

Chapter 7

**SEIGNIORAGE, RESERVE REQUIREMENTS AND BANK
SPREADS IN BRAZIL**

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Introduction

In 2001, nominal bank lending interest rates in Brazil reached an annual average of 44 percent for business loans and 73 percent for personal loans. With the inflation rate (measured by CPI) no more than 8 percent, such rates act as a serious constraint on borrowing, especially for longer terms. No wonder then that bank credit was just 28 percent of GDP: not because of a lack of sophisticated credit analysis or even of lending capacity, but essentially from the effect of high interest rates on demand. The cost of funds to banks is high: money market and wholesale deposit rates averaged almost 18 percent in 2001, and the intermediation margins above these rates must cover the cost of taxes and other impositions, including the cost of high reserve requirements, and government-directed lending, as well as the costs of non-performing loans.

This paper examines the role of bank-captured seigniorage as well as explicit taxation in influencing spreads. Bank seigniorage revenue depends on the interaction between inflation, the market for demand deposits, and the rate of reserve requirements imposed by the central bank. Bank seigniorage revenue increased with inflation in Brazil until 1989, declined when inflation accelerated above 1,000 percent per year after 1992, and turned negative with the *Real Plan* in 1995.

Despite the lack of competition otherwise observed in Brazilian banking, it is shown that that any increase in seigniorage collected by commercial banks has tended to reduce the spread between interest rates on deposits and loans. As a corollary, it can be inferred that, if supported by sound fiscal and monetary policy, reductions in the cost of reserve requirements and directed credit programs can drive down bank spreads and net margins. Since inflation stabilized in mid-1990s, the role of explicit taxation on financial intermediaries has become relatively more important for the explanation of the behavior of bank spreads.

The first section briefly summarizes the topic of financial liberalization in Brazil; section 2 reviews the macroeconomics underlying the country's historically high interest rates. Section 3 discusses reserve requirements and bank seigniorage collection. Section 4 studies evidence on the impact on bank spreads of seigniorage collection, inflation,

explicit taxation, operational costs, and provisions for non-performing loans. Section 5 offers concluding remarks.

1 Financial Liberalization in Brazil

As with many other countries, Brazil has taken extensive steps towards financial liberalization during the past 20 years. Successive governments reduced credit controls, rationalized reserve requirements, removed all interest rate ceilings on deposits in 1979, reduced barriers to entry after 1991, and liberalized controls on international capital flows during the 1990s. The path of reforms accelerated after 1995, when the government closed or privatized 10 state banks. Between mid-1994 and mid-2001, the share of public banks in total assets of the banking sector fell by 65 percent, while the share of foreign institutions increased fourfold. Loans from the financial system to the public sector practically disappeared (figures 1 and 2).

A variety of tax and quasi-fiscal instruments affect financial institutions and financial intermediation in Brazil. Some are explicit taxes included in the tax code, such as the income tax, the tax on pre-tax corporate income (CSLL), the tax on financial operations (IOF), taxes on gross revenues (PIS and COFINS) and the tax on bank debits (CPMF). Table 1 describes the structure of taxes and contributions in Brazil at the end of the 1990s, including the base of the tax, its destination and the share of revenues in the relevant variable.

Other taxes on financial intermediation are not defined explicitly and are not treated as taxes in budget accounting. These include non-remunerated reserve requirements on demand deposits and directed credit at subsidized interest rates. Implicit taxes (discussed in sections 3 and 4) secure credit for the government itself or for preferred sectors at lower than market interest rates.

Brazil has a shallow intermediation system whether measured by the ratio of liquid liabilities or private credit to GDP – no better than the Latin American averages and well below that of upper-middle income countries (cf. Beck and others, 1999). The

loans made by private commercial banks have short maturity and even short-term credit is scarce. In 2000, the average stock of credit by the private financial sector to the private sector represented just 14.6 percent of GDP (table 2). The wide bank spreads (table 4) are undoubtedly a contributing factor, associated as they are with the extremely high lending rates noted above. One causal factor in these wide spreads is certainly the low ability of creditors to enforce claims.¹ But it is the other tax-like factors on which we focus here.

2. The Macroeconomics Behind Brazil's High Interest Rates

Real interest rates in the 1980s and 1990s

In Brazil, the negative real interest rates that characterized the financial repression in the 1960s and 1970s are long gone. On average over the ten years between 1975 and 1984 real interest rates on deposits were negative because of interventions, unexpected changes in inflation, and imperfect indexation (table 3). Thereafter, with increasing financial liberalization, real interest rates on time deposits rose sharply averaging 10 percent between 1985 and 1989, though with huge fluctuations (table 3). With the acceleration of inflation in the mid-1980s, indexation intervals became shorter and a share of deposits was held in accounts linked to the daily behavior of overnight interest rates.

Between 1984 and 1994, the annual rate of inflation exceeded 100 percent in all years except in 1986. Yet, though confidence in the financial system was damaged by a spectacular series of failed stabilization plans, involving six monetary reforms in ten

¹ Courts are inefficient: Dakolias (1999) shows that there are 2,975 cases pending per judge in Brasilia and 3,129 in São Paulo, compared to 58 in Singapore and 244 in Hungary. The time taken to resolve a case (number of cases pending at the start of the year divided by the number of cases resolved during this year) is 1.9 years in Brasilia and 1.6 years in São Paulo, compared to 0.04 years in Singapore and 0.5 years in Germany. Pinheiro and Cabral (1999) estimate that a judicial execution to recover a creditor claim can take between one and ten years.

The government is working to improve these conditions. Congress is examining the creation of a Bank Credit Bill (*cédula de crédito bancário*), a credit instrument that allows the collection of debt under Commercial Law instead of Civil Law and thus increases the speed with which a loan claim can be executed. Among measures adopted to reduce costs of financial intermediation, the central bank modernized the payment system and introduced a Credit Risk Data Center. The central bank now makes available on its website standardized information on credit operations, including interest rates for each type of operation, degree of arrears and average term differentiated by financial institution.

years,² together with a moratorium external debt in 1987, and the 1990 deposit freeze,³ inflation did not destroy the Brazilian economy. Indexation, the adaptive policy response, became pervasive throughout the economy and its capacity to accommodate inflation may partially explain Brazil's failure to engage in serious structural change before 1995.

By 1992, when President Fernando Collor was ousted from power in a corruption scandal, inflation touched 1,000 percent per year and exceeded 2,000 percent in December 1993. With daily indexation of financial assets, real interest rates on time deposits jumped to 19 percent on average in the first half of the 1990s.

Launched in 1994, the *Real Plan* combined a brief fiscal adjustment, a monetary reform, and the use of the exchange rate as a nominal anchor. Stabilization was supported by very tight monetary policy: real deposit rates averaged 22 per cent per annum between June 1995 and December 1998 and the authorities sharply increased reserve requirements (see section 3). The plan brought inflation under control with remarkable speed: measured by consumer prices, it fell from four digits in 1994 to two digits in 1995 and to less than two percent in 1998. Nevertheless, the real exchange rate appreciated sharply.

The difference between domestic and foreign interest rates resulted in increased external borrowing and helped finance the current deficit resulting from real appreciation, providing apparent stability. To avoid a monetary expansion induced by capital flows, inflows were partly sterilized, and this entailed sizable fiscal costs, given the international interest differential which had opened up.

Banking problems

By increasing the cost of debt servicing, high real interest rates not only complicated fiscal adjustment but also contributed to the deterioration of bank portfolios,

² During this century, Brazil had eight monetary reforms that removed zeros from the previous currency and changed the name of the currency, as follows: Mil-Réis (1900-42), Cruzeiro (1942-66), Cruzeiro Novo (1967- 69), Cruzeiro (1970-86), Cruzado (1986-89), Cruzado Novo (1989-90), Cruzeiro (1990-93), Cruzeiro Real (1993-94), and Real (1994-2000).

³ In early 1990, when inflation reached close to 3,000 percent per year, the Collor Plan of March 1990 drastically cut liquidity. An arbitrary freeze was imposed for 17 months on nearly two-thirds of the money supply (M4), broadly defined to include demand deposits, mutual funds, federal bonds, state and municipal bonds, saving deposits, and private bonds. Although Brazilians eventually managed to circumvent some of

particularly those of public banks, further straining the fiscal resources needed for restructuring. Between mid-1994 and mid-1997, the Central Bank intervened in 51 banks and 140 other financial institutions. The failure of two big banks (Banco Econômico and Banco Nacional) prompted the creation of a program providing assistance to private banks known as PROER.

