Determinants of Credit Expansion in Brazil

Barbi, Fernando C.

Sao Paulo School of Economics FGV

8 April 2014

Determinants of Credit Expansion in Brazil

Fernando C. Barbi *
São Paulo School of Economics (FGV)

September 13, 2014

Abstract

This paper analyzes the determinants of credit using an extensive bank level panel dataset. Brazilian economy has experienced a major boost in leverage in the first decade of 2000 as a result of a set factors ranging from macroeconomic stability to the abundant liquidity in international financial markets before 2008 and a set of deliberate decisions taken by President Lula's to expand credit, boost consumption and gain political support from the lower social strata. As relevant conclusions to our investigation we verify that: credit expansion relied on the reduction of the monetary policy rate, international financial markets are an important source of funds, payroll-guaranteed credit and investment grade status affected positively credit supply. We were not able to confirm the importance of financial inclusion efforts. The importance of financial sector sanity indicators of credit conditions cannot be underestimated. These results raise questions over the sustainability of this expansion process and financial stability in the future.

keywords bank credit, public credit, emerging markets, financial stability

JEL E44, G18, G21, H81

*The author is grateful to Pedro Valls, Alkimar Moura and Emerson Marçal for their comments. Email: fcbarbi@gmail.com

1 Introduction

During the presidential campaign in 2002, concern was raised about the future conduction of economic policy should the candidate from the leftist party, Luis Inácio Lula da Silva (Lula), be elected. Just a few months before election, Lula proposed in an open letter[1] that the main priority of his administration, besides respecting contracts and keeping inflation under control, would be to reduce external vulnerabilities by creating a strong domestic market[2] based on consumption. By catering to macroeconomic stability granting the central bank a *de facto* autonomy and by closing the social inequality gap with social transfer programs and an aggressive policy of real minimum salary appreciation, Lula created the political and economic conditions to radically reduce poverty and build an emerging middle class that would guarantee his reelection in 2006 (Hunter and Power (2007)) and keep being his loyal electoral base from 2010 on. Singer (2012) suggests that since 2010 Brazil lives a "New Deal atmosphere" born out of how the 2008 crisis was tackled.

The expansion of domestic demand was based on a set of political decisions that created the conditions for economic growth. According to Lima and Ferreira (2012) "credit expansion is a deliberate outcome of Lula's government economic policy"[3]. Ricci (2006), Souza and Lamounier (2010) and Singer (2012) concur that Lula's vision is based on: (a) the expansion of formal employment, (b) real increases to minimum wage and (c) the expansion of public and private supply of credit. These three economic policy directions are complemented with a series of microeconomic reforms in credit market rules and regulations that allow for the expansion of credit supply at reduced rates. It is not possible to understand the continuous expansion of the economy between 2003 and 2008 without a correct perception of the determinants of credit expansion.

Before the 2007/8 credit crunch crisis, economists paid little attention to credit and the financial markets frictions that might affect output. Both academia and policymakers focused

[1] "Carta ao Provo Brasileiro" was signed on June 22, 2002, at the beginning of the presidential campaign.

[2] "O desenvolvimento de nosso imenso mercado pode revitalizar e impulsionar o conjunto da economia, ampliando de forma decisiva o espaço da pequena e da microempresa, oferecendo ainda bases sólidas para ampliar as exportações. (...) [A]cima de tudo, vamos fazer um Compromisso pela Produção, pelo emprego e por justiça social."

[3] "Ressalte-se o fato de que a expansão do crédito é um desdobramento deliberado da política econômica do governo Lula, visando sustentar o crescimento econômico do país não apenas pelo atendimento da demanda internacional, mas também por meio do atendimento de maior demanda interna por produtos e serviços." (p.31)

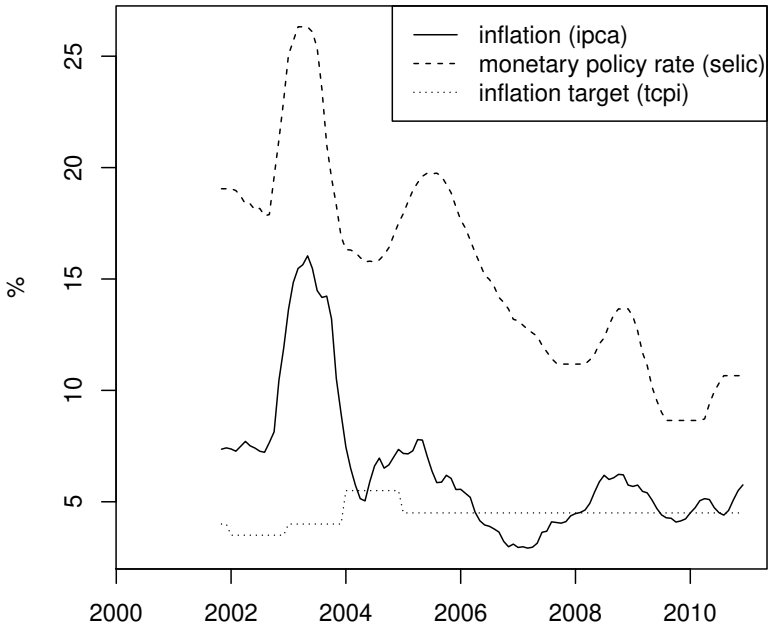
their attention to other more pressing topics: on the macro level, the monetary policy research agenda was dominated by inflation control mechanisms and on the micro level, market regulation was neglected as most believed that markets could self regulate themselves more efficiently than government agencies. The 2007/8 crisis showed that financial intermediation matters for macroeconomic stability. As Blanchard (2010) puts it, "the crisis has made clear that policymakers have to watch many targets, including the composition of output, the behavior of asset prices and the leverage of different agents". Brazil went through deep changes in the financial market. Before inflation control brought by Plan Real in 1994, the Brazilian banking system made most of its profit from rolling government's debt. After the taming of inflation, the banking sector underwent severe concentration and sanitization[4] processes as the surviving institutions reoriented their business models to increase lending to firms and households. Lima and Ferreira (2012) offer a detailed view of the financial system privatization period from 1996 to 2001 and the contraction in the number of public banks as state banks were closed or sold. The few remaining public banks stayed under federal control.

The surviving private institutions learned to profit from credit but as a considerable chunk of the consumers worked in informal activities, personal credit lagged behind as households had a hard time producing collaterals. Macroeconomic stability brought a new wave of investments and some social transfer programs tentatively implemented were raising average income while preparing the ground for the growth years that characterize the Lula Administration. Besides that, an increasing formalization rate in labor relations was key to pave the way for the credit expansion that would later happen.

Brazil adopted the Inflation Target monetary policy regime in 1999 after switching from an exchange-rate anchor put in place in 1994, in the first phase of the Plan Real. The new monetary regime relied heavily on the short-run interest rate (selic) as the Monetary Policy Rate (MPR), the instrument used to keep inflation on target. The convergence of inflation (figure 1) to target was achieved in 2006 and maintained since then under a stern policy of high interest rates that made domestic funding rather expensive. By the same token, since the later 1990 international liquidity increased, enticing big Brazilian banks to access the international financial markets for cheap funding. Eyzaguirre (2011) refers to this period as of a "double

[4]The sanitization of the banking system was conducted by the BCB in the PROER program.

Figure 1: Interest rates, actual and expected inflation trajectories



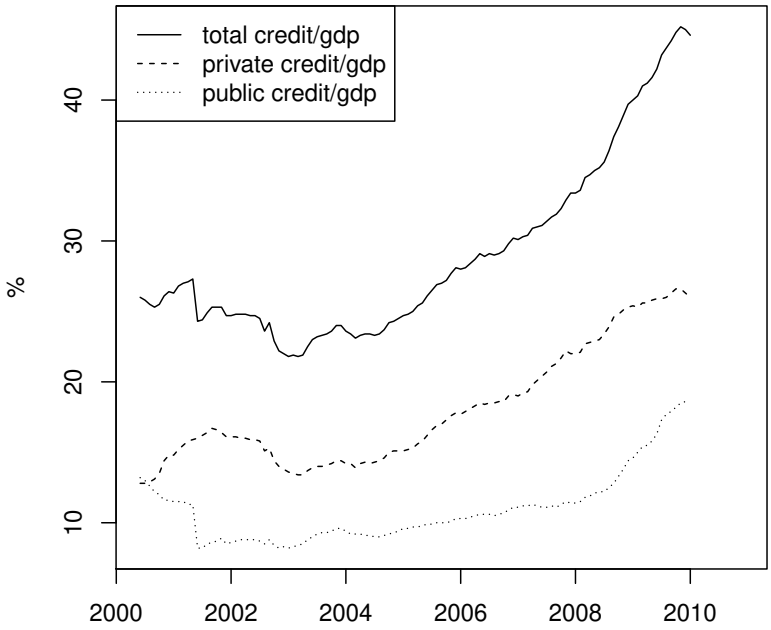
bonanza" to characterize the conjunction of easy foreign financing and the high terms of trade for Latin American commodity exporter countries.

Brazil was granted investment grade status in 2008, first by Standard & Poor's and later by Fitch. Moody's followed and also conferred it in 2009. This contributed to the inflow of funds supplementing the need for resources as domestic savings are not enough to sustain investment. As a side effect the Real appreciated and the competitiveness of the manufactured sector declined.

The Brazilian economy experienced a major boost in leverage from 2001 to 2010 (figure 2) as total credit expanded from 26.8% of GDP in 2001 to 48% in 2010. This movement is mainly credited to macroeconomic stability but also to institutional reforms that reduced the cost of credit for both households and firms. We briefly mention the new funding facility FIDC[5] created as a source of new funding for smaller banks. New payroll backed credit legislation

[5]Receivables Investment Funds (Fundos de Investimento em Direitos Creditórios) were created by the CMN Resolution 2907 of November 29, 2001 and are regulated by the CVM Instructions 356 (December 2001) and 393 (July 2003).

