



BANCO CENTRAL DO BRASIL

Working Paper Series

160

**The Incidence of Reserve Requirements in Brazil:
Do Bank Stockholders Share the Burden?**

Fabia A. de Carvalho and Cyntia F. Azevedo

February, 2008

ISSN 1518-3548
CGC 00.038.166/0001-05

Working Paper Series	Brasília	n. 160	Feb	2008	p. 1-58
----------------------	----------	--------	-----	------	---------

Working Paper Series

Edited by Research Department (Depep) – E-mail: workingpaper@bcb.gov.br

Editor: Benjamin Miranda Tabak – E-mail: benjamin.tabak@bcb.gov.br

Editorial Assistant: Jane Sofia Moita – E-mail: jane.sofia@bcb.gov.br

Head of Research Department: Carlos Hamilton Vasconcelos Araújo – E-mail: carlos.araujo@bcb.gov.br

The Banco Central do Brasil Working Papers are all evaluated in double blind referee process.

Reproduction is permitted only if source is stated as follows: Working Paper n. 160.

Authorized by Mário Mesquita, Deputy Governor for Economic Policy.

General Control of Publications

Banco Central do Brasil

Secre/Surel/Dimep

SBS – Quadra 3 – Bloco B – Edifício-Sede – 1º andar

Caixa Postal 8.670

70074-900 Brasília – DF – Brazil

Phones: (5561) 3414-3710 and 3414-3567

Fax: (5561) 3414-3626

E-mail: editor@bcb.gov.br

The views expressed in this work are those of the authors and do not necessarily reflect those of the Banco Central or its members.

Although these Working Papers often represent preliminary work, citation of source is required when used or reproduced.

As opiniões expressas neste trabalho são exclusivamente do(s) autor(es) e não refletem, necessariamente, a visão do Banco Central do Brasil.

Ainda que este artigo represente trabalho preliminar, citação da fonte é requerida mesmo quando reproduzido parcialmente.

Consumer Complaints and Public Enquiries Center

Address: Secre/Surel/Diate

Edifício-Sede – 2º subsolo

SBS – Quadra 3 – Zona Central

70074-900 Brasília – DF – Brazil

Fax: (5561) 3414-2553

Internet: <http://www.bcb.gov.br/?english>

The Incidence of Reserve Requirements in Brazil: Do Bank Stockholders Share the Burden?*

Fabia A. de Carvalho**
Cyntia F. Azevedo***

Abstract

The Working Papers should not be reported as representing the views of the Banco Central do Brasil. The views expressed in the papers are those of the authors and do not necessarily reflect those of the Banco Central do Brasil.

There is consensus in the economic literature that the reserve requirements are a tax levied upon financial intermediation, yet the incidence of the tax remains controversial. In this paper, we test whether changes in reserve requirements in Brazil impact the stock returns of the financial system distinctly from the rest of the economy. We find evidence that Brazilian bank stock returns were affected by changes in reserve requirements on both time deposits and transaction accounts, which implies that the tax burden of required reserves was not fully passed through to banks' borrowers or clients. Stock returns of non-financial firms were also affected by these changes, suggesting that in some cases, reserve requirements on time deposits and transaction accounts served as a non-neutral instrument of monetary or fiscal policy in Brazil.

Key words: Tax Incidence, Reserve Requirements, Event Studies

JEL Classification: E5, E6

* We would like to thank Anderson Caputo and Eduardo Fernandes for important comments and suggestions on earlier versions of this paper. It is not to be inferred that they share the views expressed here. Moreover, they are exempted from any errors that may still remain.

** Central Bank of Brazil. E-mail: fabia.carvalho@bcb.gov.br

*** Central Bank of Brazil and Columbia University. E-mail: cfa2101@columbia.edu

Introduction

Reserve requirements serve a number of purposes. Policymakers have extensively called upon their role as a monetary policy instrument to justify higher ratios or higher incidence, relying on theoretical arguments that they may help stabilize the demand for money (Hardy, 1997), prices (Siegel, 1981), the demand for goods (Bental and Eden, 2002), or the output gap under certain types of shocks to the economy (Baltensperger, 1982). Several other papers dispute this stabilizing function, especially when monetary policy does not target monetary aggregates, yet policymakers around the world, particularly in economies lacking fully fledged securities' markets, still see them as a feasible alternative to stabilize inflation or output.

Reserve requirements may also contribute to prudential regulation. Bris and Cantale (2003) show that positive reserve requirement ratios help restore market efficiency when there are external agency problems, i.e., when banks have incentives to take excessive risks but credit risk cannot be directly observed by regulators. In contrast, reductions in reserve requirements may help restore the efficient equilibrium in circumstances where banks have incentives to take insufficient risks, regulators cannot observe credit risk, and bank owners cannot perfectly assess managers' efforts.

Some authors advocate that the driving motive for the introduction of reserve requirements was in fact their fiscal role (De Kock 1964, and Goodfriend and Hargraves 1983, for the US). In the Brazilian case, Fernandes (1992) mentions a number of occasions when fiscal concerns affected reserve requirement decisions. As of 2007, if the government were to invest the balance of non-interest bearing reserve deposits at the central bank at a benchmark reference rate, interest accrued to these deposits would account for about 1% of federal government monthly revenues. The series shows a peak at 7% in November 1998 (Figures 1 and 2). In addition, issuing ordinary debt is much costlier than maintaining required bank reserves at the central bank (Table 1).

Reserve requirements are a tax on financial intermediation when interest accrued to required reserves deposited at the central bank is lower than the rates of return on alternative bank investment. Although the question "who pays the tax?" is of relevance to any study of economic distortions or fair income allocation, the literature has not yet reached an agreement on the answer. Black (1975) and Fabozzi and Thurston (1986) argue that the incidence of the tax falls entirely on depositors. Fama (1975) and James (1987), on the other hand, do not find any relation between reserve requirement ratios

and interest rates paid on bank deposits in the US. Fama thus infers that the tax is entirely transferred to borrowers, and James finds empirical evidence supporting Fama's argument.

More recently, the literature has been focusing on the possibility that the tax burden of reserve requirements be mutually shared by depositors, borrowers and banks' shareholders. On theoretical grounds, Davis and Toma (1995) find that borrowers and stockholders may share the burden of reserve requirements altogether in a framework where banks have comparative advantage in monitoring loans and assessing the risk of potential borrowers. On empirical grounds, Kolari, Mahajan and Saunders (1988), Slovin, Sushka and Bendeck (1990), Osborne and Zaher (1992), Cosimano and McDonald (1998), and Hein and Stewart (2002, 2003) all find evidence supporting the argument of shared incidence in the US.

The literature on the Brazilian case has focused on the question of whether reserve requirements affect the interest spreads on loans advanced by banks to their clients. If they do, as is the case in Cardoso (2003), the literature concludes that the tax burden of reserve requirements is passed through to borrowers. A number of studies produced by Central Bank of Brazil's staff have in fact assumed that the incidence of the tax falls entirely on borrowers¹.

Cardoso and Koyama (1999) argue that default ratios and operational costs are the main determinants of bank spreads in Brazil, and show that the ratios of reserve requirement on time deposits matter little to bank interest spreads because required reserves on time deposits accrue interest at the central bank. They thus infer that reserve requirements on time deposits are not passed through to borrowers.

To take a more straightforward stance on the issue of who really pays the tax implied by reserve requirements in Brazil, this paper follows the recent trend of the international literature that investigates the incidence of reserve requirements by employing event study methods to the Brazilian case. What we do in the paper is test whether banks' shareholders bear part of the burden of reserve requirements in Brazil, and, likewise, benefit from reductions in required reserve ratios or calculation base. We also investigate whether the response of stock returns of Brazilian banks is in any manner different from stock returns of the non-financial sector.

¹ Every year, the Central Bank of Brazil publishes a report on the evolution, determinants, and future prospects of banking spreads in Brazil (www.bcb.gov.br). In *Juros e Spread Bancário: Avaliação do*

Reserve requirements in Brazil equal more than a quarter of their respective deposits and the regulation on reserve requirements is also very cumbersome. Tax ratios, interest accrued on reserves, form of compliance (cash, securities or vault cash), and authorized deductions from the reservable base all differ across types of banks' liabilities and assets, and have changed remarkably often over the past 12 years.

The Brazilian sample is also very challenging. In addition to a reduced number of companies listed in the stock market compared to the US, the impressive number of changes in reserve requirement regulation during these past 12 years makes the work of any econometrician very hard, and using data prior to the Real Plan poses another challenge to empirical investigations because of the distortions caused by hyperinflation. A careful sample selection provided us with three events of changes in reserve requirements on transactions accounts and four events of changes in requirements on time deposits. It is not an easy task to reach an agreement on whether the net effect of some changes was a reduction or an increase in the tax burden. The last event of change in reserve requirements on transaction accounts that is analyzed here, for instance, refers both to an increase in the reserve requirement ratio and to an increase in authorized deductions on the taxable base, the latter functioning as a reduction in the ratio. Because of this difficulty in determining whether a change in reserve requirement would be perceived as positive, neutral or negative for stockholders, we decided to analyze each event separately and try to draw general conclusions from the individual results we were able to achieve.

The results were sensitive to alternative test methodologies employed. Under reasonable assumptions, we find evidence that some changes in reserve requirements on time and transaction accounts had important effects on the stock returns of the banking system. Non-financial corporations were most likely affected only by decisions on reserve requirements on time deposits. These results suggest that the tax implied by reserve requirements in Brazil is shared amongst banks' clients and owners, and it is sometimes born by owners alone. Thus, the widespread perception that reserve requirements on time deposits imply zero costs to banks and that reserve requirements on transaction accounts are always an efficient instrument of monetary policy cannot find much support on the results obtained here.

Segundo Ano do Projeto, pp. 51, the Central Bank of Brazil assumes that the tax burden of time deposits is zero because their reserves at the central bank accrue the overnight reference interest rate.

The paper is presented in the following sequence. Section 2 provides some stylized facts on reserve requirements in Brazil. Section 3 draws some lines on event study methods employed in this paper to test for abnormal returns. Section 4 describes the sample. Section 5 reports the results. Finally, Section 6 concludes the paper.

1. Reserve Requirements in Brazil²

Fernandes (1992) reports that reserve requirements in Brazil were first introduced in 1932. By then the central bank had not yet been created, and the monetary authority operations were carried out by Banco do Brasil, a state-owned commercial *cum development* bank.

Throughout the entire history of reserve requirement regulation in Brazil, concerns other than those attached strictly to monetary policy permeated reserve requirement decisions. Cardoso (2003, p.p. 8) argues that until 1993, reserve requirements were mainly implemented to (imperfectly) tax banks profits that accrued with high inflation rates. Fernandes (1992) suggests that other fiscal issues have also been determinant to reserve requirement decisions.

In 1945, as an attempt to part the monetary authority from Banco do Brasil, the agency Superintendência da Moeda e do Crédito (SUMOC) was created to control money market operations and to set the grounds for a Brazilian central bank. One of the measures SUMOC implemented was to introduce interest-bearing required reserves, partly complied with required investment in public bonds. It was then that the Brazilian monetary authority started to use reserve requirements to sustain an artificial demand for public securities, a policy that still prevails nowadays (Figure 3).

SUMOC was not operationally independent from Banco do Brasil, as commercial banks were required to hold their reserves at the federal commercial bank. As a result, reserve requirements also functioned as an alternative funding for Banco do Brasil to implement credit operations on behalf of the central government.

Upon inflationary concerns, the Central Bank of Brazil was created in 1964. Since then reserve requirement regulation has been successively altered in accordance with prevailing economic policy purposes. In 1986, federal government deposits were finally transferred to the Central Bank of Brazil, with the central bank not allowed to

² This section is strongly based on Fernandes (1992) and Cardoso (2003)

finance National Treasury's overdraft positions. Therefore, central bank's autonomy enhanced.

Until 1993, reserve requirements were used for distributional purposes, with required ratios being higher for bank branches located in richer regions of the country (Table 2)³. Required ratios on transaction accounts increased over time. For non-poor regions, the ratios were 27% from 1969 to 1975, 33% and 35% in 1976, and 40% from 1977 to 1993. In spite of a long-lasting period of hyperinflation in Brazil, reserve requirements were not a focal instrument of monetary policy during this period⁴.

In 1994, the perverse inflationary dynamics finally came to a halt with the successful implementation of the Real Plan. Along with a monetary reform also came a brief fiscal adjustment, the use of the exchange rate as a nominal anchor, and tight monetary policy^{5 6}. From 1994 until the end of 1998, the Central Bank of Brazil adopted rediscount rates as its main monetary policy instrument, but kept very close attention to monetary aggregates.

As a result, reserve requirements were intensely used for monetary policy purposes during the Real Plan. In mid-1994, the central bank increased required ratios on transaction accounts to 100% (from 40%), on savings accounts to 20% (from 15%), and on time deposits to 20% (from 0%). In the 18 months following June 1994, there were 53 changes of all sorts in the reserve requirement regulation. In this specific period, the central bank, attempting to curb the ability of banks to innovate on their funding and thus to bypass reserve requirements, created new requirements on a number of banks' assets and liabilities⁷, in addition to the already existing requirements on investment funds, savings accounts, transaction accounts, judicial deposits and deposits from realized guarantees (*recursos de depósitos e garantias realizadas*).

Even when monetary policy purposes prevailed in reserve requirement decisions, fiscal issues were still important. The high level of domestic real interest rates

³ Between 1969 and 1993, the required ratio on demand deposits was 18% for the poorest states (Acre, Amazonas, Pará, Maranhão, Piauí, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia, Espírito Santo, Goiás, and Mato Grosso) and 27% for the remaining regions.

⁴ Cardoso (2003). Required ratios on time deposits were in place only in part of the 1984-1985 period.

⁵ Cardoso (2003), p.p. 5

⁶ The Real Plan, which began in July 1994, put an end on decades of hyperinflation in Brazil. Its main anchor was a fixed exchange rate. The exchange rate regime changed in 1999 to a dirty floating of the currency, followed by an inflation targeting regime that has maintained price stability.

⁷ The accounts that started to be subject to reserve requirements were "contratos de assunção de obrigações", credit operations (*operações de adiantamento, empréstimos, financiamento e de crédito*), "operações ativas e passivas", and time deposits at indetermined tenure (*depósitos a prazo de reaplicação automática*).

and the sharp appreciation of the Real during the 1994-1998 period resulted in increased external borrowing. External inflows were partly sterilized to avoid pressure on domestic liquidity and interest rates. These countervailing measures, associated with high debt servicing rates, exerted strong pressure on the fiscal accounts. In 1998, a year of intense capital flight and increased difficulties to roll over the domestic debt, reserve requirements were overtly used to sustain an artificial demand for public securities.

The international confidence crisis of 1997 and 1998 and increased concerns about debt sustainability led to strong capital outflows, culminating in the floating of the exchange rate in January 1999. A new policy framework was then envisaged to keep inflation under control without further compromising the fiscal accounts. In May 1999, the central bank abandoned the use of rediscount rates as its operational target to focus on overnight interest rates. In June 1999, the country formally adopted an inflation-targeting regime, in which reserve requirements lost some of their importance as a monetary policy instrument.

