

The great financial crisis and the behavior of the credit market in Brazil: Does control matter?

Adriano Rodrigues, Jose Américo Pereira Antunes,
Jose Elias Feres de Almeida y Marcelo Alvaro da Silva Macedo

Programa de Pós-Graduação em Ciências Contábeis, Universidade Federal do Rio de Janeiro

Programa de Mestrado em Economia e Gestão Empresarial, Universidade Cândido Mendes

Departamento de Ciências Contábeis, Universidade Federal do Espírito Santo

Departamento de Contabilidade da Faculdade de Administração e Ciências Contábeis, Universidade Federal do Rio de Janeiro

This paper investigates the effects of the great financial crisis on the behavior of the Brazilian credit market through a panel of 101 Brazilian banks. For that, we measure the amount of cash involved in the credit activity in the different segments that compound the Brazilian financial system. The results show that: (i) the crisis did not change the relationship between the credit market and the credit risk, regarding the Brazilian financial system as a whole; (ii) both the state-owned and the private-owned segments of the financial system were significantly affected by the crisis, but in opposite directions. While the private segment extracted cash from the credit portfolio, reacting to the worsening in credit risk, the state-owned segment injected cash in the credit portfolio, acting counter-cyclically and compensating the private reaction.

Keywords: Brazilian Financial System, State-owned banks, Financial Intermediation, Credit Risk.

La gran crisis financiera y el comportamiento del mercado crediticio en Brasil: ¿importa el control?

Este estudio investiga los efectos de la gran crisis financiera en el comportamiento del mercado crediticio brasileño por medio de un panel de 101 bancos brasileños. Para eso, medimos la cantidad de efectivo involucrado en la actividad crediticia en los bancos estatales y los bancos privados del sistema financiero brasileño. Los resultados muestran que: (i) la crisis no cambió la relación entre el mercado de crédito y el riesgo de crédito, en relación con el sistema financiero brasileño como un todo; (ii) tanto los bancos estatales y los bancos privados del sistema financiero se vieron significativamente afectados por la crisis, pero en direcciones opuestas. Mientras que el segmento privado extrajo efectivo de la cartera de crédito, en respuesta al empeoramiento del riesgo crediticio, el segmento estatal inyectó efectivo en la cartera de crédito, actuando de manera anticíclica y compensando la reacción privada.

Palabras clave: sistema financiero brasileño, bancos estatales, intermediación financiera, riesgo de crédito.

A grande crise financeira e o comportamento do mercado de crédito no Brasil: O controle importa?

Este artigo investiga os efeitos da grande crise financeira no comportamento do mercado de crédito brasileiro por meio de um painel de 101 bancos brasileiros. Para isso, medimos os fluxos de caixa envolvidos na atividade de crédito nos

diferentes segmentos que compõem o sistema financeiro brasileiro. Os resultados mostram que: (i) a crise não mudou a relação entre o mercado de crédito e o risco de crédito, em relação ao sistema financeiro brasileiro como um todo; (ii) os segmentos estatal e privado do sistema financeiro foram significativamente afetados pela crise, mas em direções opostas. Enquanto o segmento privado extraiu caixa da carteira de crédito, reagindo à piora do risco de crédito, o segmento estatal injetou caixa na carteira de crédito, agindo contraciclicamente e compensando a reação privada.

Palavras-chave: Sistema financeiro brasileiro, bancos estaduais, intermediação financeira, risco de crédito

1. Introduction

The objective of this study is to investigate the effects of the great financial crisis (GFC) on the behavior of the Brazilian credit market from the perspective of the financial system (state-owned and private banks taken together), as well as its state-owned and private-owned segments, individually considered.

The outbreak of the (GFC) in 2008 severely compromised financial intermediation and the functioning of the credit market. The destruction of wealth caused by the crisis, circa US\$ 50 trillion, which is equivalent to one year of world GDP, was unprecedented (Loser, 2009). Losses projected by the International Monetary Fund for the major international banks exceeded US\$ 4 trillion and produced a sharp decline of the credit activity, with a contraction in the credit market of 95% of the countries in the eight month period after September 2008 (IMF, 2009, p. xi).

The climax of the GFC is the collapse of Lehman Brothers investment bank (09/15/2008) in the U.S. Only a few days later, the collapse of insurer AIG reverberated at other financial markets, turning the crisis into a global phenomenon. The immediate reaction of the central banks was to reestablish the functioning of the liquidity channels, assuming the role of the markets. The attempt to stabilize markets required the injection of resources on an unprecedented scale and expanded the Federal Reserve's

balance sheet by more than U\$1 trillion over a period of only a few weeks (Cornett, McNutt, Strahan & Tehranian, 2011, p. 303). This eased the initial panic, but it was not enough to restore confidence and bring the credit markets back from inertia. Gradually, these measures were replicated by other central banks with similar results.

The transformation of maturities that underlies financial intermediation is also the root of banks' vulnerability to liquidity crises. By tackling maturity mismatches in their balance sheets, banks create liquidity (Diamond & Dybvig, 1983, p. 403), which is made available to economic agents through credit granting and deposits taking. In crisis times, the demand for liquidity may exceed the ability of banks to provide it, putting their own existence at risk. As a result, banks react to the crisis disrupting financial intermediation, restricting credit granting and accumulating liquidity (Schinasi, 2004; Woodford, 2010). That is the credit crunch, which slashes the origination of new credit operations, the main channel used to pump liquidity in the market.

Although limited, the echoes of the GFC in Brazil required the prompt action of the Central Bank of Brazil (CBB) to restore liquidity. The measures involved the reduction of reserve requirements and the supply of credit lines for foreign trade (Mesquita & Torós, 2010, pp. 10-14).

On the credit front, the aggregate behavior of the Brazilian financial system (BFS) shows a reduction in the pace of credit grantings up to the third quarter of 2009. After a lag of about twelve months from the outbreak of the crisis (september 2008), the pre-crisis behavior was reestablished (see Fig. 1). Following Sapienza (2004), Claessens, Feijen and Laeven (2008) and Carvalho (2014), it can be argued that the reactions of the banks to the financial crisis may not have been the same: depending on the type of control, state-owned or private-owned, banks' reactions to the crisis may have been even opposite. Facing this question from a different perspective, Ribeiro and Schiozer (2013, p. 522) and Barcellos and De Mendonça (2015) found significant evidence that credit sales, a less usual funding alternative than deposits, since it only involves banks, reacted positively to the difficulty in taking new deposits during the crisis.

Although more relevant in emerging and developing economies, where they account for about 22% of the total assets, the existence of state-owned banks is not limited to these countries and reaches a 10% share in advanced economies (World Bank, 2013, p. 103; La Porta, Lopez-de-Silanes & Shleifer, 2002, p. 3).

