

Out of policymaker's sight:

the role of Banks' liquidity preference on credit supply in Brazil

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Resumo

A incorporação da preferência pela liquidez no comportamento dos bancos leva a uma compreensão da oferta de moeda como sendo definida de forma endógena. Nos modernos e sofisticados sistemas bancários, os bancos têm a capacidade inovadora de contornar as restrições de suas carteiras e aumentar o lucro potencial, atendendo, de acordo com suas expectativas de ganhos futuros, a demanda por crédito. A este respeito, a autoridade monetária influencia o fornecimento de crédito alterando a disponibilidade de ativos líquidos em comparação com todas as outras classes de ativos através de instrumentos de política monetária. Por meio da gestão da liquidez no mercado de reservas, o Banco Central pode modificar o preço do acesso à liquidez de curto prazo - a taxa de juros - e, assim, pode provocar ajustes na curva de rendimentos em operação, alterando a propensão dos bancos a expandir o crédito. Desvendar a função da oferta de crédito é, entretanto, uma tarefa intrinsecamente difícil, uma vez que o fornecimento de liquidez pelos bancos depende das expectativas e não pode ser calculado antecipadamente de maneira inequívoca. Nossa estratégia empírica foi a de estimar um modelo de painel dinâmico com dados *cross-section* dos balanços das cinquenta maiores instituições bancárias do país para o período de 1999 a 2016, ou seja, após a adoção do Regime de Metas de Inflação (IT), a partir da base do Banco Central do Brasil (BCB). A variável de crescimento do crédito foi combinada com variáveis construídas a partir do portfólio dos bancos, também combinadas com variáveis macroeconômicas do conjunto de dados BCB. Conectados ao quadro principal da abordagem Pós-Keynesiana sobre a relação entre a oferta de crédito e a composição do balanço dos bancos, nossos resultados sugerem que as mudanças na preferência pela liquidez desses agentes, refletidas nos ajustes de carteira dados os movimentos nos indicadores de flexibilidade e de alavancagem, determinam significativamente a oferta de crédito no Brasil. **Palavras-chave:** *Preferência pela Liquidez; Bancos; Crédito; Política Monetária; GMM.*

Abstract

The incorporation of liquidity preference within bank's behavior leads to an understanding of the money supply as being endogenously defined. In modern sophisticated banking systems, banks have the innovative ability to stretch their portfolios' constraints and raise potential profit, fulfilling, in accordance with their expectations of future gains, the demand for credit. In this regard, monetary authority influence credit supply by changing the availability of liquid assets compared to all other classes of assets via monetary policy instruments. Through the management of liquidity in the reserves market, the central bank can modify the price of access to short-term liquidity – the interest rate – and, thereby, it may provoke adjustments on the yield curve in operation, transforming banks propensity to expand credit. Thus, unraveling the function of credit supply is an inherently difficult task, since liquidity supply by banks depends on expectations and is not unequivocally calculated in advance. Our empirical strategy was to estimate a dynamic panel data model on a large cross-section bank-level dataset from the Brazilian Central Bank (BCB) on the balance sheet of the fifty largest banks operating in the country over the 1999-2016 period, that is, after the adoption of the Inflation Targeting Regime (IT). Credit expansion variable was matched with time-varying information on bank's portfolio constructed variables and, finally, combined with macroeconomic variables also from the BCB dataset. Connected to the main framework of the Post-Keynesian approach for the relation between credit supply and balance sheet composition of banks, our findings suggest that changes in the liquidity preference of banks, reflected on their portfolio adjustments throughout movements on flexibility and leverage indicators, have a significant determination on credit supply in Brazil. **Keywords:** *Liquidity Preference; Banks; Credit; Monetary Policy; GMM.*

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Introduction

The process of credit expansion reflects the combined action of banks and non-banks, according to preferences between more liquid and illiquid assets given their profit prospects (BERGER; BOUWMAN, 2017; CHICK, 1993). Throughout the business cycle, banks are more or less willing to increase their lending activity and change the composition and size of their portfolios. In the ascending part of the cycle, the expectations of an increase in the price of assets held by banks turn them to create liquidity both on and off their balance sheets. After liquidity preference rises, and assets are sold, banks become less and less inclined to fulfill the demand for credit of both firms and households, choosing to purchase existing securities and stressing a procyclical movement. The incorporation of liquidity preference within bank's behavior leads to an understanding of the money supply as being endogenously defined, where the monetary authority faces the challenge of fitting a "monetary collar" in the economy and is unable to have a sharp control on credit creation (GUTTMANN, 2016; MINSKY, 1986; PALLEY, 2008, 2013a).

The supply of liquid funds is strongly determined by its demand and it is originated inside the economic system in order to *finance* and *fund* investment, consumption decisions, and speculative purchases of assets (DAVIDSON, 1965; KEYNES, 1937a; ROBERTSON; KEYNES, 1938). Therefore, the monetary authority has only the ability to influence credit supply by changing the availability of liquid assets compared to all other classes of assets via monetary policy instruments, i.e. reserve requirements, discount window, and open market operations. Through the management of liquidity in the reserves market, the Central Bank may modify the price of access to short-term liquidity – the interest rate – and, thereby, provoke adjustments on the portfolio of banks, reordering the comparable disposal of assets. The result is a modification in the yield curve in operation that transforms banks propensity to expand credit creation (ARESTIS; SAWYER, 2002; FONTANA; PALACIO-VERA, 2003).

Unraveling the function of credit supply is an inherently difficult task that stems from several factors. Firstly, since liquidity supply depends on expectations, it is not unequivocally calculated in advance (and completely determined by monetary policy), i.e. we can only see the actual credit outcomes after they have happened. Secondly, there are some factors that also affect the demand for credit, which can or cannot be fulfilled. Hence, the identification of factors determining credit creation is not straightforward. Nevertheless, some progress in this area has been recently achieved through the use of matched bank-firm lending datasets and macroeconomic variables, which can be summarized in two distinct groups of work: i) the efforts that have been made on the construction of panel data models on bank specific information, such as the total liquid and illiquid assets, profitability and leverage, and macroeconomic variables (e.g. interest rates, GDP and capital requirements), giving a notorious amount of information about financial institutions over the last years (AWDEH, 2016; EVERAERT *et al.*, 2015; IANAZE, 2011; LIMA, 2016; MENDONÇA; SACHSIDA, 2013; STEPANYAN; GUO, 2011; VINHADO, 2014; VINHADO; BELÉM, 2013); ii) and the studies based on structural vector autoregression models, especially vector error correction models that analyze the impulse and response of macroeconomic variables endogenously determined in the system, in which aggregate information of credit is included (BUSCH; SCHARNAGL; SCHEITHAUER, 2010; DIB, 2010; GAMBETTI; MUSSO, 2016; GOODHART, CHARLES; HOFMANN, 2008; HOFMANN, 2004; HRISTOV; HULSEWIG; WOLLMERSHAUSER, 2012; KOLLMANN; ENDERS; MÜLLER, 2011; MUMTAZ; PINTER; THEODORIDIS, 2015; TAMÁSI; VILÁGI, 2011). Our contribution relates to the first group of studies that aim to estimate the credit supply function of banks based on variables that capture their liquidity preference over the years reflected on their balance-sheets and the demand for credit.