Public banks had also undergone restructuring before the collapse of the real. In August 1996, a program called PROES (a sister program to PROER) was introduced to reduce the role of state governments in the banking system and curb credit expansion to states and municipalities by allowing the central government to finance the restructuring of state banks. State bank claims on impaired assets were exchanged for central government bonds, with the state governments becoming, in turn, debtors to the central government. The state governments had to liquidate, privatize, or ensure that state banks would be run on a commercial basis. Alternatively, they could be transformed into non-deposit-taking development agencies.

After the restructuring, the share of state banks assets in the financial system fell sharply, though the largest financial institutions in the country are still the federally owned Banco do Brasil and Caixa Econômica Federal. In 2000, the average stock of credit from public banks to the private sector was 12 percent of GDP compared to 14.6 percent from private banks (table 2).

After the real plan

During these years, the general lack of confidence in the ability of the regime to sustain the exchange rate anchor and to meet its obligations was reflected in the increasing use of dollar-denominated and floating rate debt. By early 1999, 21 percent of domestic public debt was dollar-denominated and 70 percent was indexed to the overnight interest rate. Moreover, maturities fell: the interest due on domestic debt in January 1999 alone exceeded 6 percent of GDP. Given the lack of fiscal consolidation, external international shocks to confidence of 1997 and especially 1998 – combined with strong resistance by the domestic business community to the record high interest rates that were being employed in

these controls, the financial freeze took over personal assets and was wildly unpopular.

an attempt to stem capital outflows – forced the government to float the *real* on January 15, 1999; six weeks later it had depreciated by 35%.⁴

Charting the appropriate course of monetary policy in subsequent months required balancing the risk of a return to the old story of persistent inflation (if interest rates were left too low) against the danger of pushing the economy into a severe recession – not only costly in itself but a threat to the government’s counter-inflationary resolve. In the event, the timing and scale of the interest rate increases in the early months of the float were successful in shifting the economy from a potentially explosive situation to a path of steadily declining inflation, allowing real interest rates to fall gradually. A formal inflation-targeting policy was adopted in June 1999 and succeeded in meeting the stringent targets of 8 and 6 per cent for 1999 and 2000. Interest rates and reserve requirements were also reduced (table 3, figure 4).

Despite this success, lending rates and bank spreads continue to be very high (table 5). The central bank calculates that operational expenses and provisions for non-performing loans account for 35% of the total spread between deposit and lending rates; direct and indirect taxes explain an additional 30% and the net bank margin the remaining 35% (Banco Central do Brasil, 2001).

The sharp decline in spreads between 1996 and 2001, shown in figure 5, derives in part from the decline in operational costs: the end of inflation forced banks to merge and reduce the numbers of branches and staff. Other factors also contributed to this decline: the tax on financial operations (IOF) was cut from 6 percent to 1.5 in October 1999. Reserve requirements also declined between 1996 and 2000, as discussed in the next section.

3. Reserve Requirements and Commercial Bank Seigniorage

⁴ Because the PROER program had restored bank balance sheets to health, and because many had anticipated the devaluation and positioned themselves to benefit from it through the holding of dollar-denominated government bonds and financial derivatives, the banking system survived the devaluation and did not become a destabilizing factor as in other countries.

The central bank requires each bank to hold a minimum amount of specified reserve assets, including cash deposits, with the central bank, in proportion to deposit liabilities (Tables 6, 7). The difference between the market interest rates on short-term securities and the interest rate paid on required reserves represents a tax. As in the case of currency, the government is borrowing at below market interest rates.

Commercial banks collect seigniorage (or an inflation tax) on non-interest bearing demand deposits (Brock, 1989). Non-interest bearing reserve requirements reduce this revenue. Commercial banks can pass this loss of revenue on to depositors who will receive lower interest rates on deposits and to borrowers who will face higher interest rates on loans. The spread between deposit and loan rates will increase. How much the deposit rate will fall and how much the loan rate will increase depends on the elasticity of demand for loans compared with the elasticity of supply of deposits, assuming that both markets clear. The inflation rate will also interact with reserve requirements to increase the spread between the two rates depending on how depositors allocate their money holdings between currency, demand deposits, and time deposits (McKinnon and Mathieson, 1981)

Between 1969 and 1993, reserve requirements on time deposits in Brazil were zero (table 6). In the poorest regions of the country (Acre, Amazonas, Pará, Maranhão, Piauí, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia, Espírito Santo, Goiás, and Mato Grosso), required reserves on demand deposits were 18 percent from 1969 to 1993, when they were increased to 40 percent. In the richest regions, reserve requirements on demand deposits increased from 27 percent in 1969 to 40 percent between 1977 and 1993.

Reserve requirements were seen as a way of taxing the profits that would accrue to the banks during periods of high inflation: restricted competition prevented interest competition for deposits, allowing banks to earn high profits on non-interest bearing demand deposits. Reserve requirements represented a tax on these profits. But after 1975 and until mid-1994, 55 percent of reserve requirements on demand deposits could be held in government securities.

Between 1969 and 1993, a percentage of demand deposits were earmarked for rural credit, loans to exporters, and loans to small and medium enterprises (see notes to Table 6). Although the situation has improved since 1995, banks are still required to allocate 25 percent of average demand deposit balances to rural credit and 60 percent of savings deposits to real estate finance. In principle, the impact of forced investments on spreads is similar to reserve requirements. But the interest paid on government directed lending contributes to meeting the interest cost of deposits. Currently there are no ceilings on the rates commercial banks can charge for loans mandated for the rural sector. For real estate lending, the gross yield matches the cost of funding of savings deposits.

In mid-1994, the *Real Plan* increased reserve requirements on demand deposits to 100 percent (60 percent on other liquid resources, and 20 percent on time deposits (table 7)). The required reserves-to-deposit ratio rose from an average of 26 percent during January-June 1994 to 64 percent during November 1994-April 1995. This increase in reserve requirements and the decline of inflation led to a substantial loss of seigniorage revenue for deposit banks.

Bank seigniorage revenue (or inflationary revenue) is the increase in non-interest bearing demand deposits (ΔDD) minus the increase in non-interest bearing required reserves (ΔRR).⁵

Figure 6 shows commercial bank seigniorage revenue divided by loans. Between 1970 and 1989, bank seigniorage was high relative to more recent periods. It reached a peak immediately after the *Cruzado Plan* in 1985 when prices were frozen and money growth increased ahead of inflation. It turned temporarily negative in 1987 when inflation accelerated ahead of money growth.

⁵ Observe that $\Delta DD - \Delta RR \equiv \Delta MI - \Delta H$, that is the difference between total seigniorage and the seigniorage collected by the central bank. ΔMI is total seigniorage, i.e., the sum of the increase in currency, ΔC , and ΔDD ; and ΔH is the seigniorage collected by the central bank, i.e., $\Delta C + \Delta RR$. Thus:

$$\Delta DD - \Delta RR \equiv \Delta DD + \Delta C - \Delta C + \Delta RR \equiv \Delta MI - \Delta H$$

In figure 5, the ratio between commercial banks seigniorage and loans is $(\Delta MI - \Delta H)/L$, where ΔMI is the increase in the monthly average stock of MI ; ΔH is the increase in the monthly average stock of high powered money; and L is outstanding credit to the private sector, average between current and previous month. In measure 2, loans are the average of outstanding credit by private banks to the private sector, average between in current and previous month.

Between 1990 and mid-1994, a period of extremely high inflation, bank seigniorage declined as people economized on their holdings of non-remunerated real demand deposits. In 1995, bank seigniorage revenue turned negative. The *Real Plan's* sharp increase in reserve requirements reduced bank seigniorage.

Under the *Real Plan*, the share in total seigniorage seized by the Central Bank increased from an average of 60 percent in the first half of 1994 to 84 percent a year later. As a consequence, the share in GDP of seigniorage seized by deposit banks fell from 2 percent to close to zero and seigniorage collected by the Central Bank rose from 1.8 percent of GDP in 1993, the peak inflation year, to 3 percent in 1994, the year of the *Real Plan* (Cardoso, 1998).