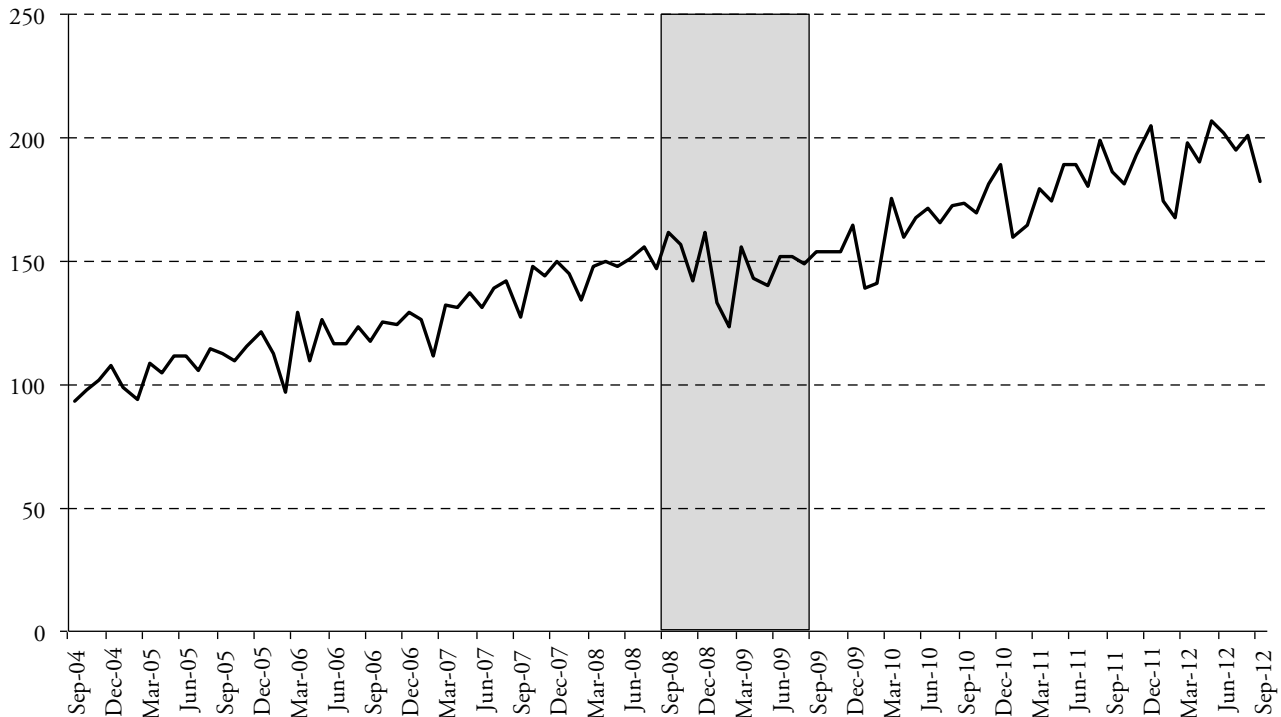
According to data available on the CBB's website, there were a total of 101 banks operating in the Brazilian financial system (BFS) throughout the period of analysis, which comprehends the period from December/2000 to December/2015. From this contingent, 13 were state-owned banks and 88 were private-owned banks. The relevance of state-owned banks implies a share higher than the international average, accounting for about 28% of the total equity of the BFS. As for other relevant measures, the state-owned segment's share is even higher, totaling 49% of the total assets and 52% of the total funding, reflecting a more significant leverage than the private segment

(22 times the equity value, compared to 9 times the equity value for the private segment). The magnitude of the state-owned segment in the BFS turns Brazil into an interesting case study to assess countercyclical behavior in the aftermath of the GFC.

The Brazilian financial system architecture, divided in state-owned and private-owned banks, raises the following research questions about the reaction of each segment to the GFC: i) how the GFC affected the behavior of the credit market in the Brazilian financial system? ii) From the perspective of control, how did the different segments react to the worsening in credit risk derived from the GFC?

This study aims to investigate the effects of the GFC on the behavior of the Brazilian credit market. To conduct the analysis, the study builds on Antunes, De Moraes and Rodrigues (2017) and Antunes, De Moraes and Rodrigues (2018) to compute a cash flow-based variable derived from the credit portfolio. The credit cash flow (CCF) is a measure associated with the financial flows of the credit portfolio, which captures only the essence of financial intermediation, namely the net cash exchange between the financial intermediary and the borrower. As a variable that explains banking behavior from the liquidity perspective of the financial intermediation, the CCF is expected to react to changes in the credit market risk scenario.

The analysis uses a data panel that segregates Brazilian banks into three groups: i) BFS, which gathers the entire banking system; ii) the state-owned banks' segment, which includes banks under government's control, totaling 13 banks; and iii) the private-owned banks' segment, which gathers banks under private control, totaling 88 banks. The BFS corresponds to the sum of state-owned and private-owned banks.

Figure 1. Non-earmarked credit granting behavior from september 2004 to september 2012.

Note: Aggregate monthly data for the Brazilian financial system, values in R\$ billions. The hatched area corresponds to the 12 month crisis period.
Source: CBB, series number 21277

This paper adds to the literature in two ways. First of all, it sheds light on the functioning of the credit market of a financial system characterized by the magnitude of state activism in banking. Then, it resorts to a cash flow-based measure to investigate the effects of the financial crisis on the behavior of this financial system.

This paper is organized as follows. Section 2 reviews the literature and formulates the hypotheses, discussing the procyclicality of the financial system and the governmental activism in banking as a countercyclical mechanism. It also presents a cash flow-based variable, the credit cash flow, as a proxy for the behavior of financial intermediation. Section 3 deals with the

methodological procedures involving the definition of the sample, the econometric models and the variables used. Section 4 provides evidence from the fixed-effects ordinary least square method (FOLS) used in panel data analysis. Section 5 concludes.

2. Literature review and hypotheses development

The procyclicality of the financial system is the subject of extensive literature (Bernanke, Gertler & Gilchrist, 1999, p. 1345; Borio, Furfine & Lowe, 2001, p. 1, Brunnermeier et al., 2009), which argues that information asymmetry and the credit risk it originates lie at the root of this market failure. According to these

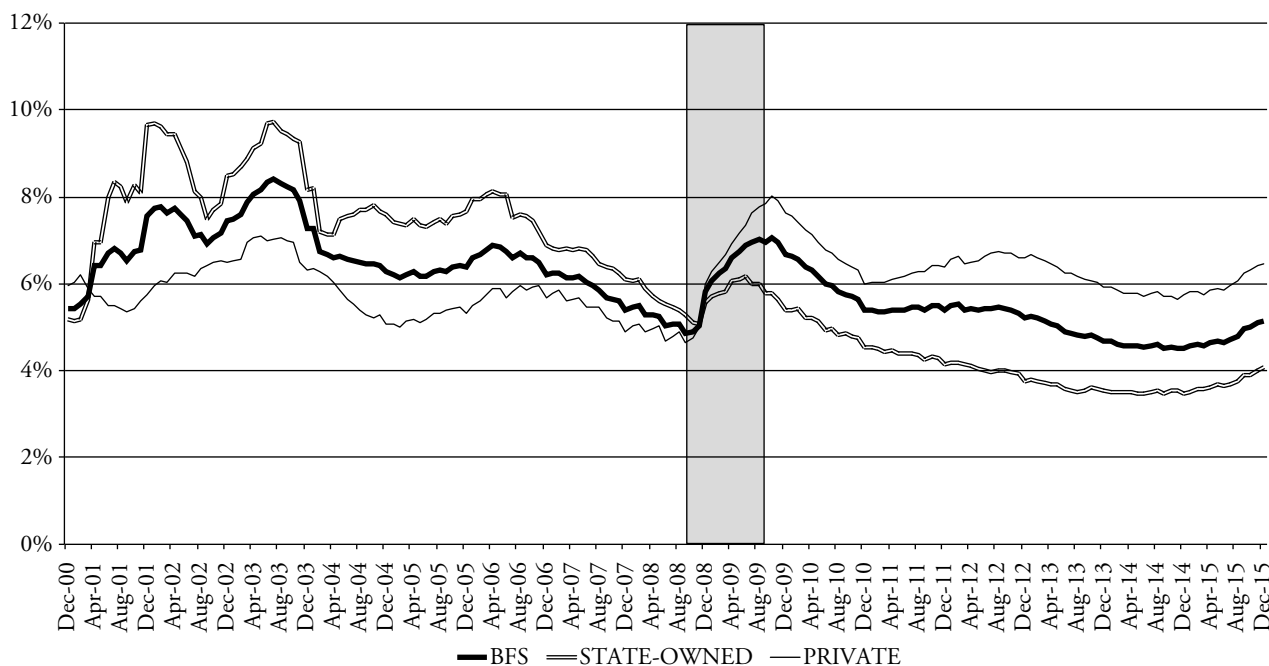
authors, the decision to enter the credit market reflects a perception of risk and the procyclicality of credit risk amplifies banks' expectations for the economy in general and for the credit market in particular.

According to Borio et al. (2001, p. 2), an alternative explanation for the procyclicality of the financial system lies in the difficulties of measuring the risk over time. Minsky (1986) and Kindleberger (1996) argue that difficulties in measuring credit risk lead to its underestimation in times of euphoria and overestimation in times of depression. In the euphoria, the underestimation of risk is reflected in the excessively rapid growth of credit, the exaggerated increase in the value of collateral, the reduction of spreads and the

maintenance of low levels of capital and provisions. In depression times, the opposite occurs. This behavior of the financial system amplifies the effects of the economic cycle, increasing its amplitude and lengthening its duration.

The loan loss provision (PROV) expresses the estimated loss in the loan portfolio and provides an example of the procyclicality of banking activity. In Brazil, PROV combines two different approaches to quantify the losses arising from the credit risk: the incurred loss and the expected loss. Incurred loss is objective and determined by regulation in accordance with the time pass due. However, expected loss is an additional provision discretionarily defined by banks.

