</b>	4 800	8 438	3 715	11 140	28 093	7 692	12 016	17 769	4 037	41 514	23 657	18 314	41 971
<i>Inflows</i>	14 381	16 139	12 250	21 982	64 752	16 351	25 799	31 987	31 687	105 824	34 250	32 798	67 048
<i>Outflows</i>	9 581	7 701	8 535	10 842	36 659	8 659	13 783	14 218	27 650	64 310	10 593	14 484	25 077

\* This data is not a direct sum of the Capital Movement Selected Accounts presented here. See footnote 3 for further explanation.

**Table 2 - Main Econometric Results**

	Dep. Variable	Constant	CID	IGDPR4Q	GDPR	CADGDPR	DCID	DIGDPR4Q	DGDPR	DCADGDPR	DANNEXIV	R ** 2	DW
	Period	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	R Bar **2	F (p-value)
1	TOTLRUN	1149,289	-285,5757	-75,84251	-214,5543	13,28907	6806,582	-8,396799	-53819,65	-109,8644	1919,826	0,568261	2,008598
	85:01 TO 97:04-	0,817142	-1,068298	-0,927968	-0,091079	0,900482	1,776852	-0,15192	-1,446162	-3,344434	1,051593	0,475746	0,000018
9	SRCF	-3979,774	230,8761	220,2615	-47,07155	3,882957	5470,638	-88,87364	-39005,55	32,88057	1982,128	0,60352	1,571865
	85:01 TO 97:04-	-4,897997	0,517919	4,707013	-0,01811	0,268304	1,975548	-2,579424	-2,038374	1,331347	1,730712	0,51856	0,000004
17	TOTNOF	-1861,923	16,85524	103,4823	-652,744	12,2895	12100,1	-27,18328	-83097,28	-35,77105	3189,299	0,526424	1,455784
	85:01 TO 97:04-	-1,022804	0,043536	0,974201	-0,205944	0,789803	2,494917	-0,51567	-2,039639	-0,717706	1,568222	0,424943	0,000097
25	TOTSR	-3200,317	206,6513	175,6875	187,052	4,179176	8674,897	-67,47676	-58190,25	29,7994	2469,973	0,518529	1,21979
	85:01 TO 97:04-	-2,516833	0,457224	2,384187	0,070046	0,281702	2,298819	-1,521563	-1,960559	0,897115	1,618623	0,415357	0,000131
33	NOFLR	-2641,38	41,08003	148,0563	-886,8676	11,99328	8895,838	-48,58015	-63912,58	-32,68989	2701,453	0,581084	1,658785
	85:01 TO 97:04-	-2,040145	0,108514	1,954763	-0,28654	0,788675	2,290416	-1,227594	-2,311201	-0,8459	1,808395	0,491317	0,00001

Table 3 - ANNEX IV - Composition

Date	Value(US\$ Millions)					Total in US\$ Millions
	Stocks	Derivatives	Debentures	Others	Priv.Currencies	
Jan/93	1958	0	55	361	0	2374
Fev/93	1740	0	113	483	19	2354
Mar/93	2486	0	9	386	44	2925
Abr/93	2701	0	130	585	3	3419