This appropriation of seigniorage from the banking sector to the Central Bank helped to finance government spending as inflation ebbed, but it also put the banking sector at risk. Lending interest rates and bank spreads increased sharply as did non-performing loans. As already mentioned, these elements exposed the weaknesses of the Brazilian banking sector in the mid-1990s. After 1998, as reserve requirements declined, bank seigniorage recovered.

The data suggests that there is a Laffer curve for bank seigniorage in relation to inflation. Seigniorage increases with inflation but as inflation continues to increase, the demand for real money, including interest free demand deposits, declines more than proportionally with the increase in inflation and bank revenue from seigniorage declines (Table 8).

The objective of next section is to determine the impact of seigniorage on bank spreads and margins.

4. Empirical evidence on the link between seigniorage and spreads

Bank spreads and margins reflect the cost of intermediation. In Ho and Saunders (1981), banks are risk averse dealers in loan and deposit markets where loan requests and

deposit funds arrive randomly. Bank interest margins are fees charged by banks for the provision of liquidity. Allen (1988) extends the model to account for cross-elasticity of demand between bank products and Angbazo (1995) extends it for default risk. Wong (1997) confirms the results of the earlier models and predicts that bank interest margins are positively related to the banking sector's market power, operating costs, credit risk, and interest rate risk.

Explicit and implicit taxes on financial intermediation can also raise spreads. Taxes on financial transactions drive a wedge between what borrowers pay and lenders receive, thus increasing the spread (Chamley and Honohan, 1993). The wedge will reduce the total amount of resources passing through the financial system and raise the rate paid by borrowers or lower deposit rates, depending on the elasticity of demand for credit and on the elasticity of supply of deposits (Hanson and Rocha, 1986).

Reserve requirements can also drive a wedge between borrowing and lending rates and thus act as an implicit tax on financial intermediation, if the interest rate on required reserves is lower than the interest rate on deposits. The wedge develops because the reserve requirement allows only a fraction of the deposits to be loaned. Therefore the lending rate must exceed the deposit rate in order to cover the total interest due on deposits.

In the case where both deposits and required reserves are interest free, an increase in required reserves would transfer seigniorage revenue from commercial banks to the central bank and act as an increase of taxes on bank profits.

Koyama and Nakane (2001) find a positive long-run relationship between bank spreads in Brazil and operational costs, indirect taxes, and country risk. They use the Johansen co-integration test and find a positive but non-significant relationship between bank spreads and the required rate of reserves. But the co-integration test might not be appropriate inasmuch as the rates of required reserves and indirect taxes are not known to be nonstationary.

This section takes a different approach to test the impact of reserve requirements on bank spreads. The effect of reserve requirements on bank spreads depends on the interaction with inflation and deposit demand and its ability to affect bank seigniorage revenue and spreads. Thus, this section tests the hypothesis that a gain in bank seigniorage revenue reduces bank spreads and margins.

Table 9 reports results of regressions of the spread between average lending rates and the interest rate on time deposits after the *Real Plan*. The lagged inflation rate, lagged operational costs, lagged provisions for overdue loans, lagged direct and indirect taxes are included in equations 3 and 4 in table 9. The ratio between seigniorage revenues and loans appear with different lags in all specifications. Table 10 reports results of regressions of the bank margin net of explicit taxes, operational costs and provisions for bad loans. Table 11 reports results of regressions of the spread between the interest rate on loans to working capital and interest rate on time deposits from 1990 to 2000. Definitions of variables and data sources are listed in the appendix. The estimation technique is ordinary least squares.

In all regressions, bank seigniorage revenue has the expected negative sign and is significant. An increase in seigniorage collected by commercial banks reduces the spread between deposit and loan rates. The variable measuring bank seigniorage revenue is defined as a single month value of bank seigniorage relative to loans with four lags in equations 1 and 4. It is defined as the 6-month moving average of bank seigniorage relative to loans in equations 2 and 4, again with a lag of four months. As expected, the effect of the average seigniorage is bigger than the effect of a single month. A 100 percent increase in the 6-month average bank seigniorage four months earlier reduces spreads between 15 and 30 percent in different specifications, while a 100 percent reduction in bank seigniorage four months earlier reduces the spread by 7 percent.

Regressions 10 and 11 reported on table 11 including years before the *Real Plan* show a bigger impact of bank seigniorage on spreads. A 100 percent increase in the 6-month average of the ratio between bank seigniorage and loans two months earlier reduces the current bank spread by 73 percent. Results on table 11 have to be looked at

with a grain of salt because data for interest rates before 1995, compiled from different sources, are not based on large samples such as the information published by the Central Bank for the period after September 1994.

Inflation costs

The reasons usually given for intermediation costs to rise with inflation are the following: Inflation decreases the maturity of contracts and thus requires more frequent interest rate transactions per unit of assets. Chronic inflation leads to an expansion of the branch network as banks compete for low cost deposits by offering more services and branches. The variable measuring operational costs in regressions 3 and 4 probably captures both effects better than the inflation rate variable.

In regressions 1 to 8 in tables 9 and 10, the coefficient of lagged inflation rate, following the *Real Plan*, is positive but small.

In regressions 9 and 10 in table 11, covering a period of high and volatile inflation rates, the inflation rate has a negative and significant coefficient that perhaps reflects inflationary revenue not fully captured by the bank seigniorage revenue.

It is also worthwhile observing that in regressions 3 and 4, covering the period of low inflation after the *Real Plan*, the response of spreads to changes in inflation and bank seigniorage revenue is smaller than the response to other variables such as explicit taxes on financial intermediation and the costs of provisioning for non-performing loans.

Explicit taxes

The results in table 9 (regressions 3 and 4) suggest that both indirect and direct taxes pass through completely to bank customers. Thus the evidence does not support the notion that corporate income taxes, as opposed to indirect taxes on financial intermediation, are not a distorting tax on bank profits.

The complete pass-through of income taxes in a context of growing capital mobility is also consistent with the assumption that international investors demand a net-of-tax return on capital invested in the country.

Non-performing loans

Non-performing loans are often seen as a source of upward pressure on bank spreads and real lending rates because bankers try to offset their losses on their non-performing loans by charging higher interest rates to their performing borrowers.

The evidence in table 9 is consistent with this hypothesis. A 100 percent increase in the ratio of provisions for overdue loans to credit increases the spread between deposit and lending rates by 80 percent.

The evidence for Brazil is consistent with the evidence from industrial countries where non-performing loans are associated with higher spreads. It contradicts the evidence for Latin America in Brock and Rojas Suarez (2000).

It is also meaningful to observe that while average bank spreads between monthly deposit and loan rates fell between 1996 and 2000, the ratio of the interest rate on working capital loans to non-prime borrowers relative to the interest rate on working capital loans to prime borrowers increased (figure 7). High lending rates may reflect financial distress among non-prime borrowers.⁶

Operational Costs

Figure 8 shows a dramatic decline in operational costs of banks between 1996 and 2001. According to regressions in table 9, only half of the decline in operational costs is passed through to a decline in bank spreads. This points to less-than perfect much competition in the banking sector in Brazil.

Net Margin

Table 10 reports the results of the regression of commercial bank net margin. Bank net margin is calculated as a residual by the Central Bank (2001). (It deducts from interest rates on loans the deposit interest rate and the effect of direct and indirect taxes,

⁶ Patrick Honohan suggests that the widening spread on non-prime over prime rates could instead reflect changing competitive conditions in banking with the top firms getting increased access to competitively supplied finance so that banks have to squeeze poorer risks harder to cover their costs.

operational costs, and provisions for overdue loans). The coefficient for bank seigniorage has the expected negative sign and is significant. A 100 percent increase in the 6-month average of bank seigniorage lagged two months reduces the net margin between 6 and 9 percent. Lagged inflation also has a small and positive impact on the net margin.

5. Concluding Remarks

Brazil's financial development is still lacking: it has all the basics, but depth and term finance are absent. Term credit in the free segments of the market does not exist because of very high real interest rates and uncertainty linked to a history of high inflation. Recent demonstrations of commitment to low inflation, an important element of the inflation targeting adopted since 1999, will help build confidence.

Domestic deposit rates remain very high even in the absence of expected large exchange rate depreciation because high government debt coupled with political uncertainty raises concerns among investors. Persistent fiscal adjustment will contribute to the credibility of macroeconomic policies and to a sustained reduction in interest rates. Recently adopted technology for credit scoring and credit information will also help improve the reach of the financial system and access for small entrepreneurs.