Figure 2. Performance of the loan loss provisions for the Brazilian financial system, state-owned and private owned segments



Note: aggregate monthly data, values in percentage points The hatched area corresponds to the 12 month crisis period.

Source: CBB, IFdata, authors'elaboration.

So, it reflects the expectation of the financial system about the behavior of the credit market. Thus, combining both perspectives, incurred and expected losses, embeds a forward-looking ability in the loan loss provision, namely the ability to anticipate bank behavior in accordance with the risk perception regarding the credit market. Fig. 3 shows the behavior of PROV in the pre- and post-crisis periods. It reveals a gradual convergence of the three strands of analysis in the pre-crisis period and a post-crisis divergence. Although both private-owned and state-owned segments show an increase in provisions in the twelve months following the crisis, the intensity of the reaction observed in the private-owned segment is much higher than in the state-owned segment, including a reversal of pre- and post-crisis roles.

In this context, and taking into account the ineffectiveness of the classic instruments of monetary policy to reactivate the credit market (Mishkin, 2010, p. 10), the existence of complementary countercyclical policies is necessary. In contrast to developed economies, emerging countries rely on official banks to minimize the effects of the contraction of private credit, with positive implications for the resumption of the economic dynamism (World Bank, 2013, p. 102). The adoption of this complementary strategy and the observed positive results renewed the interest in the role of state activism in financial intermediation (Cunha, Lélis & Lopes, 2015, p. 2) and agree with Micco and Panizza (2006, p. 250) who found evidences that the performance of state-owned banks in the credit market is less procyclical than that of private-owned banks and, in addition, their performance contributes to smooth the credit market, mitigating the effects of the economic cycle.

According to Stiglitz (1993, p. 32) and Peria and Mody (2004), in less developed economies, private

credit alternatives offer a limited set of possibilities to access financing, since capital markets are not sufficiently developed and private-owned banks favor liquidity, opting for short-term and lower-risk credit operations. The role of state-owned banks would correct this market failure and provide the necessary financing for long-term and high-risk credit operations, as well as those with high social returns.

In Brazil, government influences the credit market through state-owned banks and earmarked credit. Historically, the role of state-owned banks is focused on the granting of earmarked credit, either directly, or through a private bank, with the primary origination of credit being done by a state-owned bank. Earmarked credit mainly comprehends loans destined to finance agriculture, exports and mortgages, which involves subsidized rates and usually does not attract the private-owned banking segment (Sapienza, 2004).

However, the role of state-owned banks in Brazil is not limited to earmarked credit, but also encompasses other types of credit usually explored by the private-owned segment. Hence the state-owned segment competes directly with private-owned banks and can assume their role in times of credit contraction (Bonomo, Brito & Martins, 2015).

But how to measure these turning points, when the private role in financial intermediation is replaced with state-owned banks? Literature often proxies financial intermediation with balance-based measures such as variations around the credit to GDP ratio. However this approach fails to capture the liquidity dimension that characterizes financial intermediation and only indirectly reflects it. Balance-based measures also vary slowly and are not adequate to capture sudden changes. For their turn, cash flow-based measures

are ideal because they reveal real-time interruptions and behavior reversals in financial intermediation.

2.1. Measuring the credit cash flow (CCF)

When analyzing whether financial development promotes economic growth, King and Levine (1993) use the amount of credit granted to nonfinancial private firms as numerator and GDP and total credit as denominators of financial intermediation proxies. Levine, Loayza and Beck (2000) assess whether exogenous components of the development of financial intermediation influence economic growth through three measures of financial intermediation, also balance-based: (i) the ratio between the net liabilities of the financial system and GDP; (ii) the ratio between the assets of commercial banks and the central bank; and (iii) the ratio between the amount of credit granted to the private sector and GDP. Beck and Levine (2004) analyze the effect of financial intermediation and the capital market on economic growth and use the ratio between commercial banks' lending to the private sector and GDP. More recently, Kasselaki and Tagkalakis (2013), analyzing the relationship between indexes of financial strength and episodes of financial crisis, use the ratio between the amount of domestic credit granted to private companies and GDP.

Cash flow information has long been pointed out as essential to users. The US regulator (FASB) argues that the first objective of the financial statements is to provide information that helps investors, creditors and others to assess the amounts, timing and uncertainty of future business cash flows. The literature on

variables and methods for estimating cash flows is abundant (Bowen, Burgstahler & Daley, 1986) and reveals the importance of cash flow information.

A novelty of this study is to use a variable built upon cash flow data to proxy the behavior of financial intermediation. Unlike measures around the credit portfolio balance, the credit cash flow (CCF) is less subject to purely accounting effects, such as the accrual of interest and the exchange rate variation. It presents the net financial amount of credit granted (when negative) or received (when positive) in the period. Therefore, it signals the financial system risk appetite, revealing its expectations regarding the behavior of the credit market and proving to be useful to investigate turning points, such as the outbreak of a crisis and the ulterior recovery.

The CCF is calculated following Antunes et al. (2017) and Antunes et al. (2018). The authors use the same procedure adopted in the preparation of the statement of cash flows using the indirect method. The statement of cash flows is a mandatory financial statement for all public companies, according to the Brazilian Securities and Exchange Commission. Brazilian regulation mirrors IASB (IAS 7)¹ and FASB (SFAS 95)² that demand the same for the companies under their jurisdictions. The rationale used assumes that changes in the book balance of any account between two subsequent periods are the result of accounting events (revenues and expenses) and financial events (cash flows), according to equation I below.

$$\text{Book Balance}_t - \text{Book Balance}_{t-1} = + / - \text{Accounting Events}_t + / - \text{Cash Flow Events}_t \quad (\text{I})$$

¹ International Accounting Standards Board.

² Financial Accounting Standards Board.

Table 1 below presents the most common accounting and financial events used to calculate CCF.

Table 1. Common accounting and financial events used to calculate the credit cash flow (CCF)

Variable	Accounting events	Financial events
CCF	- Accrual of interest - Loan loss provisioning - Loan loss provision reversals - Recovery of write-offs	- Credit proceedings - Credit granting

When removing the effects of accounting events on the variation of the book balance, the remaining variation corresponds to the effects of financial events (cash flows). Thus, by rewriting equation I for CCF, the book balance is replaced with credit operations (COp), accounting events are replaced with revenues and expenses, and financial events are replaced with credit proceedings and credit grantings:

$$COp_t - COp_{t-1} = Revenues_t - Expenses_t + Grantings_t - Proceedings_t \quad (II)$$

Rewriting equation II to isolate the financial events:

$$Proceedings_t - Grantings_t = -(COp_t - COp_{t-1}) + Revenues_t - Expenses_t \quad (III)$$

Finally, replacing the financial events with CCF in equation III:

$$CCF_t = -(COp_t - COp_{t-1}) + Revenues_t - Expenses_t \quad (IV)$$

Thus, the CCF expresses the net amount of funds received or disbursed by a bank in relation to its credit

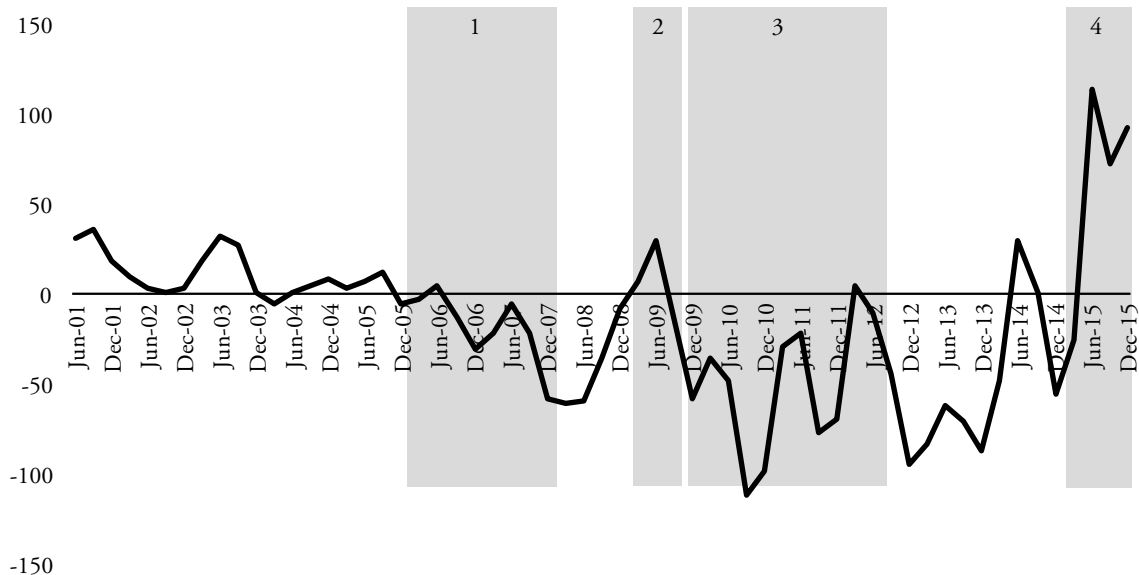
portfolio, evidencing its risk appetite and the intensity of the financial intermediation.