Mai/93	3239	0	89	717	4	4048
Jun/93	3993	0	131	706	5	4834
Jul/93	3784	0	247	1112	5	5148
Ago/93	4838	0	275	1734	34	6882
Set/93	5215	0	1284	81	176	6755
Out/93	5081	0	2183	67	119	7451
Nov/93	5842	0	3011	27	81	8961
Dez/93	8314	0	1920	31	114	10380
Jan/94	10002	0	1928	24	170	12124
Fev/94	11020	0	1870	28	308	13226
Mar/94	11353	715	1931	15	493	14507
Abr/94	9661	537	2048	10	570	12827
Mai/94	8809	986	2089	9	1081	12974
Jun/94	9050	1167	2058	10	1288	13573
Jul/94	11463	914	2442	63	1266	16148
Ago/94	15645	1151	2387	1023	1108	21315
Set/94	16879	692	2658	303	1081	21612
Out/94	16067	843	2642	154	1066	20771
Nov/94	16792	859	2382	139	1188	21359
Dez/94	16261	807	2603	166	1135	20971
Jan/95	13687	339	2480	286	1053	17845
Fev/95	12279	508	1935	159	984	15864
Mar/95	11010	186	1117	412	572	13297
Abr/95	12802	347	1025	121	784	15079
Mai/95	14581	204	1343	102	748	16994
Jun/95	14418	355	1286	118	745	16923
Jul/95	15758	557	1412	111	762	18583
Ago/95	17840	660	1217	144	763	20634
Set/95	17065	593	1185	99	810	19751
Out/95	16409	360	1366	114	721	18970
Nov/95	16741	245	1072	56	696	18810
Dez/95	16692	205	1026	37	690	18650
Jan/96	18857	0	975	187	726	20745
Fev/96	18653	21	930	207	847	20657
Mar/96	17514	20	936	195	839	19503
Abr/96	17770	20	1155	199	777	19922
Mai/96	19140	0	1147	212	744	21243
Jun/96	21156	0	1115	209	743	23223
Jul/96	20765	0	1312	115	829	23021
Ago/96	21431	0	1302	118	829	23681
Set/96	22177	0	1290	122	779	24344
Out/96	22816	0	1251	125	826	25018
Nov/96	23583	0	1237	129	825	25774
Dez/96	24923	0	1273	135	759	27090
Jan/97	28066	0	1455	152	636	30309
Fev/97	30767	0	1487	165	628	33047
Mar/97	32054	0	1476	137	652	34319
Abr/97	34439	0	1353	146	622	36559
Mai/97	36240	0	1262	76	650	38228
Jun/97	40688	385	1282	0	385	42739
Jul/97	43980	322	1382	0	368	46052
Ago/97	37309	236	1456	0	354	39355
Set/97	40053	236	1417	0	349	42055
Out/97	30428	290	1289	0	226	32233
Nov/97	29905	156	969	0	219	31249
Dez/97	30925	449	673	0	0	32047
Jan/98	27966	555	671	0	0	29192
Fev/98	29782	457	652	0	0	30892
Mar/98	33924	443	488	0	7	34862
Abr/98	34069	720	512	0	7	35309
Mai/98	29059	472	520	0	9	30060
Jun/98	27719	485	511	0	9	28724
Jul/98	29946	526	495	0	0	30968
Ago/98	19108	511	578	0	8	20206