Brazil's banking system can benefit from more competition. There is still a significant share of the banking sector in state hands and further privatization will help in this regard. It is also suggested that promoting competition from new, low cost banks, especially foreign banks, can reduce spreads. Brazil's government has carefully managed the entry of new foreign banks, aware that their cost advantage could derive from a low cost labor force with little seniority, rather than any difference in real efficiency. Whereas the opening of the domestic banking sector spelled disaster for local banks in other emerging economies, the major Brazilian banks have increased their market share and margins.

Concentration of the banking sector continued to increase in 2001. To judge from the data, the banks seem to have chosen to earn high profits rather than compete

vigorously. Year-end results for 2001 shows that Brazilian banking sector profitability contrasted sharply with the modest results of the vast majority of non-financial enterprises. The net profits of the 31 largest banks more than doubled between 2000 and 2001.

The analysis in this paper suggests that reducing reserve requirements and directed credit could reduce bank spreads and net margin. Yet, experience suggests that these measures can only succeed if supported by adequate fiscal policy.

Appendix

Definition of variables:

The *spread between active and passive rates* is defined as the natural logarithm of the ratio between one plus the average interest rate on loans in the segment of free loans and one plus the interest rate on time deposits of 30 days.

Operational costs are defined as the natural logarithm of one plus the ratio of operational costs and the volume of credit (calculated from a sample of 17 large banks, Central Bank of Brazil, 2001, Annex I).

Provisions for overdue loans are defined as the natural logarithm of one plus the ratio of provisions for overdue loans and the volume of credit (based on a sample of 17 large banks in Central Bank of Brazil, 2001, Annex I).

Direct taxes are defined as the natural logarithm of one plus the ratio between the burden of the Income Tax and the Pre-Tax Corporate Income (the CSLL) in a 30-day loan financed by a 30-day time deposit based on tax rates and simulations (Central Bank of Brazil, 2001, Annex I).

Indirect taxes are defined as the natural logarithm of one plus the indirect tax rates. Indirect taxes include: the tax on financial operations (IOF), taxes on gross revenues (PIS and COFINS) and the tax on bank debits (CPMF).

Commercial Bank Seigniorage Revenue is defined as the natural logarithm of one plus the ratio of bank seigniorage and the credit of banks to the private sector.

Bank margin is the natural logarithm of one plus the net margin calculated as a residual after deducting from lending rates: the passive rate and the expenses with administration, bad loans, and taxes.

Data and sources:

Interest rates on time deposits are from the Central Bank of Brazil and from the Institute of Applied Economic Research (IPEA) in Rio de Janeiro, Brazil.

Consistent interest rates on loans do not exist for the whole period between 1970 and 2001.

For the period between September 1994 and September 2001 Central Bank of Brazil publishes the average of interest rates on different instruments calculated from large samples.

Interest rates on loans between 1990 and 2000 are interest rates on working capital loans from Andima until 1991, from DIESP until 1993, and from the Central Bank between 1994 and 2000.

Interest rates on loans between 1970 and 1980 are interest rates on commercial paper ("ao mutuário") from the website of Instituto de Pesquisa Econômica Aplicada (IPEA).

Data on credit, monetary base, and demand deposits are from the IPEA data bank.

The general price index, IGP-DI, from Fundação Getúlio Vargas, Rio de Janeiro, is also available at the website of IPEA.

References

- Allen, Linda, 1988, "The Determinants of Bank Interest Margins: A Note," *Journal of Financial and Quantitative Analysis*, vol. 23, pp.231-235.
- Angbazo, Lazarus, 1997, "Commercial Bank Net Interest Margins, Default Risk, Interest-rate Risk, and Off-balance Sheet Banking," *Journal of Banking and Finance*, vol.21, pp.55-87.
- Banco Central do Brasil, 2001, *Juros e Spread Bancário no Brasil: Avaliação de Dois Anos do Projeto*, Brasília, DF: Banco Central do Brasil.
- Beck, Thornsten, Demirgüç-Kunt, Asli, and Levine, Ross, 1999, *A New Database on Financial Development and Structure*, World Bank Policy Research Working Paper 2146, Washington DC: The World Bank.
- Brock, Philip, 1989, "Reserve Requirements and the Inflation Tax," *Journal of Money, Credit and Banking*, vol.21, pp.106-21.
- Brock, Philip, 1996, *High Real Interest Rates, Guarantor Risk, and Bank Recapitalizations*, Policy Research Working Paper 1683, Washington DC: The World Bank.
- Brock, Philip and Liliana Rojas Suarez, 2000, "Understanding the Behavior of bank Spreads in Latin America," *Journal of Development Economics*, vol. 63, pp.113-134.
- Cardoso, Eliana, 1998, "Virtual Deficits and the Patinkin Effect," *IMF Staff Papers*, vol. 45, no. 4, pp. 619-646.
- Carrizosa, Maurício, 2000, "Brazil Structural Reform for Fiscal Sustainability," *World Bank Report No.19593*, Washington, D.C.: The World Bank.
- Chamley, Christophe, and Patrick Honohan, 1993, "Financial Repression and Bank Intermediation," *Savings and Development*, vol.17, no.3, pp.301-308.
- Chamley, Christophe and Patrick Honohan, 1990, *Taxation of Financial Intermediation: Measurement Principles and Application to Five African Countries*, World Bank Working Paper WPS 421, Washington DC: The World Bank.
- Dakolias, Maria, 1999, *Court Performance Around the World: A Comparative Perspective*, World Bank Technical Paper 430, Washington DC: The World Bank.
- Demirgüç-Kunt, Asli and Harry Huizinga, 1999, "Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence," *The World Bank Economic Review*, vol.13, no.2, pp.379- 409.

Hanson, James and Roberto Rezende Rocha, 1986, *High Interest Rates, Spreads, and the Costs of Intermediation*, The World Bank: Industry and Finance Series, Vol.18, Washington DC: The World Bank.

Ho, Thomas S. and Anthony Saunders, "The Determinants of Bank Interest Margins: Theory and Empirical Evidence," *Journal of Financial and Quantitative Analysis*, vol. XVI, no.4, pp. 581-599.

Koyama, Sérgio Mikio and Márcio I. Nakane, 2001, "Os determinantes do Spread Bancário no Brasil," In *Juros e Spread Bancário no Brasil*, Banco Central do Brasil, November.

McKinnon, Ronald, 1973, *Money and Capital in Economic Development*, Washington, DC, Brookings Institution.

McKinnon, Ronald and Donald Mathieson, 1981, How to Manage a Repressed Economy, *Essays in International Finance*, No. 145.

Pinheiro, Armando Castelar and Célia Cabral, 1999, *Credit Markets in Brazil: The Role of Judicial Enforcement and Other Institutions*, Ensaio BNDES 9, Rio de Janeiro: Banco Nacional de Desenvolvimento.

Rodríguez, Carlos, 1994, *Interest Rates in Latin America*, World Bank Internal Discussion Paper No.IDP-140.

Shaw, Edwards, 1973, *Financial Deepening in Economic Development*, New York: Oxford University Press.

Williamson, John and Molly Mahar, 1998, *A Survey of Financial Liberalization*, Princeton University: Essays in International Finance, No.211, November, Princeton, New Jersey.

Wong, Kit Pong, 1997, "On the Determinants of Bank Interest Margins under Credit and Interest Rate Risks," *Journal of Banking and Finance*, vol.21, pp.251-271.

World Bank, 2001, *Finance for Growth: Policy Choices in a Volatile World*, New York, NY: Oxford University Press.