Figure 2: Expansion of Credit relative to GDP



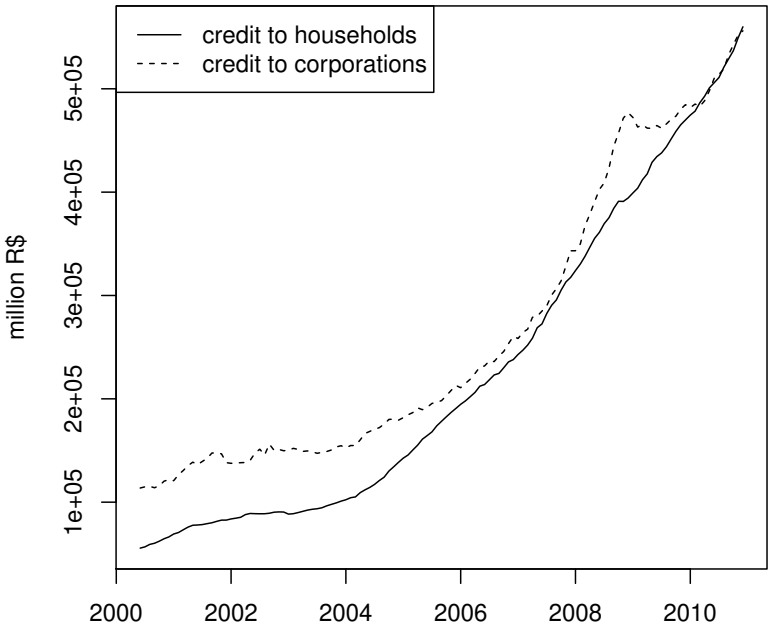
("crédito consignado") was passed by the end of President Lula's first year in power. In the beginning of 2005, bankruptcy legislation ("Lei de Falências") was passed in Congress that would speed up the capture of debtors assets.

Brazil has gone through some profound changes in the last decade that explain the expansion of the credit market. On the supply side, a series of structural microeconomic reforms increased property rights of creditors and created a market for credit portfolios that would increase the recycling of liquidity. Some four events must be mentioned: the first reform was the creation of FIDC. This financial instrument was created to allow small and medium banks to generate funds by selling their credit portfolios.

A second innovation was payroll-backed loans legislation[6] passed in 2003 that allowed lenders to automatically deduce principal and interest payments directly from the credit takers' payroll: this credit modality is the single most important source of credit for individuals today. A third reform is the new bankruptcy legislation passed in 2005 to facilitate the recovery of

[6]In January 2004 this credit modality represented 34% of personal loans and grew to 69% in December 2010.

Figure 3: Evolution of Credit for Households and Firms



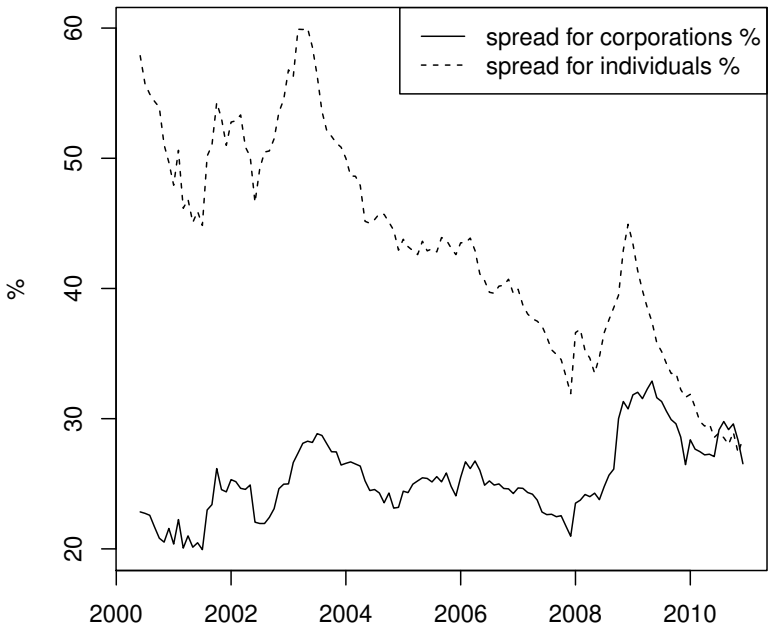
assets by creditors.

As a result, the stock of credit for individuals reached the same levels of credit to corporations (Figure 3) while spreads for these two categories converged by the end of 2010 (Figure 4).

On the demand side, a steady increase in real wages (figure 5), including minimal wages, a steady decrease of unemployment and a series of social transfer programs were adopted as government policy to reduce social inequalities and increase consumption from the lower social classes. At the same time that the population got better educated: comparing PNAD[7] results from 1992 to 2007 the percentage of workers with 11 or more years of education went from 18.40% in 1992 to 39.6% in 2007. The lower end also showed improvements as illiteracy rate reduced from 17.2% in 1992 to 9.6% in 2009 considering all the population above 15 years old. As more educated workers are more productive, education improvement suggests that real wage is increasing in for workers in general.

[7]Pesquisa Nacional por Amostra de Domicilios (national household survey) available at www.ibge.gov.br

Figure 4: Spreads for Corporations x Individuals (%)

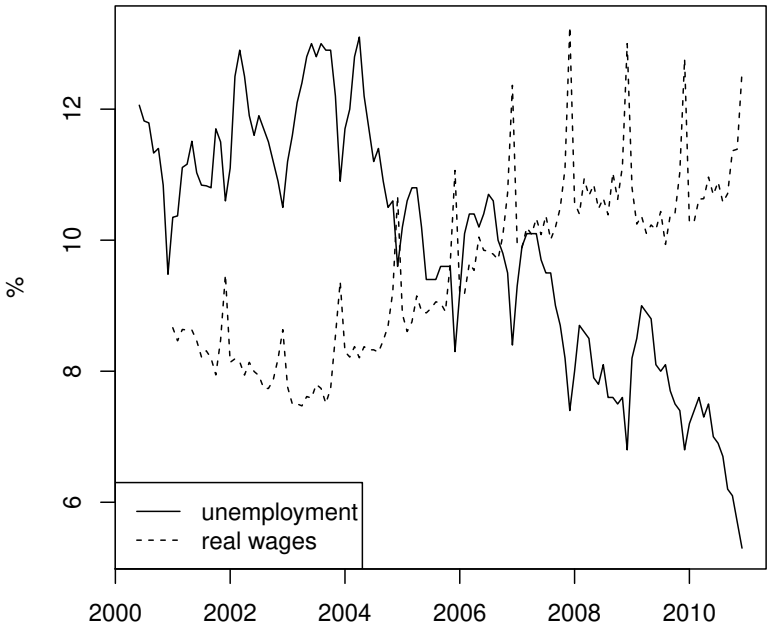


The official employment report (RAIS[8]) shows that during the Lula Administration some 15 millions formal jobs were created (in both private and public sectors) for a total of 44 million people regularly employed. Formal employment was a priority to ensure economic growth. Special attention was dedicated to labor intensive sectors such as construction and small businesses. Fiscal stimulus in the form of payroll taxes rebates were offered to companies to keep employees and the result is that formal employment reached historical full employment rates.

Another factor with implications to both supply and demand of credit is the fact that the country gained credibility as it reached macroeconomic stability. As inflation converged to target, the Brazilian Central Bank (BCB) gained credibility and *de facto* (but not *de jure*) independence to conduct monetary and regulatory policies. As the BCB adopted a more transparent and predictable approach to policy-making Brazil was granted investment grade status in 2008, first by Standard & Poor's and later by Fitch. Moody's followed and also

[8]Características do Emprego Formal segundo a Relação Anual de Informações Sociais - 2010.

Figure 5: Evolution of formal employment and real wages

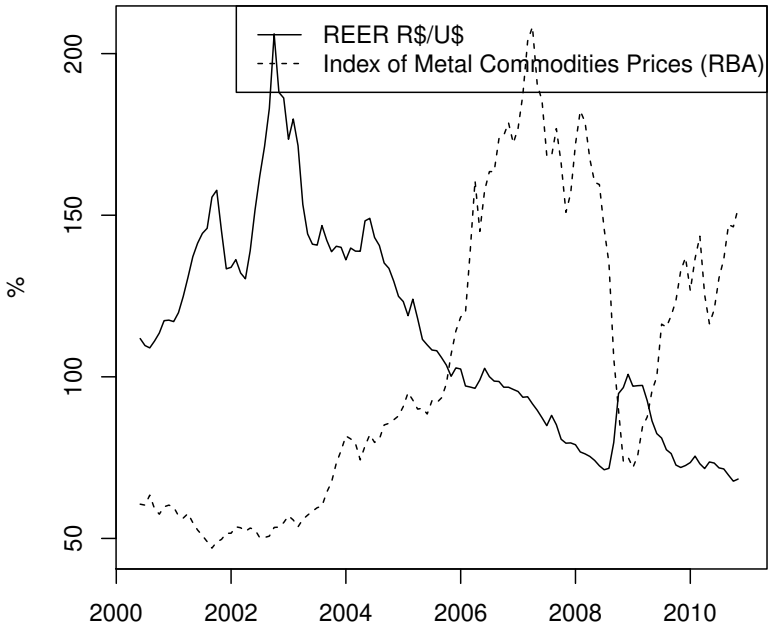


conferred it in 2009. This contributed to the inflow of funds supplementing the need for resources as domestic savings are beneath the necessary level to sustain investment. This inflow complements another one originated in a terms-of-trade shock in commodities prices since 2003 (Figure 6). As Brazil is a big exporter of metals and food commodities, a side effect to these inflows is the appreciation of the domestic currency.