Source: CVM



Appendix 1 - Econometric Results													
	Dep. Variable	Constant	CID	IGDPR4Q	GDPGR	CADGDPR	DCID	DIGDPR4Q	DGDPR	DCADGDPR	DANNEXIV	R ** 2	DW
	Period	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	R Bar **2	F (p-value)
1	TOTLRUN	1149,289	-285,5757	-75,84251	-214,5543	13,28907	6806,582	-8,396799	-53819,65	-109,8644	1919,826	0,568261	2,008598
	85:01 TO 97:04-	0,817142	-1,068298	-0,927968	-0,091079	0,900482	1,776852	-0,15192	-1,446162	-3,344434	1,051593	0,475746	0,000018
2	TOTLRUN	-1585,93	-194,5613	80,87901	-677,2155		-3912,246	-104,3325	-60661,36		6990,984	0,30552	1,091213
	85:01 TO 97:04-	-1,018582	-0,880043	0,898275	-0,310396		-0,492076	-1,071634	-1,365328		1,905429	0,195034	0,017978
3	TOTLRUN	1718,809	-292,6729	-109,0721		12,93891	8293,601	38,44594		-110,8183	373,452	0,542423	1,929248
	85:01 TO 97:04-	1,254612	-1,224936	-1,370065		0,885786	2,879866	0,956309		-3,460594	0,300336	0,469626	0,000007
4	TOTLRUN	-153,0311	-259,2351		-208,3305	14,3732	5364,551		-39407,97	-99,50414	1742,562	0,525489	1,855503
	85:01 TO 97:04-	-0,664095	-1,039671		-0,093823	1,071462	1,718159		-1,526248	-3,310986	2,167522	0,449998	0,000014
5	TOTLRUN	-981,9007	-192,7906	45,47904			-2394,972	-52,51318			5311,911	0,272122	1,068698
	85:01 TO 97:04-	-0,694458	-0,952824	0,557132			-0,346514	-0,718446			1,834161	0,193005	0,010073
6	TOTLRUN	-127,9688	-271,5739			14,82561	6372,134			-101,9666	1203,626	0,510563	1,840466
	85:01 TO 97:04-	-0,577937	-1,211238			1,1266	2,247438			-3,493361	1,76952	0,457363	0,000003
7	TOTLRUN	-265,8284	-177,7721		-489,655		-3141,48			-53349,34	4999,305	0,298679	1,063343
	85:01 TO 97:04-	-1,120313	-0,783808		-0,230907		-0,457506		-1,475602		2,70568	0,222449	0,004833
8	TOTLRUN	-237,2562	-186,7044				-2042,105				4368,288	0,270856	1,055638
	85:01 TO 97:04-	-1,100515	-0,924869				-0,32742				2,659272	0,225285	0,001566
9	SRCF	-3979,774	230,8761	220,2615	-47,07155	3,882957	5470,638	-88,87364	-39005,55	32,88057	1982,128	0,60352	1,571865
	85:01 TO 97:04-	-4,897997	0,517919	4,707013	-0,01811	0,268304	1,975548	-2,579424	-2,038374	1,331347	1,730712	0,51856	0,000004
10	SRCF	-2903,183	215,2357	157,1367	-145,9846		9549,901	-48,96475	-36080,7		15,1411	0,500121	1,40868
	85:01 TO 97:04-	-3,250954	0,494416	3,04336	-0,058386		2,266588	-0,949296	-1,541236		0,008035	0,420595	0,000039
11	SRCF	-3568,103	223,4236	196,2848		3,570965	6547,72	-55,05835		32,24998	864,4438	0,566732	1,860154
	85:01 TO 97:04-	-4,274214	0,531368	4,074856		0,259207	2,135782	-1,720473		1,352624	0,808319	0,497803	0,000002
12	SRCF	-2546,86	210,4254	136,3787			10451,66	-18,50832			-976,0995	0,4684	1,637104
	85:01 TO 97:04-	-3,031967	0,516561	2,811249			2,461737	-0,406128			-0,605993	0,410618	0,000015
13	SRCF	-256,4928	193,6859		37,71912		10448,05		-55485,11		-272,9446	0,283982	1,051801
	85:01 TO 97:04-	-1,441863	0,471272		0,015439		2,676506		-1,570391		-0,250933	0,206154	0,007294
14	SRCF	-222,7136	172,0113				11594,84				-927,4492	0,203625	1,17478
	85:01 TO 97:04-	-1,392155	0,442028				3,051327				-1,056409	0,153852	0,011514
15	SRCF	-233,5036	178,3541			0,317994	10196,36			14,28426	-405,1578	0,221894	1,161376
	85:01 TO 97:04-	-1,401791	0,440781			0,022415	2,956433			0,592951	-0,511264	0,137317	0,036115
16	SRCF	-272,8897	204,5961		68,71399	-0,140337	8702,394		-58438,67	17,70596	391,5816	0,310189	1,023316
	85:01 TO 97:04-	-1,458564	0,479525		0,026552	-0,009318	2,498645		-1,649716	0,700303	0,413049	0,200446	0,01601
17	TOTNOF	-1861,923	16,85524	103,4823	-652,744	12,2895	12100,1	-27,18328	-83097,28	-35,77105	3189,299	0,526424	1,455784
	85:01 TO 97:04-	-1,022804	0,043536	0,974201	-0,205944	0,789803	2,494917	-0,51567	-2,039639	-0,717706	1,568222	0,424943	0,000097
18	TOTNOF	-2491,139	58,23882	138,0775	-1043,859		9492,787	-47,07622	-84436,2		4385,296	0,511753	1,352453
	85:01 TO 97:04-	-2,106656	0,142228	2,004339	-0,327198		2,568431	-0,929783	-2,128537		2,17393	0,434077	0,000024
19	TOTNOF	-979,3669	12,74245	51,86086		11,92146	14397,91	45,53836		-37,42408	792,679	0,470758	1,620761
	85:01 TO 97:04-	-0,545853	0,033817	0,495358		0,801833	3,132841	0,997338		-0,779469	0,469534	0,38656	0,000118
20	TOTNOF	-110,6815	-1,952137		-615,5675	10,51183	13741,44		-95111,78	-44,81898	2712,891	0,494592	1,333597
	85:01 TO 97:04-	-0,455506	-0,005211		-0,197843	0,686279	3,183434		-1,763167	-0,997297	1,926933	0,414187	0,000048

