Financial Stability and Monetary Policy - The Case of Brazil*

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Contents: **1. Introduction; 2. Literature Review; 3. A Brief Review of the Brazilian Banking System; 4. Methodology; 5. Data; 6. Empirical Results; 7. Final Considerations.**

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This paper seeks to examine the effects of monetary policy over banks' loans growth and whether there is a bank lending channel operating in Brazil. Therefore, we employ a detailed high frequency panel data in which we include bank characteristics and ownership control. We contribute to the literature on bank lending channel by showing that during periods of loosening/tightening monetary policy, banks increase/decrease their loans. Additionally,our results illustrate that large, well-capitalized and liquid banks react differentially to the effects of monetary policy shocks. Finally, we show that the impact of monetary policy differs across state-owned, foreign and private domestic banks. These results are important for developing and conducting monetary policy.

Este artigo procura analisar os efeitos da política monetária sobre o crescimento dos empréstimos de bancários crescimento e se existe o canal de empréstimos em operação no Brasil. Para isso, nós empregamos um painel de dados de alta frequência que inclui características dos bancos e controle da propriedade. Assim, contribui para a literatura de canal de empréstimos bancários, mostrando que durante os períodos de afrouxamento/aperto da

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política monetária os bancos aumentam/diminuem seus empréstimos. Adicionalmente, nossos resultados mostram que bancos grandes, bem capitalizados e líquidos reagem diferentemente aos efeitos dos choques de política monetária. Finalmente, mostra que o impacto da política monetária difere entre bancos com controle estatal, privado e estrangeiro. Estes resultados são importantes para o desenvolvimento e condução da política monetária.

1. INTRODUCTION

In 2008, a series of large financial institutions around the world collapsed or failed, resulting in the need for government intervention. The crisis has shown that banking system losses can lead to tightening credit conditions among with economic costs. The financial crisis halted global credit markets, jeopardizing the financial stability of the economy worldwide. Brazil was no exception. However, even though affected by the crisis, Brazil reacted more effectively than other countries because it had less financial vulnerability and counted with proactive regulation and supervision of its financial market. The monetary policy was crucial for the good development of Brazil during the financial crisis. Furthermore, the role of central banks in conducting monetary policy to help equalize the adverse consequences of financial instability on the real sector of the economy was intensified.

In this context, this paper intends to discuss the role of monetary policy in creating an environment of financial stability, defined by Schinasi (2004) in terms of its ability to facilitate and enhance economic processes, manage risks, and absorb shocks. When analyzing financial stability, understanding the transmission channels that exist between the financial and the real sectors of the economy is crucial. This paper brings out the discussion of the bank lending channel in Brazil.

In the literature, it is quite an agreement that the bank lending channel acts through the impact of monetary policy over deposits. According to Bernanke and Blinder (1988) monetary policy tightening leads to a fall in deposits which induces banks to substitute towards more expensive forms of market funding, contracting loan supply. This happens when banks face frictions in issuing uninsured liabilities to replace the shortfall in deposits. As we will expose later in the literature review section, many studies found empirical evidence that points out differences in the responses to monetary policy shocks depending on the banks characteristics such as its balance sheet liquidity, capital ratio and size.

The literature of banking channel studies is vast, however, there is a scarce number of studies relating to developing countries. This paper intends to contribute to the literature by analyzing the case of Brazil, a developing economy. We report banks's specific characteristics and ownership control in order to verify if there is a bank lending channel operating in Brazil. Our sample consists of a high frequency panel data, with 5237 observations for the period 2003-2009. The main results of our study are as follows.

We show the existence of a bank lending channel by showing that during periods of monetary tightening/loosing, banks have their loans decreased/increased. Moreover, the effects on the loan portfolio of larger, well capitalized and liquid banks differ. We show that the financial crisis has had a large impact on lending activity. We find that state-owned and foreign banks seem to respond less to monetary policy changes than private banks.