This article provides some empirical evidence for the analysis of credit money creation in Brazil, seeking to explain how credit growth has been determined in the Brazilian economy after the restructuring process that followed the adoption of the Real Plan, and, after that, the Inflation Targeting Regime. Both led to the transformation of the banking system into a complex structure, highly internationalized, concentrated and with the presence of large instruments of economic stabilization policy public banks. More specifically, we test the hypothesis that credit supply by banks are strongly determined by their liquidity preference and it is reflected on their portfolios decisions. To this end, we use two complementary approaches: firstly, we revise the theoretical aspects of banks' behavior and credit creation

in modern capitalist economies, exploring the origins of liquid funds demand by Keynes and Minsky's cycle approach to characterize credit creation by banks in a balance sheet management outline; secondly, we econometrically investigate the responsiveness of bank's credit creation to the liquidity preference indicators calculated based on the actual bank's balance sheet lines.

Our empirical strategy is to use the GMM estimator, based on the Arellano and Bond (1991) and Holtz-Eakin *et.al.* (1988), which accounts for the persistence over time of both autocorrelation, given the presence of lagged variables, and individual effects that controls for the heterogeneity between entities. For these estimators, additional instruments are created by the differences among lagged variables and disturbances. Therefore, we can estimate the coefficients for the credit supply function with the generated regressors as instruments. We are then able to use a large cross-section bank-level panel dataset with data from the Brazilian Central Bank (BCB) on the balance sheet of the fifty largest banks operating in the country over the 1999-2016 period, that is, after the adoption of the Inflation Targeting Regime in Brazil. Credit and bank's financial variables are matched with time-varying information on bank's ownership and, finally, combined with macroeconomic variables also from the BCB dataset.

Connected to the main framework of the Post-Keynesian approach for the relation between credit supply and balance sheet composition of banks, our findings suggest that changes in the liquidity preference of banks, reflected on their portfolio adjustments throughout movements on flexibility and leverage indicators, have a significant determination on credit supply. For instance, when there is a decrease in the liquidity preference of banks, they are more likely to increase their degree of financial leverage, which indicates a search for riskier passive positions in order to subsidize larger gains in riskier asset positions, such as credit. Additionally, in such situations, the willingness of more flexible portfolio condition is surpassed by the desire of more illiquid and profitable stance. Besides, but not less important, in line with the Post-Keynesian theory, demand for credit plays an important role on the determination of funds to be offered by banks in Brazil. We find evidences that monetary policy in Brazil, grounded on the Inflation Targeting Regime framework, is essentially imprecise: the desire to control the monetary base lays on a limited view of money as, primordially, means of payment and thus intrinsically loose, as it does not effectively control credit creation but only indirectly affects it.

The article has five sections. After this introduction, we address the theoretical aspects of the incorporation of liquidity preference within banks' behavior, which leads to an understanding of the credit supply as being endogenously defined by their intent to hold more or less liquid assets in their balance sheets. Section 3 discusses the Brazilian monetary policy instruments used after the adoption of the Inflation Targeting Regime, which is set to influence the system liquidity preference in order to restraint demand excess over the potential output. Section 4 addresses the econometric appraisal for the credit money supply function in Brazil. This section highlights the importance of bank financial and ownership variables for the dynamics of credit growth, so as its responses to macroeconomic variables. Finally, the last section presents some concluding remarks.

2. Banks liquidity preference

The Post-Keynesian structuralist⁴ view resumes the analytical precedence of credit on deposits in monetary dynamics, focusing on the relationship between money, credit, and liquidity preference. In fact, the credit expansion process reflects the combined action of banks and non-banks, lying in the preferences between more liquid or illiquid assets by the non-bank public and in the profit prospects of financial institutions. Therefore, the lending expansion is not completely limited by the volume of existing reserves as financial institutions can develop new sources of funding both at national or international levels, besides the Central Bank's reserves (CHICK, 1994). Actually, the money endogeneity becomes relevant to the extent that financial institutions have the capacity to expand credit, provided it is profitable, in order to

⁴ It is important to note here that the Post-Keynesians view money as essentially endogenous. However, that are two main 'subgroups': the Horizontalist view states that banks create money endogenously, but they are able to **accommodate** the demand for money with a markup on the CB short-term rate. The structuralist view, however, sees banks' decision and liquidity preference as the central determinant of credit and money creation.

meet the demand conditions, despite the restrictions placed by the Central Bank⁵. Consequently, in the process of expansion of loans, banks create deposits, endogenously expanding money and quasi-money, and interfering in the state of liquidity in the economy (CHICK; DOW, 2002; MADI, 1993).

In a liability management context, banks may increase the lending power of its reserve base creating funding instruments so that the public release liquid funds, accepting in exchange less liquid financial securities. Since the reserve requirement on demand deposits is greater than on those less liquid securities, management of liabilities means that the reserve base can expand endogenously to meet the changes in the net demand for loans in case it is profitable for the financial institution. The expansion of financial intermediation becomes dependent on a positive differential between the funding interest rates and investing funds (GOODHART, CHARLES ALBERT ERIC, 2011).

The credit creation movement follows the fluctuations in liquidity preference of agents, which entails the risk perception of both borrowers and lenders in conformation with Minsky's (1975, 1986) financial instability hypothesis. Throughout a cycle's ascending movement, expectations on the increase of asset prices are confidently held, and thus, liquidity preference is low. Banks are more willing to exchange liquid for less liquid assets, as well as to increase their lending activity, changing the composition and the size of their portfolios. As productive expected returns reach a maximum, activity shifts towards speculative trading, which deepens the financial fragility of the economy. The moment liquidity preference rises, and assets are sold, the economy may move into a downturn, which additionally strengthens liquidity preference, discouraging both spending and lending (GUTTMANN, 2016; MINSKY, 1986). Banks, thus, become less inclined to fulfill the demand for credit of firms and households, choosing to purchase existing securities and also discriminating among potential borrowers by risk category. The adoption of a more prudent lending behavior progressively confines banks into financial intermediaries rather than lenders, redistributing rather than creating liquidity (FONTANA, 2003, 2004). This process characterizes the downturn of a long wave in the cycle and reveals the procyclical behavior of banks (GUTTMANN, 2016).

According to Keynes' theory of liquidity preference, the demand for liquid funds originates mainly⁶ from both the uncertainty about the future (speculative-motive) and the need to finance planned increases of spending. From the first motive perspective, the public anxiety to increase their hoards can only affect the aggregate amount of hoarding if banks are willing to acquire (or dispose of) additional assets beyond what is required to compensate changes in the active balances. If banks withstand, an increasing propensity to hoard pressures the rate of interest to rise, and thereby, the prices of capital assets other than cash to lower. This process may go on until agents cease the idea of selling these assets or of abstaining from buying them in order to expand their hoards. The rate of interest is the pecuniary sacrifice that the owner of a hoard thinks worth suffering in preference to other claims and assets with an equal present value (KEYNES, 1937a).

The latter reason to hold money, in its turn, relates to planned investment that may need a financial provision before it takes place. There must be a technique to bridge this gap between the moment in which the investment decision is taken and the time at which the correlated investment and saving actually occur. Keynes (1937a) called this advance provision of cash the *finance* required by the current decisions to invest. The *ex-ante* investment is the search for credit to carry out the investment, and as any other type of expenditure, may increase the demand for money for transactions⁷, because the entrepreneur wants to have at his disposal the money before the payment date. If the investment grows in a steady rate,

⁵ In addition to the reserves requirements and the interest rate policy rules, banking activity is highly regulated, subject to quantitative restrictions such as capital requirements (PALLEY, 2013b).