However, fiscal concerns have still played a role in reserve requirement decisions, even under an inflation targeting regime. Upon the implementation of the new monetary policy regime, the central bank committed itself to gradually reduce reserve requirement ratios “as long as good fiscal results continue and inflation is under control”⁸. However, the easing path of reserve requirements on transaction accounts did not last long. In 2002, the central bank inaugurated an additional requirement: interest-bearing reserve requirements on transaction accounts and time deposits and savings accounts. The purpose was to reduce some of the pressure on the liquidity that was freed to the market because of an innovation in instruments used to rollover domestic debt indexed to foreign-currency⁹. The liquidity freed to the market had to be channeled out to daily repo operations with the central bank or the pressure would be too strong on interest rates and thus on inflation. This placed the central bank at a very uncomfortable position of rolling over high amounts of very short-term debt. In 2002, this excess liquidity reached R\$ 70 billion and as of November 2006 (date for the last revision in this paper) stood at R\$ 80 billion, of which 28% was withdrawn with very short-term repo operations and 47% with repos redeeming in 5 months.

⁸ Juros e Spread Bancário, *primeiro ano*.

⁹ As an attempt to improve on the supply of financial hedge to the volatility of the exchange rate, and because of constraints on the issuance of domestic-debt indexed to foreign currencies, the government decided to rollover maturing domestic-debt indexed to foreign currencies using derivatives, which had minor monetary impact.

In February 2003, the required ratio on transaction accounts increased as part of a set of measures to control accelerating inflation. In this event, the Monetary Policy Committee made it explicit that the central bank was changing reserve requirements for monetary policy purposes. After inflationary pressures dissipated, reserve requirement ratios were reduced.

1.1. A brief international comparison

García (1995) reports that, contrary to Brazil, advanced economies have followed a reducing trend in reserve requirements over time. This trend has arisen from the widespread adoption of interest rates, rather than monetary aggregates, as the main instrument of monetary policy.

In Brazil, even after the explicit adoption of interest rates as the main monetary policy instrument, and despite the fact that reserve requirements have not been used as policy instruments since 2003, their phasing out has been hindered by the entanglements of fiscal and monetary policy. For one thing, the banking credit market is still not deep enough to absorb the liquidity that would be freed to the market should required reserves be strongly reduced. In addition, as of September 2007, around 23% of total reserve requirements were complied with mandatory investment in public securities (Figure 3), which guarantees an artificial demand of R\$ 44 billion for government debt, or 4% of federal government bonds in the market.

In September 2007, the requirements that remained in Brazil were on transactions accounts (40% in cash-in-vault plus 5% in non-interest bearing reserves at the central bank plus 8% interest-bearing reserves at the central bank), time deposits (15% in the form of mandatory investment in public securities plus 8% in interest-bearing reserves at the central bank), and savings accounts (30% in the form of both mandatory investment in public securities and interest-bearing reserves at the central bank plus 65% in required concession of loans) (Figure 4 and Table 3). These ratios are still significantly high under international comparisons (Figure 5).

The share of required reserves on transaction accounts that accrue interest yield the Selic rate (reference overnight rate), and so do required reserves on time deposits and additional reserves on savings accounts). At end-2006, interest paid to required reserves on savings accounts (excluding the additional requirement that yields the Selic rate) was 6.7% p.y plus Taxa Referencial (TR, another base rate set by the Central

Bank) for some types of savings accounts (*poupança livre*, *pecúlio* and *rural*) and TR plus 3% p.y. for the other type (*poupança vinculada*).

Compared to the US, reserve requirements in Brazil bring about an additional difficulty to depository institutions: the relatively high frequency of changes in the regulation. A quick search on Banco Central do Brasil's website for reserve requirement regulation from January 2004 to December 2006 returns a record of a dozen changes of all sorts – although not all of them meant increases in requirements. For the past twenty years in Brazil, the number of changes in reserve ratios, calculation and maintenance periods, exemption base, required daily balances as a share of total requirement, and reporting procedures has been substantial. In the US, the most frequent changes usually occur once a year, and refer to the bounds on the volume of net transaction accounts over which distinct reserve ratios apply. Nonetheless, market is not caught by surprise upon these changes, as the yearly changes were envisaged by the Monetary Control Act of 1980 and the Garn-St Germain Act of 1982. For requirements other than net transaction accounts, no changes have occurred for the past 16 years.

One could argue that the reason why there have been so many changes in reserve requirement regulation in Brazil is that financial innovations in Brazil are more frequent, as the market is in a less mature state. However, of the 12 changes in the regulation over the 2 years ending in 2006, only 2 of them comprised changes to the list of liabilities included in the reservable base.

Table 4 compares reserve requirement regulation on transactions accounts in the US and in Brazil, as of December 2006. There were important differences not only regarding the ratios, but also the form of compliance, calculation and maintenance periods, and minimum required daily balances.

2. Event Study

Most of the literature that tests the impact of changes in reserve requirements on stock returns has employed the one-factor model derived from CAPM¹⁰. Quoting Brown and Warner (1980), the abnormal return for a given security in any time t is defined as the difference between its actual *ex post* return and that which is predicted under the assumed return-generating process¹¹:

¹⁰ Brown and Warner (1980) show that multi-factor models or more complicated risk adjustment models do not yield significant improvements in assessing abnormal returns compared to the one-factor model.

¹¹ Brown and Warner (1980), pp. 207.

$$AR_{it} = R_{it} - E(R_{it}) \quad (1)$$

with

$$E(R_{it}) = \begin{pmatrix} \hat{\alpha}_i & \hat{\beta}_i \end{pmatrix} \begin{pmatrix} 1 \\ MKT_t \end{pmatrix} \quad (2)$$

where

AR_{it} = portfolio i 's abnormal return at time t

R_{it} = portfolio i 's return at time t

MKT_t = benchmark market return at time t

$\begin{pmatrix} \hat{\alpha}_i & \hat{\beta}_i \end{pmatrix}$ = vector of parameters of the market model estimated for portfolio i using data from the estimation period

What varies significantly in the literature is the way the parameters $\hat{\alpha}_i$ and $\hat{\beta}_i$ are estimated. Slovin, Sushka and Bendeck (1990), and Cosimano and McDonald (1998) add dummies to the model to capture abnormal returns on the day of the change in reserve requirements ($t = 0$), and on the previous day ($t = -1$), the latter also test for eventual leaks in policymakers' intentions. They estimate the parameters through pooled cross section time series regressions, using ordinary least squares errors in the hypothesis tests.

Osborne and Zaher (1992), nonetheless, argue that models using dummies have the drawback of not being able to identify the size of abnormal returns relative to the size of the tax change. To overcome this problem, they employ the event-study method, which is widely used in the finance and accounting literature to identify the impact of certain events on stock returns, and which is also employed here.

Many authors criticize the use of OLS errors to test the hypothesis of abnormal returns when events are clustered in calendar time, as is the case in this paper. With clustering of events, the errors estimated through OLS will present cross-sectional dependence and probably heteroscedasticity, and will thus jeopardize hypothesis tests if additional techniques are not introduced in the estimation. Brown and Warner (1980, 1985) suggest that aggregate measures of stock performance be used instead of individual portfolio returns to overcome the problem of cross-sectional correlation.

Our null hypothesis is of no abnormal returns over the event period (the period when the event may be affecting stock returns). To test the null we employed two alternative test procedures, based on Dann and James (1982) and Dodd and Warner

(1983). To apply Dann and James' T -test statistics, we averaged the stock returns of companies listed in Bovespa, the most important Brazilian stock exchange, over two groups: financial and non-financial, weighing each company's return by its daily financial volume of transactions. We then ran OLS on each of the two groups of companies over the estimation period (when the event was likely not affecting the return generating process) to obtain the parameters in (2). We would then identify the size of the abnormal return in (1) by comparing the result we obtained in (2) with the actual average stock returns in each group over the event period.

The T -statistic for each day in the event window is defined as:

$$T = AR_{p,t} / S_{p,t} \quad (3)$$

where

$$S_{p,t} = \left\{ S_p^2 \left[1 + \frac{1}{L_p} + \frac{(MKT_t - MKT)^2}{\sum_{\tau=1}^{L_p} (MKT_{\tau} - MKT)^2} \right] \right\}^{1/2}$$

where

p = industry (in this study financial or non-financial)

L_p = number of days in the estimation period

S_p^2 = variance of the market-model residuals for industry p (calculated over the estimation period)

MKT_t = return of the benchmark portfolio at time t in the event window

MKT_{τ} = return of the benchmark portfolio at time τ in the estimation period

MKT = average return of the benchmark portfolio over the estimation period

As cross-section correlation and heteroscedasticity were properly treated, market model residuals are independent and identically distributed. Therefore, the T -statistic is distributed as two-tailed Student- t with $(L_p - 2)$ degrees of freedom.

To test for the significance of cumulative abnormal returns over a sub-period (I) of the event window, or even over the entire event window itself (A), the first method employed was to calculate the T_2 statistics:

$$T_2 = \left[\frac{1}{n} \sum_{t \in I} AR_{p,t} \right] / \left[\frac{1}{n(N-n-1)} \sum_{\substack{t \in A \\ t \notin I}} (AR_{p,t} - AR)^2 \right]^{1/2} \quad (4)$$

where

n = number of days in the impact period (I), defined as a sub-period within the event window

N = number of days in the even window

AR = average abnormal return calculated over the subset of the event window that does not include the impact period

Under the null of no abnormal returns, the T_2 statistics is distributed as a two-tailed t -Student with $N-n-1$ degrees of freedom.

The alternative method to the T_2 statistics used in this study is Dodd and Warner (1983)'s Z -statistics. For each firm i , we calculate the standardized abnormal return:

$$SAR_{i,t} = AR_{i,t} / S_{i,t} \quad (5)$$

where

$$S_{i,t} = \left\{ S_i^2 \left[1 + \frac{1}{L_i} + \frac{(MKT_t - MKT)^2}{\sum_{\tau=1}^{L_p} (MKT_\tau - MKT)^2} \right] \right\}^{1/2}$$

We thus calculate the standardized cumulative abnormal return for each firm i :

$$SCAR_i = \sum_{t \in A} \frac{SAR_{i,t}}{\sqrt{n}} \quad (6)$$

and finally obtain the equally weighted Z -test statistics for each industry p :

$$Z = SCAR_p \sqrt{k_p} \quad (7)$$

where

$$SCAR_p = \frac{1}{k_p} \sum_{i \in p} SCAR_i$$

and k_p is the number of firms in industry p . Under the null of no abnormal standardized returns, Z is distributed as a standard normal.

3. The Sample and the Events

The sample consisted of ordinary (voting) shares negotiated at Bovespa. The series was obtained from Economatica[®], and was adjusted for dividends, splits, and

grouping. However, following Mandelker (1974), Watts (1978), Asquith and Mullins (1986), and Osborne and Zaher (1992), we removed from our sample those companies that distributed or announced dividends, stock dividends, capital gains, splits, grouping, new stock offers, unresolved ownership disputes, mergers, buyouts, and acquisitions during the estimation period and event window. There is a problem that remains when this procedure is implemented, and to our knowledge it is not explicitly addressed in the literature investigated¹². The benchmark market index does not exclude companies that may be under the effect of such events. Thus, in some occasions their abnormal returns may influence the test-result and imply that the industry analyzed is showing abnormal returns when in fact it is the market index that is abnormal. Such an issue seemed to play a role in one of the events analyzed below. We shall address it then.

Mergers and acquisitions were a serious problem in the Brazilian sample. During the entire period analyzed in this paper, financial institutions went through significant changes in ownership, not only due to the privatization program of state and federal banks, but also due to a fierce competition for higher stakes of the domestic market. In the non-financial sector many industries also went through similar processes of ownership transfers, but to a lesser extent.

Seven events of reserve requirement changes were analyzed. As shown in Table 5, events 1 to 4 refer to changes in reserve requirements on time deposits, and the three remaining events refer to changes in reserve requirements on transaction accounts. Table 5 also shows the non-event (estimation) period used for each event.

The estimation period selected for each event was the largest possible, given the number of changes in reserve requirements that occurred during the analyzed period. The selected events had their estimation window free of any possible influence from other reserve requirement changes. This is the reason why we selected so few events, compared to the universe of reserve requirement changes that have occurred since 1994.

For events 1 and 3, the estimation period spans a period prior to the event window. For events 4 to 7, we used a post-event estimation period because the period before the event had important economic announcements that could adversely impact the estimation of the market model. Distinctly from the other events, the estimation period of the second event was split in two. The number of days that could be used for the estimation period either before or after the event window was too small to allow for

¹² We thank an anonymous referee for bringing this issue to our attention.

reasonable econometric inference. To prevent the event dynamics from having any impact on the estimation period, we left a span of 7 working days (12 week days) between the end of the event window and the beginning of that subset of the estimation window. The use of pre- and post-event estimation periods is not an innovation here (see e.g. Osborne and Zaher (1992)). Under the assumption that the event will only affect the stock return dynamics in the event period, the econometrician can choose pre-event, post-event or a mix of both for the estimation period.

For daily T -tests and the Z -tests, the event window tested here consisted of 6 business days (D-2 to D+3). D0 was either the announcement date, when it was made with the markets still open, or the business day that immediately followed the announcement, when it was made after markets had closed. For more robustness in the analysis, we let the event window be comprised of either 6 or 11 business days for cumulative T -tests. Specifically for event 4, the event window tested consisted of either 6 or 8 business days.

The choice of the length of the event period is ad-hoc in the literature. In the literature that employs event-methods to detect abnormal returns from changes in reserve requirements in the US, for instance, Dann and James (1982) and Kolari et al (1988) use a 26-business day event period whereas Osborne and Zaher (1992) use an 11-day window. A rule of thumb is that the event period should not be too short to let out eventual price corrections or too lengthy to be contaminated by normal price dynamics or other innovation. A lengthy period would be more problematic in the Brazilian case because of the high frequency of news that impact stock returns in the country, both at a macro level, affecting all listed companies alike, and at more micro levels, affecting only a subgroup of listed companies.

There are two representative benchmark rates that can be used in Brazil: Ibovespa and IbrX. Both are traded in Bovespa, the main stock exchange in Brazil, but significantly differ as to their calculation methodologies. Ibovespa's theoretical portfolio dates of 1968 and accounts for around 80% of the amount and financial volume traded in the spot market. IbrX, on the other hand, comprises the 100 stocks with the greatest number of negotiations and financial volume traded.

4. The Results

Table 6 shows the results of the market model estimation and the tests for abnormal returns using Dann and James (1982)'s T -tests and Dodd and Warner (1983)'s

Z-test. As the market model estimations using IBrX had a better performance, we chose to test for abnormal returns using the IBrX as the proxy for the market return.

For each event we tested the null hypothesis of no abnormal returns in the event period. We will first analyze each event separately and then draw general conclusions.

In event 1, the central bank changed the regulation on reserve requirements on time deposits by requiring banks to comply with the requirement by investing in federal securities. The regulation that was previously in place required banks to deposit reserves at the central bank, accruing TBC interest rate, which was lower than the rates accrued to federal securities. Thus, this change in reserve requirement regulation would be expected to cause net positive abnormal returns to the banking industry and/or to the non-financial system over the event window. However, two days prior to the announcement, there were significant negative abnormal returns in banks' stocks. On that specific day, there is no evidence in the newswires of any false rumor about a change in reserve requirements. Thus, negative abnormal returns in the banking industry are likely to have occurred because of a temporary overreaction of the benchmark market return stemming from a previous successful auctioning of a domestic energy generation firm (Gerasul).

The tests for cumulative abnormal returns over the entire event period are sensitive to the methodology employed. Using Dann and James (1982)'s two-tailed *T*-test statistics, we found no evidence of cumulative abnormal returns in the stocks of the financial or non-financial system. Notwithstanding, Dodd and Warner (1983)'s *Z*-test points to significant cumulative negative abnormal returns to the banking industry even at the 99% confidence level. There is an important methodological difference between these two test alternatives. Whilst the *T*-test for cumulative abnormal returns uses a stock return series that is weighted by the daily traded financial volume, the *Z*-test is equally weighted. Therefore, significant abnormal returns of stocks that are less liquid will be attributed greater importance by the *Z*-test than by the *T*-test.