These findings should be taken into account when managing monetary policy. Policymakers must be aware of the possible implication of their actions on banks' incentives. Therefore, central banks should have caution when conducting monetary policy. The benefits of the central bank independence are quite a consensus not only for aiming price stability but also for maintaining financial stability (Shiratsuka, 2001, Herrero and Lopez, 2003, Klomp and Haan, 2009, Smaghi, 2008). However, Greenspan (2002) recommends that monetary policy should only be used as a reactive instrument to alleviate the effects of a financial crisis and not as an instrument to prevent it.

This paper is organized into the following sections. Section 2 presents a literature review providing previous work's theoretical and empirical findings. Section 3 presents a brief review of the Brazilian banking system. Section 4 describes the empirical methodology adopted. Section 5 presents the data. Section 6 shows the empirical results. Finally, section 7 concludes our work.

2. LITERATURE REVIEW

In this section, we will expose the theoretical and empirical findings of the previous studies of the effects of monetary policy over banks' loans growth.

Recently, monetary policy and financial stability issues have become very intertwined, which has encouraged studies concerning the bank lending channel. We commented earlier the finding of Bernanke and Blinder (1988) about how monetary policy tightening leads to a fall in deposits which induces banks to contracting loan supply. In accordance, after studying more than 600 banks from 32 countries, Nier and Zicchino (2008) verified that tightening/loosing monetary policy is associated with loan decrease/increase. Disyatat (2011), on the other hand, argues that the emphasis on policy-induced changes in deposits is misplaced. A reformulation of the bank lending channel is proposed, in which monetary policy impacts primarily banks' balance sheet strength and risk perception.

In their pioneering work, Kashyap and Stein (1995) use US banks to attest that under monetary policy tightening, smaller banks reduce a larger amount of loans compared to larger banks. Gambacorta (2005), in contrast, shows in a study of Italy that bank size seems to be irrelevant; small banks are not more sensitive to monetary policy shocks than large banks. Moreover, Kashyap and Stein (2000) and Bayoumi and Melander (2008) affirm that bank's balance sheets have a significant effect on credit availability. Banks with less liquid balance sheet, that is, banks with lower ratios of securities to assets, suffer a stronger impact on lending from monetary policy. Kishan and Opiela (2000) studied the US banks and found that during periods of monetary policy tightening banks with less capital reduce loans. In theory, the only banks that raise loan rates substantially in response to an increase in the federal funds are the ones that present a high proportion of relationship loans that are close to a loan-to-core deposit ratio of one (Black et al., 2007).

Altunbas et al. (2002), Francis and Osborne (2010) and Gambacorta and Mistrulli (2004) found that better capitalized banks experience less pronounced impacts on their lending. This might happen because well-capitalized banks have easier access to non-deposit fund-raising (Gambacorta and Mistrulli, 2004) or because with capital adjustment costs, higher capital requirements reduce a bank's optimal loan growth (Francis and Osborne, 2010). The use of securitization also protects bank's loan supply from the effects of monetary policy and additionally increases the grant of loans (Altunbas et al., 2009). However, attention is needed when increasing the lending standards, since it can cause negative effect on lending and on economic activity (Berrospide and Edge, 2008). Altunbas et al. (2010) found out that banks with a lower expected default frequency not only can offer a higher amount of credit but also can protect better their loan supply from monetary policy changes.

From the scarce literature involving the study of developing economy, we found that Francis and Osborne (2009) have shown that emerging market authorities have retained significant monetary control after the recent liberalization of financial markets. However, local monetary policy does not have a significant effect on emerging stock markets. In particular, Gunji and Yuan (2010) studied the case of China, suggesting that larger banks, banks with lower levels of liquidity and profitable banks suffer a less pronounced effect of monetary policy over their lending activity.

When considering the bank's characteristics and ownership control and still in the developing economy context, Chortareas et al. (2011) affirm that for a good comprehension of Latin American banks' performance it is necessary to evaluate the degree of capitalization and the banks' size. Those characteristics were included in our study, along with liquidity. Additionally, we show that monetary policy has different effects on banks with different ownership. This may be due to the fact that state-owned,

foreign and private domestic banks have different goals and strategies and may have different funding sources, either domestically or abroad. Recent research has found that banks with different ownership may have different bank technology and efficiency (Staub et al., 2010). Therefore, the empirical evidence presented in this paper is in line with a different impact to monetary policy for state-owned, foreign and private domestic banks.