⁶ The aggregate demand for money is a composite result of different motives in the General Theory: the Income-motive, meaning the demand for cash to bridge the interval between the receipt of income and its disbursement; the business-motive, where similarly, money is held to fill the interval between the time of incurring business costs and that of the receipt of the sale-proceeds; the precautionary-motive, which means to have the ways to provide for contingencies requiring sudden expenditure and for unforeseen opportunities of advantageous purchases; and finally, the speculative-motive, which is particularly important in transmitting the effects of a change in the quantity of money to the rates of interest when there are changes in expectation affecting the liquidity function (KEYNES, 1936, p. 124–125).

⁷ This is a special case of the finance required by any productive process and has similar characteristics to the demand for money from the transaction motive; nevertheless, it is subject to special fluctuations of its own and thus needs highlight.

this new demand for money (*finance*) can be supplied by a *revolving fund* of a more or less constant amount, i.e. while some entrepreneurs are having their finance replenished for the purpose of a projected investment, others are exhausting theirs on paying for completed investments. However, if the rate of investment grows, the extra finance involved will constitute an additional demand for money (DAVIDSON, 1965; KEYNES, 1937a; KREGEL, 1986; ROCHON; SETTERFIELD, 2011).

Even if the entrepreneur relies on financial provision previously arranged simultaneously with effective expenditure on investment, both by mobilizing installments regarding new market-issues precisely when desired or by arranging bank's overdraft facilities, market's commitments will be in excess of actual saving up to the present time and there is a limit to the extent of the commitments which market will be willing to enter into in advance. Or if he accumulates a cash balance beforehand (which is more likely to occur if he is financing himself by a new market-issue than if he is depending on his bank), then an accumulation of unexecuted or incompletely executed investment-decisions may cause, for the time being, an extra special demand for cash (MORANDI, 2004; WRAY, 1992).

This *finance* bridge might be filled either by new issues in the market or by credit creation by banks. Nevertheless, a pressure to assure more finance than usual may certainly affect the rate of interest through its impact on the demand for money; and unless the banking system is ready to expand the supply of money, scarcity of finance will prove to be an important obstacle to investment decisions. As Keynes (1937b) stresses:

... to the extent that the overdraft system is employed and unused overdraft ignored by the banking system, there is no superimposed pressure resulting from planned activity over and above the pressure resulting from actual activity. In this event the transition from a lower to a higher scale of activity may be accomplished with less pressure on the demand for liquidity and the rate of interest (KEYNES, 1937a, p. 9) .

It is the banking system that supplies liquidity both to the entrepreneur, before his actual expenditure, and to the recipients of this expenditure, before they have decided the way to employ it. Short-term credit must finance an increase of planned investments, and once the expenditure starts, these credits flow into the *revolving fund* of *finance* and the appropriate level of income, over which an exactly sufficient amount of saving to the new investment will be generated. Therefore, banks, and the whole financial system accordingly, hold the key to economic expansion. In this regard, under the Post-Keynesian structuralist view, *finance* has no correspondence with saving: at the *financial* stage of the events, the investment *ex ante*, no net saving nor its corresponding net investment has taken place on anyone's part (LAVOIE, 2014; SMITHIN, 2006; WRAY, 1992). *Finance* and commitments to *finance* are mere credit and debit book entries, which sanction entrepreneurs to go forward with pledge (DAVIDSON, 1965; KEYNES, 1937a; ROBERTSON; KEYNES, 1938).

A growing rate of spending financed by credit creation would, thus, involve banks' balance sheets expansion and its consequent reduction of liquidity, by leveraging equities, reserves, and a range of safe assets. The continuity of this process leads banks to charge higher interest rates in order to compensate for greater perceived risk (CHICK; DOW, 2002; DOW, 1996). Therefore, the incorporation of liquidity preference within banking behavior leads to an upward-sloping money supply curve. Minsky (1975) points out that in the short run, for a state of liquidity preference, banks require higher interest rates for them to be encouraged to expand illiquid positions and satisfy the demand for credit. Nonetheless, continuous financial innovations and guidelines revisions regarding the appropriate leverage ratios increase money supply potentials, allowing credit expansion with no pressure on interest rates for a while. Eventually, however, leverage ratios and illiquid positions will reach some point beyond any expansion would be considered imprudent and a greater compensation for perceived risk will be demanded (MINSKY, 1975).

As preference for liquid assets goes up, the entire price structure of financial assets must adjust: prices of less liquid financial assets may fall relative to those of more liquid ones until their yields encourage agents to hold them. Meanwhile, banks and other financial institutions reduce lending and the flow supply of highly liquid assets decelerate. With pessimistic expectations, demand prices of capital assets fall and their supply prices rise, since lenders increase loan rates of interest to compensate for greater lenders' risk.

Consequently, planned investment may fall together with the flow demand for money to satisfy the finance motive, which can lead to an interruption of the money supply growth. A rising demand for money against a fixed money supply drives rates of interest to even higher levels and prices of illiquid assets to even lower ones (MINSKY, 1975).

Optimistic expectations about the future lead both borrowers and lenders to lower their risks' estimations (MINSKY, 1986). This causes the demand price borrowers are willing to pay to purchase investment goods to increase, just as supply prices are lowered as lenders reduce interest rates on loans. The increase reliance of borrowers on external finance raises their risk because default becomes more likely as net worth falls on debt. Lenders take this into consideration by incorporating a premium in the loan rate of interest. There are other practices taken by banks to mitigate risk such as the imposition of collateral requirements, the establishment of closer relations with borrowers, and imposition of quantity constraints on lending. Banks have also developed methods on liability management to enable them to satisfy credit demand by suitable customers and to permit them tolerate temporary interruptions of income flows when borrowers do not pay off commitments⁸. Even though, competition for markets and innovations continually expands creditworthy activities and continually creates new financial instruments, acceptable both by banks and their customers and, gradually, experience with defaults will allow rates of interest to rise (WRAY, 1992).

This does not imply, however, that banks will fully accommodate the increasing demand for money even though their expectations are in the same direction as those of borrowers. Banks are not passive lenders; instead, they balance their needs for earnings and liquidity so as to be active agents together with borrowers in the money supply process. They are actually able to choose between creating loans on one hand and buying securities, which also creates deposits, on the other. Through substitution between credit and investments, banks can manipulate the liquidity of their portfolios according to their needs for liquidity and earning. Also, along with their own credit ration due to uncertainty and rises on interest rates with balance sheets increasingly illiquid, restraint by the Central Bank will also tend to thrust interest rates and reduce banks willingness and ability to increase the supply of money (CHICK; DOW, 2002; DOW, 1996). Nonetheless, structural market diffusion is by no means completed: the universal banking model preserves a full range of services inside a holding company, and is able to institutionally separate functions within the company structure. Hence, while a specific banking corporation might be willing to expand credit, this may tend to be applied only to a chosen market segment. Therefore, the extent which credit creation grows, given the specific monetary policy posture, depends on the strategic plans of banks (DOW, 2006).