The *Z*-test result for the banking industry is probably capturing not only the exaggeration in the benchmark market index on the first day of the event period but also a negative reaction on the last day caused by some news that Standard and Poor's had lowered the outlook for the external debt of the country and of 3 privately owned banks amongst which was Unibanco, included in the sample analyzed in the event.

The *T*-test, on the other hand, is highly influenced by the neutrality of the event in the stock returns of Banco do Brasil, the bank by far with the highest financial

volume traded over the event. This neutrality is ambiguous, though. One could reason that if it had not been for the positive news about the reserve requirements, the turmoil surrounding the domestic economy (e.g. capital flight, increased interest rates, debt downgrading) would have caused important negative abnormal returns to the stocks of Banco do Brasil. As we do not know of a way to solve this issue, we take the more conservative stance of interpreting the results as suggesting that this change in reserve requirement regulation was neutral to the banking industry.

In the non-financial system, the *Z*-test indicates significant cumulative positive abnormal returns. The presence of stocks of non-financial firms (albeit not the most liquid ones) being positively affected by this change in required reserves on time deposits can thus suggest that the change was interpreted as a relief of the tax burden imposed to the non-financial system.

In events 2, 3 and 4, the central bank reduced the ratios of reserve requirements on time deposits. Although the absolute reduction was most pronounced in the last events, abnormal returns in the financial system were only observed in event 2. The *T*-tests for daily abnormal returns indicate positive abnormal returns in bank stocks on the day prior to the announcement and on the three days following the announcement. The *Z*-test result for cumulative abnormal returns in the banking industry is also in line with the daily *T*-tests, and suggests a significant positive abnormal return to bank shareholders in the event period.

The evidence of abnormal returns to the banking industry only in event 2 suggests that banks' shareholders may have anticipated the future downward trajectory of required ratios, as the central bank had previously announced that reduction of reserve requirements was a medium term goal.

That may also have been the case for the non-financial system. Although daily and cumulative *T*-tests do not support the evidence of abnormal returns in event 2, the *Z*-test rejects the null hypothesis at the 99% confidence level. Once again, the difference in the test results stems from the distinct weighting methodology of each test.

We should thus interpret these results as supporting the evidence that for corporate stocks that are not highly liquid, reserve requirements on time deposits are a tax shared amongst banks' clients and owners. These conclusions contrast with those in Cardoso and Koyama (1999). Our view is that, in spite of yielding market returns on securities, the fact that reserve requirements on time deposits require banks to allocate their portfolio in a certain class of investment may be in itself distortional. It may also

be misleading to assume that these types of reserve requirements do not impose any kind of burden to the real sector.

We now turn to changes in reserve requirements on transaction accounts. Event 5, which reduced the required ratio by 10 bps, had a neutral effect on the stock returns of the non-financial system. This evidence holds for both *T*- and *Z*- tests. On the other hand, although daily *T*-tests and the cumulative *Z*-test did not point to significant abnormal bank stock returns, cumulative *T*-tests strongly reject the null for both the sub-period following the announcement and for the entire event period. We thus interpret these results as suggesting that banks whose stocks were highly traded during the event period were significantly more impacted by these changes in reserve requirements than those with low negotiation volumes. Under this reasoning, required reserves on transaction accounts would be interpreted as a tax born upon banks' shareholders, and not clients.

Event 6, which exempted one liability account from the taxable base, had a significant impact on bank stock returns two days prior to the announcement. However, this impact was offset throughout the event period, and both cumulative *T*- and *Z*-tests could not reject the null hypothesis of no abnormal return.

The daily and cumulative *T*-tests do not indicate presence of abnormal returns in the non-financial sector. On the other hand, the *Z*-test points to counter-intuitive negative cumulative abnormal returns in the event period (at a 90% confidence level). Traded volume in the stock exchange was very low over the event period due to uncertainty stemming from the international environment and negative news from major foreign stock exchanges. We thus take the conservative stance of accepting the results of the *T*-tests as indicative that this change in the reserve requirement regulation had a neutral impact on both the banking and the non-banking industry.

In event 7, the central bank increased the reserve requirement ratio and also increased deductions from the taxable base. Contrary to the events analyzed above, this change was justified purely as a monetary policy decision. However, the event was contaminated by a concomitant central bank's decision to increase basic interest rates. Although we cannot conclude that evidence of abnormal returns during this event would be solely or even partially due to the change in reserve requirements, it should be interesting to check whether the use of two instruments together to further restrict monetary conditions would cause negative abnormal returns in the stocks of the non-financial sector.

In the non-financial sector, the event induced negative abnormal returns on the day following the announcement. Cumulative *T*-tests also point to negative abnormal returns over the sub-period after the announcement and over the entire event period. However, and surprisingly, the *Z*-test points to positive abnormal returns over the event period. In this particular event, we find that the *T*-tests are to be more trusted than the *Z*-test for the non-banking sector. On the second day of the event, a particular firm stock (Telebras Remanescente ON) posted a 100% daily return, partially offset the following day, but with negligible traded volume.

On the other hand, the *Z*-test for the banking industry points to negative abnormal returns over the event period, whereas the daily and cumulative *T*-tests present no evidence of abnormal returns. This time, the banks more severely affected by the event were the ones whose stocks had lower financial negotiation.

Looking at these results, we conclude that reserve requirements on transaction accounts in Brazil were not a tax born exclusively by banks' clients. From the events that were not contaminated by concomitant monetary policy decision, we further infer that they are a tax born solely by banks' shareholders, and thus not operative for the credit channel of monetary policy. This latter conclusion should be taken with caution, as it is derived from two events only. We advise that in the future more events be analyzed to draw more robust conclusions.

Our findings are in line with most papers that investigate the incidence of reserve requirements using event-study methods. Kolari, Mahajan and Saunders (1998), Slovin, Sushka and Bendeck (1990), Osborne and Zaher (1992), Cosimano and McDonald (1998), and Hein and Stewart (2002, 2003) all find that reserve requirements are a tax shared by banks' shareholders and clients in the US. Slovin, Sushka and Bendeck go on further to argue that in this case they are not an efficient instrument of monetary policy.

5. Conclusion

In this paper we tested the hypothesis of shared incidence of reserve requirements in Brazil. By employing an event-study method, we investigated whether changes in reserve requirements on transaction accounts and time deposits caused abnormal stock returns in the financial and non-financial sector of the economy.

The results obtained are sensitive to the test procedure adopted, implying that the conclusions should be taken with caution. What is reported below is based on a

discretionary choice by the authors of taking a more conservative stance upon choosing among conflicting test results.

Some results from the aggregate portfolio model oppose the assumption that interest bearing required reserves on time deposits are not distortional. In one of the events investigated, there is evidence that a reduction in required ratios caused positive abnormal returns to the banking industry. The results also oppose the assumption that reserve requirements on time deposits are neutral to non-financial corporations. In spite of yielding market returns on securities, the fact that reserve requirements on time deposits require banks to allocate their portfolio in a certain class of investment may be in itself distortional. It may also be misleading to assume that these types of reserve requirements do not impose any kind of burden to the real sector. In two events investigated, stock returns of the non-financial system were positively impacted by announcements that the required ratio would reduce or interest accrued on the required reserves would increase to market rates.

Some authors (e.g. Slovin, Sushka and Bendeck, 1990) advocate that when reserve requirements affect stock returns of non-financial corporations, then reserve requirements are a non-neutral instrument of monetary policy. However, when fiscal concerns drive reserve requirement decisions, as has been the case on a number of occasions in Brazil, we could extend this argument to state that reserve requirements are a non-neutral instrument of fiscal policy when stock returns of non-financial firms are affected by these requirements.

Of the two events that were most likely not contaminated by concomitant decisions on basic interest rates, changes in reserve requirements on transaction accounts were neutral to the non-financial sector, implying that if reserve requirements on transaction accounts were being used to affect the credit channel of monetary policy, they were inefficient. In one of these events, the banking industry seems to have benefited from the change, thus suggesting that the tax implied by these required reserves was most likely born by banks' shareholders.

Importantly, as banks' shareholders bear part or (as the events analyzed here suggest) the bulk of the burden of reserve requirements, reductions in their ratios are likely to be of limited impact in bank spreads. In this respect, this paper adds support to the work of Nakane and Koyama (2001a,b) and Afanasieff, Lhacer and Nakane (2002), where the authors find no significant relation between reserve requirements and bank spreads on bank loans in Brazil.

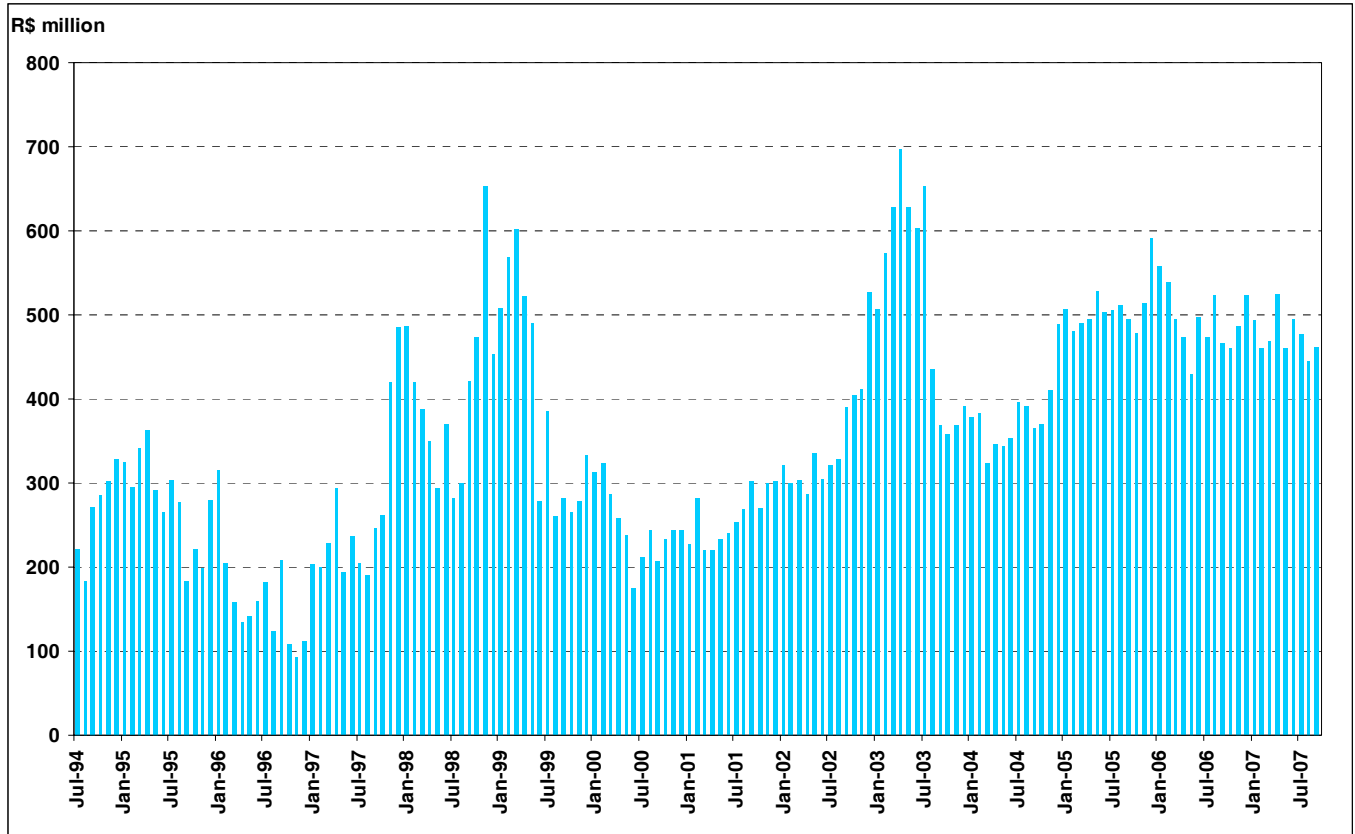
References

- Afanasieff, T. S., Lhacer, P.M.V. and Nakane, M. I.** (2002). 'The Determinants of Bank Interest Spreads in Brazil', *Working Paper Series of the Central Bank of Brazil*, **46**.
- Asquith, P. and Mullins, D.** (1986). 'Equity Issues and Offering Dilution', *Journal of Financial Economics*, **15**, 61-89.
- Baltensperger, E.** (1982). 'Reserve Requirements and Economic Stability', *Journal of Money, Credit and Banking*, **14**, 205-215.
- Bental, B. e Eden, B.** (2002). 'Reserve Requirements and Output Fluctuations', *Journal of Monetary Economics*, **49**, 1597-1620.
- Black, F.** (1975). 'Bank Funds Management in an Efficient Market', *Journal of Financial Economics*, **2**, 323-39.
- Bris, A. and Cantale, S.** (2003). 'Bank Capital Requirements and Managerial Self-Interest', *The Quarterly Review of Economics and Finance*, forthcoming.
- Brown, S. and Warner, J.** (1980). 'Measuring Security Price Performance', *Journal of financial Economics*, **8**, 205-258.
- Brown, S. and Warner, J.** (1985). 'Using Daily Stock Returns: The Case of Event Studies', *Journal of financial Economics*, **14**, 3-31.
- Cardoso, E.** (2003). 'Seigniorage, Reserve Requirements and Bank Spreads in Brazil'. In. Banco Mundial. Chapter 7.
- Cardoso, R. and Koyama, S.** (2000). 'A Cunha Fiscal sobre o Spread Bancário no Brasil'. IPEA - Instituto de Pesquisa Econômica Aplicada, Série Seminários DIMAC, **9**, mimeo.
- Cosimano, T. and McDonald, B.** (1998). 'What's different among banks?', *Journal of Monetary Economics*, **41**, 57-70.
- Dann, L. and James, C.** (1982). 'Na Analysis of the Impacto f Deposit Rate Ceilings on the Market Values of Thrift Institutions', *The Journal of Finance*, **37**, 1259-1275.
- Davis, G. and Toma, M.** (1995). 'Inflation, Reserve Requirements, and Real Interest Rates with Direct and Indirect Loan Markets', *Journal of Macroeconomics*, **17**, 515-531.
- De Kock, M.** (1964). 'Banca Central', Versión Española de Eduardo Villa-señor. México-Buenos Aires.
- Dodd, P. and Warner, J.** (1983). 'On Corporate Governance', *Journal of Financial Economics*, **11**, 401-438.
- Cardoso, R. and Koyama, S.** (1999). 'A Cunha Fiscal sobre a Intermediação Financeira', in *Juros e Spread Bancário no Brasil*, Central Bank of Brazil.