3. A BRIEF REVIEW OF THE BRAZILIAN BANKING SYSTEM

The Brazilian banking system consists of state-owned, foreign and private domestic banks. However, there are several differences among asset structures of the various banking segments. State-owned banks, with the exception of the National Bank of Economic and Social Development (BNDES), had the lowest proportion of assets invested in loan operations in 2007. Meanwhile, these banks also had the largest volume of Stocks and Securities (TVMs), particularly in papers held to maturity. This is due to high interest rates and large profits that stem from these operations with low risk. Private banks, on the other hand, are characterized by presenting the largest volume of interbank liquidity investments, accompanying the tendency of making greater use of funding through repo operations and permanent assets, due to investments in stockholding positions. Foreign institutions, in the recent period, presented a greater use of other common assets, particularly derivatives. This could be due to hedging purposes as some of these institutions are specialized in intermediating external funding operations for domestic clients in Brazil.

The credit expansion has made the monitoring of default and capitalization levels of financial institutions become more important. The level of default dropped from 6.9% in 2003 to 3.2% in 2007. Despite the reduction in leverage, state-owned banks continued making intensive use of third-party capital, especially through subordinate debt. Credit assigns[1] have been another important source of financing, particularly to smaller scale banks. In the recent period, private banks have hold the largest volume of liabilities for repo operations. Foreign banks have made greater utilization of time deposits and liabilities for loans and on lending operations, as state-owned banks have become known for saving deposits[2].

The Brazilian economy was negatively affected by the worsening of the world economic crisis since September 2008, after the failure of Lehmam Brothers. Financing conditions for firms and banks deteriorated and only began to improve in the second semester of 2009. The government implemented monetary, fiscal and credit stimuli through 2009 to help accelerate the recovery of the economy. In particular, a quantitative easing was undertaken by the central bank due to a cool off of inflation pressures in light of the large contraction of domestic demand. This quantitative easing has helped to normalize credit conditions.

With the disorder triggered by the mortgage market crisis, national financial market indicators presented some kind of resilience. As a result, investors were favorable on bringing their money to Brazil, a distinguished emerging economy. However, domestic indicators became more volatile, especially in what concerns interest rates and stock markets. The growing dynamics of domestic demand presented significant increases in investment levels and in expanding household consumption. Although credit supply (% GDP) has reached high historical levels in the recent past, it is still relatively low if compared to other countries. The considerable confidence of consumers and Brazilian businessmen in the market led to an increasing in the average maturity of loans, which can be used as a proxy for measuring risk. Consequently, credit growth in Brazil has in no way jeopardized financial system solidity. As a matter of fact, at the end of 2008, there was a continuous credit expansion, with low default level and a consistently greater level of provisions than any expected losses.

[1] Joint liabilities assumed in assigns, securitization of credit or negotiation of certificates or bank credit to corporate financial entities and individuals.

[2] Brazilian Central Bank Financial Stability Report - 2008, 2009.

Since banks present different characteristics and different strategies due to ownership control, we expect to find different reactions to interest rates changes from each bank segment in what concerns lending exposure. These results are important to assess the different impacts of monetary policy on the banking system.

4. METHODOLOGY

The empirical specification is designed to test the relationship between monetary policy and financial stability. We search for evidences that suggest the existence of a bank lending channel in Brazil. We also shed light on the different impacts of monetary policy over state-owned, foreign and private banks. To do so, we test the impact of monetary policy over loan growth.

We have constructed a VAR model for the Brazilian economy in accordance with Ashcraft (2006) and Kashyap and Stein (2000) that includes interest rates, inflation and industrial production. Several authors use a VAR with macro variables and use the residuals for the interest rate as a proxy for monetary policy. In Brazil the central banks adopts an inflation targeting regime. Therefore, interest rates respond to inflation and macro variables that may affect inflation. In this case one expects that the correlation between interest rates and the residuals of interest rates equation in the VAR to be high. The choice of the lag length of the VAR follows the Akaike information criteria, provided that residuals are white noise. We employ the residuals of the interest rates regression as an independent variable in panel data regressions and find qualitatively the same results. It is worth remarking that the correlation between this indicator of monetary policy and the interest rate is very high and about 0.75 for the Brazilian data case.