3. Monetary policy in Brazil: Instruments under the Inflation Targeting Regime

The adoption of the inflation target regime a few years after the implementation of the Real Plan in Brazil can be understood as the submission of the entire economy to a well-defined objective, which is seen as a needed anchoring point to maintain price stability and enable economic growth. According to the decree 3,088 of June 1999, it is the responsibility of the Central Bank of Brazil (BCB)⁹ to design the proper monetary policy to achieve the stipulated target – the inflation target fixed by the National Monetary Council (CMN), upon a proposal of the Minister of Finance¹⁰. Under the Regime, monetary policy is conducted to influence the level of the short-term interest rate by adjustments in the supply of bank reserves.

⁸ They can, for example, appeal to lines of credit on other banks and nonbank financial institutions; they have also developed other "off-balance sheet" contingencies that enable them to obtain funds as necessary.

⁹ The main functions of the BCB are set by the 10,214 law of the National Monetary Council (CMN).

¹⁰ The targets are represented by annual variations of the National Extended Consumer Price Index (IPCA) and it is considered that it was achieved when the cumulative inflation variation – measured by the chosen price index, for the period from January to December of each calendar year – is inside the range of its respective tolerance intervals. Along with its intervals, the target must be fixed until the month of June of the previous year (only for the years of 1999, 2000 and 2001 the targets and intervals were set by June 30 of 1999). If the target is not met, the President of the BCB will publicly disclose the reasons for the noncompliance, by means of an open letter to the Minister of Finance. The BCB is also responsible to disclose, until the last day of each quarter, the Inflation Report addressing the performance of the inflation targeting regime, the results of past monetary policy decisions and the prospective inflation assessment (Decree, 3.088).

In this regard, it manipulates three importantly different instruments: i) *the reserve requirements*; ii) *the liquidity discount window*; and iii) *the open market operations*. Although the policy may not be understood as having the sole purpose of fixing the interest rate, this objective constitutes an important operational goal, making it possible to achieve the final goal of price stability (DE PAULA; SARAIVA, 2016; MISHKIN, 2011, 2012).

The framework is grounded on the control of demand-based inflation, i.e. short-run excess of aggregate demand over the potential output, whereas cost inflation ought to be either accommodated, or the supply shocks, which come and go with time, on average will be equal to zero and will not have effect on the rate of inflation. In other words, it is strongly implied that inflation can be controlled through the management of the interest rate to influence demand, bearing in mind the existence of an equilibrium rate of interest which is capable of balancing aggregate demand and supply. This may be interpreted as the capacity of the real interest rate to have a price effect on investment and consumer expenditure (CLARIDA; GALI; GERTLER, 1999). Accordingly, the ultimate interest rate effect on demand occur by six channels or transmission mechanisms: *the narrow credit channel* and *the broad credit channel*, which are distinct but complementary ways whereby imperfections in financial markets might affect real magnitudes in the economy on the assumption of credit market frictions – the narrow credit channel, or the banking lending channel, refers to the impact of reserve requirements change on the supply of loans, whereas the broad credit channel indicates the financial health of borrowers impacts on the supply of finance and ultimately aggregate demand; *the interest rate channel* and *the monetarist channel*, which depend heavily on the assumption made about the degree of substitutability between money and other assets – this can amplify or diminish the speed by which interest rate changes impact the level and pace of economic activity, also affecting the amount of change on monetary base needed to set the interest target; *the wealth effect channel*, where consumption function is hypothesized to depend on consumer wealth; and finally, *the exchange rate channel*, operating through import prices and net external demand.

Hence, BCB conducts monetary policy by choosing a target for the interest rate for the overnight interbank loans collateralized by domestic federal securities registered with and traded on the “*Sistema Especial de Liquidação e Custódia*” (SELIC)¹¹. More specifically, the Central Bank sets the target for the Selic rate, which is defined as the “adjusted average rate of daily financings determined in the SELIC for federal securities” (BCB, 2017b). It includes, consequently, all exchange operations of reserves for a day between financial institutions – the secondary/interbank market – and between these and the Central Bank in its calculation – the primary market¹² (ARAÚJO, 2002).

SELIC is, thus, part of the bank reserves market (or the federal securities market), i.e. the institutional arrangement dedicated for the negotiation of bank reserves. If exchange reserves are not collateralized in public securities, they will be made and registered at the “*Central de Custódia e de Liquidação Financeira de Títulos Privados*” (CETIP)¹³, currently “Organized Markets”, and will then be remunerated by a DI-Cetip rate (Interbank Deposit). These transactions stand for changes on the reserve account of banks, which is the cash deposit account that all banks maintain on the Central Bank balance sheet in order to meet the reserve requirements and to settle the clearing of payments and receipts with other banks (interbank transactions) (BCB, 2016b).

In this sense, reserve requirements are deposits made in cash (bank reserves) or in securities that each bank is legally obliged to maintain at the Central Bank and are calculated as a percentage of deposits – demand deposits, time and saving deposits and additional requirements¹⁴. Reserve requirements were extremely high at the beginning of the Real Plan, in order to contain a possible surplus demand from the initial success of price stabilization, and in accordance with the BCB intent to control the monetary base. Consequently, in order to meet its required reserve balance – i.e., the net sum of the BCB reserve requirements and the economy’ daily transactions – banks can either lend directly from the BCB at the

¹¹ Special System for Settlement and Custody.

¹² For more on Selic legislation and norms, go to <http://www.bcb.gov.br/htms/demab/circular3587-english.pdf>

¹³ Custody and Financial Settlement Center for Private Securities.

¹⁴ The additional requirements applies to savings, demand deposits and time deposits (BCB, 2016a).

discount rate or go the interbank market, where the lower bond rate for borrowed reserves is the interest rate BCB pays on some types of reserve requirements¹⁵.

Reserve borrowings from the BCB are then negotiated at the liquidity discount window, where loans are priced at the discount rate in order to diminish liquidity problems for banks, also fetching some stability to financial markets. Nonetheless, the access to liquidity assistance operations in Brazil is restricted to financial institutions holding bank reserve accounts and the operations can be settled by the use of reverse repurchase commitments, which are revolving loans against guarantees up to the borrower's withdrawal limit set by the BCB, or by the actual rediscount of eligible securities. Moreover, charges over these transactions can be either fixed, being more or less favorable depending on the behavior of the reserve market interest rate, or anchored to the Selic rate but with an additional rate, which maintains a constant differential. BCB is, thus, able to limit the access of financial institutions to these liquid funds, operating a balance between its function as a lender of last resort and a guarantor of the payment system fluidity.

The system, therefore, requires a more active role of open market operations in liquidity management. In other words, the rediscount operations act only as an auxiliary instrument in reserve management by the BCB, which provides banks with a liquidity assistance line that helps to solve individual cash problems that may occur at the end of the day or at the end of the period of movement of the compulsory collection, avoiding the existence of overdrafts in the bank reserves account (FIGUEIREDO; FACHADA; GOLDENSTEIN, 2002).

Therefore, in order to guarantee the level and the desired behavior of the short-term interest rate, BCB works to estimate the liquidity need of the interbank market. With that estimation, it operates the volume of reserves, adding or withdrawing money on/of the system. Thus, changes in reserves are a result of both BCB's actions to manage liquidity and autonomous variations in the Central Bank balance sheet accounts of net external assets¹⁶, loans to Government, paper money in circulation and deposits in the Treasury account¹⁷. In this sense, liquidity forecasting is the initial stage towards the implementation of monetary policy; it is the baseline for the decisions on the volume, frequency and maturity of operations designed to balance the reserve market (FIGUEIREDO; FACHADA; GOLDENSTEIN, 2002).