Fig. 3 shows the performance of fifteen years of the CCF between december 2000 and december 2015. These are aggregate monthly data for the Brazilian Financial System (BFS), accumulated in a six-month moving average. The highlights are events that significantly affected the decision to enter the credit market, such as³: (1) regulation of the payroll-discounted loan that intensified the channeling of funds to this segment; (2) the great financial crisis that increased risk-aversion dramatically; (3) the rapid recovery of the crisis with the government countercyclical stimulus to credit, the boom in real estate credit and auto financing, again intensifying financial intermediation; and (4) the fall in GDP and the political crisis that culminated in the process of impeachment, and intense financial disintermediation. Another relevant aspect to highlight is the credit growth in the Brazilian economy. Between March 2005 and November 2012, the credit to GDP ratio doubled in Brazil, from 25.1% to 50.3%⁴. The predominantly negative behavior of the credit cash flow throughout this period, except for the financial crisis, corroborates the facts.

In times of economic expansion, when the credit market scenario is positive, CCF behaves negatively, that is, credit grantings exceed credit proceedings, resulting in net outflow of cash to the credit portfolio (events 1 and 3). On the other hand, in times of financial stress, characterized by the deterioration of the credit risk scenario, CCF becomes positive and expresses net inflow of cash from the credit portfolio (events 2 and 4).

³ See De Mello and Garcia (2012) for a brief history of the Brazilian financial intermediation evolution until the GFC.

⁴ Source: Central Bank of Brazil website, time series management system (SGS), access in 11.30.2016: <https://www3.bcb.gov.br/sgspub/localizarseries/localizarSeries.do?method=prepararTelaLocalizarSeries>

Figure 3. Performance of the credit cash flow (CCF) in Brazil, from December 2000 to December 2015.

Note: aggregate monthly data for the Brazilian Financial System, accumulated in a six-month moving average, values in R\$ billions. The highlights refer to: (1) the positive effects of the regulation of the payroll-discounted loans; (2) the negative effects of the financial crisis; (3) the positive effects of the government countercyclical stimulus to credit, the boom in real estate credit and auto financing; and (4) the negative effects of the political crisis that culminated in the process of impeachment and the fall in GDP.

Crummenerl, Heldt and Koziol (2014, p. 176) argue that, in a credit constraint scenario, the origination of a new credit can be carried out or rejected depending on the expectation of each bank in relation to its own credit portfolio. Hence, the private-owned and state-owned segments of the BFS can present different behaviors, depending on their perception of risk.

Thus, the investigation of the relationship between the credit cash flow (CCF) and the credit risk in crisis and non-crisis times, may offer more precise answers to the research problem. Hence, the hypotheses formulated for the study are:

H₁: The financial crisis changed the relationship between the behavior of the credit activity and the credit risk perception regarding the BFS.

H₂: The financial crisis changed the relationship between the behavior of the credit activity and the credit risk perception regarding the state-owned segment.

H₃: The financial crisis changed the relationship between the behavior of the credit activity and the credit risk perception regarding the private-owned segment.

3. Data and methodology

3.1. Data

Our database is obtained from the CBB financial report analysis (IF.Data) and includes: a set of 101 financial institutions (88 under private control and 13 state-owned) and quarterly observations for the

period of December 2000 to December 2015, totaling a panel with 61 quarterly observations.

Following Antunes et al. (2017) and Antunes et al. (2018), credit cash flow (CCF) is the net cash flow resulting from the proceedings of existing loans and the granting of new loans. In determining the CCF, the proceedings of existing loans present a positive sign, while the grantings of new loans assume a negative sign. When proceedings exceed grantings, CCF is positive, characterizing net inflow of cash from the credit portfolio. Conversely, when grantings exceed proceedings, CCF assumes negative values, characterizing net cash outflow to the credit portfolio. CCF is the dependent variable used in the analysis.

According to Guo (2013, p. 280), “credit risk is the potential loss that arises from the possibility that a business will fail to fully meet its contractual obligations on time”. Credit risk is expected to affect cash flow generation as the increase in delinquency reflects the deterioration of the credit risk scenario and inhibits banks’ risk-taking, reducing credit activity. In order to capture the effects of credit risk on the credit cash flow, the ratio between the loan loss provision and the credit portfolio is used as a measure of credit risk. PROV reflects the sum of incurred and expected losses of the credit portfolio. A positive result is expected between PROV and CCF, as the worsening of credit risk leads to the credit market retraction, when proceedings are privileged and credit grantings are avoided.

In Brazil, the basic interest rate is the main monetary policy instrument. IR is the rate of change of the basic interest rate and captures the impact of monetary policy on the activity of the financial system, which is evidenced through the risk-taking channel (Borio & Zhu, 2012; Gambacorta, 2009). A positive

relationship is expected between IR and CCF, since the increase in the interest rate leads to a worse risk perspective in the financial system and consequently to the reduction in the credit activity.

In order to capture the autoregressive component of CCF, the one-period lagged of the dependent variable was included as an exogenous variable in the model. Thus, the effect of endogeneity on the models is mitigated by giving the analysis a dynamic panel bias (Wooldridge, 2002).

The literature on banking behavior usually takes into account the influences of regulatory capital and size. Thus, in order to minimize the omitted variable bias, the following variables were included in the empirical model:

- Regulatory capital - The relevance of the Basel Capital Adequacy Ratio as an indicator of financial soundness recommends the use of this variable. A positive relationship is expected between regulatory capital and CCF, since banks with greater solvency tend to engage less in credit activity. The strengthening of the capital base is compatible with a lower risk-taking. To capture this effect, the excess of regulatory capital over the minimum required (BUF) is used in the model (Antunes et al., 2017).
- Size - access to funding is facilitated by the size of the bank and the respective capillarity, generally through a large network of branches. As a consequence, larger banks are expected to engage more in the credit market (Bhagat, Bolton & Lu, 2015). The natural logarithm of the total assets was used as a proxy of size (SIZE).

Table 2 below presents the descriptive statistics of the data.

Table 2. Descriptive Statistics

Brazilian Financial System	Mean	Median	Maximum	Minimum	Standard dev.	Observations
CCF	-0.005	0.004	1.848	-2.000	0.230	5272
PROV	0.048	0.036	1.000	0.000	0.056	5272
IR	-0.026	0.000	5.140	-5.070	1.424	5272
BUF	2.277	1.698	48.284	-2.381	2.047	5272
SIZE	21.622	21.499	27.967	15.549	2.200	5272
LCF	0.015	0.008	2.000	-1.978	0.246	5272
State-Owned segment	Mean	Median	Maximum	Minimum	Standard dev.	Observations
CCF	0.008	0.006	0.817	-0.590	0.071	780
PROV	0.072	0.061	0.360	0.006	0.045	780
IR	-0.034	-0.005	5.140	-5.070	1.471	780
BUF	1.997	1.657	5.832	0.234	0.926	780
SIZE	23.166	22.817	27.967	19.405	2.194	780
LCF	0.010	0.012	0.246	-0.488	0.058	780
Private-Owned segment	Mean	Median	Maximum	Minimum	Standard dev.	Observations
CCF	-0.008	0.004	1.848	-2.000	0.247	4492
PROV	0.044	0.031	1.000	0.000	0.057	4492
IR	-0.025	0.000	5.140	-5.070	1.416	4492
BUF	2.325	1.704	48.284	-2.381	2.181	4492
SIZE	21.354	21.306	27.882	15.549	2.088	4492
LCF	0.016	0.007	2.000	-1.978	0.266	4492

Note: CCF stands for credit cash flow; PROV is the ratio of the loan loss provision and the credit portfolio; IR is the rate of change of the basic interest rate; BUF is the ratio between regulatory capital and the regulatory minimum; SIZE is the log of total assets; LCF stands for liabilities cash flow and is used in the robustness check.