All these micro and macroeconomic changes conflate to explain the expansion of the credit market that changed the face of consumption and investment even at the high levels of interest rates practiced by the BCB. This work is unique in the large sample of banks considered and the degree of details provided by data retrieved in the accounting records. It makes two contributions. The first is to perform intervention analysis to test a series of events that may explain temporary and permanent shocks to the domestic credit market. These events are credit ensured by payroll legislation, the achievement of investment grade, Lehman's demise, Lula's candidacy for Presidency and his first year in government.

The second contribution is to untangle the relation between funding channels for credit

Figure 6: REER and Metal Commodities Prices



expansion and macroeconomic variables such as GDP, industrial production, unemployment, inflation, exchange rate and minimum wage. Minimum wage is not generally used in the literature but in Brazil it has added relevance because it is not only an indicator of wage costs but also a key index for social security transfers to pension recipients. Hunter and Power (2007) further explain that "[M]ost Brazilian salaries are in some way linked to the minimum wage as a unit of reference, so increases in the minimum wage have a ripple effect in consumer spending and throughout the economy."

As the minimum salary is an index and a floor to salaries in the private sector it is also an income redistribution tool. According to Neri (2010) "between 2003 and 2009, Brazilians per capita average income raised by 4.72% in real terms going from R$ 478 to R$ 630 per month. The income source that increased most is social programs (12.9%) influenced by the expansion of Bolsa Família created in 2003. After that comes the income share from social security related to minimum wage. The effects of minimum wage hikes that raised more than 45% during this period, created pressure not only by the value of the base benefit but also by the increasing

participation of the elder in population income, given the aging of the population". Hunter and Power (2007) concur: "[T]he real increase in the purchasing power of the minimum wage was approximately 23 percent in Lulas first term. This, combined with cash injections from the poverty-reducing income transfer program, the Bolsa Família, has had a palpable effect on the local economies of smaller and less developed municipalities, which depend heavily on small-scale personal spending for their livelihood." Programa Bolsa Família (PBF) is the most visible social transfer program. In 2003 it transferred some R$ 570 million, in 2006 this grew up to R$ 7.5 billion. In 2010 the program received R$ 13.46 billion, some 0.4% of GDP, to support more than 13.5 million families.

This paper is organized in five sections besides this introduction. The second part presents the credit channel and offers a brief literature review to conclude with some pending questions that this work will investigate. The third part is a list of empirical models to be tested. The fourth part presents and discusses empirical results, while the last part concludes.

2 Literature review

The very existence of the banking system is based on the concept of liquidity provisioning. Banks recycle liquidity by taking deposits and turning them into loans. The principle of Delegated Monitoring (Diamond (1984)) states that monitoring of credit takers is made more efficiently by banks. According to Calomiris and Kahn (1991) depositors do not have to monitor banks as long as they may credibly threaten bankers with liquidation at any time. Bankers have incentives to act prudently to keep in business. They have to face maturity mismatch concerns as their assets (loans) usually have longer maturities then their liabilities (deposits) so whenever they anticipate delinquency upheavals they influence the supply of credit to ensure their good reputation. This is why the structure of the banking system is a concern for policymakers: the medium may distort the message[9].

There is an extensive literature on how interest rate shocks propagate to the real economy through the credit channel. Most of it shows how lenders influence the contraction process by

[9]We paraphrase Marshall McLuhan ("the medium is the message") as the message conveyed by movements in the monetary policy rate (selic) may be distorted by the banking system through the bank lending channel.

redirecting credit to more reliable firms ("flight to quality") or simply by reducing the supply of credit (credit rationing). We briefly review some of the more relevant results in credit literature to contextualize our research.

Stigliz and Weiss (1981) credit rationing model explains the adverse selection process in the credit market that happens when interest rates increase: as the more trustworthy customers leave for cheaper financing source only the credit takers less likely to repay remain. To avoid the deterioration of the borrower profile, banks ration credit to the most risky projects in order to preserve their profit margins.

The Kyiotaki and Moore (1997) credit model argues that as only part of production can be collateralized, the lending allocation is suboptimal: constraints imposed on creditors on their capacity to recuperate assets from borrowers make them lend less than socially desirable. The paper emphasizes the importance of institutions to protect lenders as a mean to increase economic surplus.

Bernanke, Gertler and Gilchrist (1996) propose the concept of Financial Accelerator that is at the heart of the broad credit channel by exposing the dynamics of a contractionary shock that spreads through corporate balance-sheets when collateral assets lose value. Credit constrained firms reduce investments and soon the product will be negatively affected in a process that will drag all the economy down. As lenders perceive big companies as more reliable to repay, more transparent and cheaper to monitor, with smaller information gathering/agency costs, they turn their resources to these borrowers and reduce credit to riskier, smaller firms, in a process the authors call 'flight to quality'.

Kashiap and Stein (2000) verify that the impact of monetary policy in terms of lending behavior is stronger in banks with less liquid balance sheets, the smaller banks that have less deposits to fund its loan operation. As noted by Cetorelli (2008) "the key Kashiap and Stein insight is that monetary policy influences lending activity by altering the sensitivity of lending to balance sheet health".

Alencar (2011) verify the existence of a complete pass-through from Monetary Policy Rate to the lending rates while observing some stickiness in time deposit rates (Certificate of Deposit) that could be explained by the lack of competition in the bank funding market. The pass-through effect is analyzed by customer category (corporate and retail) and time-lag. The

author reaches two major conclusions: while pass-through is faster to corporate loans, it is higher for retail (personal) loans in the long-run. The paper also observes higher loan rates and interest spreads in banks with large market shares, a phenomenon that could be explained by the market power hypothesis stated by Berger (1995). This is rather unexpected since bigger banks face lower funding costs and would imply important differences in the composition of bank spread according to bank size. Also relevant to our analysis is the fact that corporate loans are more sensitive to bank related variables (size and funding inefficiency being the most relevant factors) than retail rates that are more sensitive to the monetary policy rate (selic), its volatility and market structure (higher concentration leading to higher spreads). The author conjectures that this might be caused by higher competition in the corporate loan market. Finally the debt maturity of also affects the pass-through effect: the shorter the maturity the fastest is the transmission of movements in the MPR to loan rates. This is of special relevance since the majority of outstanding credit has short maturity. The author analyzed data from the Brazilian credit market and showed that the long run coefficients of bank loan interest rates are heavily linked to market structure (concentration), seconded by their own volatility, to default rate and finally to the MPR at a much lower degree. These results pave our choices for macroeconomic indicators as discussed in the next section.

The monetary policy rate is a key component of the cost of credit that it influences twice: directly as the opportunity cost of creditors and indirectly by affecting credit spread. Koyama et al. (2008) decompose the banking spread into six components: loan default costs, operational costs, reserve requirements, taxes, cross subsidies in credit lines and the cost of deposit insurance. This insight leads us to consider in our dataset the provision to bad debt as a proxy for precautionary behavior.

The first victim of the 2008 crisis may well have been the myth of the decoupling of business cycles between developed and emerging economies. According to Mori and Holland (2010), the transmission happened through three channels: reduction in commodities prices, decrease in exports of manufactured products and fall of the interest rates in the developed economies. Concerning the direct consequences to the Lehman Brothers demise in September 2008, Mesquita and Torós (2010) report that between August 2008 and January 2009 deposits in small banks flew to bigger institutions who experienced an increase in deposits by 20%

while small and medium sized banks lost deposits at rates of 11% and 23% respectively. The authors present the series of measures taken by the BCB to supply liquidity to the market in 2008/2009 with special attention to the smaller institutions. In this context, the reserve requirements were relaxed but bigger banks could only access these funds to purchase credit portfolios from the smaller banks. This measure was seen as an orderly way of supplying liquidity to smaller institutions as direct access to the BCB refinance lines is usually shrouded in stigma. The authors also observe that the situation was critical since the short maturity of funding could jeopardize banks already facing liquidity mismatchs. The solution was the creation of a new deposit securitization mechanism, DPGE[10] ,to allow smaller institutions access to funding through time deposits.

On the supply side of credit, Calani et al. (2010) document the importance of credit standards in the supply of credit. According to data obtained by surveying senior loan officers in Chile, the authors verify that the most relevant factors to explain commercial credit demand in Chile are: (1) the cost of credit, (2) the MPR (an important component of the cost of credit) and (3) the expansion of the economy. On the supply side, the authors show the overwhelming importance of nonperforming loans distantly followed by the cost of credit as the major determining factors.

Tabak et al. (2010) bring three relevant results as they empirically verified that "during periods of loosening/tightening monetary policy, banks increase/decrease their loans. Moreover, our results illustrate that large, well-capitalized and liquid banks absorb better the effects of monetary policy shocks. We also find that low interest rates lead to an increase in credit risk exposure, supporting the existence of a risk-taking channel". These results are important as they give some clues about the sources of vulnerability the Brazilian financial sector maybe exposed to. First, MPR is distorted and delayed by an important part of the banking system (small and medium banks) that usually represent the key funding source for small and medium companies. Besides, these results also suggest that some sort of financial vulnerability may be building up inside banks that are taking increasingly more risk.

Gambacorta and Marques-Ibanez (2011) verify that important changes happened to the

[10]DPGE (Depósito a Prazo com garantia Especial do FGC) committed depositors to at least 6 months with a R$ 20 million value cap.

monetary policy transmission mechanism after 2008. According to the authors, traditional bank-specific characteristics (size, liquidity and capitalization) have lost relevance to explain the bank lending channel while short-term funding and securitization became more important. They suggest these changes could be permanent and not a mere reflection of the thigh credit markets. The authors support the need for closer coordination between monetary policies and financial stability requirements.