In this regard, the authority estimates can point either to a generalized deficiency in the reserve market or to a widespread excess of bank reserves in the market. In the first case, the Central Bank is oversold and the volume of bank reserves available in the market is lower than the stock of public securities issued and held in banks' portfolios – i.e. the outflow of resources from the reserve account of all institutions is larger than the inflow. In the second, the Central Bank is undersold and the inflow of resources into the bank reserves account is greater than the outflow. Hence, if the Central Bank does not want greater fluctuations in the market interest rate, it must act accordingly, either providing the necessary funds to banks or purchasing excess reserves. These compensatory adjustments are, thus, mainly made through open market operations, given their greater versatility in accommodating daily variations on market liquidity (CARVALHO *et al.*, 2015).

From this perspective, BCB may also choose between definitive operations or repurchase agreement operations. On the one hand, outright operations usually are chosen in the case that the central bank intends to make a lasting withdrawal from the reserves market or when it wishes to intervene at the level of the prevailing interest rate over a medium or long-term horizon. Thus, this way of acting is usually

¹⁵ The liquidations of these operations are processed through the entries in the accounts maintained by the participants in the Central Bank and occur through the Reserve Transfer System (STR), which is the heart of the National Financial System (NFS). For more on the STR, go to <http://www.bcb.gov.br/htms/novaPaginaSPB/str.asp?IDPAI=STR>.

¹⁶ The changes in the net external assets account result both from the balance between exports and imports and from financial operations. In Brazil, the Central Bank operates in the foreign exchange market, buying or selling foreign currency (to banks) through auctions, in order to maintain the quotation at the considered appropriate level, and these operations can directly sensitize the bank reserves account. These auctions are of two types: spot market or swap. In 2002, the BCB and the Treasury began to carry out foreign exchange swap operations in conjunction with primary offers of LFT - Treasury Financial Letters. The use of this instrument enables the market itself, more than the Central Bank, to offer foreign exchange hedge to companies. The new system also made it possible to reduce the issue of securities indexed to the exchange rate (CARVALHO *et al.*, 2015).

¹⁷ The Treasury on BCB is called "Conta Única" and it keeps all government spending and collection information, such as tax collection, public bond auctions, and server payment.

associated with active intervention type by the monetary authority. On the other hand, repurchase operations are the main option when the need is of managing short-term or very short-term conditions in the bank reserve market. These operations, also known as *repo* or *reverse repo*¹⁸, are related to the fine-tuning of liquidity conditions that permit the neutralization of unwanted changes in the level of bank reserves, whether resulting from an unexpected behavior of the agents, as sudden reversal on expectations, or from seasonal occurrences. For this reason, they are regularly preferable when dealing with defensive interventions (ALMEIDA, 2014).

BCB thus chooses the target for the interest rate for the overnight interbank loans – the Selic rate target – by the use of a set of tools that go from small-scale structural models of the transmission mechanism of monetary policy and short-term inflation forecasting models to surveys of market expectations of inflation and economic growth (BOGDANSKI; TOMBINI; WERLANG, 2000). In fact, given the temporal lag between the monetary authority action and its effect on macroeconomic variables and on prices, the Central Bank takes monetary policy decisions in accordance with the movements in the expected inflation (forward looking) in an attempt to anticipate future price pressures and volatility on GDP. One of the main features of the monetary policy adopted in Brazil based on inflation targets is, therefore, to look at the market's expectations of future inflation to decide the interest rate in the present (LIMA; SILVA, 2011).

According to the latest essay on the Inflation Target regime in Brazil by the BCB – *Dez Anos de Metas para a Inflação no Brasil: 1999-2009* (BCB, 2011) – and according to the view of the BCB working paper series opening article on the same subject – *Implementing Inflation Targeting in Brazil* (BOGDANSKI; TOMBINI; WERLANG, 2000) – the system of equations BCB estimates (and calibrates) in order to identify the mechanism of monetary policy transmission is, thus, a combination of an IS type equation, a Phillips curve, an exchange rate passthrough specification, and a Taylor rule. The models currently in use for this system can, therefore, be divided into the following five categories: i) antecedent indicators and core inflation indexes; ii) vector autoregressive models (VAR) for inflation trajectory projection; iii) small-scale semi-structural models for inflation forecast; iv) medium semi-structural models for the analysis of alternative economic scenarios (PAGODE); and v) a micro model of medium size (SAMBA) – whose structure is similar to that of general equilibrium stochastic models (DSGE models) (DSGE models) (BCB, 2011; BOGDANSKI; TOMBINI; WERLANG, 2000; LIMA; ARAUJO; SILVA, 2011).

Under this system, thus, changes on the interest rate will respond to the market's ability to absorb securities. Accordingly, conducting the auction on days of oversold may increase the liquidity premium required by the participants or even decrease the demand for papers; both tending to rise the interest rate. On its turn, in moments when expectations and liquidity are more stable, and the total amount of securities issued is lower than the quantity maturing, there is no pressure on the interest rate. Conversely, in times of great volatility in expectations, the Central Bank has a major difficulty in defining the cut price for securities, taking the risk of sending misleading signals about the direction of the interest rate. So, in summary, this process ultimately depends on the monetary flow defined in the liquidity management, and on the balance between securities to be issued and the ones on the date of maturity (CARVALHO *et al.*, 2015).

This, in fact, corroborates with the Post-Keynesian perspective of a credit money economy where monetary policy does not affect the economy by exclusively (or even mainly) increasing or decreasing the supply of means of payment, but rather by changing the availability of liquid assets compared to all other classes of assets. Using the short-term interest rate as an instrument, the Central Bank acts on

¹⁸ Repurchase agreements may also be conducted under the liquidity or rediscount assistance and consist in the purchase and sale of securities in which the seller undertakes to repurchase the security at an agreed price on a specified date. When central banks perform this operation as temporary buyers of these government bonds, they are injecting liquidity into the economy, thus operating what we call *repos*. When, on the contrary, they temporarily give up the securities they hold in the portfolio, they are withdrawing liquidity from the economy, doing what we call *reverse repos*. In Brazil, the increasing use of repurchase agreement has been specially associated, though, with the rise of international reserves balances by the Central Bank in the period between 2006 and 2009, and to net redemptions of securities by the National Treasury after 2010, which had established a strategy to change the profile of public debt. For more on reverse repos operations in Brazil see De Conti (2016) and Macedo e Silva (2016).

the financial circulation through open market operations in which bank reserves are exchanged for public securities, in general. Thereby, the first impact of the effort to change the interest rate is on the portfolio of banks that will be adjusted according to the yield curve in operation, reordering the comparable disposal of assets¹⁹, as it alters the expectation of banks carrying government bonds in their portfolio about future capital gains (MODENESI *et al.*, 2013). It is this impact on the portfolio of banks that will (hopefully) reverberate on demand to finally affect inflation.

In fact, the initial adjustment of banks' portfolio resounds on the financial relationships described by the yield curve: agents are induced to adapt to the new situation by changing their assets' positions, causing asset price movements that reestablishes a new relation between rates. This is because the change on the very short-run rate of interest by the central bank alters the offsetting between risk and interest for all the range of assets with different maturities, which leads investors to realign their portfolios by selling and/or buying assets with the new preferred maturity. These operations on the assets' markets, either on the pressure for sale in the case of a policy to increase the basic interest rate or for buying with a policy in the opposite direction, would realign all asset prices (and interest rates), shifting the yield curve. From the non-banking stand point, it may change the willingness to increase spending, both investment and consumption, which can or cannot be fulfilled, depending on the reliance on credit. Credit fulfillingness (or credit creation), on the other hand, will depend on banks willingness to lend, which is also connected to its new yield curve in operation and, therefore, depend on the calculation of expected gains by the alteration in their portfolio position (CARVALHO *et al.*, 2015).