Table 1: Brazil Taxes and Contributions at the end of the 1990s

Taxes and Contributions	Base	Value in 1997 (R\$)	Share in relevant variable	Destination
Federal Taxes				
Income Tax	Personal and Business Income	35.6	4.6 % of GDP	Federal: 53%; States: 21.5%; Municipalities: 22.5%; Development Funds: 3%.
Import Tariffs	CIF Imports	5.1	8.3 % of Imports	Federal.
Industrial Products (IPI)	Industrial Value Added	16.6	9.8 % of Manufacturing GDP	Federal: 43%; States: 21.5%; Municipalities: 22.5%; Dev. Funds: 3%; Export Fund: 10%.
Financial Operations (IOF)	Loans, Insurance, Foreign Investment.	3.8	6.7 % of Financial GDP	Federal
Rural Land Fees	Land Values (?) Various	0.2 0.3		Federal: 50%; Local: 50% Federal
Federal Contributions				
Social Security	Private Wage Bill	44.1	20.1 % of Non-Government Wages	Social Security Benefits
COFINS	Gross Revenues	18.3	2.4 % of GDP	Social Security Benefits
CPMF	Check Debits	6.9	12.1 % of Financial GDP	Health
CSLL	Pre-Tax Corporate Income	7.2	2 % of Operational Surplus	
PIS/ Pasep	Gross Revenues	7.3	0.9 % of GDP	FAT: Deposits at Federal Financial Institutions
Federal Employee Contributions	Federal Wage Bill	2.6	6.1 % of Federal Wages	Payment of Federal Pensions
Other Social Contributions	Various			
FGTS	Wage Bill	12.9	5.9 % of Non-Government Wages	Severance Benefits, Housing
Economic Contributions	Various	0.9		
Salário-Educação	Wage Bill	2.8	0.8 of Wages	FNDE
State Taxes				
Value Added (ICMS)	Value Added	59.8	7.7 % of GDP	States: 60%; Local: 25%; FUNDEF: 15%
Vehicle (IPVA)	Vehicle Value	3.8		States: 50%; Local; 50%
Inheritance (ITCD)	Inheritance Value	0.3		States
Social Security Contributions	Wage Bill	1.5	1.9 % of State Government Wages	States
Municipal Taxes				
Urban Property (IPTU)	Assessed Value	3.1	2.6 of Rental Income	Municipalities
Transfer of Fixed Assets (ITBI)	Value of Asset	0.8		Municipalities
Services (ISS)	Value Added	4.4	0.9% of Services GDP	Municipalities
Fees	Various	2.0		Municipalities
Other	Various	0.1		Municipalities

Source: Mauricio Carrizosa, 2000, "Brazil Structural Reform for Fiscal Sustainability," *World Bank Report* No.19593, Washington, D.C.: The World Bank.

Table 2:
Loans as Percent of GDP
Brazil, 1989-2000

	Loans from the Public Financial Sector		Loans from the Private Financial Sector		Loans from Public and Private Financial Sectors				
	To the Public Sector	To the Private Sector	To the Public Sector	To the Private Sector	To the Public Sector	Personal Loans	Business Loans	Total to the Private Sector	Total Loans
1989	14.7	25.7	1.6	16.5	16.3	1.5	40.8	42.3	58.6
1990	7.1	11.2	0.7	9.3	7.9	0.6	19.9	20.5	28.4
1991	8.0	14.3	0.8	11.3	8.8	0.9	24.7	25.6	34.4
1992	9.4	18.2	0.8	15.1	10.2	1.4	31.9	33.3	43.5
1993	11.3	23.4	0.7	22.3	12.0	2.3	43.4	45.7	57.8
1994	4.3	12.2	0.3	12.2	4.5	2.3	22.1	24.4	28.9
1995	4.6	13.8	0.4	14.1	4.9	2.4	25.5	27.8	32.8
1996	4.8	12.6	0.4	13.6	5.2	2.4	23.8	26.2	31.4
1997	3.7	12.0	0.3	13.3	4.0	3.2	22.0	25.3	29.2
1998	2.3	13.3	0.2	13.3	2.5	3.7	22.9	26.7	29.1
1999	1.8	13.6	0.1	13.5	2.0	3.9	23.2	27.1	29.1
2000	1.2	11.9	0.1	14.6	1.4	4.6	21.8	26.4	27.8

Note: Loans as percent of GDP were calculated by dividing the average stock of credit (between December of current year and December of previous year) by GDP.

Source: Central bank of Brazil.

Table 3
 Real Interest Rates*
 Brazil, 1970-2001
 Percent per year

	Passive Real Rates	Active Real Rates		
Period	Certificate of Time Deposit	Commercial Paper	Working Capital	Average of Active Rates
1970-74	3	24	-	-
1975-79	-3	14	10	-
1980-84	-6	20	20	-
1985-89	10	**	**	-
1990-94	19	-	42	-
1995-98	22	-	74	92
1999-2001	6	-	-	45

Notes: * Real interest rates are defined as $r = [(1+i)/(1+\pi)] - 1$ where i is the annualized average monthly interest rates and π is the general price index (IGP-DI). Calculations use the general price index because current consumer price indices are not available for earlier periods. Real interest rates between 1999-2001 are higher when consumer price indices are used in place of the general price index.

-: Not available

** : Information for active rates between 1985 e 1989 from different sources is inconsistent.

Sources: Central Bank of Brazil, Institute of Economic Research (IPEA), Andima and Broadcast.

Table 4
 Spreads between active and passive annual interest rates*
 Brazil, 1970-2001
 Percent

Period	Between rates on Commercial Paper and Certificate of Time Deposit	Between rates on Working Capital and Certificate of Time Deposit	Between Average Active Rates and Certificate of Time Deposit
1970-74	20	-	-
1975-79	18	13	-
1980-84	28	28	-
1985-89	-	-	-
1990-94	-	19	-
1995-98	-	43	57
1999-2001	-		37

* Spreads are defined as $s = (1+rl)/(1+rd) - 1$, where rl is the real interest rate on loans and rd is the real interest rates on time deposits, as defined in table 3.

-: Not available

Source: table 3.

Table 5
 Spreads between Active and Passive Monthly Interest Rates and Net Margins of
 Commercial Banks
 Brazil, 1995-2001
 Percent

Period	Spread between the average active interest rates per month and the rate on certificate of deposits per month	Commercial bank margin net of administrative expenditures, expenditures with bad loans and explicit taxes
1995	5.3	0.90
1996	3.6	0.77
1997	3.1	0.76
1998	3.3	0.90
1999	3.2	1.01
2000	2.5	1.01

Source: Central Bank of Brazil

Table 6:
Rates of Required Reserves Before the Real Plan
Brazil, 1969-1993
Percent of deposits

	Demand Deposits (1)		Time Deposits	
	Region A (2)	Region B (2)	Region A (2)	Region B (2)
April 1969	27	18	9	4.5
May 1971 (3)	27	18	9	4
January 1973	27	18	0	0
March 1973 (4)	27	18	0	0
July 1973 (5)	27	18	0	0
July 1974 (6)	27	18	0	0
February 1975 (7)	27	18	0	0
July 1975 (8)	27	18	0	0
April 1976	33	18	0	0
July 1976	35	18	0	0
October 1977	40	18	0	0
July 1979 (9)	40	18	0	0
December 1984	40	18	22	22
June 1985	40	18	20	20
January 1992	40	18	0	0
November 1993	40	40	0	0

Notes:

(1) The periods and formula for calculating average deposits on which required reserves were to be based changed many times between 1969 and 1993.

(2) Region B: Acre, Amazonas, Pará, Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia, Espírito Santo, Goiás, Mato Grosso. Region A: all other states.

(3) A reduction of half percentage point in required reserves will make up resources from demand deposits destined to loans to small and medium enterprises.

(4) A reduction of 2 percentage points in required reserves rates will make up resources from demand deposits to be destined to loans to exporters.

(5) Percentage of demand deposits destined for rural credit increased from 10 percent to 15 percent.

(6) Amount to be destined to loans to small and medium enterprises increases to 4 percent of demand deposits.

(7) Mandatory loans for working capital of small and medium enterprises increases to 8 percent of demand deposits.

(8) 55 percent of required reserves to be held in government bonds (LTN or ORTN).

(9) Percentage of demand deposits destined for rural credit increased from 15 percent to 17 percent.