3.2. Research design

From the variables described, three models were developed to observe the effects of the credit risk on credit activity. The baseline model is so defined:

$$CCF_{i,t} = \beta_0 + \beta_1 PROV_{i,t} + \beta_2 IR_{i,t} + \beta_3 CCF_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

Where the sub-index $i = 1, 2, \dots, 101$ refers to financial institutions; $t = 1, 2, \dots, 61$, refers to the time periods; and $\varepsilon_{i,t}$ is the error term.

The next two models include the variables BUF and SIZE, as follows.

$$CCF_{i,t} = \beta_4 + \beta_5 PROV_{i,t} + \beta_6 IR_{i,t} + \beta_7 CCF_{i,t-1} + \beta_8 BUF_t + v_{i,t}$$

$$CCF_{i,t} = \beta_9 + \beta_{10} PROV_{i,t} + \beta_{11} IR_{i,t} + \beta_{12} CCF_{i,t-1} + \beta_{13} BUF_t + \beta_{14} SIZE_{i,t} + \psi_{i,t}$$

A second baseline model was built by including a dummy for the financial crisis (equation 2). Based on

the behavior of non-earmarked credit granting presented in Fig. 1, the length of the crisis in Brazil was arbitrated in twelve months. Thus, CRISIS assumes value 1 in the four quarters as of September 2008 (last quarter of 2008 and the first three quarters of 2009), that marks the event accepted as the epicenter of the financial crisis, the fall of the investment bank Lehman Brothers, and zero elsewhere. A positive relationship between CRISIS and CCF is expected regarding the private-owned segment, reflecting the deterioration in the risk perspectives and the consequent retraction in the credit market. As for the state-owned segment, a negative relationship between CRISIS and CCF is expected as a consequence of the countercyclical role played by this segment (Bonomo et al., 2015). Regarding the BFS, the result will depend on which segment will prevail over the other. BUF and SIZE are also included in the model.

$$CCF_{i,t} = \beta_0 + \beta_1 PROV_{i,t} + \beta_2 IR_{i,t} + \beta_3 CCF_{i,t-1} + \beta_4 CRISIS_{i,t} + \Phi_{i,t} \quad (2)$$

In order to test the validity of the hypotheses developed, an empirical analysis was conducted using the fixed effects ordinary least squares method (FOLS), according to the result obtained in the Hausman Test. Models 1 and 2 are applied to the BFS, as well as to the state-owned and private-owned segments.

4. Results

A preliminary analysis of the relationship between the variables used in the models can be done through the correlation matrix presented in Table 3. In particular, the correlation between the credit cash flow (CCF) and the credit risk (PROV) indicates an aligned behavior, suggesting that an increase in credit risk increases the cash drained from the credit portfolio, reducing the credit activity.

Table 3. Correlation Matrix

Brazilian Financial System	CCF	PROV	IR	BUF	SIZE	LCF
CCF	1					
PROV	0.177	1				
IR	0.038	0.026	1			
BUF	-0.039	-0.076	-0.033	1		
SIZE	0.014	-0.004	0.015	-0.328	1	
LCF	-0.376	-0.083	-0.025	-0.004	-0.029	1
State-Owned segment	CCF	PROV	IR	BUF	SIZE	LCF
CCF	1					
PROV	0.344	1				
IR	0.055	-0.027	1			
BUF	0.069	0.299	-0.067	1		
SIZE	-0.186	-0.217	0.018	-0.456	1	
LCF	-0.239	-0.139	-0.065	-0.079	0.031	1
Private-Owned segment	CCF	PROV	IR	BUF	SIZE	LCF
CCF	1					
PROV	0.172	1				
IR	0.039	0.035	1			
BUF	-0.040	-0.089	-0.031	1		
SIZE	0.018	-0.038	0.017	-0.326	1	
LCF	-0.378	-0.083	-0.024	-0.004	-0.0322	1

Note: CCF stands for credit cash flow; PROV is the ratio of the loan loss provision and the credit portfolio; IR is the rate of change of the basic interest rate; BUF is the ratio between regulatory capital and the regulatory minimum; SIZE is the log of total assets; LCF stands for liabilities cash flow and is used in the robustness check.

The results of the baseline model 1 and its variations are presented in Table 4 below.

Table 4. Credit Cash Flow - FOLS estimation (CCF)

Regressors:	BFS			STATE OWNED BANKS			PRIVATE OWNED BANKS		
	Eq(1a)	Eq(1b)	Eq(1c)	Eq(1d)	Eq(1e)	Eq(1f)	Eq(1g)	Eq(1h)	Eq(1i)
C	-0.035*** (0.007)	-0.042*** (0.012)	-0.165 (0.162)	-0.029** (0.012)	-0.035*** (0.013)	-0.023 (0.200)	-0.035*** (0.007)	-0.042*** (0.013)	-0.165 (0.173)
PROV	0.692*** (0.147)	0.696*** (0.149)	0.702*** (0.151)	0.501*** (0.179)	0.473*** (0.176)	0.468** (0.230)	0.705*** (0.164)	0.711*** (0.167)	0.712*** (0.167)
IR	0.584*** (0.190)	0.598*** (0.190)	0.583*** (0.190)	0.262* (0.155)	0.277* (0.144)	0.278* (0.148)	0.634*** (0.225)	0.649*** (0.224)	0.634*** (0.224)
CCF(-1)	0.039 (0.056)	0.039 (0.055)	0.039 (0.055)	0.175 (0.148)	0.174 (0.150)	0.174 (0.149)	0.038 (0.056)	0.037 (0.056)	0.037 (0.056)
BUF		0.003 (0.004)	0.003 (0.004)		0.003 (0.005)	0.003 (0.005)		0.003 (0.004)	0.003 (0.004)
SIZE			0.005 (0.007)			-0.000 (0.007)			0.005 (0.007)
NOBS	5241	5241	5241	780	780	780	4461	4461	4461
adj. R2	0.06	0.06	0.06	0.23	0.24	0.23	0.06	0.06	0.06

Note 1: CCF stands for credit cash flow; PROV is the ratio of the loan loss provision and the credit portfolio; IR is the rate of change of the basic interest rate; BUF is the ratio between regulatory capital and the regulatory minimum; SIZE is the log of total assets.

Note 2: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. FOLS – OLS fixed effects.

The positive and significant relationship between CCF and PROV is evident in the three approaches analyzed and is consistent with the expectational component concerning the behavior of the credit market embedded in PROV. As Antunes, De Moraes and Montes (2016) point out, PROV expresses the amount expected to be lost in the credit portfolio and combines objective values, derived from default events, such as delinquency, and subjective values, derived from banks' perspectives about the behavior of the credit market (Jia-Liu, 2015, pp. 599-600). Thus, an increase in the credit risk agrees with an increase in the cash removed from the loan portfolio. It is important to highlight the magnitude of the PROV coefficients in the analysis. Although stable in all specifications, the coefficients of the private segment are higher than those of the state-owned seg-

ment, suggesting a more intense relationship between the behavior of the credit market and the credit risk in the private segment than in the state-owned segment.

The positive and significant relationship between IR and CCF agrees with the literature regarding the risk-taking channel, and suggests that the credit market retracts when monetary policy contracts. According to Borio and Zhu (2012) and Gambacorta (2009), monetary policy affects the risk-taking channel, worsening expectations for the credit market.

It is also worth highlighting the intense reduction in the magnitude and significance of the influence of IR on CCF in the state-owned segment, which may suggest flexibility in the reaction of the credit behavior to the credit risk perspectives.

Regarding control variables, BUF presents the expected sign, but it is not significant, suggesting the prevalence of credit risk and interest rate in explaining the behavior of the credit market. As for the variable SIZE, the results are contradictory and without significance.

The inclusion of the crisis dummy in model 2 offers an interesting perspective for the analysis, presented in Table 5 below.