Financial capitalism is mainly driven by the prospects of future earnings in the way that uncertainty and conventions play a crucial role in decisions of spending and investing. Money is the base institution of the capitalist economy, and the price of access to short-term liquidity, the rate of interest, is negotiated by a series of institutional, political, and even cultural factors. Considering that the behavior of agents depends on conventional evaluations subject to abrupt changes, the Central Bank seeks, in its daily management, to set limits to such volatility in financial markets, signaling the behavior of short-term interest rate, while the long-term interest rate is determined by the profits on capital, which, in turn, depend on the productivity and the relative abundance of the existing capital (MODENESI *et al.*, 2013).

Accordingly, the Central Bank is not empowered to, through the management of interest rate, fully control the structure of demand and asset prices, in order to facilitate the stable growth of the system, ensuring a relative pricing structure compatible with the scarcity of assets and with full employment. The active monetary policy refers to the administration of the nominal interest rate and short-term by the central bank. Real interest rates are a result (*ex post*). However, the *ex post* real rate may differ from the actual rate *ex ante*, which is relevant for decision-making. In other words, the monetary interest rate incorporates expectations about the evolution of future prices. Thus, an increase in the monetary interest rate may indicate a rise in inflation forecast. However, the forecast can be frustrated and the actual *ex post* rate be below the *ex-ante* real rate (PALLEY, 2008).

In a context of uncertainty, agents try to anticipate the decisions of the monetary authority, in order to obtain arbitrage gains. In this movement, although the Central Bank cannot prevent the sudden change of expectations, manifested in changes in asset prices independently of monetary policy, it can influence the behavior of financial institutions, through interest rate policy and the use of reserves. The influence of the Central Bank depends on the impact of its short-term interest rate policy, and the policy reserves associated with it, on the expectations of financial institutions (PALLEY, 1993, 2006).

¹⁹ Commercial banks have in deposit creation their most important passive account, and even term deposits tend to have relatively short maturity when compared to other forms of fundraising. As a consequence, the possibility to held assets with longer maturity can only occur in the existence of organized and activated secondary market where these assets have a stronger liquidity attribute. For instance, loans made by the industry, in particular, must have maturities compatible with the maturities of their liabilities. This implies that, for the monetary policy instrument to have the desired effect on the economy, a sufficiently diversified financial system, both in terms of markets and institutions, must exist so that the induced portfolio adjustments are transmitted to the longer maturity segments – and not entirely translated into the simple replacement of short-term assets. In other words, it is necessary to have a yield curve that defines stable relations between interest rates (and therefore, prices) of securities of different maturities (CARVALHO, 2005).

4. Credit money supply function: an econometric appraisal

From the Post-Keynesian interpretation on the credit supply in a monetary economy of production, in which the balance sheet composition of the banks is guided by the degree of liquidity preference assumed by these institutions at a given moment, we analyze the determinants of credit growth by using a large cross-section bank-level panel dataset. In this regard, data from the BCB on credit and bank financial variables were matched with time-varying information on bank ownership. The sample included 50 banks²⁰ with activities in the country and covers the period from 1999 to 2016, i.e. from the year of the inflation targeting regime' adoption to the last data available. These quarterly data were, finally, combined with macroeconomic variables also from the BCB dataset.

The estimation strategy was to use the GMM estimator, based on the Arellano and Bond (1991) and Holtz-Eakin *et.al.* (1988), which counts on the persistence over time of both autocorrelation, given the presence of lagged variables, and individual effects that controls for the heterogeneity between entities. For these estimators, additional instruments are created by the differences among lagged variables and disturbances. Therefore, we can estimate the coefficients for the credit supply function with the generated regressors as instruments.

The basic regression uses the following specification, where credit in bank i , at time t , is given by:

$$credit_{i,t} = c_i + \alpha \cdot credit_{i,t-1} + \beta \cdot macro_t + \gamma \cdot bank_{i,t} + \varepsilon_{i,t} \quad (1)$$

Bank-specific fixed effects, c_i , the, credit in the previous period, $credit_{i,t-1}$, macroeconomic variables at time t , $macro_t$, and bank-specific balance sheet variables at time t , $bank_{i,t}$. Hence, according to the literature on bank credit in the Post-Keynesian perspective, a set of typical variables are included to control for the macroeconomic conditions and, most importantly, some bank indicators were created in order to capture banks specific portfolio arrangements that affects their decision to lend. The following box gives the summary of the variables characteristics and the expected sign.

²⁰ BCB (2017a) provides information of the balance sheet of the entire NFS, covering data from banks and their conglomerates. In this thesis, we have opted to work with bank data in an intent to capture more specific balance sheet composition changes. Also, in order to build the panel data sample with the less possible missing data as well as with a sufficient large number of information (giving the fact that some institutions have merged or stopped activities over time), we have taken as base the fifty largest banks in activity in the year of 2016. In addition, monthly data for these banks were transformed in average quarterly data to diminish extreme variation on errors in the model.

Box 1. Description of input variables and expected signals

Domestic macroeconomic variables	
Real domestic demand (+)	Reflects the demand intensity and is expected to have a positive impact on credit supply. The domestic demand was used instead of GDP because it was a critical driver of the financial credit cycle in Brazil from 2004 to 2015. From the perspective of an individual bank, contemporaneous domestic demand growth is assumed to be an exogenous variable, and not to depend on the banks' own credit supply. Hence, no lags are used for this variable.
Selic (-)	Apprehends the impact of the monetary policy instrument on credit supply. Selic changes alter the yield curve of banks that respond to it with balance sheets adjustments. The sign is expected to be negative as liquid assets become relatively more attractive than credit.
Average inflation (-)	Captures expectations on macroeconomic balance. The sign is expected to be negative as lack of price stability deters financial transactions and inflation erodes bank capital.
Bank's balance sheet variables	
Previous credit supply (+)	It reflects the preceding expectations and the anticipation of demand growth; both having a positive impact on future credit supply.
Speculative position (-)	It reflects how much the result of bank's normal operations is used to pay interest and other principal obligations. The expected sign of this indicator is negative because the lower the ratio between operating revenues and operating expenses, the lower the degree of liquidity preference, i.e. the more risk taker is the bank and, therefore, the greater the supply of credit.
Leverage (+)	Ratio between third-party resources and equity and measures the aggressiveness of banks. The higher the indicator, the higher the bank's speculative grade, the greater the credit supply.
Assets flexibility (-)	At times of declining liquidity preference, banks tend to increase their positions in assets whose monetary return is high and whose liquidity premium is low, such as credit operations, thereby reducing the ratio of more liquid assets, such as short-term public and private securities, to total assets.
Liabilities flexibility (+)	Ratio between the sum of resources with no incidence of reserves requirements and the total current and long term liabilities. The more the bank is able to raise non-reserve requirements, the greater the ability to offer credit.
Risk exposure (-)	Ratio between the lowest risk credit portfolio (A and AA) and the total credit portfolio. The lower this ratio, the more prone to risky operations is the bank, therefore, with a tendency to increase the supply of credit.
Foreign currency exposure (+)	Ratio between obligations and rights in foreign currency. The higher the indicator, the greater the risk assumed, the greater the funds for credit.
Financial Independence (+)	Ratio between shareholders' equity and adjusted total assets (total assets less shareholders' equity). The higher, the higher the bank's independence degree to third-party capital, the greater the ability to offer credit.
Return on Equity (+)	Quotient between net income and shareholders' equity, indicating bank profitability. More profitable banks are expected to be in a better position to extend credit.