Guo and Stepanyan (2011) study a panel dataset of emerging economies before and after the 2008 crisis and conclude that "foreign capital is a mixed blessing for credit growth in EMEs. Countries that relied more heavily on foreign borrowing to finance domestic credit, notably some European EMEs, in general experienced the largest swings of credit growth before and after the crisis, while countries that relied less on foreign borrowing, e.g. EMEs in Latin America and Asia, fared much better during the crisis. Given the volatility of capital flows to EMEs, a banking sector that is dependent on foreign capital for funding may prove vulnerable to external shocks and could also be prone to boom-bust cycles. Therefore, macro-prudential policies should be particularly vigilant to foreign-capital fueled credit booms, which could reverse course very quickly. (...) Building a robust domestic deposit base could be a key for sustained and stable credit growth. As is evident from our analysis, countries that experienced little or no deceleration of credit growth during the crisis were all supported by relatively robust/stable domestic deposit growth."

Jimenez et al. (2012a,b) observe that in times of crisis bank balance sheets affect the supply of credit while firms leverage determines its capacity to get new loans. The authors analyzed an extensive dataset of corporate loans to conclude that credit supply fluctuates more for less capitalized banks and for those with less assets. Curiously these factors are not significant in good times when the expanding GDP is the key driver for new loan grants. The precautionary measures to reinforce bank capital in good times seem to be best way to prevent an important retraction of loans in bad times.

3 The models

A number of studies of credit treat the identification of supply and demand determinants to explain the credit level. We take a different approach. From the banks perspective, we first explore the different bank funding channels that lead to the stock of liquid assets available for credit operations. We study the determinants of the four main channels of resources: cash deposits, time deposits, interbank and foreign lending. The second step is to relate these channels to the pool of liquid resources (netfunds) and a set of macroeconomic and control variables. In the last step we model the flow of loans from this pool of liquid resources in relation to key macroeconomic variables. By taking this approach we separate the two processes: fund gathering and credit concession.

We use a board definition of credit, encompassing both free and channeled (earmarked) credit. This is done to simplify the analysis as the scope of this paper is not concerned with the allocation of resources between the different credit channels. This methodological note is due here since in Brazil a significant share of credit is earmarked . The most relevant earmarked credit for our discussion probably is destined to the construction sector as it generates a significant demand for low-qualified workforce. Notably the popular housing program "Minha Casa Minha Vida" received the major part of resources available in the PAC stimulus package. Lundberg (2011) further elaborates on the different destinations of earmarked credit, that also contemplate resources to finance agricultural production and infra-structure long-term investments.

As the first contribution of this work is to unwind the funding channels for credit expansion, we propose a simple credit model, we then analyze each component to understand the basic relations between these components and macroeconomic variables. The basic model is derived from the accounting rule that equates assets (loans) to liabilities primarily in the form of debt:

$$Loans_{it} = Capital_{it} + Deposits_{it} + Interbank_{it} + Foreign_{it} + NPL_{it} + \epsilon_{it}$$

There are for sources of funding (fundsource): cash deposits, time deposits, interbank lending and foreign debt. A fifth source, savings deposit accounts ("cadernetas de poupança"),

was also studied but empirical tests did not result fruitful for our analysis and we will later suggest a possible explanation. We model each of these sources to test which factor(s) are determinant for the allocation of resources to be lent by the banks. All models control for bank characteristics (size, liquidity and capital) and the short-term interest rate (selic).

Model 1 relates minimum wage (minwage) and price stability (measured by the inflation index ipca) to cash - highly liquid - deposits. We expect that cash deposits maintain a positive relation with minimum wage and with price levels:

$$fundsource_{it} = SLC_{it} + selic_t + minwage_t + ipca_t + \epsilon_{it}$$

where SLC stands for size, liquidity and capital.

Model 2 relates economic activity indicators such as GDP, industrial production (indprod) and unemployment (unemp) to funding: we expect that a higher activity generates more funding, while a lower unemployment rate guarantees a higher volume of resources, salaries, deposited at the banks:

$$fundsource_{it} = SLC_{it} + selic_t + gdp_t + indprod_t + unemp_t + \epsilon_{it}$$

Model 3 takes the foreign funding perspective and relates rear exchange rate (rer), libor and fed funds rates. We expect to see a positive relation between the internalization of foreign funds and the domestic currency appreciation. We expect that this flow increases as risk-free rates abroad plunge: libor is tied to funds coming from Europe while Fed Funds rate relates to US originated funds:

$$fundsource_{it} = SLC_{it} + selic_t + rer_t + libor_t + fedfunds_t + \epsilon_{it}$$

Finally, model 4 puts into perspective the perception of risk presented by the financial institution measured by three different indicators. We expect a negative relation with the Non Performing Loans (NPL) indicator, a positive relation with the precautionary indicator for provisions to bad debt and a negative relation to leverage as measured by the outstanding loan stock in relation to assets. The level of capital-to-loans is also a key indicator of risk but

as capital is already controlled for there is no need to include another regressor that would present a strong collinearity with an already existing regressor:

$$fundsource_{it} = SLC_{it} + npl_{it} + provisions_{it} + leverage_{it} + selic_t + \epsilon_{it}$$

In this context leverage is the loanstock/assets ratio that indicates a propensity to lend (and take risks) of the financial institution.

A last remark is that funding is not perfectly related to the amount available since there are some monetary policy tools, such as reserve requirements and capital requirements, that affect each funding category differently according to central bank policies. To isolate the effect of these different rates, we also observe an aggregate measure of liquid assets that will be directly available to be lent. This indicator (netfunds) is modeled with the different sources of funding so we may have an idea of how relevant each funding source actually. The results are presented in table 7 and will be analyzed in the next section.

Model estimation is done using as much as possible bank level data to build a panel dataset. Models are estimated with a fixed effects framework with robust estimators. As an instrument for credit demand we consider industrial production, as did Tabak et al. (2010), and the external funding channel. We assume that the supply of credit was severely impacted by the liquidity restrictions imposed on foreign lenders.

Another contribution of this work is to perform intervention analysis with a set of events that are relevant to explain temporary and permanent shocks to the domestic credit market. The events we studied (table 4) are briefly explained here. Candidate Lula's campaign to Presidency in 2002 generated concerns about the future of economic policy. In the past, as a union leader, Lula argued in favor of Brazilian defaulting on its debts with IMF and an image of Lula being a rogue leader was formed in the financial market. The BCB had to raise interest rates on the third quarter of 2002 to reduce capital evasion from the country as the October election approached. The second event controlled in our data is President Lula first year in power. As President Lula chose a former private bank officer to head BCB and honored contracts from his predecessor, the market grew confident in him and the country lived some five years of permanent growth. FIDC was created as a source of new funding for

smaller banks in July 2003 and the new payroll backed credit legislation was passed by the end of Lulas first year in power. In the beginning of 2005, a new bankruptcy legislation was passed in Congress that would speed up of creditors assets. It is still unclear whether the piece of legislation reached its full potential as the Justice system is still plagued with the same old issues. In 2007, the Bear Stearns filing for bankruptcy is another relevant event that is controlled for. The investment grade status granted by three credit agencies (S&P, Fitch and Moodys) in 2008/2009 are treated as three different events. The final event is Lehman Brothers demise in September 2008.

Traditionally the banking sector is studied under three perspectives: by institution size, nationality and ownership. The size cleavage is justified by difference in access to funds. The big banks have an extensive number of branches where they can collect funds, either free (cash deposits) or remunerated (time deposits). They also have international outreach for funding either by debt or by equity (bank notes). The small and medium-sized banks either recur to borrowing from the bigger institutions or to sale of their credit portfolios to the big banks. We do not enforce this cleavage in our analysis since our focus is in the relation of the financial system as a whole with and macroeconomic variables.

In Brazil banks are not allowed to issue commercial papers (with the notable exception of their leasing affiliates). Their key funding sources are deposits: cash, time and savings. Debt is the second best source of funds and it exists in three forms: (a) big banks contract credit abroad, (b) big banks lend to smaller ones and (c) all banks negotiate in the interbank market. The interbank market is mainly used for short-period financing as the interest rate is high and closely follows the short-term interest rate defined by the Central Bank. One key measure is the reduction of this basic interest rate as, we will see, it affects cash deposits, the main source of funds for banks.

4 Data and Results

We use panel data on bank balance sheets publically available on the BCB website and classified under the COSIF accounting plan, the standard classification for Brazilian financial institutions. In the Appendix we present the data sources and COSIF accounts used to calculate the

regressors. We also detail the four dummies related to institutional breaks (investgrade, payroll) and time events (lehman, lula) that might affect credit supply and/or demand. Models are estimated with a fixed effects framework with robust estimators. All models were estimated with year dummies and constants (results omitted).

Table 1 and 2 presents the sources of data and the descriptive statistics of the regressors and is divided in two parts: the top part presents panel data available for each bank, while the lower part brings the time series data that was incorporated in the panel. For the 11 years in the sample, from 2000 to 2010, we observe data twice a year, in June and December, when banks consolidate balance sheets. The choice is conditioned by the availability of loan information that started in 2000. The end of the sample coincides with the end of Lula's presidency as we focus on getting a clear picture of the Lula Administration (2003-2010). President Dilma (2011-2014) later continued the economic policies started by President Lula (notably the steady reduction of short-term interest rates) and deepened credit policy by increasing positively the supply of credit by public banks[11].

To understand the equilibrium between supply and demand it would be good to have data on the quantity as well as about the price of credit. Quantity data is at hand in great detail (by financial institution) but unfortunately there is no available data on the particular interest rate each institution offered. The existing data is in aggregated format and we decided not to use it since the relation to the specific bank characteristics is lost.

We do not study the determinants of domestic raised equity but as this funding source composes the liquid funds in the banks, we take them into account as an aggregate when we analyze liquid assets (table 8). The accounting data on foreign funding encompasses all funds obtained in foreign currencies such as equities and bonds sold abroad. Table 6 shows that these funding sources can not be overlooked.