- Fabozzi, F. and Thurston, T.** (1986). 'State Taxes and Reserve Requirements as Major Determinants of Yield and Spreads among Money Market Instruments', *Journal of Financial and Quantitative Analysis*, **21**, 427-436.
- Fama, E.** (1985). 'What's different about banks?', *Journal of Monetary Economics*, **15**, 29-39.
- Fernandes, E.** (1992). 'Instrumentos de Execução de Política Monetária no Brasil', in *Seminário de Pesquisa*, Fundação Getúlio Vargas, Rio de Janeiro.
- Goodfriend, M. and Hargraves, M.** (1983). 'A Historical Assessment of the Rationale and Functions of Reserve Requirements', *Working Paper of the FRB of Richmond*, **83-1**.
- Hardy, D.** (1997). 'Reserve Requirements and Monetary Management: An Introduction', in Baliño, Tomás J.T., and Lorena M. Zamalloa (Eds.), *Instruments of Monetary Management; Issues and Country Experiences*, International Monetary Fund, Washington, D.C.,
- Hein, S. and Stewart, J.** (2003). 'Reserve Requirement Changes and Money Market Responses', *Working Paper*.
- Hein, S. e Stewart, J.** (2002). 'Reserve Requirements: A Modern Perspective', *Economic Review*, **87**, 41-52.
- James, C.** (1987). 'Some Evidence on the Uniqueness of Bank Loans', *Journal of Banking and Finance*, **19**, 217-235.
- Kolari, J., Mahajan, A. and Saunders, E.** (1988). 'The Effect of Changes in Reserve Requirements on Bank Stock Prices', *Journal of Banking and Finance*, **12**, 183-198.
- Mandelker, G.** (1974). 'Risk and Return: The Case of Merging Firms', *Journal of Financial Economics*, **1**, 303-335.
- Nakane, M. I. and Koyama, S. M.** (2001a). 'Os Determinantes do Spread Bancário no Brasil', *Juros e Spread Bancário no Brasil*, Banco Central do Brasil.
- Nakane, M. I. and Koyama, S. M.** (2001b). 'O Spread Bancário Segundo Fatores de Persistência e Conjuntura', *Juros e Spread Bancário no Brasil*, Banco Central do Brasil.
- Osborne, D. and Zaher, T.** (1992). 'Reserve Requirements, Bank Share Prices, and the Uniqueness of Bank Loans', *Journal of Banking and Finance*, **16**, 799-812.
- Slovin, M., Sushka, M. and Bendeck, Y.** (1990). 'The Market Valuation Effects of Reserve Regulation', *Journal of Monetary Economics*, **25**, 3-19.
- Watts, R.** (1978). 'Systematic 'Abnormal' Returns After Quarterly Earnings Announcements', *Journal of Financial Economics*, **6**, 127-150.

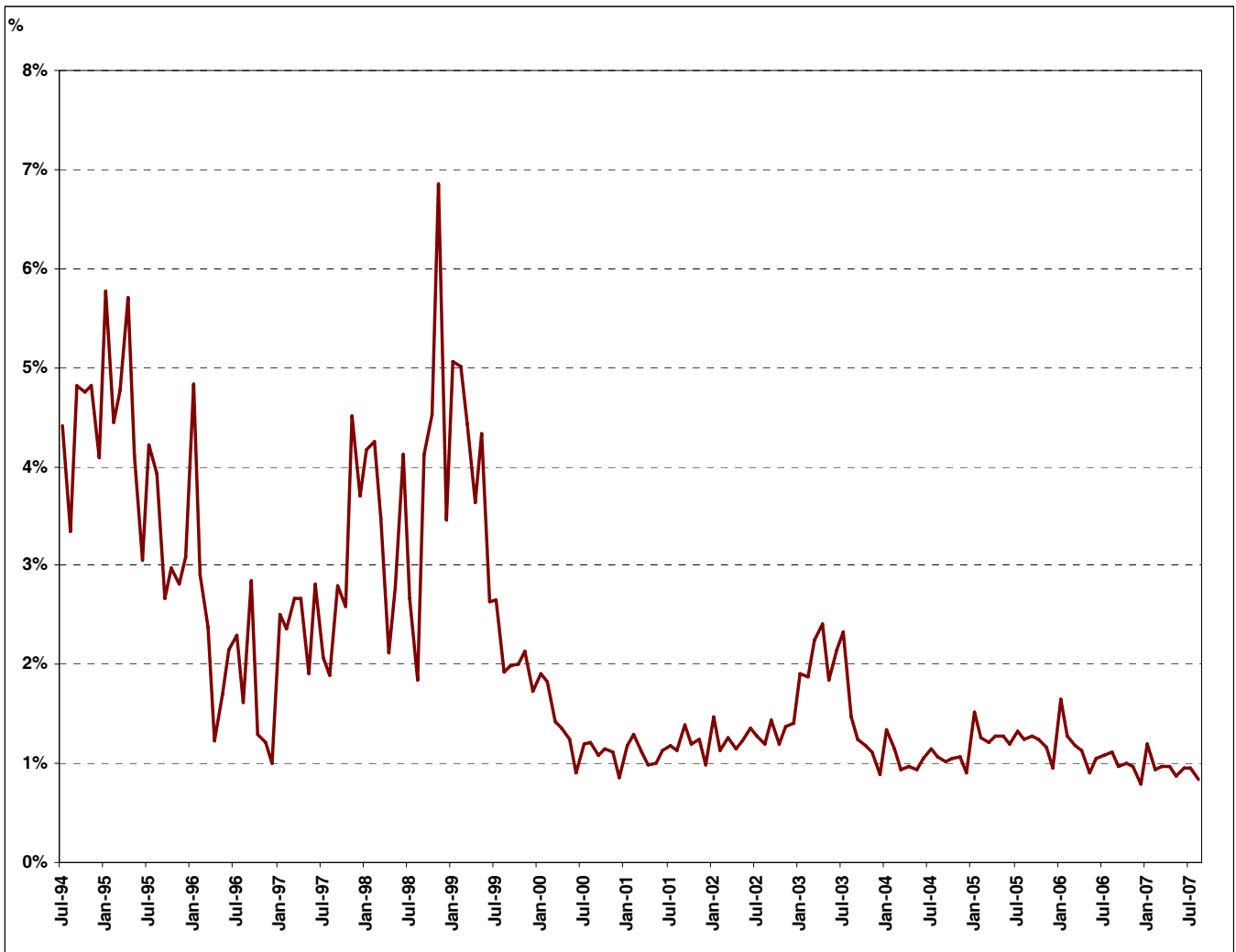
Appendix A – Figures

Figure 1 – Potential revenue from interest accrued on monthly reserve deposits at the Central Bank of Brazil (R\$ million)



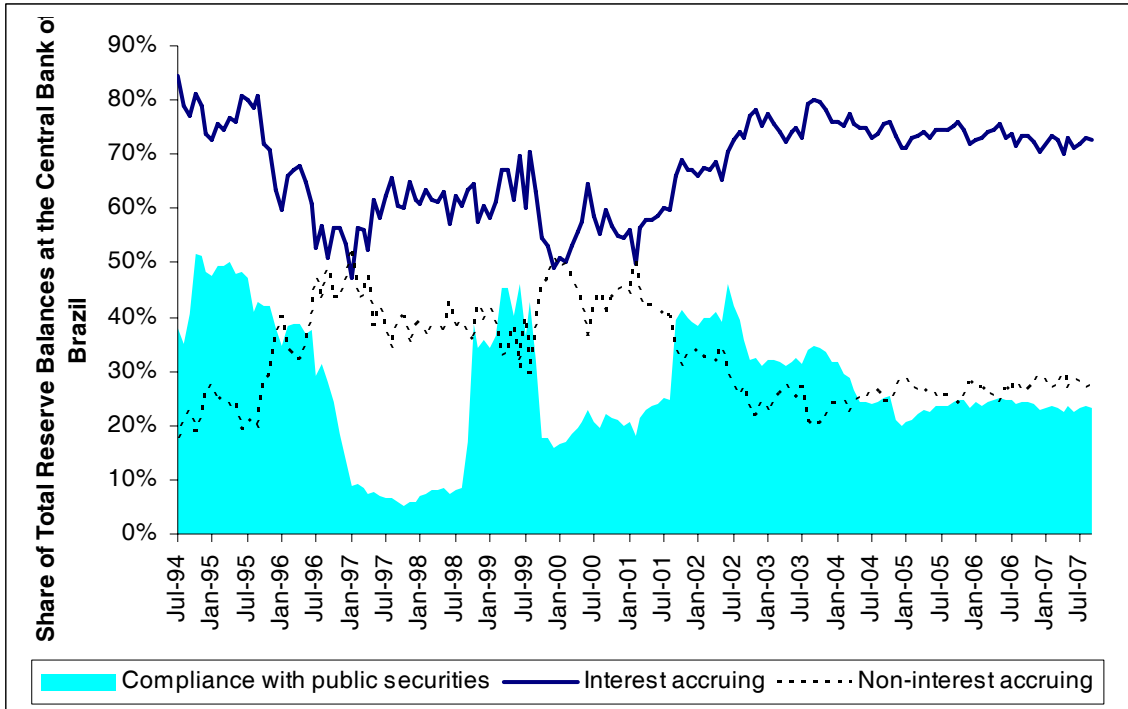
Source: Central Bank of Brazil (www.bcb.gov.br)

Figure 2 – Potential revenue from interest accrued on monthly reserve deposits at the Central Bank of Brazil (as a share of total revenues actually collected by the federal government)



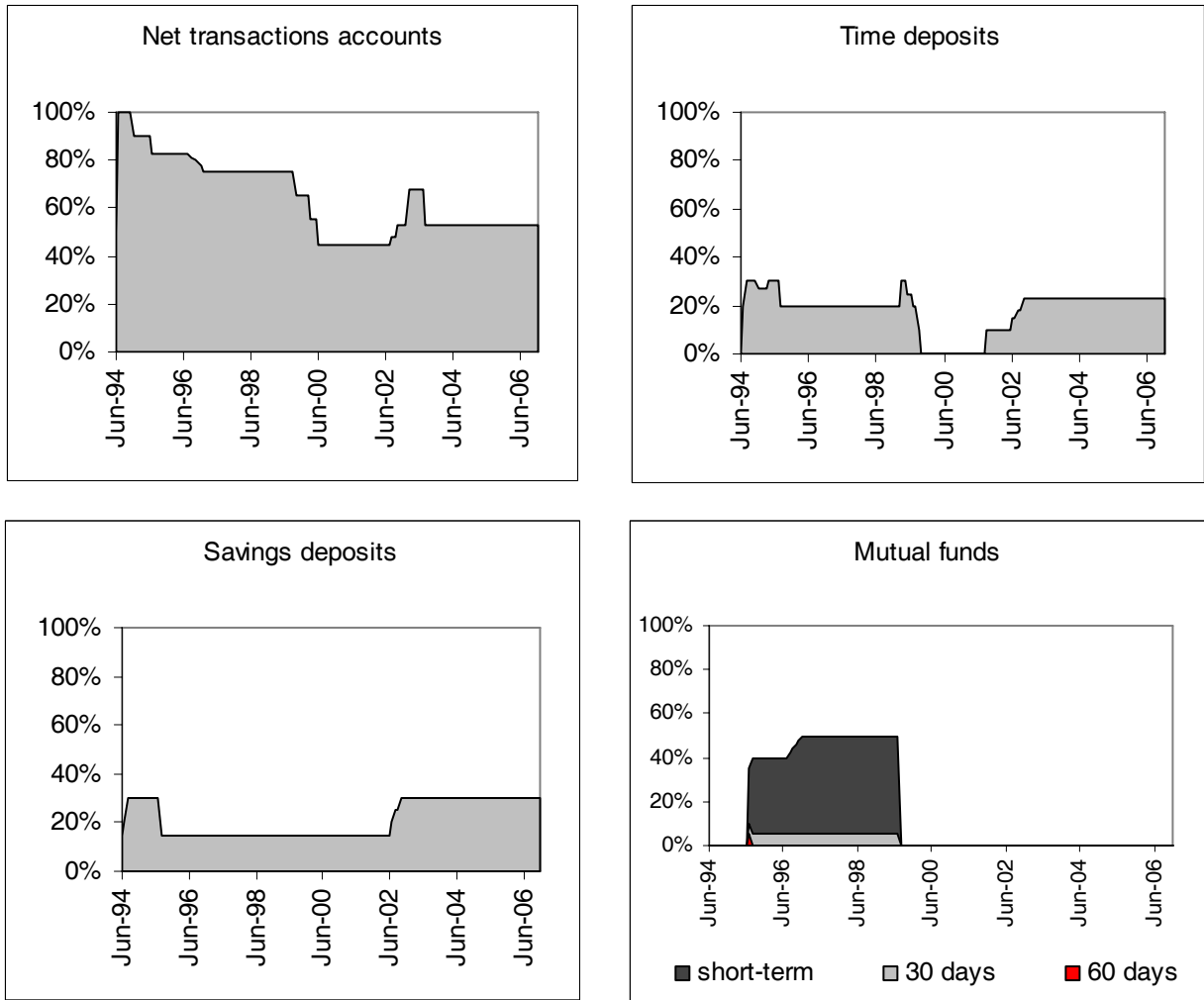
Source: Central Bank of Brazil (www.bcb.gov.br)

Figure 3 – Composition of Required Reserves at the Central Bank of Brazil



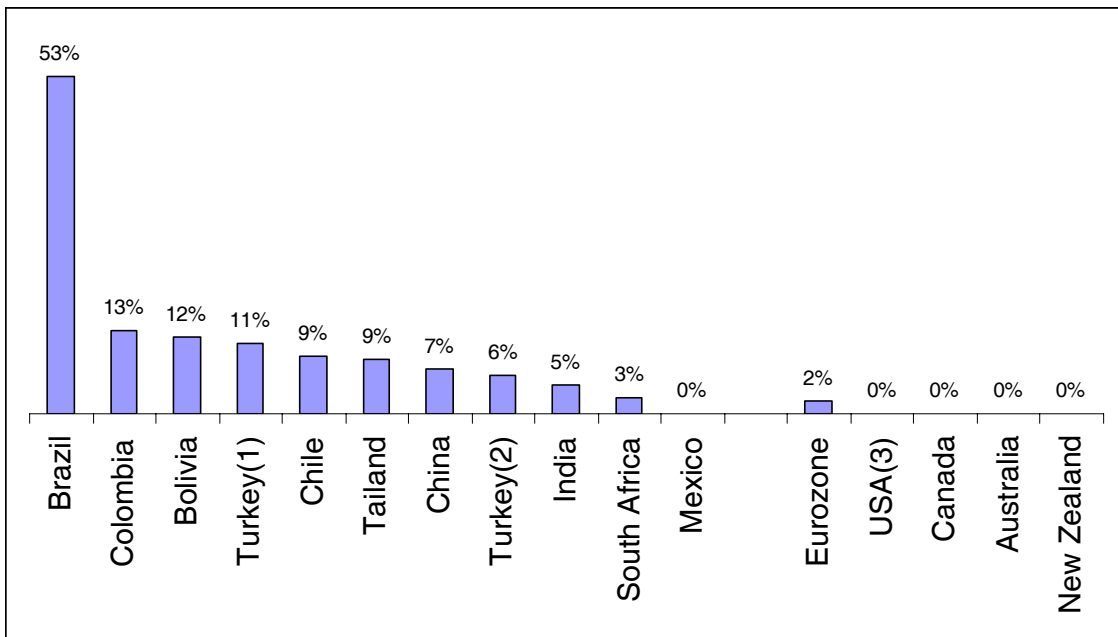
Source: Central Bank of Brazil (www.bcb.gov.br)

Figure 4 – Reserve Requirement Ratios in Brazil*



* These figures only illustrate the time evolution of ratios on reserve requirements that are still in place in Brazil as of September 2007. The ratios represented here are the sum of all ratios that apply to a certain reservable base (standard + additional). The deductible base for each type of ratio is different and is not shown here.