Table 7:
Rates of Required Reserves After the Real Plan
Brazil, 1994-2001
Percent

Period	Demand Deposits	Time Deposits	Saving Deposits	Credit Operations	FIF-CP	FIF-30 days
Before the Real Plan	40	0	15	0	0	0
Jul-94	100	20	20	0	0	0
Aug-94	100	30	30	0	0	0
Oct-94	100	30	30	15	0	0
Dec-94	90	27	30	15	0	0
Apr-95	90	30	30	15	0	0
May-95	90	30	30	12	0	0
Jun-95	90	30	30	10	0	0
Jul-95	83	30	30	10	35	10
Aug-95	83	20	15	8	40	5
Sep-95	83	20	15	5	40	5
Nov-95	83	20	15	0	40	5
Aug-96	82	20	15	0	42	5
Sep-96	81	20	15	0	44	5
Oct-96	80	20	15	0	46	5
Nov-96	79	20	15	0	48	5
Dec-96	78	20	15	0	50	5
Jan-97	75	20	15	0	50	5
Dec-98	75	20	15	0	50	5
Mar-99	75	30	15	0	50	5
May-99	75	25	15	0	50	5
Jul-99	75	20	15	0	50	5
Aug-99	75	20	15	0	0	0
Sep-99	75	10	15	0	0	0
Oct-99	65	0	15	0	0	0
Mar-00	55	0	15	0	0	0
Jun-00	45	0	15	0	0	0
Sep-01	45	10	15	0	0	0

Source: Central Bank of Brazil

Table 8: Ratio of Bank Seigniorage to Loans, Inflation Rate, and Required Reserves
Brazil, 1970-2000

Period	Bank Seigniorage Divided by Loans (Percent)	Average Inflation Rate (IGP-DI) (Percent per year)	Range of Required Reserves on Demand Deposits (Percent)
1970-74	0.485	21	18 to 27
1975-79	0.223	46	18 to 40
1980-84	0.364	143	18 to 40
1985-89	0.500	507	18 to 40
1990-June94	0.189	1660	18 to 40
July 94-1998	-0.118	16	60 to 100
1999	0.086	20	60 to 65
2000	0.225	10	45 to 55

Source: Central Bank of Brazil and IPEA.

Table 9:
 Determinants of the Spread between Active and Passive Rates After the Real Plan
 Period 1994:12 to 2001:09
 OLS, Newey-West HAC Standard Errors and Covariance, lag truncation=3
 All variables expressed as natural logarithms (see appendix for definitions)
 (t-statistics in parentheses)

	Regression 1 1994:12- 2001:09	Regression2 1994:12- 2001:09	Regression 3 1995:01- 2001:09	Regression 4 1995:01- 2001:09
Constant	0.001 (1.079)	0.001 (1.227)	0.012 (15.97)	0.013 (20.01)
Bank Seigniorage Revenue (t-4)	-0.074 (-2.053)		-0.070 (-2.528)	
6-month Average Bank Seigniorage Revenue (t-2)		-0.148 (-1.640)		
6-month Average Bank Seigniorage Revenue (t-4)				-0.305 (-4.452)
Inflation Rate (t-1)	0.047 (1.535)	0.053 (1.798)	0.058 (2.832)	0.041 (2.487)
Direct taxes (t-1)			0.97 (23.42)	0.93 (19.57)
Indirect taxes (t-1)			0.997 (8.076)	0.94 (8.284)
Operational Costs (t-1)			0.517 (4.386)	0.543 (5.153)
Provisions for overdue loans (t-1)			0.785 (7.879)	0.749 (8.372)
Spread (t-1)	0.95 (29.24)	0.94 (25.98)		
Number of observations	82	82	81	81
Adjusted R2	0.95	0.95	0.95	0.96
Durbin- Watson	1.90	1.88	1.66	1.83

Table 10:

Determinants of the Commercial Bank Net Margin after the Real Plan
 OLS, Newey-West HAC Standard Errors and Covariance (lag truncation = 3)
 All variables expressed as natural logarithms (see appendix for definitions)
 (t-statistics in parentheses)

	Regression 5 1994:12- 2001:09	Regression 6 1994:10- 2001:09	Regression 7 1994:11- 2001:09	Regression 8 1994:11- 2001:09
Constant	0.0025 (2.935)	0.0024 (2.930)	0.002 (1.720)	0.0025 (3.1076)
Bank Seigniorage Revenue (t-3)	-0.023 (-2.2550)			
Bank Seigniorage Revenue (t-4)	-0.027 (-1.948)			
6-month Average of Bank Seigniorage Revenue (t-2)		-0.056 (-1.34)		
6-month Average of Bank Seigniorage Revenue (t-3)			-0.094 (-2.573)	-0.063 (-1.807)
Inflation (t-1)	0.011 (0.815)		0.025 (2.025)	
Inflation (t-2)	0.021 (0.956)			
February 95 Dummy (Mexico's contagion)	0.001 (3.761)	0.001 (2.671)	0.0015 (2.403)	0.001 (3.749)
February 99 Dummy (The Real floats)	0.002 (2.652)	0.003 (15.59)	0.0023 (11.480)	0.003 (17.71)
Margin (t-1)	0.687 (6.978)	0.734 (8.342)	0.662 (7.900)	0.722 (8.386)
Trend			0.0003 (1.0500)	
Number of observations	82	84	83	83
Adjusted R2	0.63	0.61	0.62	0.61
Durbin-Watson	1.99	2.03	2.04	2.00

Table 11

Determinants of the Spread between Interest Rates on Working Capital Loans and Interest Rates on Time Deposits

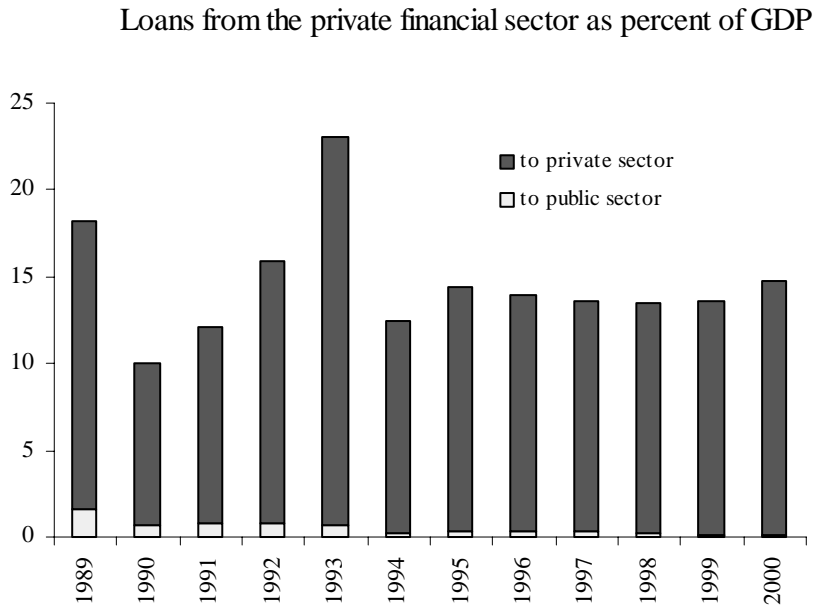
Period: 1990:03-2000:12

All variables expressed as natural logarithms (see appendix for definitions)

(t-statistics in parentheses)

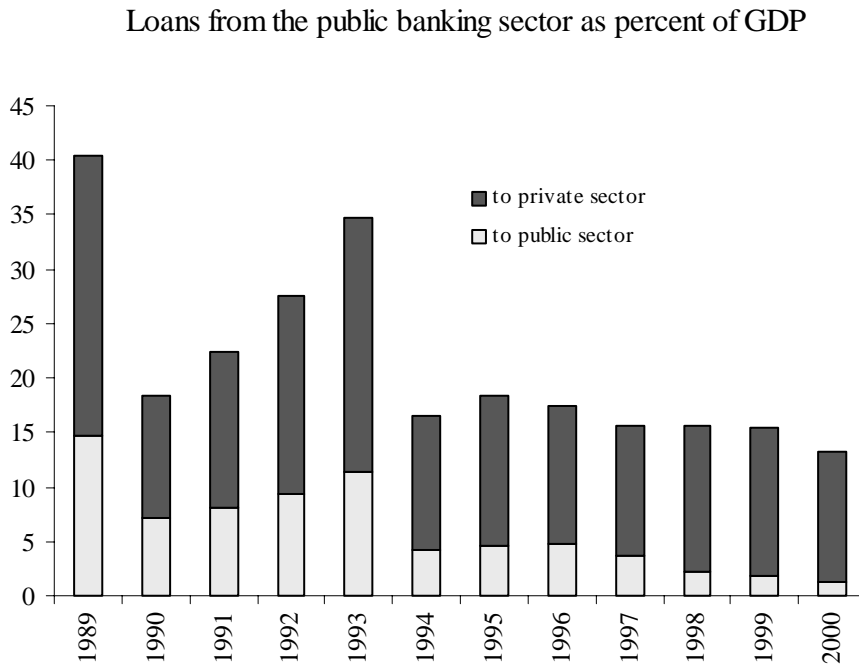
	Regression 9	Regression 10
Constant	0.0195 (10.227)	0.0196 (8.481)
Bank Seigniorage Revenue (t-2)	-0.268 (-1.842)	
6-month Average of Bank Seigniorage Revenue (t-2)		-0.727 (-2.986)
Inflation	-0.070 (-6.690)	-0.061 (-6.109)
March 1990 Dummy (Collor Plan)	0.171 (12.871)	0.166 (28.307)
July 1994 Dummy (The Real Plan)	0.192 (15.809)	0.192 (117.964)
Spread (t-1)	0.244 (5.399)	0.236 (3.335)
Number of Observations	130	130
Adjusted R-squared	0.79	0.80
Durbin-Watson	1.91	2.03