From table 2 we can rank the sources of funding by their size: foreign resources, time deposits, cash deposits and finally interbank funds. This ranking will be latter confirmed in table 8 when we analyze the determinants of liquid assets (netfunds) suggesting that foreign funding is indeed an important source of resources for the Brazilian financial system. This may vary from bank to bank (particularly when distinguishing between small and big banks)

[11]Barbi (2013) analyzes potential financial stability concerns related to this expansion.

but the key concept is that the system as a whole relies on external funding to supply credit domestically. The risk of foreign borrowing raised by Guo and Stepanyan (2011) was such a concern that the whole apparatus of Brazilian public banks was mobilized to smooth the impact of the 2008 Lehman financial shockwave (Barbi (2013). Needless to remember that all the exchange rate depreciation risk is bore by the banks, leaving them vulnerable to exchange rate volatility. We may suppose that one reason for the Brazilian central bank to manage a dirty float exchange rate regime is to prevent shocks to the financial system.

A final word about two financial inclusion indicators: the number of bank accounts opened per year (depbank) and the number of credit cards (ccard) activated per year. These data are available in yearly basis so we replicate the observation for the June and December records of each year.

Table 3 presents the determinants of cash deposits. Models 1 to 5 all have in common controls for the size, liquidity and capital of each bank, and the basic cost of opportunity for cash resources (selic). The higher the short-term interest rate (selic), the more expensive is maintaining extremely liquid assets, so a negative correlation is expected as in models 1 to 4. Another robust result is the relevance of bank total assets (size) and liquidity to explain cash positions: a positive relation suggests that bigger institutions receive proportionally more cash deposits than the others. This may be due to the intrinsic guarantee a valuable banking brand offers to depositors as suggested by Diamond and Rajan (2012), but also because bigger banks have a wider network of agencies were the deposits are made. The cost of maintaining a network of agencies is repaid by the collection of remunerated and non-remunerated deposits. The perceived bank risk does not seem relevant to depositors as the coefficient for NPL is not significant. In accordance with Calomiris and Kahn (1991), provision for bad dept are positively related to cash deposits suggesting the preference of depositors for prudent banks. A bank with more cash deposits is more liquid and may lend more, although this result is only marginally significant. A final result that may not be robust is the positive relation between cash deposits and the real exchange rate (rer) in model 3. The coefficient is rather large (0.7) when compared to the others so we tentatively infer that an inflow of resources that causes a real appreciation of the domestic currency reflects in the level of cash deposits. We also tested model 5 including a regressor that indicates the number of bank accounts opened that year

(depbank) as well as the number of credit cards (ccard) activated per year. Results were not significant and were omitted.

Table 4 presents the conditioning of time (remunerated) deposits. Banks with more assets and more liquid positions perform better in capturing these deposits. It must be noted that these deposits are not generally ensured by government or the FGC ("Fundo Garantidor de Crédito"). The interesting result is a robust negative relation with capital that can be explained by considering that smaller banks, with lower capital, pay a premium to sell their certificates of deposit in the market. As these small and medium sized banks do not have an extensive network of agencies and have little or no access to international financial markets, they are likely to have recourse to this source of funding. Also noteworthy is the lack of statistical relevance of the level of short-term interest rate (selic). Although all coefficients are negative, they are not statistically significant. If they were significant, we might explain that as investors are risk averse, when government bonds yield more (selic rises), time deposits fall. Another surprising results is that average investor in bank certificates may not be concerned with bank risks, as long as the institution has a solid asset position, this is why NPL and provisions are not relevant but size and liquidity are. As a bank lends more it needs more funds so the leverage coefficient is positive and significant. A final note is the positive relation of GDP in model 5: although expected it is not robust.

A conspicuously absent analysis is about the determinants of savings deposits ("cadernetas de poupança"). We tested different models including whether minimum wage could somehow explain these deposits. It so happens that it does not explain savings, suggesting that the average saver is not remunerated in terms of this wage indicator. We may expect that recipients of low wages do consume all of their income and the savings mechanism is used by higher income depositors.

Table 5 presents the conditioning of interbank lending. The first notable result is the positive relation between short-term interest rates and the dependent variable. The pecking order determines that funding in the interbank market is the least desirable as the rates in this market are usually above the others. It is an alternative for banks to finance their short-term illiquid positions before resorting to the central bank liquidity assistance channel that bears a high reputational cost and is shrouded in stigma , as noted by Mesquita and Torós (2010). The

higher the short-term rate, the less able are the banks to finance themselves with time deposits as discussed above, so banks are more likely to access the interbank market in scenarios of high short-term interest rates. Some authors also suggest that the credit takers in this market are generally middle or small-size banks, while the lenders are the big national institutions. The positive leverage coefficient in models 4 and 5 suggest that banks with higher leverage (here defined as the ratio of loans to assets) tend to access this source of funds. Who might be the credit takers? As the industrial production coefficient is significant and positively related to interbank credit, as indicated in models 2 and 5, we may infer that banks participate in this market to get resources to lend to corporations . The industrial production index indicates the level of activity in the industrial sector, proxying corporate credit needs. As the financing horizon is basically on the short term (after all there are other much cheaper sources of funds of one can spare some time to get them) the resources obtained on this market will probably feed some short-term corporate credit lines (such as hot money) to avoid maturity mismatches. The fact that the coefficient for the real exchange rate is positive in models 3 and 5 suggest some relation with international trade activities. As the coefficient for GDP in model 2 is significant but not robust as occurs with the coefficients of libor m model 3 and ipca in model 1, we will not interpret these results further.

Table 6 presents some statistics of the composition of external funding considering all forms of funding: bond, equity and loan syndication. The overall amounts went from US$ 16.7 billion in 2004 up to U$ 73.7 billion in 2007. Bonds are the preferred instruments, representing from 13% in 2007 up to 58% in 2011 of the total inflow of resources. This distribution elicits the investors preference for security.

Table 7 reports the determinants of foreign funding. We might expect that either the real exchange rate or some international interest rate, either libor or fed funds, would be statistically significant. The real exchange rate is marginally significant in model 3 with a negative coefficient indicating that an appreciation of the real reduces foreign financing but this result is not confirmed in model 5. We are unable to conclude that banks go abroad to take advantage of the carry trade opportunities created by the interest rate hiatus (selic is historically maintained well above fed funds or libor rate). The coefficient for industrial production is negative in models 2 and 5 suggesting some form of counter-cyclicality of the

credit supply but these results are only marginally significant. Some might argue that we should control for some form of bank credit rating. We believe that the risk-related regressors included in the models (NPL, provisions and leverage) convey the necessary information to foreign lenders besides the banks balance-sheets as indicated by the positive coefficients for size, liquidity and capital in all five models. The interesting fact to note is the signs for NPL and provisions: a negative coefficient for provisions and positive coefficient for NPL suggesting that banks increase risky-taking the more they rely on foreign funds. The sign for leverage is positive as expected (more leverage requires more funds). When we estimate a first difference version of this model (omitted results) the only significant coefficients are related to size and leverage, both with the same signs of the presented models.

Banks have basically two constraints to operate in the credit market: the availability of liquid assets ("netfunds") and the obligation to comply with capital requirements, therefore the only real endogenous limitation to credit operation is the existence of funds. In table 8 all models suggest the relevance of the three dimensions of bank characteristics: size, liquidity and capital. Capital coefficients are always bigger suggesting a prevalence of this dimension. This is somewhat surprising since liquidity was expected to be more relevant for credit decisions, this may be because banks are not liquidity but capital constrained. A second set of results gives the relative weights of each source of funds. In all models all the sources are statistically relevant, the coefficients rank is: foreign funding, time deposits, cash deposits and interbank loans. Recalling results from table 2, the mean value for these four regressors follow the same order. There are two subtle differences between the coefficients in these models and the averages presented in table 2. In this table the averages are less significant in the presence of strong heterogeneity among individual banks (what is clear if one considers the dispersion of size and capital within the sample). Another factor is the different reserve requirement rates imposed by the monetary authority that might distort the composition of the pool of funds (but do not). Finally the payroll intervention variable is significant in most models (1, 2 and 3), while the investment grade dummy is significant for all models. Both have positive signs as expected. Interestingly neither lula or lehman dummies were significant suggesting that banks target a level of liquid funds and will adjust their composition according to the context. As we did for cash deposits, we also tested the inclusion of the financial inclusion regressors,

depbank and ccard. Results were again not significant and were omitted to save space.

Finally tables 9 and 10 present the determinants of loans, in levels and first differences. The results are basically the same. The amount of assets is positively related to the capacity to supply credit. Liquidity is reduced by the concession of loans in models 1 and 4. Capital is positively related to loans in models 2 and 3, as expected: the level of capital is a binding constraint to lending. Surprisingly the interest rate is not significant in any model. This has a sad interpretation as suggested by Figure 4: the average spread rate for non-earmarked funds is so much higher than the short-term rate (MPR) that the final price of credit actually is more dependent on the level of default (NPL) faced by financial institutions. An increase in the MPR should be very large to generate the desired effects in reducing the level of economic activity. The two hikes in the MPR in 2005 and 2008 were sizeable, 5% and 3% respectively, and effective in reducing actual inflation (ipca) as can be seen in figure 1.

The negative relation between credit supply and NPL is well documented in the literature, see Alencar (2011) and Alfaro et al. (2004). This results concurs with Calomiris and Powell (2000) that studied the banking system in Argentina, they explain that "market discipline encourages banks to respond to increases in default risk by limiting asset risk or lowering leverage". The positive coefficient for provisions only suggests a precautionary attitude as the volume of NPL is expected to increase in absolute terms. If screening is well conducted, and standards for credit concession are not softened as reported by Calani et al. (2010), the proportion of NPL to loans should keep stable as indicates table 11. The positive relation with netfunds is expected, since these constitute the resource pool to originate the loans. The coefficient of industrial production is positive, as more production begets demand for corporate credit, while the negative coefficient of unemployment suggests that employment level affects the demand for loans by individuals for the reasons already discussed.