The relationship between the independent variables and CCF does not change after the inclusion of the crisis dummy. However, the relationship between CRISIS and CCF is different for all groups. While positive and significant for the private segment, indicating a credit crunch in times of crisis, it presents opposite behav-

ior for the state-owned segment. These results suggest a countercyclical reaction of the state-owned segment in the financial crisis, granting credit in the midst of the crisis. This result agrees with Duprey (2015), who argues that the actions of state-owned banks are asymmetric throughout the economic cycle, reacting countercyclically in periods of crisis.

Regarding the BFS, CRISIS is not significant, pointing to a negligible repercussion of the financial crisis in the behavior of the Brazilian credit market, from the credit cash flow perspective, thus rejecting H_1 .

On the other hand, the results for the state-owned and private segments are significant and opposite, revealing opposed and balanced behavior of the seg-

Table 5. Credit Cash Flow - FOLS estimation (CCF)

Regressors:	BFS			STATE OWNED BANKS			PRIVATE OWNED BANKS		
	Eq(2a)	Eq(2b)	Eq(2c)	Eq(2d)	Eq(2e)	Eq(2f)	Eq(2g)	Eq(2h)	Eq(2i)
C	-0.035*** (0.007)	-0.042*** (0.012)	-0.170 (0.163)	-0.028** (0.012)	-0.034** (0.013)	-0.025 (0.201)	-0.039*** (0.007)	-0.046*** (0.013)	-0.135 (0.173)
PROV	0.692*** (0.148)	0.695*** (0.149)	0.701*** (0.152)	0.495*** (0.181)	0.467*** (0.177)	0.464** (0.233)	0.700*** (0.160)	0.706*** (0.163)	0.707*** (0.163)
IR	0.595*** (0.192)	0.610*** (0.192)	0.597*** (0.192)	0.278* (0.156)	0.293** (0.145)	0.293* (0.150)	0.863*** (0.240)	0.877*** (0.239)	0.862*** (0.239)
CCF(-1)	0.039 (0.056)	0.039 (0.055)	0.039 (0.055)	0.174 (0.147)	0.172 (0.149)	0.172 (0.148)	0.035 (0.056)	0.035 (0.056)	0.035 (0.056)
BUF		0.003 (0.004)	0.003 (0.004)		0.003 (0.004)	0.003 (0.005)		0.003 (0.004)	0.003 (0.004)
SIZE			0.005 (0.007)			-0.000 (0.007)			0.004 (0.007)
CRISIS	-0.006 (0.009)	-0.006 (0.009)	-0.007 (0.009)	-0.009** (0.004)	-0.009** (0.004)	-0.009** (0.004)	0.059*** (0.011)	0.059*** (0.011)	0.058*** (0.011)
NOBS	5241	5241	5241	780	780	780	4461	4461	4461
adj. R2	0.06	0.06	0.06	0.24	0.24	0.23	0.06	0.06	0.06

Note 1: CCF stands for credit cash flow; PROV is the ratio of the loan loss provision and the credit portfolio; IR is the rate of change of the basic interest rate; BUF is the ratio between regulatory capital and the regulatory minimum; SIZE is the log of total assets; CRISIS is the dummy for the GFC.

Note 2: Note2: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. FOLS – OLS fixed effects.

ments, which resulted in an absence of effects on the BFS. While the private sector reacted to the crisis by increasing the credit portfolio's cash generation, in accordance with the worsening credit risk (Chan-Lau & Chen, 1998, p. 4), the state-owned segment acted in the opposite direction, injecting cash in the credit portfolio, despite the worsening credit risk (Bertay, Demirgüç-Kunt & Huizinga, 2014). Such an action agrees with Claessens, Feijen and Laeven (2018) and Carvalho (2014) and suggests the presence of an external influence, possibly the governmental activism in the banking activity, determining a countercyclical position in the credit market. These results confirm H_2 and H_3 .

5. Robustness checks

In order to corroborate the results of the previous analysis, the same procedure was repeated under the perspective of the liabilities. As Mishkin (1992) points out, financial stability is compromised when financial intermediation is interrupted. From the financial intermediary standpoint, financial intermediation is a process that encompasses cash inflows from surplus income units and cash outflows to deficit income units. The latter was proxied in this study as the credit cash flow (CCF), for the credit activity is the main channel through which cash is pumped into financial intermediation. The same rationale is used to derive the relationship between financial intermediaries and surplus income units. Following Antunes, De Moraes and Rodrigues (2018), the liabilities cash flow (LCF) is the net cash flow resulting from the inflow of new funding and the outflow of existing funding. In the determination of LCF, the entry of new funding presents a positive sign, while the redemption of existing funding assumes a negative sign. When the inflow of new funding exceeds the redemption of existing funding, LCF is positive. Conversely, when the redemption

of existing funding exceeds the entry of new funding, the LCF assumes negative values.

Because they assume opposite positions in the balance sheet of the financial intermediaries, since they derive from assets and liabilities, CCF and LCF present opposite signs for the situations of net inflows and net outflows. So, when replacing CCF with LCF in the analysis, as shown in model 3 below, results are expected to present opposite signs.

$$LCF_{i,t} = \beta_0 + \beta_1 PROV_{i,t} + \beta_2 IR_{i,t} + \beta_3 LCF_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

Where the sub-index $i = 1, 2, \dots, 101$ refers to financial institutions; $t = 1, 2, \dots, 61$, refers to the time periods; and $\varepsilon_{i,t}$ is the error term. As in the previous analysis, two other models include the variables BUF and SIZE. Table 6 below presents the results of the analysis.

The relationship between LCF and PROV is negative and significant in the three approaches and is consistent with the expectation for the behavior of the credit market embedded in this variable. The increase in credit risk reduces financial intermediation activity, motivating the net reduction of funding. This result, combined with the relationship between CCF and PROV, is consistent and presents the behavior of financial intermediation from the perspective of financial flows. The worsening scenario for the credit market (increase in credit risk) reduces the financial intermediation process, increasing the credit cash flow (net cash inflow from the credit portfolio) and reducing liabilities cash flow (net cash outflow from liabilities).

The same reasoning applies to the relationship between LCF and IR. The negative and significant coefficients found agree with the literature regarding the effects of the monetary policy on the risk-taking channel (Borio & Zhu, 2012 and Gambacorta, 2009).

Table 6. Liabilities Cash Flow - FOLS estimation (LCF)

Regressors:	BFS			STATE OWNED BANKS			PRIVATE OWNED BANKS		
	Eq(3a)	Eq(3b)	Eq(3c)	Eq(3d)	Eq(3e)	Eq(3f)	Eq(3g)	Eq(3h)	Eq(3i)
C	0.031*** (0.006)	0.038*** (0.010)	0.179 (0.185)	0.025*** (0.003)	0.031*** (0.002)	-0.131 (0.110)	0.031*** (0.006)	0.038*** (0.011)	0.185 (0.199)
PROV	-0.399*** (0.129)	-0.403*** (0.129)	-0.410*** (0.131)	-0.224*** (0.055)	-0.196*** (0.064)	-0.129** (0.052)	-0.417*** (0.144)	-0.424*** (0.146)	-0.425*** (0.145)
IR	-0.497** (0.253)	-0.511** (0.255)	-0.493* (0.265)	-0.263** (0.120)	-0.278** (0.125)	-0.287** (0.123)	-0.534* (0.299)	-0.549* (0.301)	-0.530* (0.313)
LCF(-1)	-0.005 (0.042)	-0.006 (0.043)	-0.006 (0.042)	0.064 (0.049)	0.061 (0.050)	0.057 (0.047)	-0.005 (0.043)	-0.007 (0.043)	-0.007 (0.043)
BUF		-0.002 (0.003)	-0.003 (0.003)		-0.003* (0.002)	-0.002 (0.002)		-0.003 (0.003)	-0.003 (0.003)
SIZE			-0.006 (0.008)			0.006 (0.004)			-0.006 (0.009)
NOBS	5241	5241	5241	780	780	780	4461	4461	4461
adj. R2	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03

Note 1: LCF stands for liabilities cash flow; PROV is the ratio of the loan loss provision and the credit portfolio; IR is the rate of change of the basic interest rate; BUF is the ratio between regulatory capital and the regulatory minimum; SIZE is the log of total assets.

Note 2: Note2: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. FOLS – OLS fixed effects.