It is difficult to separate and distinguish supply from demand factors using aggregate data. Empirically, it is not clear whether the effects of banks conditions are affecting the demand or the supply side. In order to solve this identification problem we include in our specification the industrial production to control for aggregate loan demand, as suggests Nier and Zicchino (2008)[3]. This variable enables to account for differences in the time profile of loan demand as well as relieve identification of bank loan supply. Considering the supply side, Kashyap and Stein (2000) propose to examine lending behavior at the individual bank level. Therefore, we have incorporated variables for bank-specific characteristics, such as size, capitalization and liquidity. The interaction between these variables and interest rates should be statistically significant if there is an active bank lending channel.

4.1. Bank Lending Channel

We test if there is a bank lending channel in Brazil by analyzing the relationship between monetary policy changes and loan growth. Chortareas et al. (2011) sustain that there are two bank's specific factors that are particularly important in explaining Latin American banks' performance: the degree of capitalization and banks' size. We include these variables in our specification, along with liquidity. Moreover, we test interactions of loans with bank's specific characteristics (Size, Capitalization and Liquidity) in order to verify if they are in accordance with the bank lending channel literature. In addition, we test the different reactions of state-owned, foreign and private domestic banks to interest rates (Selic) changes. In order to verify this relation we include two dummies: $State - Owned$ and $Foreign$. They represent, respectively, state-owned banks and foreign banks. We expected to find different effects. State-owned and foreign banks differ in several ways. Staub et al. (2010) show that foreign banks have improved their performance in what concerns the establishment of new affiliates and the acquisition of local banks. On the other hand, despite having improved cost efficiency, state-owned banks are profit inefficient.

[3] We also include other variables to control for changes in the demand for loans and results are qualitatively the same.

We take into consideration in our empirical analysis the impact of the 2008 financial crisis. The Brazilian economy was negatively affected by the worsening of the world economic crisis since September 2008, after the failure of Lehmam Brothers. In order to capture this effect we introduce a dummy crisis, $Crisis$. Moreover, we test if the the bank lending channel is more pronounced during the crisis period by adding some interactions with $Crisis$.

The benchmark equation is presented as follows:

$$\begin{aligned}
\Delta Loans_{it} &= \alpha \Delta Loans_{i,t-1} + \beta Size_{i,t-1} + \gamma Cap_{i,t-1} + \delta Liq_{t-1} \\
&+ \psi \Delta IP_{t-1} + \varphi \Delta Selic_{t-1} + \tau Ownership_{i,t} \\
&+ \rho \Delta Selic_{t-1} * Ownership_{i,t} + \varrho Size_{i,t-1} * \Delta Selic_{t-1} \\
&+ \upsilon Cap_{i,t-1} * \Delta Selic_{t-1} + \varsigma Liq_{i,t-1} * \Delta Selic_{t-1} \\
&+ \zeta Size_{i,t-1} * \Delta Selic_{t-1} * Crisis \\
&+ \chi Cap_{i,t-1} * \Delta Selic_{t-1} * Crisis \\
&+ \vartheta Liq_{i,t-1} * \Delta Selic_{t-1} * Crisis + \kappa Crisis + \varepsilon_{i,t}
\end{aligned} \tag{1}$$

where $\Delta Loans$ is the variation of bank's loan growth of bank i, *Size* is the log of the total assets of bank i at time $t-1$, *Cap* stands for capitalization, measured by the equity ratio over assets, *Liq* represents liquidity and is measured by deposits over loans, $\Delta Selic$ is the Banco Central do Brasil's overnight lending yoy (year over year), $DummyOwnership$ represents the dummies for $State - Owned$ and $Foreign$ banks, $Crisis$ is the dummy for crisis period that starts in September of 2008, and $\varepsilon_{i,t}$ is the error. All variables are presented in natural logarithm.