The separation in netfunds (table 8) and loanstock (tables 9 and 10) is not only didactic but also performs the important task of separating the process of fund acquisition to the decision of credit concession. The intervention variables were not significant in the loanstock regressions but were relevant to explain the origin of funds.

It might be argued that there may be simultaneity between loanstock and netfunds: liquid funds come from deposits because once a loan is received it is deposited in the bank that

issued the credit. In this case the coefficient for netfunds would be biased and not consistent. To test this hypothesis, we propose to instrument netfunds in the regression using as the variables liquid, capital and unemployment. In table 12 model 1 indicates that these variables are not significant to explain loanstock but are significant to explain netfunds (model 2). We instrument (Schaffer (2005)) netfunds in the loanstock regression in model 3. With this setup, it is difficult to understand how netfunds is not related to loanstock as indicated in model 3. We suspect of sample heterogeneity so we split the sample among public and private institutions. Model 4 indicates that loanstock is correlated to size, netfunds, npl and provisions for private banks, while model 5 shows that loanstock is correlated to netfunds, gdp, npl e provisions in public banks. The fact that coefficients for netfunds have different signs in models 4 and 5 suggests that the effects were compensating each other and rendering the coefficient too small to be significant in model 3. All the other results from model 3 are confirmed in models 4 and 5 so they are considered robust.

Model 5 also suggests that public bank credit is positively related to gdp. Some might expect a negative coefficient to indicate that public credit is counter-cyclical but this would be a wrong interpretation, the correct test would require a crisis dummy to test whether public credit is pro or counter-cyclical in bad times. The counter-cyclical result is confirmed in Barbi (2013).

An interesting result is the negative relation of netfunds to loanstock in the public sector, while being positive in the private sector as expected. As the source of financing is not a constraint for public banks, they are not limited by their liquid funds and the more aggressively they participate in the market, the more depleted are their stock of liquid funds. The coefficient for the private banks (0.168) is well below the one suggested in models 5 of table 9 (0.639) and table 10 (0.413) suggesting that the previous estimations were indeed biased but consistent.

The key result is that irrespective of the ownership of the bank, NPL and provisions are always significant to explain the concession of loans. Public banks look more cautious than private banks (higher provisions coefficients: 0.750 against 0.466 for private banks). As such, probably the best any government can do to ensure the long-term supply of credit is to guarantee that financial risks are under control and the credit system is sane.

5 Conclusions

As the first important conclusion to our investigation we verify the importance in the reduction of the monetary policy rate (selic) to assure the supply of credit. Figure 1 shows that this processes started in 2000 and continued through the years only to be temporarily interrupted to deter inflation spikes. The overall picture is that there exists a firm long-term commitment to both inflation control and economic growth.

We also verified the statistical relevance of both the payroll guaranteed legislation and investment-grade status were relevant microeconomic shocks to explain the credit expansion. Payroll guaranteed legislation is a good example of the microeconomic reform agenda that should be carried away further to improve public governance.

Finally the importance of sanity indicators of credit conditions (NPL, provisions and leverage) cannot be overstated. The IMF 2012 Financial System Stability Assessment for Brazil states that "Despite considerable progress in recent years, capital market development remains constrained by the low duration and high interest rate environment. Further progress will take time and be contingent upon maintaining a stable macro-financial environment, but could be spurred by financial sector reforms, including providing incentives for longer duration and infrastructure investments, as well as refocusing BNDES to support private long-term finance." The case for the reduction of the public banking sector is further made in Barbi (2013) where the author also discusses the possible nefarious implications for financial stability of the expanding public credit.

In his letter of intentions in 2002, candidate Lula proposed other legislation reforms (notably in labor regulations, social security rules and tax legislation) there were not implemented in his 8 years in power. Some believe that he is saving them for the a future campaign, in which poverty reduction might loose first priority status towards the construction of a more efficient State, a State that gives back more from the huge chunk of taxes it takes away.

Appendix.COSIF accounts

Loans stock is the sum of accounts 14300002, 16100004, 16200007, 16300000, 16400003, 16500006, 16600009, 16700002, 16800005, 16910005, 16995006, 17100003, 17300009, 17500005, 17700001, 17800004, 17910004, 17920001, 17995005, 18100002, 18275009, 18278006, 18820007, 18600007, 18835009, 18875007, 18878004, 18880009, 18910003, 18995004, 23200007, 24180009, 24199801, minus the accounts 14399006, 18880205, 49206009, 49207008, 49214008, 49217005, 49236000, 49248005, 49285006, 49908008, 49909007.

Non Performing Loans (NPL) is the sum of accounts 31600008, 31700001, 31800004, 31900007. These are the credit operations more than 90 days due and classified under levels E, F, G and H.

Loan Loss Provisions (provisions) is the sum of accounts 16900008, 17900007 e 18900006.

Bank Size is Total Assets as reported in account 39999993.

Bank Capital is the account 61100004.

Liquid Assets is the sum of accounts 11000006, 12100008 minus the accounts (12130009 and 42340003), and minus the smallest value of accounts (12120002 and 42220006), 12200001, 12300004, 12500000, 12600003, 12900002, 13100007, 13200000, 13400006, 13500009, 13600002, 13700005, 13800008, 18570003, 18575008, 18580000, 18590007.

References

Alfaro,R., Franken, H., Garcia, C., Jara, A. 2004. "The Bank Lending Channel in Chile". Banco Central de Chile.

Alencar, L.S. 2011. "Revisiting Bank Pricing Policies in Brazil: evidence from loan and deposit markets". BCB Working Paper 235. March 2011.

Barbi, F.C. 2013. "Public Credit, Monetary Policy and Financial Stability". EESP FGV. PhD Thesis.

Berger, A. 1995. "The profit structure relationship in banking: Tests of market-power and efficient-structure hypotheses." Journal of Money, Credit and Banking, 27, 404-431.

Bernanke, B., Gertler, M., Gilchrist, S. 1996. "The Financial Accelerator and the Flight to Quality," The Review of Economics and Statistics, Vol. 78, No. 1. (Feb., 1996), pp. 1-15.

Blanchard, O., DellAriccia, G., Mauro, P. 2010. "Rethinking Macroeconomic Policy". IMF Staff Position Note. SPN/10/03. February 2010.

Calani, M., Garcia, P. Oda, D. 2010. "Supply and Demand Identification in the Credit Market". Central Bank of Chile Working Papers No.571. April 2010.

Calomiris, C.W., Kahn, C.M. 1991. "The Role of Demandable Debt in Structuring Optimal Banking Arrangements," American Economic Review, American Economic Ass., vol. 81(3), pages 497-513, June.

Calomiris, C.W., Powell, A. 2000. "Can Emerging Market Bank Regulators Establish Credible Discipline? The Case of Argentina, 1992-1999," NBER Working Paper No. 7715. May 2000

Cetorelli, N, Goldberg, L.S. 2008. "Banking Globalization, Monetary Transmission, and the Lending Channel". NBER Working Paper No. 14101. June 2008.

Diamond, D.W. and Rajan, R. 2012. "Illiquid Banks, Financial Stability, and Interest Rate Policy," Journal of Political Economy, University of Chicago Press, vol. 120(3), pages 552 - 591.

Diamond, D.W. 1984. "Financial Intermediation and Delegated Monitoring," Review of Economic Studies, Wiley Blackwell, vol. 51(3), pages 393-414, July.

Eyzaguirre, N., Kaufman, M.,Phillips,S., Valdés, R. 2011. "Managing Abundance to Avoid a Bust in Latin America." IMF Staff Discussion Note SDN/11/07

Gambacorta, L., Marques-Ibanez, D. 2011. "The new bank lending channel: lessons from the crisis". BIS Working Papers 345. May 2011.

Guo,K, Stepanyan,V. 2011. "Determinants of Bank Credit in Emerging Market Economies," IMF Working Papers 11/51, International Monetary Fund.

Hunter, W. and Power, T. J. (2007), "Rewarding Lula: Executive Power, Social Policy, and the Brazilian Elections of 2006". Latin American Politics and Society, 49: 1-30.

Jiménez,G., Ongena,S., Peydró,J.L. and Saurina, J. 2012a "Credit Supply Versus Demand: Bank and Firm Balance-Sheet Channels in Good and Crisis Times". EBC Discussion Paper No. 2012-003.

Jiménez,G., Ongena,S., Peydró,J.L. and Saurina,J. 2012b. "Credit Supply and Monetary Policy: Identifying the Bank Balance-Sheet Channel with Loan Applications". AER 102(5) (p.2301-26)

Kashiap,A., Stein, J. 2000. "What Do a Million Observations on Banks Say About the Transmission of Monetary Policy?," American Economic Review, 90(3), pp. 407/28. 2000

Kyiotaki,N., Moore,R. 1997. "Credit Cycles" Journal of Political Economy, 1997, vol.105, no.2

Koyama,S. Annibal,C., Lunberg,E., Bader,F., Takeda, T. 2008. "Decomposição do Spread Bancrio e Apresentação da Nova Metodologia". Banco Central do Brasil. Relatório de Economia Bancria 2008.

Lima, I.S., Ferreira, D.Q.G. 2012. "A Participação Estatal no Sistema Bancário Brasileiro: Uma Análise Do Período 1996-2006" in IPEA Planejamento e Políticas Públicas. número 39 jul./dez. 2012

Lundberg, E.L. 2011. “Bancos Oficiais e Crédito Direcionado o que diferencia o mercado de crédito brasileiro ?”. Banco Central do Brasil Working paper 258.