In both analyzes, the results are stable, although the coefficients in the private segment are higher than in the state-owned segment, suggesting a more intense association between the funding behavior and the credit risk, as well as the interest rate in the private segment.

As for the control variables, the results are similar to the previous analysis and also suggest the prevalence of the credit risk and the interest rate in explaining the behavior of funding.

Table 7 presents the results after the addition of the crisis dummy to the analysis, as in model 4 below.

$$LCF_{i,t} = \beta_0 + \beta_1 PROV_{i,t} + \beta_2 IR_{i,t} + \beta_3 LCF_{i,t-1} + \beta_4 CRISIS_{i,t} + \Omega_{i,t} \quad (4)$$

The results are very similar to those obtained in the previous analysis. The relationship of the independent variables with LCF does not change with the inclusion of the crisis dummy and the aspect to be commented is the effect of CRISIS on LCF. Although less intense than the results of the previous analysis, the relationship between LCF and CRISIS corroborates those obtained for CCF and CRISIS. While it is negative and significant for the segment of private banks, indicating a downturn in funding during crisis times, it presents an opposite behavior for the state-owned segment, although not significant. These results also suggest an opposite behavior, concerning the state-owned and private segments in the financial crisis. While the private segment removed cash from funding, reducing financial intermediation in response to

Table 7. Liabilities Cash Flow - FOLS estimation (LCF)

Regressors:	BFS			STATE OWNED BANKS			PRIVATE OWNED BANKS		
	Eq(4a)	Eq(4b)	Eq(4c)	Eq(4d)	Eq(4e)	Eq(4f)	Eq(4g)	Eq(4h)	Eq(4i)
C	0.030*** (0.006)	0.037*** (0.011)	0.189 (0.187)	0.024*** (0.003)	0.030*** (0.002)	-0.130 (0.108)	0.033*** (0.006)	0.040*** (0.011)	0.167 (0.200)
PROV	-0.398*** (0.129)	-0.402*** (0.130)	-0.410*** (0.131)	-0.220*** (0.054)	-0.192*** (0.063)	-0.126** (0.052)	-0.413*** (0.144)	-0.420*** (0.145)	-0.421*** (0.144)
IR	-0.525** (0.250)	-0.539** (0.253)	-0.524** (0.260)	-0.273** (0.126)	-0.287** (0.130)	-0.296** (0.128)	-0.674** (0.317)	-0.688** (0.320)	-0.666** (0.336)
LCF(-1)	-0.005 (0.042)	-0.006 (0.043)	-0.007 (0.042)	0.063 (0.047)	0.060 (0.049)	0.056 (0.045)	-0.006 (0.043)	-0.007 (0.044)	-0.008 (0.043)
BUF		-0.002 (0.003)	-0.003 (0.003)		-0.003* (0.002)	-0.002 (0.002)		-0.002 (0.003)	-0.003 (0.003)
SIZE			-0.006 (0.008)			0.006 (0.004)			-0.005 (0.009)
CRISIS	0.015 (0.013)	0.015 (0.013)	0.017 (0.014)	0.005 (0.007)	0.005 (0.007)	0.005 (0.007)	-0.036*** (0.011)	-0.036*** (0.011)	-0.035*** (0.012)
NOBS	5241	5241	5241	780	780	780	4461	4461	4461
adj. R2	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03

Note 1: CCF stands for credit cash flow; PROV is the ratio of the loan loss provision and the credit portfolio; IR is the rate of change of the basic interest rate; BUF is the ratio between regulatory capital and the regulatory minimum; SIZE is the log of total assets; CRISIS is the dummy for the GFC.

Note 2: Note2: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. FOLS – OLS fixed effects.

the crisis, the state-owned segment may have acted countercyclically, seeking new funding to fill the gap left by the private segment.

The contribution of this study to the literature is twofold. The consistency of the results obtained confirms the relevance of the state-owned banks' segment as a countercyclical instrument to be used in crisis times. Perceiving risk under a different paradigm enables state-owned banks to play an important role during downturns. They can act as circuit-breakers, which stops the hysteria and resumes activity in more suitable terms.

It also accredits the cash flow based measures used as an additional toolkit to be used in financial stability management. Such measures can help the regulator to

better understand banking behavior related to financial intermediation.

5. Conclusions

This study investigated the effects of the financial crisis on the behavior of the credit market in the Brazilian financial system (BFS) through the analysis of state-owned and private-owned banks.

From the credit portfolio cash flow generation standpoint, there was no repercussion of the great financial crisis in the BFS, hence rejecting H_1 . This apparent neutrality, however, hides the intense friction between opposing behaviors involving the state-owned and private-owned segments that compose it. Thus, the

absence of repercussion in the BFS that the empirical analysis supports is rather the offset of intense and opposing forces than the result of an erratic behavior of the analyzed segments. These results confirm H_2 and H_3 . According to its state-owned and private-owned components, the BFS was hit by the crisis and the balance between the reactions of these segments contributed to the maintenance of its stability.

Except for the crisis period, the state-owned and private-owned segments presented similar reactions to credit risk, albeit with different emphases, as the PROV and IR coefficients suggest. On the one hand, the private segment adjusts its appetite for credit to the credit risk it reports. On the other hand, the state-owned segment is less assertive, reacting less intensely to credit risk, suggesting the possibility of an external agent influencing its credit appetite. As for the crisis, the countercyclical action of the state-owned segment in the credit market reflects the government's efforts to contain the damages caused by the financial crisis and the reaction of the private banks to it. The effort was successful, since Brazil was mildly affected by the crisis. A question still to be answered is whether the behavior of credit losses will follow historical averages.

The coexistence of two financial subsystems with such different reactions suggests interesting research possibilities and points to the limitations of this study. Reactions, both in the private and state-owned segments, may not have been homogeneous, opening up the possibility of new subsystems. There are differences of niche and complexity that could enrich the analysis conducted in this study.

References

- Antunes, J. A. P., De Moraes C. O., & Montes, G. C. (2016). How does capital regulation react to monetary policy? New evidence on the risk-taking channel. *Economic Modelling*, 56, 177-186. <https://doi.org/10.1016/j.econmod.2016.03.025>
- Antunes, J. A. P., De Moraes, C. O., & Rodrigues, A. (2017). How financial intermediation impacts on financial stability? *Applied Economics Letters*, 25, 1135-1139. <https://doi.org/10.1080/13504851.2017.1400647>
- Antunes, J. A. P., De Moraes, C. O., & Rodrigues, A. (2018). Financial Intermediation Analysis from Financial Flows. *Journal of Economic Studies* (forthcoming).
- Barcellos, V. & De Mendonça, H. (2015). Securitization and credit risk: Empirical evidence from an emerging economy. *North American Journal of Economics and Finance*, 32, 12-28. <https://doi.org/10.1016/j.najef.2015.01.002>
- Beck, T. & Levine, R. (2004). Stock markets, banks, and growth: Panel evidence. *Journal of Banking & Finance*, 28, 423-442. [https://doi.org/10.1016/S0378-4266\(02\)00408-9](https://doi.org/10.1016/S0378-4266(02)00408-9)
- Bernanke, B. S., Gertler, M., & Gilchrist, S. (1999). The financial accelerator in a quantitative business cycle framework. In J. Taylor & M. Woodford (coords.), *Handbook of Macroeconomics* (pp. 1341-1393). Amsterdam: North-Holland. [https://doi.org/10.1016/S1574-0048\(99\)10034-X](https://doi.org/10.1016/S1574-0048(99)10034-X)
- Bertay, A. C., Demirgüç-Kunt, A., & Huizinga, H. (2014). Bank ownership and credit over the business cycle: Is lending by state banks less procyclical? *Journal of Banking & Finance*, 50, 326-339. <https://doi.org/10.1016/j.jbankfin.2014.03.012>
- Bhagat, S., Bolton, B., & Lu, J. (2015). Size, leverage, and risk-taking of financial institutions. *Journal of Banking & Finance*, 59, 520-537. <https://doi.org/10.1016/j.jbankfin.2015.06.018>
- Bonomo, M., Brito, R. D., & Martins, B. (2015). The after crisis government-driven credit expansion in Brazil: A firm level analysis. *Journal of International Money and Finance*, 55, 111-134. <https://doi.org/10.1016/j.jimonfin.2015.02.017>