We also estimate the growth rate of loans in periods of monetary contraction and expansion using two dummies Up and $Down$. They represent, respectively, upward and downward movements in the Selic interest rates. We interact these dummies with banks' characteristics (size, capitalization and liquidity), ownership control, and the dummy for crisis. We verify whether the loan growth supply differs for these banks for different periods in the monetary cycle. The specification to be tested is given by:

$$\begin{aligned}
\Delta Loans_{it} &= \alpha \Delta Loans_{i,t-1} + \beta Size_{i,t-1} + \gamma Cap_{i,t-1} + \delta Liq_{t-1} \\
&+ \psi \Delta IP_{t-1} + \varphi Dummy_{t-1} + \tau Ownership_{i,t} \\
&+ \rho Dummy_{t-1} * Ownership_{i,t} + \varrho Size_{i,t-1} * Dummy_{t-1} \\
&+ \upsilon Cap_{i,t-1} * Dummy_{t-1} + \varsigma Liq_{i,t-1} * Dummy_{t-1} \\
&+ \zeta Size_{i,t-1} * Dummy_{t-1} * Crisis \\
&+ \chi Cap_{i,t-1} * Dummy_{t-1} * Crisis \\
&+ \vartheta Liq_{i,t-1} * Dummy_{t-1} * Crisis + \kappa Crisis + \varepsilon_{i,t}
\end{aligned} \tag{2}$$

where $Dummy$ represents the monetary policy dummies. We expect the Up coefficient to be negative, i.e., when interest rates increase, banks reduce their lending activity. On the other hand, the $Down$ coefficient is expected to be positive, i.e., decreases in the interest rates lead to increases in bank's lending activity. Furthermore, we expect the coefficients for Size, Capitalization and Liquidity to be positive, in accordance with the bank lending channel literature.

5. DATA

Data was collected from monthly reports that banks have to present to the Central Bank of Brazil, which provides information on financial statements for financial institutions. We use a sample consisting of an unbalanced panel with 5183 observations. We identify 99 banks for which income statements

and balance sheets detailed data are provided from January 2003 to February 2009. We focus on commercial banks that engage in loan operations. We have included (only) all banks that have commercial banking lending activity in our data set. The average ratio of loans to total assets is 49.37% and at the 5th and 10th percentiles these ratios are 12.17% and 18.01%, respectively. Therefore, there is a very small number of banks for which the lending activity is marginal.

The data was used from bank consolidated accounts (bank conglomerates) and from unconsolidated accounts for individual banks. If banks merge or are acquired we use consolidated data for the acquiring bank and the acquired bank is not included in the data after that. The bank ownership information is obtained from the Brazilian Central Bank database.

6. EMPIRICAL RESULTS

This section presents empirical results for the impacts of monetary policy changes on lending activity in order to sustain the existence of a bank lending channel.

The results of Equation (1) are summarized in Table 1. The size, the capitalization and the liquidity effect are significant, suggesting that in Brazil banks' loan portfolio are differentially influenced depending on banks' characteristics. We also test the effect of monetary policy changes on loan growth. The response of bank lending to a monetary policy shock is negative. When Selic increases, banks reduce their lending activity. Those results are in accordance with Nier and Zicchino (2008) and Kashyap and Stein (2000). This happens mainly because during monetary tightening banks opt to lend to the government, who pays more, rather than lend to consumers. The higher the Selic, the more expansive is the credit offered to consumers, since there is less money available in the economy.

This finding clarifies the existence of a bank lending channel, which is a particular case of the broad credit channel (Kashyap and Stein, 1994) due to its emphasis on just one source of external financing, the supply of bank loans, in the monetary policy transmission. During expansionary monetary policy, the interest rate decreases leading to an increase in the supply of credit (Bernanke, 1993). Disyatat (2011) adds to this discussion by attesting that tight monetary policy is assumed to drain deposits from the system and, therefore, reduce lending if banks face frictions in issuing uninsured liabilities to replace the shortfall in deposits. Additionally, much of the driving force behind bank lending is attributed to policy-induced quantitative changes on the liability structure of bank balance sheets.