Source: own elaboration based on BCB (2017c), Oliveira (2009) and Everaert *et al.* (2015).

The domestic demand was included among the macroeconomic variables in order to capture the prominent impact of demand for funds on credit supply. The reason is that, as stated in the first chapter, credit demand, aside from liquidity preference, determines the volume of credit. Besides, it was chosen instead of GDP because of its critical role as a growth driver in the Brazilian last credit cycle. Finally, from the perspective of an individual bank, contemporaneous domestic demand growth is assumed to be an exogenous variable, i.e. not to depend on the banks' own credit supply, and to have a positive impact on credit supply (EVERAERT *et al.*, 2015).

Moreover, the Selic rate and the inflation rate apprehend the generalized expectations of macroeconomic stability manipulated by the monetary authority. Additionally, while a rise in the Selic rate can indicate the possibility of more gains in concurrent and more liquid assets than credit, a higher inflation

rate erodes the reserve of value function of money and augments the economic environment instability. Therefore, the sign of the coefficients of both variables have been expected to be negative.

Nevertheless, in addition to the macroeconomic variables²¹, we have incorporated several balances of payments indicators in the model. The inclusion of these indicators is related to the Post-Keynesian view highlighted from the beginning of this thesis, based on Minsky's seminal analytical contributions that banks, like all other agents, have a preference for liquidity and expectations regarding the future that guide the strategies they draw in their incessant search for valuation, which may or may not deter the supply of credit, and then the decisions of production (MINSKY, 1975). Accordingly, apart from a strictly accounting approach, the composition of a bank's balance sheet expresses its degree of liquidity preference at a given moment, confined to a context where forecasts based on probability calculations are not sufficient to ensure that the expected scenario will be effectively verified (OLIVEIRA, 2009). Consequently, the indicators based on these balance sheets reflect the institutions' perception of the economic prospective scenario, that is, it captures the constant changes in the yield curves of these agents, including those caused by monetary policy.

In effect, these institutions decide not only to allocate their resources among the different classes of assets available at a given moment and context of expectations, but also to have less or more flexibility in relation to the amount of resources they will be willing to lend. Banks thus decide simultaneously the magnitude and how to allocate their resources, i.e. how much flexibility and leverage their balance sheets will present. Hence, we have created most of the indicators based on the literature that connects balance sheets' positions and credit creation, being the last three on the above box extracted from Oliveira (2009).

The first measure of speculative position of banks, i.e. the ratio between operational revenue and expenses, has been expected to be negative. This reflects the fact that banks hedge financial positions tend to transform into speculative ones, and the speculative into Ponzi in the upward of a cycle. Therefore, the more speculative the position, the lower this indicator will be and the greater the credit expansion. For the same reasons, the contrary sign has been projected for the leverage indicator, which represents the ratio between third-party resources and equity, and measures the aggressiveness of banks. Consequently, the higher the indicator, the higher the bank's speculative grade and the greater the credit supply.

The next two indicators are based on the need of banks to maintain flexible positions both in the assets and in liabilities side of their balance sheets. As stated by Oliveira (2009), the flexibility provided by liquidity is a fundamental condition for the balance sheet decisions of banks, being favored the greater the perception of uncertainty, the bigger the degree of liquidity preference. In moments of high macroeconomic instability, for instance, the option for a portfolio of more liquid assets provides the possibility of near-instant equity adjustments, necessary both to protect wealth and to benefit from opportunities to expand it. Even more, flexibility is also related to speculative movements in relation to the expected changes in interest rates (money demand speculation), as well as unforeseen opportunities gains with several assets on the market, being, therefore, the ratio between liquid assets to total assets – the assets flexibility indicator – negatively related to credit expansion.

On the other hand, the liabilities flexibility indicator stands for the quotient between the sum of resources that does not implicate in reserves requirements and short and long-term liabilities. Banks have before them a multiplicity of possibilities for raising funds, rather than just deposits. Thus, their needs of reserves, resulting from bold positions taking in the management of assets, can be compensated by either the use of instruments capable of influencing depositors' preferences or the fundraise from different sources, different markets or from arbitration. In addition to the use of conventional liability management techniques, banks are constantly working on financial innovations that are not subject to regulatory restrictions, consolidating different operational strategy. Banks are, therefore, active players in what comprises the administration of their liabilities in the search for the appreciation of their wealth. In this way, the greater the liabilities flexibility indicator, the greater the possibilities of offering credit (HASTINGS, 2006; TUFANO, 2003).

²¹ The vast majority of GMM models that seek to identify factors that alter the supply of credit use these three macroeconomic variables: demand, inflation and interest rates. See for instance Everaert et al. (2015),

The next indicator is the risk exposure indicator, i.e. the ration between the lowest risk credit portfolio (A and AA) and the total credit portfolio, which refers to the inherent risk of credit supply given non-payment possibility by the borrower. Even though they may minimize this source of risk through a policy of customer diversification, loan ceilings, guarantees, or securitization of assets, futures markets operations, options or swaps, in business expansion phases, banks tend to reduce their safety margins, entering the region of increasing risks (GENNAIOLI; SHLEIFER; VISHNY, 2012; SANTOMERO; TRESTER, 1998). In this sense, Kregel (1997) points that banks generally do not realize that their safety margins are being reduced since, on the one hand, the very expansion of business tends to increase the conviction of bankers that potential borrowers have sufficient financial conditions of payment; and, on the other hand, the optimistic state positively influences the borrower's risk record, which in other circumstances would inevitably have his claims rejected. Thus, the greater the risk exposure indicator, the greater the credit supply.

We then have an indicator that is related to bank leverage in external resources: the foreign currency exposure. This is the ratio between obligations and rights in foreign currency and stands for the risk the risk of exchange rate variation. According to Saunders (2000), banks can mitigate this type of through in- and out-of-balance hedging strategies. Among the strategies on the balance sheet are the attempts to match maturities and values of assets and liabilities in foreign currency and the diversification of portfolio positions in different currencies, since the correlations between exchange rates and interest rates are not perfect between markets. Out of the balance sheet, the author points to the use of derivative transactions such as forward and futures contracts, swap transactions and options. Nonetheless, in the case of expansion prospects of the economy, these institutions tend to minimize the risks of currency mismatching on the balance sheet and increase the proportion of liabilities in foreign currency when compared to the volume of assets denominated in the same currency. In this way, the higher the indicator, the greater the risk assumed the greater the supply of credit (DAVANZO, 2004; HASTINGS, 2006).