Figure 5 – Ratios of Reserve Requirement on Transaction Accounts in Selected Emerging Markets and Developed Countries (As of 2004)



- (1) Ratio on demand deposits in foreign currency
- (2) Ratio on demand deposits in Turkish Lira
- (3) Ratio on demand deposits below US\$ 6.6 million

Source: Central Banks and IMF

Appendix B – Tables

Table 1 – Financial Cost of Reserve Requirements on Transaction Accounts (% p.y.)

	Interest Accrued on Reserve Requirements (Excludes non-interest bearing bank reserves on transaction accounts)	Interest Accrued on Total Reserve Requirements	Overnight Selic rate
Dec-00	7.36	3.60	16.19
Dec-01	8.13	4.26	19.05
Dec-02	10.82	7.48	23.03
Dec-03	8.42	6.02	16.91
Dec-04	8.98	6.32	17.50
Dec-05	8.98	6.22	18.24
Dec-06	8.01	5.56	13.19
Sep-07	6.52	4.68	11.22

Table 2 – Reserve Requirements in Brazil: Pre-Stabilization Period (1969 – 1993)
(% of deposits)

	Demand Deposits ^{1/}		Time Deposits	
	Region A ^{2/}	Region B ^{2/}	Region A ^{2/}	Region B ^{2/}
Apr-69	27	18	9	4.5
May-71 ^{3/}	27	18	9	4
Jan-73	27	18	0	0
Mar-73 ^{4/}	27	18	0	0
Jul-73 ^{5/}	27	18	0	0
Jul-74 ^{6/}	27	18	0	0
Feb-75 ^{7/}	27	18	0	0
Jul-75 ^{8/}	27	18	0	0
Apr-76	33	18	0	0
Jul-76	35	18	0	0
Oct-77	40	18	0	0
Jul-79 ^{9/}	40	18	0	0
Dec-84	40	18	22	22
Jun-85	40	18	20	20
Jan-92	40	18	0	0
Nov-93	40	40	0	0

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% to 15%.

6/ Amount to be destined to loans to small and medium enterprises increases to 4% of demand deposits.

7/ Mandatory loans for working capital of small and medium enterprises increases to 8% of demand deposits.

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

9/ Percentage of demand deposits destined for rural credit increased from 15% to 17%.

Source: Cardoso (2003)

Table 3 – Changes in Reserve Requirement Ratios in Brazil After the Real Plan

Period (months in which required ratios changed)	Demand Deposits	Time Deposits	Savings Accounts	Loan Operations	Money Market Funds			Additional Reserves		
					Short Term	30 days	60 days	Demand Deposits	Time Deposits	Savings Accounts
Before the Real Plan	50%	^{1/}	0%	15%	0%	0%	0%	0%	0%	0%
Jul/94	100%	^{1/}	20%	20%						
Aug/94		^{1/}	30%	30%						
Oct/94		^{1/}		15%						
Dez/94	90%	^{1/}	27%							
Apr/95		^{1/}	30%							
May/95		^{1/}		12%						
Jun/95		^{1/}		10%						
Jul/95	83%				35%	10%	5%			
Aug/95			20%	15%	8%	40%	5%	0%		
Sep/95				5%						
Nov/95				0%						
Aug/96	82%				42%					
Sep/96	81%				44%					
Oct/96	80%				46%					
Nov/96	79%				48%					
Dez/96	78%				50%					
Jan/97	75%									
Dec-98										
Mar/99		30%								
May/99		25%								
Jul/99		20%								
Aug/99					0%	0%				
Sep-99		10%								
Oct-99	65%	0%								
Mar/2000	55%									
Jun/2000	45%									
Sep/2001		10%								
Jun/2002		15%								
Jul/2002			20%							
Aug/2002								3%	3%	5%
Oct/2002								8%	8%	10%
Feb/2003	60%									
Aug/2003	45%									

^{1/} In addition to this required ratio on the current collectable base, a 100% ratio was applicable over the increase of collectable base after a pre-determined period

Source: Central Bank of Brazil (www.bcb.gov.br)

Table 4 – Regulation on Reserve Requirements on Transaction Accounts in the US and in Brazil, as of December 2006

	USA	Brazil
Ratios^{1/}	US\$ 0 – US\$ 7.8 million: 0% US\$ 7.8 million – US\$ 48.3 million: 3% More than US\$ 48.3 million: 10%	R\$ 0 – R\$ 44 million: 0% More than R\$ 44 million: 45%
Exemptions	Institutions with a daily average of net transactions accounts below US\$ 7.8 billion	<ol style="list-style-type: none"> 1. Institutions with a daily average of reservable deposits below R\$ 44,000,010 thousand 2. Deposits from payment orders in foreign currencies 3. Demand, prior notice and investment deposits of government, autarchies and government-controlled institutions with their respective federal and state-controlled banks 4. Demand, prior notice and investment deposits of city governments with their respective state-controlled banks
Deductions	N/A	R\$ 44 million from total reservable deposits
Share of Vault Cash	At the discretion of the depository institution, up to the amount of the reserve requirement, provided that reserve balances at the FRB are non-negative	Up to 40% of the reservable base
Reservable Accounts	<ol style="list-style-type: none"> 1. Demand Deposits 2. Automatic transfer service accounts 3. NOW accounts 4. Share draft accounts 5. Telephone or preauthorized transfer accounts 6. Ineligible acceptances 7. Obligations issued by affiliates maturing in 7 days or less 	<ol style="list-style-type: none"> 1. Demand Deposits 2. Prior notice deposits 3. Share draft accounts 4. Deposits from tax levied 5. Business cheques 6. Deposits from services supplied 7. Deposits from realized guaranties 8. Investment deposits 9. <i>Contratos de Assunção de Obrigações Vinculados a Operações Realizadas no País</i>
Total Required Reserves	US\$ 41.05 billion (as of August 2006)	
Depository Institutions	Commercial banks, savings banks and loan associations, credit unions, US branches and agencies of foreign banks, Edge act corporations, and agreement corporations	Universal banks with a commercial portfolio, commercial banks, investment banks, savings banks
Calculation Period	For institutions that file reports on a weekly basis: 2 weeks For institutions that submit reports on a quarterly basis ^{2/} : 1 week	2 weeks
Maintenance Period	For institutions that file reports on a weekly basis: 2 weeks, beginning 17 days after the end of the associated calculation period For institutions that submit reports on a quarterly basis: 13 consecutive 1-week periods, beginning 24 days after the end of the calculation period	2 weeks, overlapping with the last week of the calculation period
Minimum daily balances in the maintenance period	0%, provided that the reserve requirement is met on average over the maintenance period	80% of the reservable base, and provided that the reserve requirement is met on average over the maintenance period

1/ Bound values refer to daily averages of reservable deposits. For the US, net deposits correspond to total deposits less amounts due from other depository institutions and less cash items in the process of collection. In Brazil, cash items in the process of collection are also deducted from the reservable base.

2/ These institutions are usually the ones with a low record of transactions deposits. More accurately, the FRB clarifies that an institution with net transaction accounts greater than the exemption amount for either of the two weeks and with total deposits less than the nonexempt deposit cutoff for both weeks will continue to submit the FR 2900 on a quarterly basis. An institution with net transaction accounts less than or equal to the exemption amount for both of the two report weeks and with total deposits less than the reduced reporting limit for both of the report weeks will no longer be required to submit the FR 2900.

Source: FRB and Central Bank of Brazil (www.bcb.gov.br)

Table 5 – Selected Events

Event #	Announcement Date^{1/}	Event	Estimation Period (EsP)	Business days in EsP	# of firms in the sample
1	Sep. 17 th , 1998	Time deposits: instead of depositing reserves that accrued the TBC rate, banks were required to invest in federal securities	Jul. 13 th , 1998 to Sep. 14 th , 1998	45	70
2	May 6 th , 1999	Time deposits: reduction in reserve requirement ratio to 25% from 26.5%	Apr. 19 th , 1999 to May 4 th , 1999 and May 24 th , 1999 to Jun. 30 th , 1999	38	83
3	Jul. 7 th , 1999	Time deposits: reduction in reserve requirement ratio to 20% from 25%	May 24 th , 1999 to Jul. 5 th , 1999	30	75
4	Oct. 10 th , 1999	Time deposits: reduction in reserve requirement ratio to 0% from 10%	Oct. 25 th , 1999 to Mar. 10 th , 2000	93	103
5	Mar. 14 th , 2000	Transaction accounts: reduction in reserve requirement ratio to 55% from 65% ^{2/}	Oct. 25 th , 1999 to Mar. 10 th , 2000	93	84
6	Sep. 28 th , 2000	Transaction accounts: reduction in reserve requirement calculation base	Oct. 19 th , 2000 to Dec. 28 th , 2000	48	73
7	Feb. 19 th , 2003	Transaction accounts: increase in reserve requirement ratio to 60% from 45% and increase in exempted base	Mar. 19 th , 2003 to Jun. 20 th , 2003	64	64

1/ We thank an anonymous referee for mentioning that in events 1, 2, 3, 5 and 7, the announcement was made after the market had closed. Therefore the D0 impact day was chosen as the first business day following the announcement.

2/ The previous ratio of 65% was applicable to demand deposits and deposits on notice. The ratio to other deposits that were also very short term was 60%.

Table 6 – Estimation of the Market Model and Tests for Abnormal Returns Using Aggregated Portfolios

Event 1															
Financial System							Non-Financial System								
Market Model	OLS						Market Model	OLS							
		β	t-test	p-value	R2	F		p-value		β	t-test	p-value	R2	F	p-value
	Ibovespa	1.13	6.24	0.00	0.48	39.00		0.00	Ibovespa	2.28	14.82	0.00	0.84	219.56	0.00
IBx	1.32	6.90	0.00	0.53	47.65	0.00	IBx	2.57	15.60	0.00	0.85	243.39	0.00		

Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test
	D-2	-8.8%	-3.22***	-3.22***	
	D-1	3.3%	1.39	1.39	
	D0	0.8%	0.33	0.33	
	D+1	0.4%	0.18	0.18	
	D+2	-1.1%	-0.47	-0.47	
	D+3	-3.8%	-1.60	-1.60	
	Total D-2 to D0	-4.8%	-1.29	-1.44	
	Total D+1 to D+3	-4.4%	-0.40	-0.65	
	Total D-2 to D+3	-9.2%		-1.42	

Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test
	D-2	1.6%	0.77	0.77	
	D-1	-3.3%	-1.62	-1.62	
	D0	1.2%	0.61	0.61	
	D+1	-1.8%	-0.88	-0.88	
	D+2	-0.6%	-0.30	-0.30	
	D+3	2.3%	1.15	1.15	
	Total D-2 to D0	0.00	-0.13	-0.20	
	Total D+1 to D+3	0.00	-0.01	-0.02	
	Total D-2 to D+3	-0.01		-0.02	

* Rejects null hypothesis at 0.10 level (two-tailed test)

** Rejects null hypothesis at 0.05 level (two-tailed test)

*** Rejects null hypothesis at 0.01 level (two-tailed test)

Event 2

Financial System								Non-Financial System							
Market Model	OLS							Market Model	OLS						
		β	t-test	p-value	R2	F	p-value			β	t-test	p-value	R2	F	p-value
	Ibovespa	1.06	4.10	0.00	0.32	16.80	0.00		Ibovespa	1.93	6.38	0.00	0.53	40.72	0.00
IBx	1.23	4.40	0.00	0.35	19.33	0.00	IBx	2.18	6.59	0.00	0.55	43.49	0.00		

Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test	Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test
	D-2	-0.2%	-0.11	-0.11			D-2	1.8%	1.00	1.00	
	D-1	4.1%	2.69**	2.69**			D-1	1.0%	0.59	0.59	
	D0	1.3%	0.89	0.89			D0	0.4%	0.20	0.20	
	D+1	2.8%	1.88*	1.88*			D+1	1.1%	0.65	0.65	
	D+2	3.5%	2.37**	2.37**			D+2	-1.0%	-0.55	-0.55	
	D+3	2.7%	1.78*	1.78*			D+3	-2.3%	-1.30	-1.30	
	Total D-2 to D0	5.3%	6.55**	1.18			Total D-2 to D0	3.1%	1.05	1.80	
	Total D+1 to D+3	9.0%	2.40	1.84			Total D+1 to D+3	-2.1%	-1.74	-1.31	
	Total D-2 to D+3	8.3%		1.72			3.02***	Total D-2 to D+3	2.5%		0.85

* Rejects null hypothesis at 0.10 level (two-tailed test)
 ** Rejects null hypothesis at 0.05 level (two-tailed test)
 *** Rejects null hypothesis at 0.01 level (two-tailed test)

Event 3															
Financial System							Non-Financial System								
Market Model	OLS							Market Model	OLS						
		β	t-test	p-value	R2	F	p-value			β	t-test	p-value	R2	F	p-value
	Ibovespa	1.07	4.62	0.00	0.43	21.35	0.00		Ibovespa	1.74	8.81	0.00	0.73	77.57	0.00
IBx	1.27	5.16	0.00	0.49	26.61	0.00	IBx	1.99	9.64	0.00	0.77	92.98	0.00		
Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test	Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test				
	D-2	1.3%	1.07	1.07			D-2	0.2%	0.16	0.16					
	D-1	-0.1%	-0.08	-0.08			D-1	0.3%	0.32	0.32					
	D0	0.8%	0.63	0.63			D0	1.5%	1.45	1.45					
	D+1	1.6%	1.28	1.28			D+1	2.1%	2.09**	2.09**					
	D+2	-1.7%	-1.37	-1.37			D+2	-1.4%	-1.35	-1.35					
	D+3	1.0%	0.82	0.82			D+3	1.4%	1.38	1.38					
	Total D-2 to D0	2.0%	0.66	0.99			Total D-2 to D0	2.0%	0.61	0.83					
	Total D+1 to D+3	0.9%	0.75	0.66			Total D+1 to D+3	2.2%	1.74	1.25					
	Total D-2 to D+3	2.3%		1.29			0.21	Total D-2 to D+3	3.9%		1.82	0.14			

* Rejects null hypothesis at 0.10 level (two-tailed test)

** Rejects null hypothesis at 0.05 level (two-tailed test)

*** Rejects null hypothesis at 0.01 level (two-tailed test)

Event 4															
Financial System							Non-Financial System								
Market Model	OLS							Market Model	OLS						
		β	t-test	p-value	R2	F	p-value			β	t-test	p-value	R2	F	p-value
	Ibovespa	1.21	4.01	0.00	0.15	16.05	0.00		Ibovespa	1.73	6.91	0.00	0.34	47.78	0.00
	IBx	1.53	4.53	0.00	0.18	20.51	0.00		IBx	2.05	7.29	0.00	0.37	53.15	0.00
Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (8 day event period)	Z-test	Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (8 day event period)	Z-test				
	D-2	3.6%	1.58	1.58			D-2	-0.01	-0.32	-0.32					
	D-1	0.6%	0.27	0.27			D-1	0.01	0.47	0.47					
	D0	-0.3%	-0.14	-0.14			D0	0.01	0.57	0.57					
	D+1	-1.8%	-0.79	-0.79			D+1	0.00	-0.23	-0.23					
	D+2	-1.8%	-0.77	-0.77			D+2	-0.01	-0.73	-0.73					
	D+3	-0.5%	-0.22	-0.22			D+3	0.00	0.12	0.12					
	Total D-2 to D0	3.9%	3.02*	1.83			Total D-2 to D0	1.4%	0.98	0.86					
	Total D+1 to D+3	-4.1%	-1.15	-1.20			Total D+1 to D+3	-1.6%	-1.00	-1.09					
	Total D-2 to D+3	-1.5%		-0.05			0.37	Total D-2 to D+3	1.5%		-0.09	1.24			

* Rejects null hypothesis at 0.10 level (two-tailed test)