Column (2) shows that monetary policy has different effects over state-owned, foreign and private domestic banks. State-owned and foreign banks are the ones that have their loan portfolio less affected by monetary policy changes. In the state-owned banks case, one explanation could be that, during the observed period, state-owned banks have increased their payroll loans to state-owned employees. The payroll loans, characterized by personal loans with interests payments directly deducted from the borrowers' payroll check, brings benefits to both borrowers and lenders. It is safer for lenders since the payment is automatic and the responsibility belongs to the union. Thus, it brings benefits to the borrowers since it reduces their work to go to the bank or do the job manually. State-owned banks presented a strong credit growth recorded in payroll and mortgages in 2009. The payroll loans were favored by downward movements in the interest rates and by regulatory changes that increased the margin of retirees and pensioners of the National Institute of Social Security (INSS). In turn, concerning the mortgages, there was an increase in resources of the savings account and in the Guarantee Fund for Length Service (FGTS) [4].

On the other hand, in the foreign banks case, one justification is that they must have other sources of financing abroad that relieve the impact of monetary policy. Another one is that this kind of behavior is a consequence of their hedging purposes that affect dynamically their balance sheets. Additionally, results show that the interaction between Size and monetary policy (Selic) as well as Capitalization and

[4] Financial Stability Report - October of 2009.

monetary policy (Selic) has positive sign. Therefore, larger and well-capitalized banks are also better able to buffer their lending during monetary policy shocks, which is in line with the bank lending channel literature.

Table 1: The Determinants of Loan Growth **(Monthly)**

Dependent Variable: $\Delta\ Loans_t$	(1) Baseline	(2) Interaction
$\Delta\ Loans_{t-1}$	0.121***	0.121***
	(0.0404)	(0.0413)
$Size_{t-1}$	-0.0137**	-0.0140**
	(0.00563)	(0.00567)
Cap_{t-1}	0.0169***	0.0169***
	(0.00606)	(0.00618)
Liq_{t-1}	0.0141***	0.0144***
	(0.00428)	(0.00435)
$\Delta\ IP_{t-1}$	-0.000817	-0.000801
	(0.00366)	(0.00373)
$\Delta\ Selic_{t-1}$	-0.434**	-1.121**
	(0.169)	(0.544)
$\Delta\ Selic_{t-1}$*State-Owned		0.203**
		(0.0823)
$\Delta\ Selic_{t-1}$*Foreign		0.207*
		(0.120)
$Size_{t-1}$*$\Delta\ Selic_{t-1}$		0.0489**
		(0.0226)
Cap_{t-1}*$\Delta\ Selic_{t-1}$		0.224**
		(0.104)
Liq_{t-1}*$\Delta\ Selic_{t-1}$		0.0337
		(0.0344)
$Size_{t-1}$*$\Delta\ Selic_{t-1}$ * Crisis		-0.130
		(0.0994)
Cap_{t-1}*$\Delta\ Selic_{t-1}$ * Crisis		-0.402
		(0.403)
Liq_{t-1}*$\Delta\ Selic_{t-1}$ * Crisis		0.323
		(0.252)
Crisis		-0.0855
		(0.0713)
Constant	0.350***	0.356***
	(0.124)	(0.125)
Fixed Effects	FE	FE
Time Dummies	YES	YES
Observations	3,237	3,237
Number of banks	76	76
F statistic	45.12***	72.18***
Modified Wald test	65074.22***	28523.71***

This table presents the variables that affect loan growth. In Column (1) we regress our baseline model. In Column (2) we regress the baseline model adding the interactions. The method used was the OLS estimator with fixed effects. For heteroskedasticity we used the Modified Wald Test for groupwise heteroskedasticity. The independent variables are presented with one lag. We also add the Selic with more lags but the results were not statistically significant. The symbols ***,**,* stand for statistical significance at the 1%, 5% and 10% levels, respectively. Standard errors are provided in parenthesis.

Table 2 presents the results of how changes in the interest rates affect the credit growth, regarding the estimation of Equation (2). The crisis account for the absorption of the global shock that has hit the US and the rest of the world after the failure of Lehman Brothers. We can verify that the crisis period not only has a negative effect over loans but also affects lending portfolio differently when selic variates depending on banks' characteristics. Our empirical results suggest that in this event the bank lending channel was important to dampen these effects.