Appendix 1 - Econometric Results (cont)													
	Dep. Variable	Constant	CID	IGDPR4Q	GDPGR	CADGDPGR	DCID	DIGDPR4Q	DGDGPR	DCADGDPGR	DANNEXIV	R ** 2	DW
	Period	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	t-statistic	R Bar **2	F (p-value)
21	TOTNOF	-1649,212	63,0146	88,68612			11605	25,19634			2045,211	0,453599	1,521691
	85:01 TO 97:04-	-1,463502	0,162284	1,354171			3,528573	0,640396			1,379662	0,394207	0,000027
22	TOTNOF	-50,85627	-29,3599			11,66718	16173,32			-50,83092	1411,427	0,416462	1,424917
	85:01 TO 97:04-	-0,216955	-0,079328			0,805343	3,932557			-1,185654	1,288402	0,353034	0,00011
23	TOTNOF	-167,6258	40,72996		-877,6761		10297,79		-100601,5		4037,794	0,461208	1,138699
	85:01 TO 97:04-	-0,70658	0,104468		-0,284587		2,48799		-1,874257		2,902507	0,402644	0,00002
24	TOTNOF	-113,4076	22,85209				12371,18				2848,026	0,372616	1,23278
	85:01 TO 97:04-	-0,527301	0,060562				3,529417				2,801172	0,333405	0,000049
25	TOTSR	-3200,317	206,6513	175,6875	187,052	4,179176	8674,897	-67,47676	-58190,25	29,7994	2469,973	0,518529	1,21979
	85:01 TO 97:04-	-2,516833	0,457224	2,384187	0,070046	0,281702	2,298819	-1,521563	-1,960559	0,897115	1,618623	0,415357	0,000131
26	TOTSR	-2202,945	193,4505	117,1159	77,47308		12445,07	-30,36734	-55465,81		649,5797	0,460081	1,235016
	85:01 TO 97:04-	-1,957028	0,436617	1,796087	0,030111		2,880541	-0,566558	-0,767605		0,33726	0,374184	0,000174
27	TOTSR	-2588,744	190,055	140,1702		3,575598	10280,25	-17,34705		29,00285	809,7854	0,464856	1,558779
	85:01 TO 97:04-	-2,06636	0,442405	1,929151		0,253175	2,623933	-0,437973		0,904433	0,629435	0,379719	0,000147
28	TOTSR	-241,3203	184,1768		275,374	0,99642	11281,45		-74366,1	17,24642	1264,722	0,387507	0,883164
	85:01 TO 97:04-	-1,298457	0,424529		0,103804	0,065376	3,060155		-1,620542	0,540348	1,090199	0,290065	0,001903
29	TOTSR	-1658,647	179,1632	85,55471			13830,5	16,02324			-865,464	0,411049	1,52488
	85:01 TO 97:04-	-1,57769	0,429518	1,405134			3,108199	0,326513			-0,533296	0,347032	0,000133
30	TOTSR	-190,0944	146,8292			1,473896	13182,5			13,00657	252,0547	0,29342	1,113312
	85:01 TO 97:04-	-1,139185	0,353589			0,103301	3,601127			0,42763	0,28702	0,216618	0,005608
31	TOTSR	-227,0714	175,2305		207,1886		13090,59		-71267,57		577,5917	0,368799	0,947878
	85:01 TO 97:04-	-1,276605	0,415264		0,082386		3,335201		-1,582495		0,488253	0,30019	0,000566
32	TOTSR	-182,5047	143,7965				14564,56				-262,5683	0,281515	1,148563
	85:01 TO 97:04-	-1,125465	0,35669				3,735179				-0,300102	0,236609	0,001119
33	NOFLR	-2641,38	41,08003	148,0563	-886,8676	11,99328	8895,838	-48,58015	-63912,58	-32,68989	2701,453	0,581084	1,658785
	85:01 TO 97:04-	-2,040145	0,108514	1,954763	-0,28654	0,788675	2,290416	-1,227594	-2,311201	-0,8459	1,808395	0,491317	0,00001
34	NOFLR	-3191,376	80,02395	178,0984	-1267,317		6597,617	-65,67362	-65051,09		3750,858	0,562967	1,53037
	85:01 TO 97:04-	-4,177818	0,199866	3,98347	-0,405658		2,362747	-1,861384	-2,467221		2,61146	0,493439	0,000003
35	NOFLR	-1958,726	46,11103	107,9754		11,91683	10665,38	7,827055		-34,17696	847,3374	0,528668	1,784457
	85:01 TO 97:04-	-1,511406	0,126732	1,424688		0,822342	2,721558	0,199232		-0,919945	0,589117	0,453684	0,000012
36	NOFLR	-142,2509	18,4671		-822,275	9,375072	11162,39		-79184,35	-44,35944	1839,751	0,495449	1,448804
	85:01 TO 97:04-	-0,591473	0,050508		-0,270848	0,621715	2,777363		-1,822108	-1,255841	1,60685	0,41518	0,000046
37	NOFLR	-2537,425	94,27676	139,5101			8226,158	-9,335219			1934,576	0,507855	1,663534
	85:01 TO 97:04-	-3,41901	0,250561	3,230638			3,088711	-0,302008			1,636327	0,454361	0,000003
38	NOFLR	-94,26578	2,165049			10,51128	13187,18			-49,55323	754,2142	0,409663	1,475284
	85:01 TO 97:04-	-0,412877	0,006088			0,736736	3,386397			-1,47825	0,772667	0,345496	0,00014
39	NOFLR	-197,0472	59,1853		-1047,146		7655,252		-84819,07		3187,258	0,441127	1,199463
	85:01 TO 97:04-	-0,832824	0,15636		-0,348196		2,018762		-1,980281		2,91499	0,38038	0,000044
40	NOFLR	-153,6165	51,06685				9401,457				2183,145	0,341416	1,237743
	85:01 TO 97:04-	-0,723687	0,141123				2,943293				2,60878	0,300254	0,000151