** Rejects null hypothesis at 0.05 level (two-tailed test)

*** Rejects null hypothesis at 0.01 level (two-tailed test)

Event 5															
Financial System								Non-Financial System							
Market Model	OLS							Market Model	OLS						
		β	t-test	p-value	R2	F	p-value			β	t-test	p-value	R2	F	p-value
	Ibovespa	0.50	1.83	0.07	0.04	3.35	0.07		Ibovespa	1.89	6.51	0.00	0.32	42.43	0.00
	IBx	0.61	2.00	0.05	0.04	3.98	0.05		IBx	2.16	6.53	0.00	0.32	42.69	0.00
Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test										
	D-2	0.8%	0.35	0.35		Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test				
	D-1	0.0%	0.02	0.02			D-2	0.2%	0.09	0.09					
	D0	0.6%	0.29	0.29			D-1	0.2%	0.08	0.08					
	D+1	3.0%	1.43	1.43			D0	0.7%	0.32	0.32					
	D+2	-0.1%	-0.05	-0.05			D+1	0.1%	0.05	0.05					
	D+3	-0.4%	-0.19	-0.19			D+2	0.0%	-0.02	-0.02					
	Total D-2 to D0	1.4%	0.43	0.67			D+3	-0.5%	-0.21	-0.21					
	Total D+1 to D+3	2.5%	3.78*	2.65**			Total D-2 to D0	1.1%	2.15	0.40					
	Total D-2 to D+3	3.6%		5.53***			Total D+1 to D+3	-0.4%	-0.74	-0.16					
							Total D-2 to D+3	1.0%		0.38		0.45			

* Rejects null hypothesis at 0.10 level (two-tailed test)

** Rejects null hypothesis at 0.05 level (two-tailed test)

*** Rejects null hypothesis at 0.01 level (two-tailed test)

Event 6															
Financial System							Non-Financial System								
Market Model	OLS						Market Model	OLS							
		β	t-test	p-value	R2	F		p-value		β	t-test	p-value	R2	F	p-value
	Ibovespa	1.12	5.70	0.00	0.41	32.48		0.00	Ibovespa	1.55	8.52	0.00	0.61	72.60	0.00
IBx	1.35	5.85	0.00	0.43	34.28	0.00	IBx	1.93	9.64	0.00	0.67	92.95	0.00		

Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test
	D-2	-3.6%	-2.88***	-2.88***	
	D-1	-1.1%	-0.90	-0.90	
	D0	0.1%	0.06	0.06	
	D+1	-1.1%	-0.91	-0.91	
	D+2	1.6%	1.29	1.29	
	D+3	-0.3%	-0.26	-0.26	
	Total D-2 to D0	-4.6%	-1.89	-1.75	
	Total D+1 to D+3	0.2%	0.05	0.06	
	Total D-2 to D+3	-2.2%		-1.13	-0.46

Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test
	D-2	0.6%	0.53	0.53	
	D-1	1.0%	0.93	0.93	
	D0	-0.4%	-0.39	-0.39	
	D+1	0.2%	0.18	0.18	
	D+2	1.3%	1.24	1.24	
	D+3	0.1%	0.06	0.06	
	Total D-2 to D0	1.1%	0.95	0.85	
	Total D+1 to D+3	1.6%	1.26	1.17	
	Total D-2 to D+3	0.8%		1.25	-1.87*

* Rejects null hypothesis at 0.10 level (two-tailed test)
 ** Rejects null hypothesis at 0.05 level (two-tailed test)
 *** Rejects null hypothesis at 0.01 level (two-tailed test)

Event 7															
Financial System							Non-Financial System								
Market Model	OLS							Market Model	OLS						
		β	t-test	p-value	R2	F	p-value			β	t-test	p-value	R2	F	p-value
	Ibovespa	1.70	3.67	0.00	0.18	17.50	0.00		Ibovespa	1.41	7.66	0.00	0.49	58.67	0.00
IBx	1.48	2.05	0.05	0.06	4.19	0.04	IBx	2.08	7.75	0.00	0.49	60.11	0.00		

Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test
	D-2	0.6%	0.23	0.23	
	D-1	-2.6%	-0.91	-0.91	
	D0	0.7%	0.27	0.27	
	D+1	0.0%	0.01	0.01	
	D+2	-1.2%	-0.43	-0.43	
	D+3	1.3%	0.48	0.48	
	Total D-2 to D0	-1.2%	-0.54	-0.44	
	Total D+1 to D+3	0.2%	0.05	0.05	
	Total D-2 to D+3	-1.8%		-0.23	

Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test
	D-2	0.5%	0.48	0.48	
	D-1	-0.2%	-0.16	-0.16	
	D0	0.8%	0.75	0.75	
	D+1	-5.9%	-5.75***	-5.75***	
	D+2	-0.4%	-0.40	-0.40	
	D+3	-1.3%	-1.22	-1.22	
	Total D-2 to D0	1.1%	0.22	0.29	
	Total D+1 to D+3	-7.6%	-9.13**	-4.74***	
	Total D-2 to D+3	-5.3%		-2.33*	

* Rejects null hypothesis at 0.10 level (two-tailed test)
 ** Rejects null hypothesis at 0.05 level (two-tailed test)
 *** Rejects null hypothesis at 0.01 level (two-tailed test)

Table 6 – Estimation of the Market Model and Tests for Abnormal Returns Using Aggregated Portfolios

Event 1									
Financial System	Market Model	OLS							
				t-test	p-value	R2	F	p-value	
		Ibovespa	1.13	6.24	0.00	0.48	39.00	0.00	
		IBx	1.32	6.90	0.00	0.53	47.65	0.00	
	Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test			
		D-2	-8.8%	-3.22***	-3.22***				
		D-1	3.3%	1.39	1.39				
		D0	0.8%	0.33	0.33				
		D+1	0.4%	0.18	0.18				
		D+2	-1.1%	-0.47	-0.47				
		D+3	-3.8%	-1.60	-1.60				
		Total D-2 to D0	-4.8%	-1.29	-1.44				
		Total D+1 to D+3	-4.4%	-0.40	-0.65				
	Total D-2 to D+3	-9.2%		-1.42	-17.78***				
Non-financial System	Market Model	OLS							
				t-test	p-value	R2	F	p-value	
		Ibovespa	2.28	14.82	0.00	0.84	219.56	0.00	
		IBx	2.57	15.60	0.00	0.85	243.39	0.00	
	Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test			
		D-2	1.6%	0.77	0.77				
		D-1	-3.3%	-1.62	-1.62				
		D0	1.2%	0.61	0.61				
		D+1	-1.8%	-0.88	-0.88				
		D+2	-0.6%	-0.30	-0.30				
		D+3	2.3%	1.15	1.15				
		Total D-2 to D0	0.00	-0.13	-0.20				
		Total D+1 to D+3	0.00	-0.01	-0.02				
	Total D-2 to D+3	-0.01		-0.02	3.06***				

* Rejects null hypothesis at 0.10 level (two-tailed test)
 ** Rejects null hypothesis at 0.05 level (two-tailed test)
 *** Rejects null hypothesis at 0.01 level (two-tailed test)

Event 2									
Financial System	Market Model	OLS							
				t-test	p-value	R2	F	p-value	
		Ibovespa	1.06	4.10	0.00	0.32	16.80	0.00	
		IBx	1.23	4.40	0.00	0.35	19.33	0.00	
	Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test			
		D-2	-0.2%	-0.11	-0.11				
		D-1	4.1%	2.69**	2.69**				
		D0	1.3%	0.89	0.89				
		D+1	2.8%	1.88*	1.88*				
		D+2	3.5%	2.37**	2.37**				
		D+3	2.7%	1.78*	1.78*				
Total D-2 to D0		5.3%	6.55**	1.18					
Total D+1 to D+3		9.0%	2.40	1.84					
Total D-2 to D+3	8.3%		1.72	3.02***					
Non-financial System	Market Model	OLS							
				t-test	p-value	R2	F	p-value	
		Ibovespa	1.93	6.38	0.00	0.53	40.72	0.00	
		IBx	2.18	6.59	0.00	0.55	43.49	0.00	
	Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test			
		D-2	1.8%	1.00	1.00				
		D-1	1.0%	0.59	0.59				
		D0	0.4%	0.20	0.20				
		D+1	1.1%	0.65	0.65				
		D+2	-1.0%	-0.55	-0.55				
		D+3	-2.3%	-1.30	-1.30				
Total D-2 to D0		3.1%	1.05	1.80					
Total D+1 to D+3		-2.1%	-1.74	-1.31					
Total D-2 to D+3	2.5%		0.85	4.50***					

* Rejects null hypothesis at 0.10 level (two-tailed test)
 ** Rejects null hypothesis at 0.05 level (two-tailed test)
 *** Rejects null hypothesis at 0.01 level (two-tailed test)

Event 3									
Financial System	Market Model	OLS							
				t-test	p-value	R2	F	p-value	
		Ibovespa	1.07	4.62	0.00	0.43	21.35	0.00	
		IBx	1.27	5.16	0.00	0.49	26.61	0.00	
	Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test			
		D-2	1.3%	1.07	1.07				
		D-1	-0.1%	-0.08	-0.08				
		D0	0.8%	0.63	0.63				
		D+1	1.6%	1.28	1.28				
		D+2	-1.7%	-1.37	-1.37				
		D+3	1.0%	0.82	0.82				
Total D-2 to D0		2.0%	0.66	0.99					
Total D+1 to D+3		0.9%	0.75	0.66					
Total D-2 to D+3	2.3%		1.29	0.21					
Non-financial System	Market Model	OLS							
				t-test	p-value	R2	F	p-value	
		Ibovespa	1.74	8.81	0.00	0.73	77.57	0.00	
		IBx	1.99	9.64	0.00	0.77	92.98	0.00	
	Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test			
		D-2	0.2%	0.16	0.16				
		D-1	0.3%	0.32	0.32				
		D0	1.5%	1.45	1.45				
		D+1	2.1%	2.09**	2.09**				
		D+2	-1.4%	-1.35	-1.35				
		D+3	1.4%	1.38	1.38				
Total D-2 to D0		2.0%	0.61	0.83					
Total D+1 to D+3		2.2%	1.74	1.25					
Total D-2 to D+3	3.9%		1.82	0.14					

* Rejects null hypothesis at 0.10 level (two-tailed test)

** Rejects null hypothesis at 0.05 level (two-tailed test)

*** Rejects null hypothesis at 0.01 level (two-tailed test)

Event 4									
Financial System	Market Model	OLS							
				t-test	p-value	R2	F	p-value	
		Ibovespa	1.21	4.01	0.00	0.15	16.05	0.00	
		IBx	1.53	4.53	0.00	0.18	20.51	0.00	
	Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test			
		D-2	3.6%	1.58	1.58				
		D-1	0.6%	0.27	0.27				
		D0	-0.3%	-0.14	-0.14				
		D+1	-1.8%	-0.79	-0.79				
		D+2	-1.8%	-0.77	-0.77				
		D+3	-0.5%	-0.22	-0.22				
Total D-2 to D0		3.9%	3.02*	1.83					
Total D+1 to D+3		-4.1%	-1.15	-1.20					
Total D-2 to D+3	-1.5%		-0.05	0.37					
Non-financial System	Market Model	OLS							
				t-test	p-value	R2	F	p-value	
		Ibovespa	1.73	6.91	0.00	0.34	47.78	0.00	
		IBx	2.05	7.29	0.00	0.37	53.15	0.00	
	Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test			
		D-2	-0.01	-0.32	-0.32				
		D-1	0.01	0.47	0.47				
		D0	0.01	0.57	0.57				
		D+1	0.00	-0.23	-0.23				
		D+2	-0.01	-0.73	-0.73				
		D+3	0.00	0.12	0.12				
Total D-2 to D0		1.4%	0.98	0.86					
Total D+1 to D+3		-1.6%	-1.00	-1.09					
Total D-2 to D+3	1.5%		-0.09	1.24					

* Rejects null hypothesis at 0.10 level (two-tailed test)

** Rejects null hypothesis at 0.05 level (two-tailed test)

*** Rejects null hypothesis at 0.01 level (two-tailed test)

Event 5									
Financial System	Market Model	OLS							
				t-test	p-value	R2	F	p-value	
		Ibovespa	0.50	1.83	0.07	0.04	3.35	0.07	
		IBx	0.61	2.00	0.05	0.04	3.98	0.05	
	Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test			
		D-2	0.8%	0.35	0.35				
		D-1	0.0%	0.02	0.02				
		D0	0.6%	0.29	0.29				
		D+1	3.0%	1.43	1.43				
		D+2	-0.1%	-0.05	-0.05				
		D+3	-0.4%	-0.19	-0.19				
Total D-2 to D0		1.4%	0.43	0.67					
Total D+1 to D+3		2.5%	3.78*	2.65**					
Total D-2 to D+3	3.6%		5.53***	-1.03					
Non-financial System	Market Model	OLS							
				t-test	p-value	R2	F	p-value	
		Ibovespa	1.89	6.51	0.00	0.32	42.43	0.00	
		IBx	2.16	6.53	0.00	0.32	42.69	0.00	
	Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test			
		D-2	0.2%	0.09	0.09				
		D-1	0.2%	0.08	0.08				
		D0	0.7%	0.32	0.32				
		D+1	0.1%	0.05	0.05				
		D+2	0.0%	-0.02	-0.02				
		D+3	-0.5%	-0.21	-0.21				
Total D-2 to D0		1.1%	2.15	0.40					
Total D+1 to D+3		-0.4%	-0.74	-0.16					
Total D-2 to D+3	1.0%		0.38	0.45					

* Rejects null hypothesis at 0.10 level (two-tailed test)

** Rejects null hypothesis at 0.05 level (two-tailed test)

*** Rejects null hypothesis at 0.01 level (two-tailed test)

Event 6									
Financial System	Market Model	OLS							
				t-test	p-value	R2	F	p-value	
		Ibovespa	1.12	5.70	0.00	0.41	32.48	0.00	
		IBx	1.35	5.85	0.00	0.43	34.28	0.00	
	Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test			
		D-2	-3.6%	-2.88***	-2.88***				
		D-1	-1.1%	-0.90	-0.90				
		D0	0.1%	0.06	0.06				
		D+1	-1.1%	-0.91	-0.91				
		D+2	1.6%	1.29	1.29				
		D+3	-0.3%	-0.26	-0.26				
Total D-2 to D0		-4.6%	-1.89	-1.75					
Total D+1 to D+3		0.2%	0.05	0.06					
Total D-2 to D+3	-2.2%		-1.13	-0.46					
Non-financial System	Market Model	OLS							
				t-test	p-value	R2	F	p-value	
		Ibovespa	1.55	8.52	0.00	0.61	72.60	0.00	
		IBx	1.93	9.64	0.00	0.67	92.95	0.00	
	Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test			
		D-2	0.6%	0.53	0.53				
		D-1	1.0%	0.93	0.93				
		D0	-0.4%	-0.39	-0.39				
		D+1	0.2%	0.18	0.18				
		D+2	1.3%	1.24	1.24				
		D+3	0.1%	0.06	0.06				
Total D-2 to D0		1.1%	0.95	0.85					
Total D+1 to D+3		1.6%	1.26	1.17					
Total D-2 to D+3	0.8%		1.25	-1.87*					

* Rejects null hypothesis at 0.10 level (two-tailed test)