Table 2: The Effects of Monetary Policy on Loan Growth **(Monthly)**

	(1)	(2)	(3)	(4)
Dependent Variable: $\Delta\ Loans_t$	Baseline	Interaction	Baseline	Interaction
$\Delta\ Loans_{t-1}$	0.117***	0.116***	0.117***	0.107***
	(0.0404)	(0.0400)	(0.0404)	(0.0401)
$Size_{t-1}$	-0.00941**	-0.00865**	-0.00941**	-0.00871**
	(0.00406)	(0.00404)	(0.00406)	(0.00408)
Cap_{t-1}	0.0176***	0.0185***	0.0176***	0.0197***
	(0.00596)	(0.00599)	(0.00596)	(0.00611)
Liq_{t-1}	0.0145***	0.0145***	0.0145***	0.0145***
	(0.00434)	(0.00435)	(0.00434)	(0.00433)
$\Delta\ IP_{t-1}$	-0.000712	-0.000678	-0.000712	-0.000682
	(0.00339)	(0.00339)	(0.00339)	(0.00340)
Up_{t-1}	-0.00364	0.0124		
	(0.00296)	(0.0233)		
Up_{t-1}*State-Owned		0.00505		
		(0.00320)		
$Size_{t-1}$*Up_{t-1}		-0.000771		
		(0.00102)		
Crisis*Cap_{t-1}*Up_{t-1}		-0.0685**		
		(0.0310)		
Crisis*Liq_{t-1}*Up_{t-1}		-0.00478		
		(0.0204)		
Crisis		-0.0365*		-0.115***
		(0.0195)		(0.0284)
$Down_{t-1}$			0.00364	0.00364
			(0.00296)	(0.00297)
Crisis*Cap_{t-1}*$Down_{t-1}$				-0.0428***
				(0.0148)
Constant	0.255***	0.240**	0.251***	0.240**
	(0.0923)	(0.0916)	(0.0926)	(0.0930)
Fixed Effects	FE	FE	FE	FE
Time Dummies	YES	YES	YES	YES
Observations	3,237	3,237	3,237	3,237
Number of banco	76	76	76	76
F statistic	16.67***	19.85***	16.67***	16.48***
Modified Wald Test	48469.56***	54357.36***	48469.56***	47562.40***

This table presents the results of how changes in monetary policy affect loan growth. More precisely, we show the results of how changes in monetary policy affect loan growth in a different way depending on banks' size, capitalization and liquidity. In Column (1) we regress our baseline model with the dummy Up_{t-1}. In Column (2) we regress the baseline model adding the interactions. In Column (3) we regress our baseline model with the dummy $Down_{t-1}$. In Column (4) we regress the baseline model adding the interactions. The method used was the OLS estimator with fixed effects. For heteroskedasticity we used the Modified Wald Test for groupwise heteroskedasticity. The independent variables are presented with one lag. We also add the dummies with more lags but the results were not statistically significant. The symbols ***,**,* stand for statistical significance at the 1%, 5% and 10% levels, respectively. Standard errors are provided in parenthesis.

7. FINAL CONSIDERATIONS

The current credit crisis has shown the important role of monetary policy in assuring financial stability. We analyze the role of monetary policy by accessing a detailed database of Brazil during the period of 2003-2009. As expected, high interest rates reduce lending, and low interest rates increase lending. This finding clarifies the existence of a bank lending channel. Moreover, banks change their lending strategy in accordance with the direction of monetary policy. Another interesting result is the evidence that different types of banks respond differently to monetary policy.

Furthermore, the 2007-2008 financial crisis has revealed that the economy perception of risk is crucial to determine the bank access to capital. Moreover, the crisis has shown that banking losses can lead to critical credit conditions and as a result impose severe costs to the economy. Monetary policies are shown to be able to offset the consequences of financial instabilities. Therefore, we find an empirical consistent relationship between monetary policy and financial stability. Further research is needed to determine whether the market structure affects the impacts of monetary policy on bank lending.

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