Finally, we have included three more bank specific variables, which are: i) the credit supply in the previous period; ii) the financial independence variable; and iii) the return on equity indicator. As for the first one, the greater lagged credit supply indicates both preceding optimistic expectations of banks and a reliable anticipation of future demand growth. The financial independence indicator, on its hand, which is based on the quotient between shareholders' equity and adjusted total assets (total assets less shareholders' equity), reflects how much the banks can expand their lending operations based on its own resources. Lastly, the return on equity indicates bank's profitability and stands for the fact that the more profitable the bank is, the more likely it is to expand credit supply. In summary, the bigger these indicators, the greater the volume of credit; that is, they have been expected to present positive signs in their coefficients. Thereby, taking all these variables into account, we can see the estimation output for the first model in Table 1.

Table 1. Dynamic Panel Data Model 1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Credit(-1)	0.1177	0.0452	2.6028	0.0094
DomesticDemand	0.1747	0.1239	1.4100	0.1588
Selic	-0.0064	0.0023	-2.8374	0.0046
Inflation	0.0009	0.0010	0.9019	0.3673
SpeculativePosition	-0.1877	0.0690	-2.7200	0.0066
Leverage	1.0619	0.0918	11.5652	0.0000
AssetsFlexibility	-0.4546	0.0576	-7.8951	0.0000
LiabilitiesFlexibility	0.0454	0.0185	-2.4589	0.0141
RiskExposure	0.0090	0.0059	1.5361	0.1248
ForeignCurrencyExposure	0.0447	0.0257	1.7367	0.0827
FinancialIndependence	0.5446	0.0607	8.9779	0.0000
ReturnOnEquity	-0.0188	0.0066	-2.8632	0.0043
Effects Specification				
Cross-section fixed (first differences)				
Mean dependent var	0.0174	S.D. dependent var	0.1889	
S.E. of regression	0.2282	Sum squared resid	60.8348	
J-statistic	27.0498	Instrument rank	36	
Prob(J-statistic)	0.3021			

Source: own elaboration based on Eviews 9.0 estimation output.

One may see that roughly every variable presented coefficients with the expected sign, except for inflation, which didn't exhibit a good significance level (less than 10%), the risk exposure and the return on equity. In Brazil, both last, though, can be partially explained by the existence of flexible instruments with overnight gain to protect revenue and those compete with credit as profitable assets, such as the Treasury reverse repos. The opposite sign on the risk exposure can also be explained by the outstanding characteristic of banks in the country of presenting a great majority of lower risk graded credits in their portfolios, a possibility made possible by the institutional changes in the credit market presented in the previous section, i.e. the payroll-deducted credit for workers and pensioners. As for the opposite sign of the return on equity, it can also be related to the fact that among the leading banks of the expansion phase of the last credit cycle there was large public banks, such as Banco do Brasil and Caixa Econômica Federal, which started to perform credit expansionary policies after the crises in 2007.

The Selic rate, as expected, presented a negative sign on its coefficient, meaning that policy rate has a negative effect on credit supply, whereas a up change on the short-term rate of interest stimulate gains in concurrent and more liquid assets then credit, which, as could be seen on the second chapter, alters the yield curves of these institutions. Banks in Brazil are, thus, effectively bounded by the monetary policy.

As for the other variables, there is enough evidence that banks in Brazil respond in a very typical way to both liquidity preference and demand, i.e. as the more optimistic expectations about the future, the lower the urge for flexibility positions, the greater the propensity to leverage positions and, thus, the greater the volume of credit. In this regard, speculative position of banks, i.e. the ratio between operational revenue and expenses, exhibited a negative sign, while the coefficient for leverage – the ratio between third-party resources and equity – was positive. Also, assets flexibility and liability flexibility presented the expected signs, being banks in Brazil more likely to lend at times of declining liquidity preference, both increasing their positions in assets whose monetary return is high and whose liquidity premium is low, thereby reducing the ratio of more liquid assets, and augmenting the proportional sum of resources with no incidence of reserves requirements.

The foreign currency exposure indicator presented positive sign on its coefficient, capturing thus the appetite for balance sheet riskier positions in times of lower liquidity preference. This means that banks in Brazil, for the period under analyses, were able to fund themselves in external currency and increase international obligations, compared to their rights. This was associated to the growth of the domestic market and the financial innovation that, before the international financial crises, has given a second impulse to credit expansion with the internal offer of contracts linked to foreign exchange derivative

operations, which guaranteed a reduction in the cost of credit while the Real trajectory was appreciated. With the crises, the obscurity about the degree of exposure of the other agents led banks to withdraw credit and revise their portfolio positions. The indicator was, therefore, positively correlated with the supply of credit.

Lastly, there is the financial independence ratio, which captures bank's independence degree to third-party capital. Given the fact that all the indicators are in percentage form of the same unit variables, we can highlight the relative importance of this indicator in explaining the credit supply. In Brazil, thus, banks ought to provide bigger amounts of funds to firms and households based on their notorious ability to fund themselves; a characteristic of a concentrated and exceptionally cautious system. Accordingly, the indicator coefficient was presented positive, meaning the higher the bank's independence, the greater its ability to offer credit.

Therefore, connected to the main framework of the Post-Keynesian approach for the relation between credit supply and balance sheet composition of banks, aside with other macroeconomic variable, our findings suggest that changes in the liquidity preference of banks, reflected on their portfolio adjustments throughout movements on flexibility and leverage indicators, have significant relation with credit supply. For instance, when there is a lowering on the liquidity preference of banks, banks are more likely to increase their degree of financial leverage, which indicates a search for riskier passive positions in order to subsidize larger gains in riskier asset positions, such as credit. Additionally, in such situations, the willingness of more flexible portfolio condition is surpassed by the desire of more illiquid and profitable stance. Besides, not least important, in line with the Post-Keynesian theory, demand for credit plays an important role on the determination of funds to be offered by banks in Brazil. In conclusion, it is possible to say that banks in Brazil are effectively bounded by the monetary policy, but not entirely determined by it, once changes in the basic short-term interest rate alters banks' yield curves and their liquidity preference, modifying their willingness to expand credit supply.

Concluding Remarks

In the particular form money assumes in modern economies, banks can create it endogenously based on their liquidity preference, which is strongly determined by demand for credit and is originated inside the economic system in order to finance investment and consumption decisions and speculative purchases of assets. Therefore, the monetary authority has only the ability to influence credit supply by changing the availability of liquid assets compared to all other classes of assets via monetary policy instruments, i.e. reserve requirements, discount window and open market operations. Through the management of liquidity in the reserves market, the Central Bank may modify the price of access to short-term liquidity – the interest rate – and, thereby, provoke adjustments on the portfolio of banks, reordering the comparable disposal of assets. The resulting modification in the yield curve in operation transforms banks propensity to expand credit supply.

In summary, connected to the main framework of the Post-Keynesian approach for the relation between credit supply and balance sheet composition of banks, aside with other macroeconomic variable, our findings suggest that changes in the liquidity preference of banks, reflected on their portfolio adjustments throughout movements on flexibility and leverage indicators, have significant relation with credit supply. For instance, when there is a lowering on the liquidity preference of banks, banks are more likely to increase their degree of financial leverage, which indicates a search for riskier passive positions in order to subsidize larger gains in riskier asset positions, such as credit. Additionally, in such situations, the willingness of more flexible portfolio condition is surpassed by the desire of more illiquid and profitable stance. Therefore, credit supply in Brazil is endogenously determined – as expected by the Post-Keynesian theory – by the liquidity preference of banks and the demand for funds, being, thus, only bounded by the monetary policy on its attempt to control inflation by managing the short-term interest rate.

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