** Rejects null hypothesis at 0.05 level (two-tailed test)

*** Rejects null hypothesis at 0.01 level (two-tailed test)

Event 7									
Financial System	Market Model	OLS							
				t-test	p-value	R2	F	p-value	
		Ibovespa	1.70	3.67	0.00	0.18	17.50	0.00	
		IBx	1.48	2.05	0.05	0.06	4.19	0.04	
	Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test			
		D-2	0.6%	0.23	0.23				
		D-1	-2.6%	-0.91	-0.91				
		D0	0.7%	0.27	0.27				
		D+1	0.0%	0.01	0.01				
		D+2	-1.2%	-0.43	-0.43				
		D+3	1.3%	0.48	0.48				
Total D-2 to D0		-1.2%	-0.54	-0.44					
Total D+1 to D+3		0.2%	0.05	0.05					
Total D-2 to D+3	-1.8%		-0.23	-8.71***					
Non-financial System	Market Model	OLS							
				t-test	p-value	R2	F	p-value	
		Ibovespa	1.41	7.66	0.00	0.49	58.67	0.00	
		IBx	2.08	7.75	0.00	0.49	60.11	0.00	
	Tests for Abnormal Returns (using IBX)	Event day	Abnormal Return	t-test (5 day event period)	t-test (11 day event period)	Z-test			
		D-2	0.5%	0.48	0.48				
		D-1	-0.2%	-0.16	-0.16				
		D0	0.8%	0.75	0.75				
		D+1	-5.9%	-5.75***	-5.75***				
		D+2	-0.4%	-0.40	-0.40				
		D+3	-1.3%	-1.22	-1.22				
Total D-2 to D0		1.1%	0.22	0.29					
Total D+1 to D+3		-7.6%	-9.13**	-4.74***					
Total D-2 to D+3	-5.3%		-2.33*	2.84***					

* Rejects null hypothesis at 0.10 level (two-tailed test)
 ** Rejects null hypothesis at 0.05 level (two-tailed test)
 *** Rejects null hypothesis at 0.01 level (two-tailed test)

Banco Central do Brasil

Trabalhos para Discussão

Os Trabalhos para Discussão podem ser acessados na internet, no formato PDF, no endereço: <http://www.bc.gov.br>

Working Paper Series

Working Papers in PDF format can be downloaded from: <http://www.bc.gov.br>

- | | | |
|-----------|---|----------|
| 1 | Implementing Inflation Targeting in Brazil
<i>Joel Bogdanski, Alexandre Antonio Tombini and Sérgio Ribeiro da Costa Werlang</i> | Jul/2000 |
| 2 | Política Monetária e Supervisão do Sistema Financeiro Nacional no Banco Central do Brasil
<i>Eduardo Lundberg</i> | Jul/2000 |
| | Monetary Policy and Banking Supervision Functions on the Central Bank
<i>Eduardo Lundberg</i> | Jul/2000 |
| 3 | Private Sector Participation: a Theoretical Justification of the Brazilian Position
<i>Sérgio Ribeiro da Costa Werlang</i> | Jul/2000 |
| 4 | An Information Theory Approach to the Aggregation of Log-Linear Models
<i>Pedro H. Albuquerque</i> | Jul/2000 |
| 5 | The Pass-Through from Depreciation to Inflation: a Panel Study
<i>Ilan Goldfajn and Sérgio Ribeiro da Costa Werlang</i> | Jul/2000 |
| 6 | Optimal Interest Rate Rules in Inflation Targeting Frameworks
<i>José Alvaro Rodrigues Neto, Fabio Araújo and Marta Baltar J. Moreira</i> | Jul/2000 |
| 7 | Leading Indicators of Inflation for Brazil
<i>Marcelle Chauvet</i> | Sep/2000 |
| 8 | The Correlation Matrix of the Brazilian Central Bank's Standard Model for Interest Rate Market Risk
<i>José Alvaro Rodrigues Neto</i> | Sep/2000 |
| 9 | Estimating Exchange Market Pressure and Intervention Activity
<i>Emanuel-Werner Kohlscheen</i> | Nov/2000 |
| 10 | Análise do Financiamento Externo a uma Pequena Economia
Aplicação da Teoria do Prêmio Monetário ao Caso Brasileiro: 1991–1998
<i>Carlos Hamilton Vasconcelos Araújo e Renato Galvão Flôres Júnior</i> | Mar/2001 |
| 11 | A Note on the Efficient Estimation of Inflation in Brazil
<i>Michael F. Bryan and Stephen G. Cecchetti</i> | Mar/2001 |
| 12 | A Test of Competition in Brazilian Banking
<i>Márcio I. Nakane</i> | Mar/2001 |

13	Modelos de Previsão de Insolvência Bancária no Brasil <i>Marcio Magalhães Janot</i>	Mar/2001
14	Evaluating Core Inflation Measures for Brazil <i>Francisco Marcos Rodrigues Figueiredo</i>	Mar/2001
15	Is It Worth Tracking Dollar/Real Implied Volatility? <i>Sandro Canesso de Andrade and Benjamin Miranda Tabak</i>	Mar/2001
16	Avaliação das Projeções do Modelo Estrutural do Banco Central do Brasil para a Taxa de Variação do IPCA <i>Sergio Afonso Lago Alves</i>	Mar/2001
	Evaluation of the Central Bank of Brazil Structural Model's Inflation Forecasts in an Inflation Targeting Framework <i>Sergio Afonso Lago Alves</i>	Jul/2001
17	Estimando o Produto Potencial Brasileiro: uma Abordagem de Função de Produção <i>Tito Nícias Teixeira da Silva Filho</i>	Abr/2001
	Estimating Brazilian Potential Output: a Production Function Approach <i>Tito Nícias Teixeira da Silva Filho</i>	Aug/2002
18	A Simple Model for Inflation Targeting in Brazil <i>Paulo Springer de Freitas and Marcelo Kfoury Muinhos</i>	Apr/2001
19	Uncovered Interest Parity with Fundamentals: a Brazilian Exchange Rate Forecast Model <i>Marcelo Kfoury Muinhos, Paulo Springer de Freitas and Fabio Araújo</i>	May/2001
20	Credit Channel without the LM Curve <i>Victorio Y. T. Chu and Márcio I. Nakane</i>	May/2001
21	Os Impactos Econômicos da CPMF: Teoria e Evidência <i>Pedro H. Albuquerque</i>	Jun/2001
22	Decentralized Portfolio Management <i>Paulo Coutinho and Benjamin Miranda Tabak</i>	Jun/2001
23	Os Efeitos da CPMF sobre a Intermediação Financeira <i>Sérgio Mikio Koyama e Márcio I. Nakane</i>	Jul/2001
24	Inflation Targeting in Brazil: Shocks, Backward-Looking Prices, and IMF Conditionality <i>Joel Bogdanski, Paulo Springer de Freitas, Ilan Goldfajn and Alexandre Antonio Tombini</i>	Aug/2001
25	Inflation Targeting in Brazil: Reviewing Two Years of Monetary Policy 1999/00 <i>Pedro Fachada</i>	Aug/2001
26	Inflation Targeting in an Open Financially Integrated Emerging Economy: the Case of Brazil <i>Marcelo Kfoury Muinhos</i>	Aug/2001
27	Complementaridade e Fungibilidade dos Fluxos de Capitais Internacionais <i>Carlos Hamilton Vasconcelos Araújo e Renato Galvão Flôres Júnior</i>	Set/2001

- 28 **Regras Monetárias e Dinâmica Macroeconômica no Brasil: uma Abordagem de Expectativas Racionais** Nov/2001
Marco Antonio Bonomo e Ricardo D. Brito
- 29 **Using a Money Demand Model to Evaluate Monetary Policies in Brazil** Nov/2001
Pedro H. Albuquerque and Solange Gouvêa
- 30 **Testing the Expectations Hypothesis in the Brazilian Term Structure of Interest Rates** Nov/2001
Benjamin Miranda Tabak and Sandro Canesso de Andrade
- 31 **Algumas Considerações sobre a Sazonalidade no IPCA** Nov/2001
Francisco Marcos R. Figueiredo e Roberta Blass Staub
- 32 **Crises Cambiais e Ataques Especulativos no Brasil** Nov/2001
Mauro Costa Miranda
- 33 **Monetary Policy and Inflation in Brazil (1975-2000): a VAR Estimation** Nov/2001
André Minella
- 34 **Constrained Discretion and Collective Action Problems: Reflections on the Resolution of International Financial Crises** Nov/2001
Arminio Fraga and Daniel Luiz Gleizer
- 35 **Uma Definição Operacional de Estabilidade de Preços** Dez/2001
Tito Nícias Teixeira da Silva Filho
- 36 **Can Emerging Markets Float? Should They Inflation Target?** Feb/2002
Barry Eichengreen
- 37 **Monetary Policy in Brazil: Remarks on the Inflation Targeting Regime, Public Debt Management and Open Market Operations** Mar/2002
Luiz Fernando Figueiredo, Pedro Fachada and Sérgio Goldenstein
- 38 **Volatilidade Implícita e Antecipação de Eventos de Stress: um Teste para o Mercado Brasileiro** Mar/2002
Frederico Pechir Gomes
- 39 **Opções sobre Dólar Comercial e Expectativas a Respeito do Comportamento da Taxa de Câmbio** Mar/2002
Paulo Castor de Castro
- 40 **Speculative Attacks on Debts, Dollarization and Optimum Currency Areas** Apr/2002
Aloisio Araujo and Márcia Leon
- 41 **Mudanças de Regime no Câmbio Brasileiro** Jun/2002
Carlos Hamilton V. Araújo e Getúlio B. da Silveira Filho
- 42 **Modelo Estrutural com Setor Externo: Endogenização do Prêmio de Risco e do Câmbio** Jun/2002
Marcelo Kfoury Muinhos, Sérgio Afonso Lago Alves e Gil Riella
- 43 **The Effects of the Brazilian ADRs Program on Domestic Market Efficiency** Jun/2002
Benjamin Miranda Tabak and Eduardo José Araújo Lima

44	Estrutura Competitiva, Produtividade Industrial e Liberação Comercial no Brasil <i>Pedro Cavalcanti Ferreira e Osmani Teixeira de Carvalho Guillén</i>	Jun/2002
45	Optimal Monetary Policy, Gains from Commitment, and Inflation Persistence <i>André Minella</i>	Aug/2002
46	The Determinants of Bank Interest Spread in Brazil <i>Tarsila Segalla Afanasieff, Priscilla Maria Villa Lhacer and Márcio I. Nakane</i>	Aug/2002
47	Indicadores Derivados de Agregados Monetários <i>Fernando de Aquino Fonseca Neto e José Albuquerque Júnior</i>	Set/2002
48	Should Government Smooth Exchange Rate Risk? <i>Ilan Goldfajn and Marcos Antonio Silveira</i>	Sep/2002
49	Desenvolvimento do Sistema Financeiro e Crescimento Econômico no Brasil: Evidências de Causalidade <i>Orlando Carneiro de Matos</i>	Set/2002
50	Macroeconomic Coordination and Inflation Targeting in a Two-Country Model <i>Eui Jung Chang, Marcelo Kfoury Muinhos and Joaúlio Rodolpho Teixeira</i>	Sep/2002
51	Credit Channel with Sovereign Credit Risk: an Empirical Test <i>Victorio Yi Tson Chu</i>	Sep/2002
52	Generalized Hyperbolic Distributions and Brazilian Data <i>José Fajardo and Aquiles Farias</i>	Sep/2002
53	Inflation Targeting in Brazil: Lessons and Challenges <i>André Minella, Paulo Springer de Freitas, Ilan Goldfajn and Marcelo Kfoury Muinhos</i>	Nov/2002
54	Stock Returns and Volatility <i>Benjamin Miranda Tabak and Solange Maria Guerra</i>	Nov/2002
55	Componentes de Curto e Longo Prazo das Taxas de Juros no Brasil <i>Carlos Hamilton Vasconcelos Araújo e Osmani Teixeira de Carvalho de Guillén</i>	Nov/2002
56	Causality and Cointegration in Stock Markets: the Case of Latin America <i>Benjamin Miranda Tabak and Eduardo José Araújo Lima</i>	Dec/2002
57	As Leis de Falência: uma Abordagem Econômica <i>Aloisio Araujo</i>	Dez/2002
58	The Random Walk Hypothesis and the Behavior of Foreign Capital Portfolio Flows: the Brazilian Stock Market Case <i>Benjamin Miranda Tabak</i>	Dec/2002
59	Os Preços Administrados e a Inflação no Brasil <i>Francisco Marcos R. Figueiredo e Thaís Porto Ferreira</i>	Dez/2002
60	Delegated Portfolio Management <i>Paulo Coutinho and Benjamin Miranda Tabak</i>	Dec/2002

61	O Uso de Dados de Alta Frequência na Estimação da Volatilidade e do Valor em Risco para o Ibovespa <i>João Maurício de Souza Moreira e Eduardo Facó Lemgruber</i>	Dez/2002
62	Taxa de Juros e Concentração Bancária no Brasil <i>Eduardo Kiyoshi Tonooka e Sérgio Mikio Koyama</i>	Fev/2003
63	Optimal Monetary Rules: the Case of Brazil <i>Charles Lima de Almeida, Marco Aurélio Peres, Geraldo da Silva e Souza and Benjamin Miranda Tabak</i>	Fev/2003
64	Medium-Size Macroeconomic Model for the Brazilian Economy <i>Marcelo Kfoury Muinhos and Sergio Afonso Lago Alves</i>	Fev/2003
65	On the Information Content of Oil Future Prices <i>Benjamin Miranda Tabak</i>	Fev/2003
66	A Taxa de Juros de Equilíbrio: uma Abordagem Múltipla <i>Pedro Calhman de Miranda e Marcelo Kfoury Muinhos</i>	Fev/2003
67	Avaliação de Métodos de Cálculo de Exigência de Capital para Risco de Mercado de Carteiras de Ações no Brasil <i>Gustavo S. Araújo, João Maurício S. Moreira e Ricardo S. Maia Clemente</i>	Fev/2003
68	Real Balances in the Utility Function: Evidence for Brazil <i>Leonardo Soriano de Alencar and Márcio I. Nakane</i>	Fev/2003
69	r-filters: a Hodrick-Prescott Filter Generalization <i>Fabio Araújo, Marta Baltar Moreira Areosa and José Alvaro Rodrigues Neto</i>	Fev/2003
70	Monetary Policy Surprises and the Brazilian Term Structure of Interest Rates <i>Benjamin Miranda Tabak</i>	Fev/2003
71	On Shadow-Prices of Banks in Real-Time Gross Settlement Systems <i>Rodrigo Penaloza</i>	Apr/2003
72	O Prêmio pela Maturidade na Estrutura a Termo das Taxas de Juros Brasileiras <i>Ricardo Dias de Oliveira Brito, Angelo J. Mont'Alverne Duarte e Osmani Teixeira de C. Guillen</i>	Maio/2003
73	Análise de Componentes Principais de Dados Funcionais – uma Aplicação às Estruturas a Termo de Taxas de Juros <i>Getúlio Borges da Silveira e Octavio Bessada</i>	Maio/2003
74	Aplicação do Modelo de Black, Derman & Toy à Precificação de Opções Sobre Títulos de Renda Fixa <i>Octavio Manuel Bessada Lion, Carlos Alberto Nunes Cosenza e César das Neves</i>	Maio/2003
75	Brazil's Financial System: Resilience to Shocks, no Currency Substitution, but Struggling to Promote Growth <i>Ilan Goldfajn, Katherine Hennings and Helio Mori</i>	Jun/2003