Figure 1



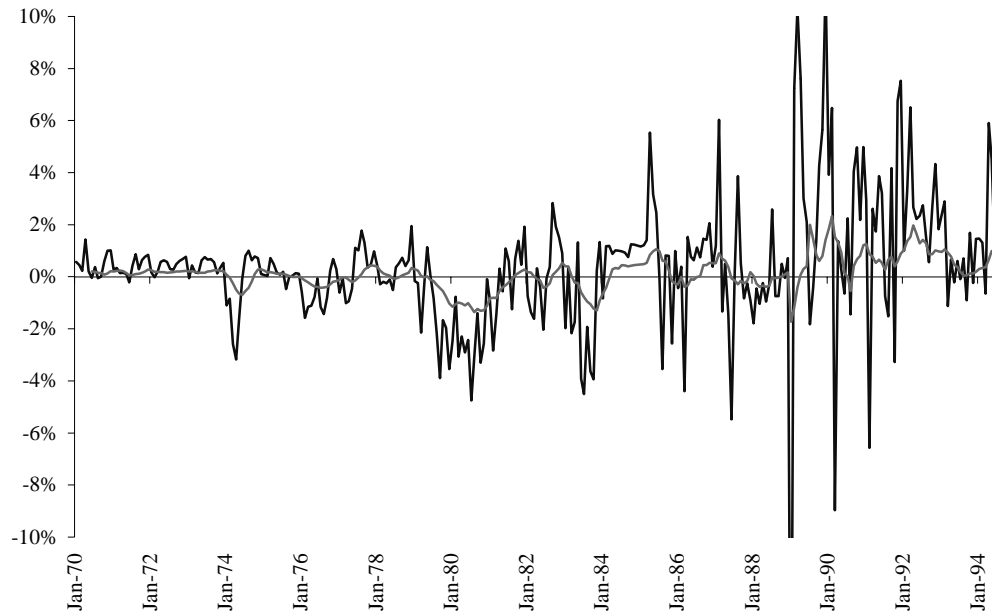
Source: Table 2

Figure 2



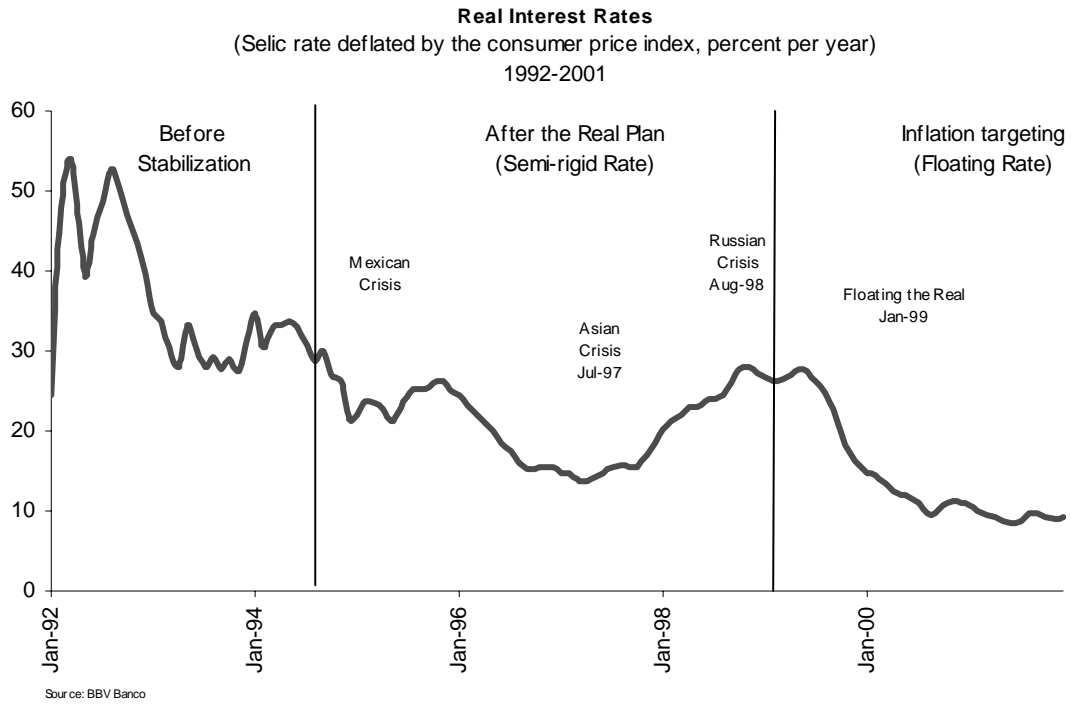
Source: Table 2.

Figure 3: Passive Real Interest Rates Before the Real Plan
Brazil, January 1970 - June 1994



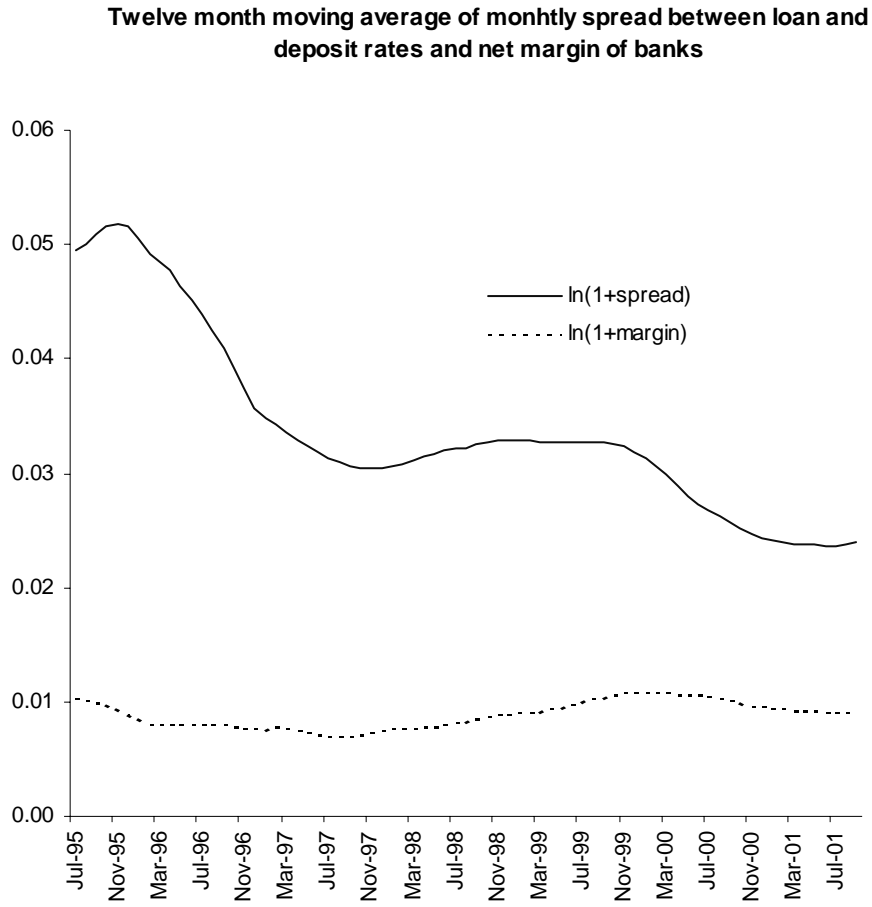
Source: Instituto de Pesquisa Econômica Aplicada (IPEA), Rio de Janeiro