Mesquita, M., Torós, M. 2010. “Considerações sobre a Atuação do Banco Central do Brasil na Crise de 2008. BCB Working Papers

Mori, R., Holland, M., 2010. “Respostas à crise financeira de 2008 de uma perspectiva brasileira,” Textos para discussão 249, Escola de Economia de São Paulo, Getúlio Vargas Foundation (Brazil).

Neri, M.C. (Org.) 2010. “A Nova Classe Média: O Lado Brilhante dos Pobres”. Rio de Janeiro: FGV/CPS, 2010.

Ricci, R. 2006. “Lulismo: três discursos e um estilo”, In revista Lutas Sociais 15/16, São Paulo: NEILS/PUC.

Schaffer, M.E. 2005. “XTIVREG2: Stata module to perform extended IV/2SLS, GMM and AC/HAC, LIML and k-class regression for panel data models,” Stat Soft Comp. Boston College Dept of Economics.

Singer, A. 2012. “Os Sentidos do Lulismo: Reforma Gradual e Pacto Conservador”. Companhia das Letras, São Paulo.

Souza, A., Lamounier, N. 2010. “A Classe Média Brasileira: ambições, valores e projetos de sociedade”. Rio de Janeiro. Elsevier Editora Ltda.

Stiglitz,J.E., Weiss,A. 1981. “Credit Rationing in Markets with Imperfect Information”. The American Economic Review, Volume 71, Issue 3 (Jun., 1981)

Tabak,B., Laiz,M., Cajueiro,D. 2010. “Financial Stability and Monetary Policy - The case of Brazil.” Banco Central do Brasil Working Papers 217.

Table 1: Data Sources

Regressor	Description	Source
capital	bank capital	COSIF
cash	cash holdings	COSIF
depositcash	cash deposits	COSIF
deposittime	time deposits	COSIF
extfund	external (foreign) funds	COSIF
interbank	funds exhanged in the Interbank market	COSIF
liquid	liquid assets	COSIF
loanstock	loan protfolio	COSIF
netfunds	net funding	COSIF
npl	non performant loans (loans due past 90 days)	COSIF
provisions	provisions for bad credit	COSIF
size	total assets	COSIF
fedfunds	Official interest rate United States	BCB 18152
gdp	GDP monthly - current prices (R$ mil.)	BCB 4380
ccard	Number of new credit cards activated	DSPV
deflator	Implicit deflator	BCB 1211
depbank	Bank deposit accounts (in thousands)	DSPV
ipca	Broad National CPI (IPCA) Monthly % var.	BCB 433
libor	Interest on deposits in LIBOR US$ (3 months)	BCB 3840
indprod	Industrial Production Index (2002=100)	BCB 13609
minwage	Minimum wage (annual)	BCB 1619
reer	Real eff.exch.rate index (IPCA) Jun/94=101	BCB 11752
rer	Real exch.rate index (IPCA) Jun/94=100	BCB 11753
selic	Interest rate (annual) - % p.y.	BCB 4189
unemp	Open unemployment rate (metropolitan region)	BCB10777

DSPV is Diagnóstico do Sistema de Pagamentos de Varejo do Brasil. Adendo estatístico 2010. BCB

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std.Dev	Min	Max
Bank level data					
capital	4693	18.4377	1.7082	14.5075	24.8637
cash	3174	11.4543	4.0534	1.0280	22.8866
depositcash	3099	15.5580	3.4155	0.0262	24.7266
deposittime	3404	18.5297	2.5784	4.0985	26.2636
foreign	2255	18.5659	2.5178	1.9676	24.5004
interbank	3086	14.9389	3.8726	1.2907	26.1188
leverage*	4024	86.5301	7.4169	22.7285	96.6262
liquid	4692	19.0602	2.4669	8.1497	26.7195
loanstock	4024	19.1499	2.5527	3.9722	26.6950
netfunds	4680	19.9056	2.1038	10.9475	27.0999
npl	4024	9.1211	16.5084	0.0000	100.0000
provisions	3995	15.9433	2.7971	3.5056	23.6515
size	4693	21.8553	2.4946	14.9501	29.5379
Time series (common to all banks)					
ccard	11	11.1428	0.6074	10.2888	12.0750
depbank	11	11.4680	0.2507	11.0612	11.8584
fedfunds	22	2.3739	2.1705	0.0000	6.5000
gdp	22	11.6239	0.1252	11.4246	11.8764
indprod	22	4.6808	0.1191	4.4554	4.9049
ipca	22	0.4791	0.4579	-0.2100	2.1000
libor	22	2.6187	2.1689	0.0000	6.7900
minwage	22	5.7342	0.4275	5.0173	6.4329
rer	22	1.0457	0.2385	0.6529	1.5045
selic	22	15.0984	4.4268	8.3900	26.0900
unemp	22	4.6952	0.0180	4.6568	4.7274

*The leverage regressor is calculated as loanstock/size and represents the degree of exposure of the institution.

Table 3: Sources of Funding: Cash Deposits

depositcash	M1	M2	M3	M4	M5
size	0.452***	0.449***	0.453***	0.429***	0.423***
	(0.128)	(0.128)	(0.128)	(0.143)	(0.143)
liquid	0.174*	0.174*	0.173*	0.203**	0.203**
	(0.101)	(0.102)	(0.101)	(0.0932)	(0.0940)
capital	-0.115	-0.121	-0.114	-0.187	-0.196
	(0.126)	(0.127)	(0.126)	(0.118)	(0.119)
selic	-0.0289***	-0.0200*	-0.0271***	-0.0246***	-0.0136
	(0.00930)	(0.0119)	(0.0101)	(0.00936)	(0.0144)
gdp		0.728			0.336
		(0.664)			(1.179)
indprod		-0.0140			0.221
		(0.508)			(0.794)
unemp		-3.170			-5.405
		(3.649)			(5.198)
minwage	0.0681				-0.602
	(0.212)				(0.476)
ipca	0.0633				0.00493
	(0.0522)				(0.0937)
rer			0.613*		0.247
			(0.330)		(0.582)
libor			0.0582		-0.0224
			(0.123)		(0.135)
fedfunds			-0.108		-0.0216
			(0.116)		(0.121)
npl				-0.00299	-0.00298
				(0.00618)	(0.00614)
provisions				0.126**	0.128**
				(0.0498)	(0.0496)
leverage				0.0473*	0.0469*
				(0.0248)	(0.0248)
Observations	2,608	2,608	2,608	2,608	2,608
R-squared	0.134	0.135	0.135	0.182	0.184
Number of banks	180	180	180	180	180

Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4: Sources of Funding: Time Deposits

deposittime	M1	M2	M3	M4	M5
size	0.507***	0.506***	0.505***	0.544***	0.542***
	(0.103)	(0.104)	(0.103)	(0.107)	(0.108)
liquid	0.302***	0.302***	0.303***	0.317***	0.318***
	(0.0795)	(0.0794)	(0.0792)	(0.0780)	(0.0781)
capital	-0.236**	-0.232**	-0.233**	-0.318***	-0.315***
	(0.105)	(0.106)	(0.106)	(0.116)	(0.117)
selic	-0.00912	-0.00370	-0.00310	-0.00887	0.00327
	(0.00588)	(0.00645)	(0.00606)	(0.00623)	(0.00889)
gdp		0.731			1.857*
		(0.534)			(0.963)
indprod		0.487*			0.485
		(0.250)			(0.534)
unemp		1.853			1.860
		(2.343)			(3.241)
minwage	0.390**				0.315
	(0.151)				(0.329)
ipca	-0.0296				-0.106
	(0.0287)				(0.0824)
rer			0.337*		-0.400
			(0.201)		(0.432)
libor			-0.0110		0.0596
			(0.0733)		(0.0859)
fedfunds			0.0543		0.00535
			(0.0633)		(0.0702)
npl				-0.00198	-0.00202
				(0.00513)	(0.00516)
provisions				0.0506	0.0526
				(0.0347)	(0.0349)
leverage				0.0577**	0.0571**
				(0.0228)	(0.0229)
Observations	2,876	2,876	2,876	2,876	2,876
R-squared	0.273	0.274	0.274	0.313	0.315
Number of bank	204	204	204	204	204

Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 5: Sources of Funding: Interbank Funding

interbank	M1	M2	M3	M4	M5
size	0.574***	0.578***	0.571***	0.543***	0.550***
	(0.143)	(0.144)	(0.143)	(0.149)	(0.150)
liquid	0.0984	0.0951	0.0966	0.130	0.128
	(0.0943)	(0.0950)	(0.0944)	(0.0934)	(0.0946)
capital	0.0137	0.0367	0.0183	-0.0835	-0.0589
	(0.145)	(0.145)	(0.145)	(0.151)	(0.150)
selic	0.0304**	0.0376**	0.0496***	0.0343***	0.0421**
	(0.0133)	(0.0157)	(0.0143)	(0.0132)	(0.0175)
gdp		-3.246***			-2.981*
		(1.006)			(1.724)
indprod		2.938***			2.817***
		(0.715)			(1.036)
unemp		-5.725			-3.072
		(5.961)			(8.495)
ipca	-0.199**				0.0282
	(0.0896)				(0.132)
rer			0.636		0.750
			(0.477)		(0.772)
libor			0.374**		0.309
			(0.173)		(0.246)
fedfunds			-0.121		-0.295
			(0.156)		(0.207)
npl				-0.00388	-0.00394
				(0.00500)	(0.00506)
provisions				0.0795	0.0801
				(0.0662)	(0.0669)
leverage				0.0652***	0.0643***
				(0.0217)	(0.0217)
Observations	2,469	2,469	2,469	2,469	2,469
R-squared	0.101	0.111	0.104	0.130	0.143
Number of bank	196	196	196	196	196

Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6: Brazilian Banks External Financing

	2004	2005	2006	2007	2008	2009	2010	2011
Bond Issuance	9,716	17,769	12,304	9,917	6,485	9,797	31,605	21,996
	58.29%	64.65%	39.41%	13.45%	23.11%	24.73%	47.48%	58.16%
Equity Issuance	1,831	3,783	11,177	39,243	10,435	12,963	24,633	8,834
	10.98%	13.76%	35.80%	53.22%	37.19%	32.72%	37.01%	23.36%
Loan Syndication	5,123	5,934	7,738	24,578	11,140	16,857	10,327	6,991
	30.73%	21.59%	24.79%	33.33%	39.70%	42.55%	15.51%	18.48%
Total	16,670	27,486	31,219	73,737	28,060	39,617	66,565	37,820
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

IMF Global Financial Stability Report 2009, 2012
(In millions of U.S. dollars)

Table 7: Sources of Funding: Foreign Funding

foreign	M1	M2	M3	M4	M5
size	0.470***	0.469***	0.470***	0.734***	0.739***
	(0.102)	(0.102)	(0.102)	(0.103)	(0.104)
liquid	0.201***	0.198***	0.197***	0.173***	0.169***
	(0.0683)	(0.0688)	(0.0687)	(0.0625)	(0.0632)
capital	0.500***	0.494***	0.496***	0.300**	0.299**
	(0.145)	(0.147)	(0.146)	(0.138)	(0.140)
selic	0.00677	-0.00599	0.00245	0.0116	-0.00959
	(0.0103)	(0.0119)	(0.0105)	(0.0101)	(0.0162)
gdp		-0.914			-0.734
		(0.975)			(1.647)
indprod		-0.917**			-1.945*
		(0.421)			(0.986)
unemp		0.447			6.856
		(4.152)			(5.216)
ipca	-0.0504				0.0698
	(0.0429)				(0.135)
rer			-0.480		0.0940
			(0.354)		(0.692)
libor			0.148		0.0105
			(0.138)		(0.124)
fedfunds			-0.122		0.0772
			(0.111)		(0.0992)
npl				0.0116**	0.0117**
				(0.00500)	(0.00506)
provisions				-0.0664**	-0.0704**
				(0.0300)	(0.0299)
leverage				0.138***	0.139***
				(0.0246)	(0.0247)
Observations	1,890	1,890	1,890	1,890	1,890
R-squared	0.169	0.171	0.170	0.228	0.231
Number of banks	150	150	150	150	150

Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 8: Banks Net Funding

netfunds	M1	M2	M3	M4
size	0.195***	0.177***	0.172***	0.147***
	(0.0464)	(0.0432)	(0.0428)	(0.0407)
liquid	0.234***	0.218***	0.210***	0.193***
	(0.0468)	(0.0510)	(0.0492)	(0.0453)
capital	0.334***	0.336***	0.331***	0.299***
	(0.0446)	(0.0444)	(0.0450)	(0.0434)
selic	-0.00234	-0.00117	-0.00162	-0.00130
	(0.00420)	(0.00403)	(0.00387)	(0.00383)
depositcash	0.0488***	0.0452***	0.0401***	0.0376***
	(0.0140)	(0.0132)	(0.0129)	(0.0118)
deposittime		0.0512	0.0492	0.0525*
		(0.0336)	(0.0336)	(0.0315)
interbank			0.0206**	0.0209**
			(0.00956)	(0.00899)
foreign				0.0606***
				(0.0141)
lehman	0.0138	0.0108	0.0263	0.00415
	(0.0285)	(0.0281)	(0.0308)	(0.0302)
lula	0.0390	0.0285	0.0203	0.0114
	(0.0482)	(0.0454)	(0.0455)	(0.0436)
payroll	0.0256	0.0261	0.0323	0.0544
	(0.0529)	(0.0521)	(0.0530)	(0.0498)
investgrade	0.239***	0.219***	0.217***	0.231***
	(0.0630)	(0.0665)	(0.0655)	(0.0650)
Observations	1,394	1,394	1,394	1,394
R-squared	0.749	0.757	0.760	0.779
Number of bank	126	126	126	126

Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 9: Loans (Levels)

loanstock	M1	M2	M3	M4	M5
size	0.373***	0.798***	0.798***	0.367***	0.166**
	(0.115)	(0.102)	(0.102)	(0.0790)	(0.0715)
liquid	-0.247***	-0.0814*	-0.0815*	-0.0120	-0.114***
	(0.0434)	(0.0488)	(0.0488)	(0.0300)	(0.0323)
capital	-0.144	0.183**	0.184**	0.0690	-0.107*
	(0.0907)	(0.0854)	(0.0857)	(0.0631)	(0.0611)
selic	-0.000696	-0.00119	0.00126	-0.00209	0.00521
	(0.00580)	(0.00590)	(0.00628)	(0.00309)	(0.00394)
gdp			-0.160		0.237
			(0.240)		(0.264)
indprod			0.298		0.479***
			(0.181)		(0.181)
unemp			-1.983		-1.132
			(1.404)		(1.513)
netfunds	1.108***				0.639***
	(0.149)				(0.0820)
rer		0.146			-0.0241
		(0.125)			(0.142)
npl				-0.0322***	-0.0291***
				(0.00337)	(0.00336)
provisions				0.495***	0.444***
				(0.0624)	(0.0604)
Observations	3,488	3,488	3,488	3,488	3,488
R-squared	0.488	0.366	0.366	0.687	0.724
Number of bank	232	232	232	232	232

Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 10: Loans (First Differences)

D.loanstock	M1	M2	M3	M4	M5
D.size	0.236***	0.354***	0.349***	0.239***	0.152***
	(0.0655)	(0.0693)	(0.0702)	(0.0418)	(0.0387)
D.liquid	-0.0831***	-0.0287**	-0.0293**	-0.0102	-0.0521***
	(0.0204)	(0.0144)	(0.0143)	(0.0117)	(0.0163)
D.capital	-0.0337	0.0949	0.0777	0.0665	-0.0454
	(0.0768)	(0.0662)	(0.0667)	(0.0491)	(0.0560)
D.selic	-0.00393	-0.00553	-7.44e-05	-0.00353	0.00875**
	(0.00363)	(0.00353)	(0.00389)	(0.00273)	(0.00355)
D.gdp			0.512**		0.719***
			(0.209)		(0.201)
D.indprod			0.139		0.432***
			(0.110)		(0.128)
D.unemp			-1.466		-1.582*
			(1.257)		(0.949)
D.netfunds	0.546***				0.413***
	(0.0769)				(0.0586)
D.rer		0.00356			-0.277**
		(0.0865)			(0.109)
D.npl				-0.0187***	-0.0181***
				(0.00275)	(0.00281)
D.provisions				0.283***	0.270***
				(0.0429)	(0.0424)
Observations	3,251	3,251	3,251	3,231	3,231
R-squared	0.177	0.102	0.108	0.371	0.426
Number of bank	222	222	222	221	221

Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 11: Brazilian Banking System Health Indicators

	2003	2004	2005	2006	2007	2008	2009
Bank Regulatory Capital to RWA	18.8	18.6	17.9	18.9	18.7	18.4	18.5
Bank Capital to Assets	9.6	10.1	9.8	9.9	9.8	9.1	9.2
Bank Nonperforming Loans to Total Loans	4.1	2.9	3.5	3.5	3	3.1	4.3
Bank Provisions to NPL (*)	171.8	214.5	179.8	179.9	181.9	189.8	157.3
Bank Return on Assets	2	2.2	2.9	2.7	2.9	1.5	1.1
Bank Return on Equity	21.1	22.1	29.5	27.3	28.9	15.6	11.6

IMF Global Financial Stability Report 2009
(*) In millions of U.S. dollars
RWA: Risk-Weighted Assets

Table 12: Two stage regressions for Loans

	M1	M2	M3	M4	M5
	FE	FE	IV	IV	IV
	all banks	all banks	all banks	private	public
Dependent variable	loanstock	netfunds	loanstock	loanstock	loanstock
size	**0.366*** **		**0.334*** **	**0.323*** **	-0.00758
	(0.0793)		(0.0313)	(0.0328)	(0.0573)
liquid	-0.0116	**0.319*** **			
	(0.0300)	(0.0345)			
capital	0.0685	**0.573*** **			
	(0.0633)	(0.0561)			
selic	0.00583	-0.00352	0.00348	0.00149	0.0148
	(0.00396)	(0.00217)	(0.00627)	(0.00656)	(0.0135)
unemp	-2.537	**-1.369***			
	(1.565)	(0.701)			
rer	-0.0344	0.0933	-0.0514	-0.00680	-0.585
	(0.150)	(0.0676)	(0.253)	(0.264)	(0.543)
gdp	0.143	0.275	0.512	0.425	**2.105** **
	(0.276)	(0.254)	(0.361)	(0.375)	(0.835)
indprod	**0.536*** **		0.387	0.301	0.302
	(0.190)		(0.262)	(0.274)	(0.584)
npl	**-0.0322*** **		**-0.0318*** **	**-0.0322*** **	**-0.0255*** **
	(0.00337)		(0.00100)	(0.00105)	(0.00255)
provisions	**0.496*** **		**0.491*** **	**0.466*** **	**0.750*** **
	(0.0624)		(0.00996)	(0.0103)	(0.0277)
netfunds			0.0861	**0.168*** **	**-0.713*** **
			(0.0565)	(0.0579)	(0.220)
Observations	3,488	4,139	3,488	3,193	295
Number of banks	232	260	232	215	17
Sargan statistic				17.649	12.98

Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
FE Fixed Effets and IV Instrument Variable panel regressions (Stata XTIVREG2)

(BLANK PAGE)