- 76 **Inflation Targeting in Emerging Market Economies** Jun/2003
Arminio Fraga, Ilan Goldfajn and André Minella
- 77 **Inflation Targeting in Brazil: Constructing Credibility under Exchange Rate Volatility** Jul/2003
André Minella, Paulo Springer de Freitas, Ilan Goldfajn and Marcelo Kfoury Muinhos
- 78 **Contornando os Pressupostos de Black & Scholes: Aplicação do Modelo de Precificação de Opções de Duan no Mercado Brasileiro** Out/2003
Gustavo Silva Araújo, Claudio Henrique da Silveira Barbedo, Antonio Carlos Figueiredo, Eduardo Facó Lemgruber
- 79 **Inclusão do Decaimento Temporal na Metodologia Delta-Gama para o Cálculo do VaR de Carteiras Compradas em Opções no Brasil** Out/2003
Claudio Henrique da Silveira Barbedo, Gustavo Silva Araújo, Eduardo Facó Lemgruber
- 80 **Diferenças e Semelhanças entre Países da América Latina: uma Análise de Markov Switching para os Ciclos Econômicos de Brasil e Argentina** Out/2003
Arnildo da Silva Correa
- 81 **Bank Competition, Agency Costs and the Performance of the Monetary Policy** Jan/2004
Leonardo Soriano de Alencar and Márcio I. Nakane
- 82 **Carteiras de Opções: Avaliação de Metodologias de Exigência de Capital no Mercado Brasileiro** Mar/2004
Cláudio Henrique da Silveira Barbedo e Gustavo Silva Araújo
- 83 **Does Inflation Targeting Reduce Inflation? An Analysis for the OECD Industrial Countries** May/2004
Thomas Y. Wu
- 84 **Speculative Attacks on Debts and Optimum Currency Area: a Welfare Analysis** May/2004
Aloisio Araujo and Marcia Leon
- 85 **Risk Premia for Emerging Markets Bonds: Evidence from Brazilian Government Debt, 1996-2002** May/2004
André Soares Loureiro and Fernando de Holanda Barbosa
- 86 **Identificação do Fator Estocástico de Descontos e Algumas Implicações sobre Testes de Modelos de Consumo** Maio/2004
Fabio Araujo e João Victor Issler
- 87 **Mercado de Crédito: uma Análise Econométrica dos Volumes de Crédito Total e Habitacional no Brasil** Dez/2004
Ana Carla Abrão Costa
- 88 **Ciclos Internacionais de Negócios: uma Análise de Mudança de Regime Markoviano para Brasil, Argentina e Estados Unidos** Dez/2004
Arnildo da Silva Correa e Ronald Otto Hillbrecht
- 89 **O Mercado de Hedge Cambial no Brasil: Reação das Instituições Financeiras a Intervenções do Banco Central** Dez/2004
Fernando N. de Oliveira

- 90 Bank Privatization and Productivity: Evidence for Brazil** Dec/2004
Márcio I. Nakane and Daniela B. Weintraub
- 91 Credit Risk Measurement and the Regulation of Bank Capital and Provision Requirements in Brazil – a Corporate Analysis** Dec/2004
Ricardo Schechtman, Valéria Salomão Garcia, Sergio Miki Koyama and Guilherme Cronemberger Parente
- 92 Steady-State Analysis of an Open Economy General Equilibrium Model for Brazil** Apr/2005
Mirta Noemi Sataka Bugarin, Roberto de Goes Ellery Jr., Victor Gomes Silva, Marcelo Kfoury Muinhos
- 93 Avaliação de Modelos de Cálculo de Exigência de Capital para Risco Cambial** Abr/2005
Claudio H. da S. Barbedo, Gustavo S. Araújo, João Maurício S. Moreira e Ricardo S. Maia Clemente
- 94 Simulação Histórica Filtrada: Incorporação da Volatilidade ao Modelo Histórico de Cálculo de Risco para Ativos Não-Lineares** Abr/2005
Claudio Henrique da Silveira Barbedo, Gustavo Silva Araújo e Eduardo Facó Lemgruber
- 95 Comment on Market Discipline and Monetary Policy by Carl Walsh** Apr/2005
Maurício S. Bugarin and Fábria A. de Carvalho
- 96 O que É Estratégia: uma Abordagem Multiparadigmática para a Disciplina** Ago/2005
Anthero de Moraes Meirelles
- 97 Finance and the Business Cycle: a Kalman Filter Approach with Markov Switching** Aug/2005
Ryan A. Compton and Jose Ricardo da Costa e Silva
- 98 Capital Flows Cycle: Stylized Facts and Empirical Evidences for Emerging Market Economies** Aug/2005
Helio Mori e Marcelo Kfoury Muinhos
- 99 Adequação das Medidas de Valor em Risco na Formulação da Exigência de Capital para Estratégias de Opções no Mercado Brasileiro** Set/2005
Gustavo Silva Araújo, Claudio Henrique da Silveira Barbedo, e Eduardo Facó Lemgruber
- 100 Targets and Inflation Dynamics** Oct/2005
Sergio A. L. Alves and Waldyr D. Areosa
- 101 Comparing Equilibrium Real Interest Rates: Different Approaches to Measure Brazilian Rates** Mar/2006
Marcelo Kfoury Muinhos and Márcio I. Nakane
- 102 Judicial Risk and Credit Market Performance: Micro Evidence from Brazilian Payroll Loans** Apr/2006
Ana Carla A. Costa and João M. P. de Mello
- 103 The Effect of Adverse Supply Shocks on Monetary Policy and Output** Apr/2006
Maria da Glória D. S. Araújo, Mirta Bugarin, Marcelo Kfoury Muinhos and Jose Ricardo C. Silva

- 104 Extração de Informação de Opções Cambiais no Brasil** Abr/2006
Eui Jung Chang e Benjamin Miranda Tabak
- 105 Representing Roommate's Preferences with Symmetric Utilities** Apr/2006
José Alvaro Rodrigues Neto
- 106 Testing Nonlinearities Between Brazilian Exchange Rates and Inflation Volatilities** May/2006
Cristiane R. Albuquerque and Marcelo Portugal
- 107 Demand for Bank Services and Market Power in Brazilian Banking** Jun/2006
Márcio I. Nakane, Leonardo S. Alencar and Fabio Kanczuk
- 108 O Efeito da Consignação em Folha nas Taxas de Juros dos Empréstimos Pessoais** Jun/2006
Eduardo A. S. Rodrigues, Victorio Chu, Leonardo S. Alencar e Tony Takeda
- 109 The Recent Brazilian Disinflation Process and Costs** Jun/2006
Alexandre A. Tombini and Sergio A. Lago Alves
- 110 Fatores de Risco e o Spread Bancário no Brasil** Jul/2006
Fernando G. Bignotto e Eduardo Augusto de Souza Rodrigues
- 111 Avaliação de Modelos de Exigência de Capital para Risco de Mercado do Cupom Cambial** Jul/2006
Alan Cosme Rodrigues da Silva, João Maurício de Souza Moreira e Myrian Beatriz Eiras das Neves
- 112 Interdependence and Contagion: an Analysis of Information Transmission in Latin America's Stock Markets** Jul/2006
Angelo Marsiglia Fasolo
- 113 Investigação da Memória de Longo Prazo da Taxa de Câmbio no Brasil** Ago/2006
Sergio Rubens Stancato de Souza, Benjamin Miranda Tabak e Daniel O. Cajueiro
- 114 The Inequality Channel of Monetary Transmission** Aug/2006
Marta Areosa and Waldyr Areosa
- 115 Myopic Loss Aversion and House-Money Effect Overseas: an Experimental Approach** Sep/2006
José L. B. Fernandes, Juan Ignacio Peña and Benjamin M. Tabak
- 116 Out-Of-The-Money Monte Carlo Simulation Option Pricing: the Joint Use of Importance Sampling and Descriptive Sampling** Sep/2006
Jaqueline Terra Moura Marins, Eduardo Saliby and Josete Florencio dos Santos
- 117 An Analysis of Off-Site Supervision of Banks' Profitability, Risk and Capital Adequacy: a Portfolio Simulation Approach Applied to Brazilian Banks** Sep/2006
Theodore M. Barnhill, Marcos R. Souto and Benjamin M. Tabak
- 118 Contagion, Bankruptcy and Social Welfare Analysis in a Financial Economy with Risk Regulation Constraint** Oct/2006
Aloísio P. Araújo and José Valentim M. Vicente

119	A Central de Risco de Crédito no Brasil: uma Análise de Utilidade de Informação <i>Ricardo Schechtman</i>	Out/2006
120	Forecasting Interest Rates: an Application for Brazil <i>Eduardo J. A. Lima, Felipe Ludovice and Benjamin M. Tabak</i>	Oct/2006
121	The Role of Consumer's Risk Aversion on Price Rigidity <i>Sergio A. Lago Alves and Mirta N. S. Bugarin</i>	Nov/2006
122	Nonlinear Mechanisms of the Exchange Rate Pass-Through: a Phillips Curve Model With Threshold for Brazil <i>Arnildo da Silva Correa and André Minella</i>	Nov/2006
123	A Neoclassical Analysis of the Brazilian "Lost-Decades" <i>Flávia Mourão Graminho</i>	Nov/2006
124	The Dynamic Relations between Stock Prices and Exchange Rates: Evidence for Brazil <i>Benjamin M. Tabak</i>	Nov/2006
125	Herding Behavior by Equity Foreign Investors on Emerging Markets <i>Barbara Alemanni and José Renato Haas Ornelas</i>	Dec/2006
126	Risk Premium: Insights over the Threshold <i>José L. B. Fernandes, Augusto Hasman and Juan Ignacio Peña</i>	Dec/2006
127	Uma Investigação Baseada em Reamostragem sobre Requerimentos de Capital para Risco de Crédito no Brasil <i>Ricardo Schechtman</i>	Dec/2006
128	Term Structure Movements Implicit in Option Prices <i>Caio Ibsen R. Almeida and José Valentim M. Vicente</i>	Dec/2006
129	Brazil: Taming Inflation Expectations <i>Afonso S. Bevilaqua, Mário Mesquita and André Minella</i>	Jan/2007
130	The Role of Banks in the Brazilian Interbank Market: Does Bank Type Matter? <i>Daniel O. Cajueiro and Benjamin M. Tabak</i>	Jan/2007
131	Long-Range Dependence in Exchange Rates: the Case of the European Monetary System <i>Sergio Rubens Stancato de Souza, Benjamin M. Tabak and Daniel O. Cajueiro</i>	Mar/2007
132	Credit Risk Monte Carlo Simulation Using Simplified Creditmetrics' Model: the Joint Use of Importance Sampling and Descriptive Sampling <i>Jaqueline Terra Moura Marins and Eduardo Saliby</i>	Mar/2007
133	A New Proposal for Collection and Generation of Information on Financial Institutions' Risk: the Case of Derivatives <i>Gilneu F. A. Vivan and Benjamin M. Tabak</i>	Mar/2007
134	Amostragem Descritiva no Apreçamento de Opções Europeias através de Simulação Monte Carlo: o Efeito da Dimensionalidade e da Probabilidade de Exercício no Ganho de Precisão <i>Eduardo Saliby, Sergio Luiz Medeiros Proença de Gouvêa e Jaqueline Terra Moura Marins</i>	Abr/2007

- 135 **Evaluation of Default Risk for the Brazilian Banking Sector** May/2007
Marcelo Y. Takami and Benjamin M. Tabak
- 136 **Identifying Volatility Risk Premium from Fixed Income Asian Options** May/2007
Caio Ibsen R. Almeida and José Valentim M. Vicente
- 137 **Monetary Policy Design under Competing Models of Inflation Persistence** May/2007
Solange Gouvea e Abhijit Sen Gupta
- 138 **Forecasting Exchange Rate Density Using Parametric Models: the Case of Brazil** May/2007
Marcos M. Abe, Eui J. Chang and Benjamin M. Tabak
- 139 **Selection of Optimal Lag Length in Cointegrated VAR Models with Weak Form of Common Cyclical Features** Jun/2007
Carlos Enrique Carrasco Gutiérrez, Reinaldo Castro Souza and Osmani Teixeira de Carvalho Guillén
- 140 **Inflation Targeting, Credibility and Confidence Crises** Aug/2007
Rafael Santos and Aloísio Araújo
- 141 **Forecasting Bonds Yields in the Brazilian Fixed income Market** Aug/2007
Jose Vicente and Benjamin M. Tabak
- 142 **Crises Análise da Coerência de Medidas de Risco no Mercado Brasileiro de Ações e Desenvolvimento de uma Metodologia Híbrida para o Expected Shortfall** Ago/2007
Alan Cosme Rodrigues da Silva, Eduardo Facó Lemgruber, José Alberto Rebello Baranowski e Renato da Silva Carvalho
- 143 **Price Rigidity in Brazil: Evidence from CPI Micro Data** Sep/2007
Solange Gouvea
- 144 **The Effect of Bid-Ask Prices on Brazilian Options Implied Volatility: a Case Study of Telemar Call Options** Oct/2007
Claudio Henrique da Silveira Barbedo and Eduardo Facó Lemgruber
- 145 **The Stability-Concentration Relationship in the Brazilian Banking System** Oct/2007
Benjamin Miranda Tabak, Solange Maria Guerra, Eduardo José Araújo Lima and Eui Jung Chang
- 146 **Movimentos da Estrutura a Termo e Critérios de Minimização do Erro de Previsão em um Modelo Paramétrico Exponencial** Out/2007
Caio Almeida, Romeu Gomes, André Leite e José Vicente
- 147 **Explaining Bank Failures in Brazil: Micro, Macro and Contagion Effects (1994-1998)** Oct/2007
Adriana Soares Sales and Maria Eduarda Tannuri-Pianto
- 148 **Um Modelo de Fatores Latentes com Variáveis Macroeconômicas para a Curva de Cupom Cambial** Out/2007
Felipe Pinheiro, Caio Almeida e José Vicente
- 149 **Joint Validation of Credit Rating PDs under Default Correlation** Oct/2007
Ricardo Schechtman

- 150 A Probabilistic Approach for Assessing the Significance of Contextual Variables in Nonparametric Frontier Models: an Application for Brazilian Banks** Oct/2007
Roberta Blass Staub and Geraldo da Silva e Souza
- 151 Building Confidence Intervals with Block Bootstraps for the Variance Ratio Test of Predictability** Nov/2007
Eduardo José Araújo Lima and Benjamin Miranda Tabak
- 152 Demand for Foreign Exchange Derivatives in Brazil: Hedge or Speculation?** Dec/2007
Fernando N. de Oliveira and Walter Novaes
- 153 Aplicação da Amostragem por Importância à Simulação de Opções Asiáticas Fora do Dinheiro** Dez/2007
Jaqueline Terra Moura Marins
- 154 Identification of Monetary Policy Shocks in the Brazilian Market for Bank Reserves** Dec/2007
Adriana Soares Sales and Maria Tannuri-Pianto
- 155 Does Curvature Enhance Forecasting?** Dec/2007
Caio Almeida, Romeu Gomes, André Leite and José Vicente
- 156 Escolha do Banco e Demanda por Empréstimos: um Modelo de Decisão em Duas Etapas Aplicado para o Brasil** Dez/2007
Sérgio Mikio Koyama e Márcio I. Nakane
- 157 Is the Investment-Uncertainty Link Really Elusive? The Harmful Effects of Inflation Uncertainty in Brazil** Jan/2008
Tito Nícias Teixeira da Silva Filho
- 158 Characterizing the Brazilian Term Structure of Interest Rates** Feb/2008
Osmani T. Guillen and Benjamin M. Tabak
- 159 Behavior and Effects of Equity Foreign Investors on Emerging Markets** Feb/2008
Barbara Alemanni and José Renato Haas Ornelas