- Borio, C., Furfine, C., & Lowe, P. (2001). Procyclicality of the financial system and financial stability: issues and policy options. In A. Crockett (coord.), *Marrying the macro and micro-prudential dimensions of financial stability* (pp. 1-57). Basle: Bank for International Settlements. <http://www.bis.org/publ/bppdf/bispap01a.pdf>
- Borio, C. & Zhu, H. (2012). Capital regulation, risk-taking and monetary policy: a missing link in the transmission mechanism? *Journal of Financial Stability* 8(4), 236-251. <https://doi.org/10.1016/j.jfs.2011.12.003>
- Bowen, R., Burgstahler, D., & Daley, L. (1986). Evidence on the relationships between earnings and various measures of cash flow. *The Accounting Review*, 61(4), 713-725. <http://www.jstor.org/stable/247365>
- Brunnermeier, M. et al. (2009). *The fundamental principles of financial regulation*. Geneva London: International Center for Monetary and Banking Studies Centre for Economic Policy Research.
- Carvalho, D. (2014). The real effects of government-owned banks: evidence from an emerging market. *The Journal of Finance*, 69, 577-609. <https://doi.org/10.1111/jofi.12130>
- Chan-Lau, J. A. & Chen, Z. (1998). Financial crisis and credit crunch as a result of inefficient financial intermediation - with reference to the Asian financial crisis. *International Monetary Fund Working Paper*, 98(127). <https://doi.org/10.2139/ssrn.96622>
- Claessens, S., Feijen, E., & Laeven, L. (2008). Political connections and preferential access to finance: the role of campaign contributions. *Journal of Financial Economics*, 88(3), pp. 554-580. <https://doi.org/10.1016/j.jfineco.2006.11.003>
- Cornett, M., McNutt, J., Strahan, P. & Tehranian, H. (2011). Liquidity risk management and credit supply in the financial crisis. *Journal of Financial Economics*, 101(2), 297-312. <https://doi.org/10.1016/j.jfineco.2011.03.001>
- Crummenerl, M., Heldt, K. & Koziol, C. (2014). Contingent capital makes credit crunches less likely: but do banks want to have it? *Review of Managerial Science*, 8(2), 175-196. <https://doi.org/10.1007/s11846-013-0100-x>
- Cunha, A., Lélis, M., & Lopes, L. (2015). *Os bancos públicos atuaram de forma contra-cíclica no Brasil durante a grande recessão?* Recuperado em 25 de agosto, 2015, de http://www.ppge.ufrgs.br/anpecsul2015/artigo/os_bancos_publicos.pdf
- De Mello, J. M. P. & Garcia, M. G. P. (2012). Bye, bye financial repression, hello financial deepening: the anatomy of a financial boom. *The Quarterly Review of Economics and Finance*, 52, 135-153. <https://doi.org/10.1016/j.qref.2011.12.009>
- Diamond, D. & Dybvig, P. (1983). Bank runs, deposit insurance, and liquidity. *Journal of Political Economy*, 91(3), 401-419. <https://doi.org/10.1086/261155>
- Duprey, T. (2015). Do Publicly Owned Banks Lend Against the Wind? *International Journal of Central Banking*, 11(2), 65-112. <http://www.ijcb.org/journal/ijcb15q2a3.pdf>
- Gambacorta, L. (2009). Monetary policy and the risk-taking channel. *BIS Quarterly Review*, (4), 43-51. http://www.bis.org/publ/qtrpdf/r_qt0912f.pdf
- Guo, L. (2013). Determinants of credit spreads: The role of ambiguity and information uncertainty. *North American Journal of Economics and Finance*, 24(C), 279-297. <https://doi.org/10.1016/j.najef.2012.10.003>
- International Monetary Fund (2009). Global Financial Stability Report: Responding to the financial crisis and measuring systemic risk. *World Economic and Financial Surveys*. <http://www.imf.org/external/pubs/ft/wfsr/2009/01/>
- Jia-Liu, Z. (2015). Cross-country study on the determinants of bank financial distress. *Revista de Administração de Empresas - FGV-EAESP*, 55(5), 593-603. <https://doi.org/10.1590/S0034-759020150510>
- Kasselaki, M. & Tagkalakis, A. (2013). Financial soundness indicators and financial crisis episodes. *Annals of Finance*, 10(4), 623-669. <https://doi.org/10.1007/s10436-013-0233-6>

- Kindleberger, C. (1996). *Manias, panics and crashes*. (3. ed.) Cambridge: Cambridge University Press. <https://doi.org/10.1007/978-1-349-25126-1>
- King, R.G. & Levine, R. (1993). Finance and Growth: Schumpeter Might be Right. *The Quarterly Journal of Economics*, 108(August(3)), 717-737. <https://doi.org/10.2307/2118406>
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (2002). Government ownership of banks. *Journal of Finance*, 57(1), 256-301. <https://doi.org/10.1111/1540-6261.00422>
- Levine, R., Loayza, N., & Beck, T. (2000). Financial intermediation and growth: causality and causes. *Journal of Monetary Economics*, 46, 31-77. [https://doi.org/10.1016/S0304-3932\(00\)00017-9](https://doi.org/10.1016/S0304-3932(00)00017-9)
- Loser, C. (2009). Global financial turmoil and emerging market economies: major contagion and a shocking loss of wealth? *Global Journal of Emerging Market Economies*, 1(2), 137-158. <https://doi.org/10.1177/097491010900100203>
- Mesquita, M. & Toros, M. (2010). *Considerações sobre a atuação do Banco Central na crise de 2008* [Working Paper N° 202]. Banco Central do Brasil, Brasília, DF. <https://www.bcb.gov.br/pec/wps/port/wps202.pdf>
- Micco, A. & Panizza, U. (2006). Bank ownership and lending behavior. *Economic Letters*, 93(2), 248-254. <https://doi.org/10.1016/j.econlet.2006.05.009>
- Minsky, H. P. (1986). *Stabilizing an unstable economy*. New Haven: Yale University Press.
- Mishkin, F. (1992). Anatomy of a financial crisis. *Journal of Evolutionary Economics*, 2, 115-130. <https://doi.org/10.1007/BF01193536>
- Mishkin, F. S. (2010). *Over the cliff: from the subprime to the global financial crisis* [Working Paper N° 16609]. National Bureau of Economic Research, Cambridge, MA. <https://doi.org/10.3386/w16609>
- Peria, M.S.M., & Mody, A. (2004). How foreign participation and market concentration impact bank spreads: evidence from Latin America. *Journal of Money, Credit & Bank*, 36(3), 511-537. <https://doi.org/10.1353/mcb.2004.0048>
- Ribeiro, F. V. F., & Schiozer, R. F. (2014). Cessão de crédito e restrição de capital: um estudo com bancos brasileiros. *Revista de Administração de Empresas - FGV-EAESP*, 54(5), 521-536. <https://doi.org/10.1590/S0034-759020140506>
- Sapienza, P. (2004). The effects of government ownership on bank lending. *Journal of Financial Economics*, 72, 357-384. <https://doi.org/10.1016/j.jfineco.2002.10.002>
- Schinasi, G. (2004). *Defining Financial Stability*. International Monetary Fund Working Papers n. 04/187. <https://doi.org/10.5089/9781451859546.001>
- Stiglitz, J. (1993). The role of the state in financial markets. In: *The World Bank Annual Conference on Development Economics*. Washington, DC. https://doi.org/10.1093/wber/7.suppl_1.19
- Woodford, M. (2010). Financial Intermediation and Macroeconomic Analysis. *Journal of Economic Perspectives*, 24(4), 21-44. <https://doi.org/10.1257/jep.24.4.21>
- Wooldridge, J. M. (2002). *Econometric analysis of cross-section and panel data*. Cambridge, MA: The MIT Press.
- World Bank (2013). *Global Financial Development Report 2013: rethinking the role of government in finance*. Washington, DC: World Bank. <https://openknowledge.worldbank.org/bitstream/handle/10986/11848/Global%20Financial%20Development%20Report%202013.pdf>

Fecha de recepción: 06 de junio de 2018

Fecha de aceptación: 02 de abril de 2019

Correspondencia: adriano@facc.ufrj.br

jose.antunes@bcb.gov.br

jose.e.almeida@ufes.br

malvaro.facc.ufrj@gmail.com