Figure 4



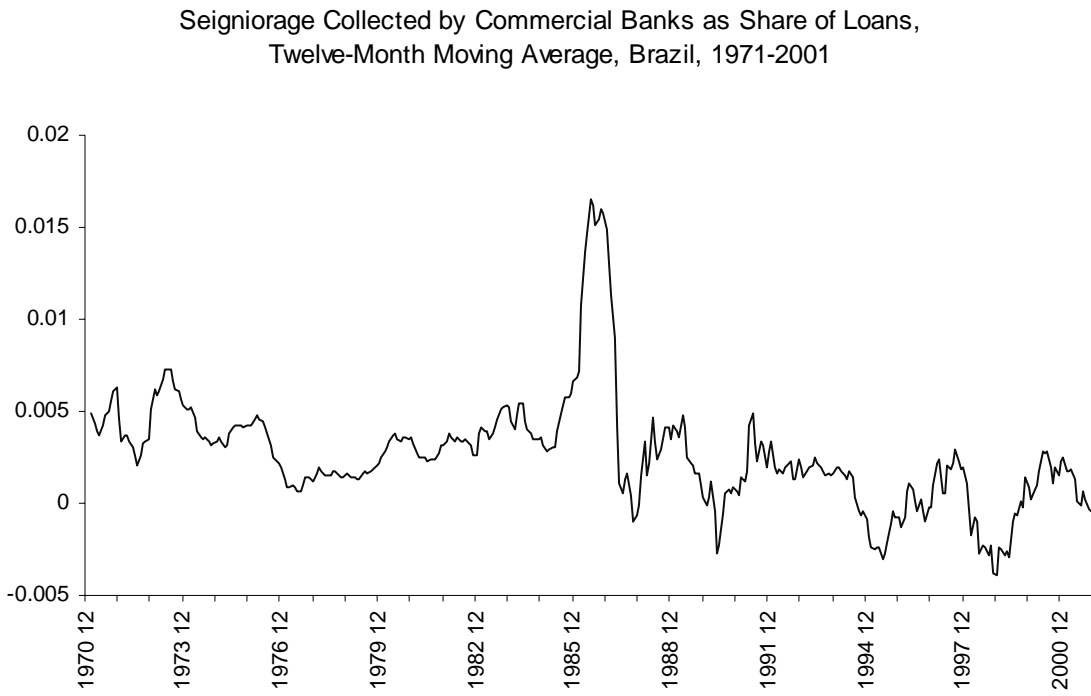
Source: BBV Bank

Figure 5



Source: Central Bank of Brazil

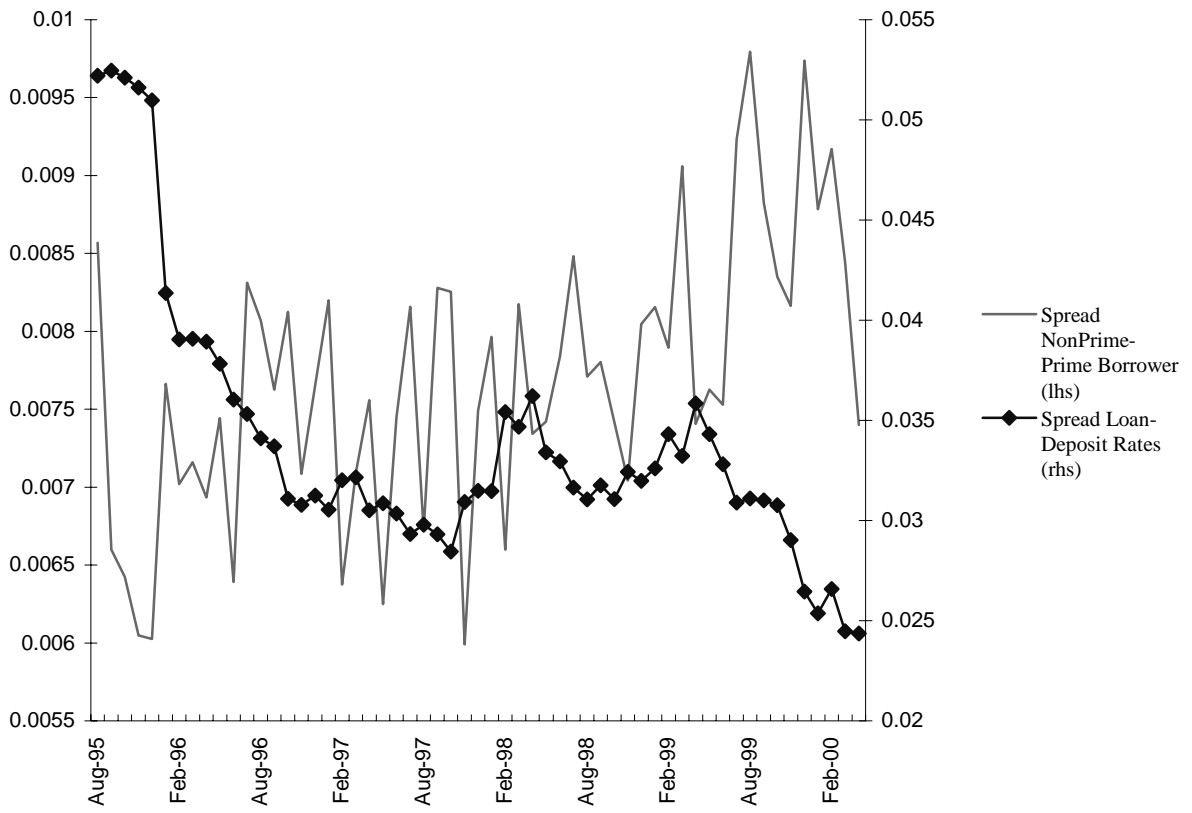
Figure 6



Source: Central Bank Of Brazil and IPEA

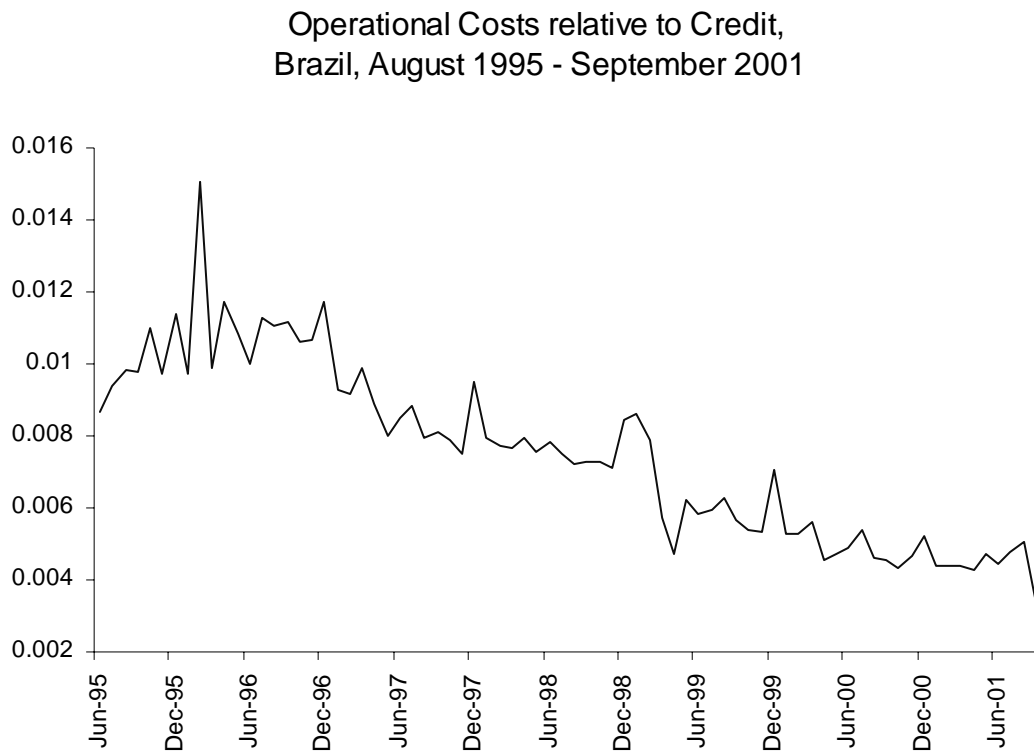
Figures 7

Risk Spread & Average Intermediation Spread
 Brazil, August 1995 - April 2000, Natural Logarithms



Source: Broadcast Interest Rates

Figure 8



Source: Central Bank of Brazil