Monetary Policy and its real effects: loan-level evidence from Brazil on the bank lending-channel

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Preliminary (do not quote)

Abstract

This paper investigates the bank balance-sheet transmission channel of monetary policy. I use loan-, firm-, and bank-level data from Central Bank of Brazil and the Ministry of Labor and Employment to estimate this channel and its real-effects for firms. This loan-level panel has over 40 million observations from 2004 to 2016, a period which includes a deep local crisis and relative "bonanza" prior to the global financial crisis (GFC). Brazil is a large emerging market, with an arguably open economy adopting an inflation target regime since 1999. To identify the effects of changes in the overnight Brazilian funds rate in credit supply via banks' core characteristic, I control for observable and unobservable time-varying firm heterogeneity using firm*time fixed effects, and I "horserace" bank observables against Taylor-based fundamentals (e.g. Consumer Price Index (CPI), GDP growth and expected CPI). I find an economically significant bank capital channel with relevant effects on firms' employment and investment outcomes. Other relevant macroeconomic variables have no such effects.

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1. Introduction

Banks are fundamental to the proper functioning of developed and emerging markets economies (EMEs), including their monetary policy pass-through (Bernanke and Blinder (1992), Bernanke and Gertler (1995)). In the last 10 years, since the first rumors of a financial crisis in the US, several economical, regulatory and political shocks have had implications for banks business and arguably for the lending channel of local monetary policy (Gambacorta, Pérez and Tuesta (2017)). Moreover, conventional and unconventional monetary policy carried to alleviate the GFC impacts on developed economies had spillovers on EMEs lending channel, including credit expansion in local currency (Peydró, Morais and Ruiz-Ortega (2015), Barroso, Pereira da Silva and Soares (2016)).

In this paper, I estimate the lending channel of local monetary policy in an EME pursuing an inflation target regime, and a floating exchange rate. For identification, I estimate the bank balance-sheet lending channel of monetary policy using loan- and bank-level data and its real-effects via banks' characteristics assossiated with bank balance-sheet strength. Bank balance-sheet strengh (capital and liquidity) are core to the transmition of monetary policy as well as bank's size (e.g. Kashyap and Stein, 2000). Loan-level studies document this channel in Spain, where the monetary policy is arguably exogenous due to the relative size of the country in the eurozone (Jimenez et al., 2012, Jimenez et al., 2014). To the best of my knowledge, this is the first loan-level data to document this channel in an EME following a Taylor-rule and its real effects. While our identification strategy is more reliant on interactions with Taylor fundamentals (CPI, GDP growth and CPI expectation, CPI*), its findings are perhaps more elusive to a broader number of countries that fill into this category.

The recent literature documents a noticeable dependence of the local credit supply on the global financial cycle (e.g. Miranda-Agrippino and Rey (2015), Obsfeld, Ostry and Qureshi (2017)). I contribute to this stream of the literature controlling for the FED funds rate, for Wu-Xia Short Shadow (Federal Funds) Rate (to proxy for global liquidity), and for options-implied equity volatility (VIX - to proxy for risk aversion). These macro-variables are "horseraced" against core bank (strength) characteristics to access their interference with the core bank lending channel.

I find a potent channel mostly conditional on bank's capital and in line with loan-level studies carried in developed economies (e.g. Kashiap and Stein (2000), Jimenez et

al. (2012, 2014)) with real-effects for employment and investment. However, I find little room to support that local monetary policy in Brazil has been deeply influenced by VIX or US monetary policy (Rey (2015)) via the bank capital lending channel.

2. The floating exchange regime, monetary policy and the banking sector in Brazil

Brazil adopts a floating exchange rate (and an inflation target) regime in January, 18, 1999, after several decades of managed exchange rates.

> "Under managed exchange rates Brazil suffered recurrent balance of payments difficulties in the 1950s and 1960s, the 1980s debt crisis, which contributed to a dramatic deterioration in macroeconomic performance in the following years, and the slowdown and crisis of the 1990s, before its final collapse in January 1999 (Meirelles, 2009)"

The first four years from the inception of the floating exchange rate regime have been marked by several episodes of turmoil, including the Hight Tech buble burst, the Argentinian crisis, the September 11th attacks, and the presidential election of 2002. Throughout these years, the BCB has relied on tight monetary policy and capital controls to prevent overshooting of the local currency, the Brazilian real (BRL), support the trade sector, and the rollover of firms' foreign debt.

Between 2003 and 2008, Brazil has experienced relative bonanza and the Central Bank of Brazil (BCB) has mostly met its inflation target (4.5%) despite strong economic and credit growth (see Figure 1).

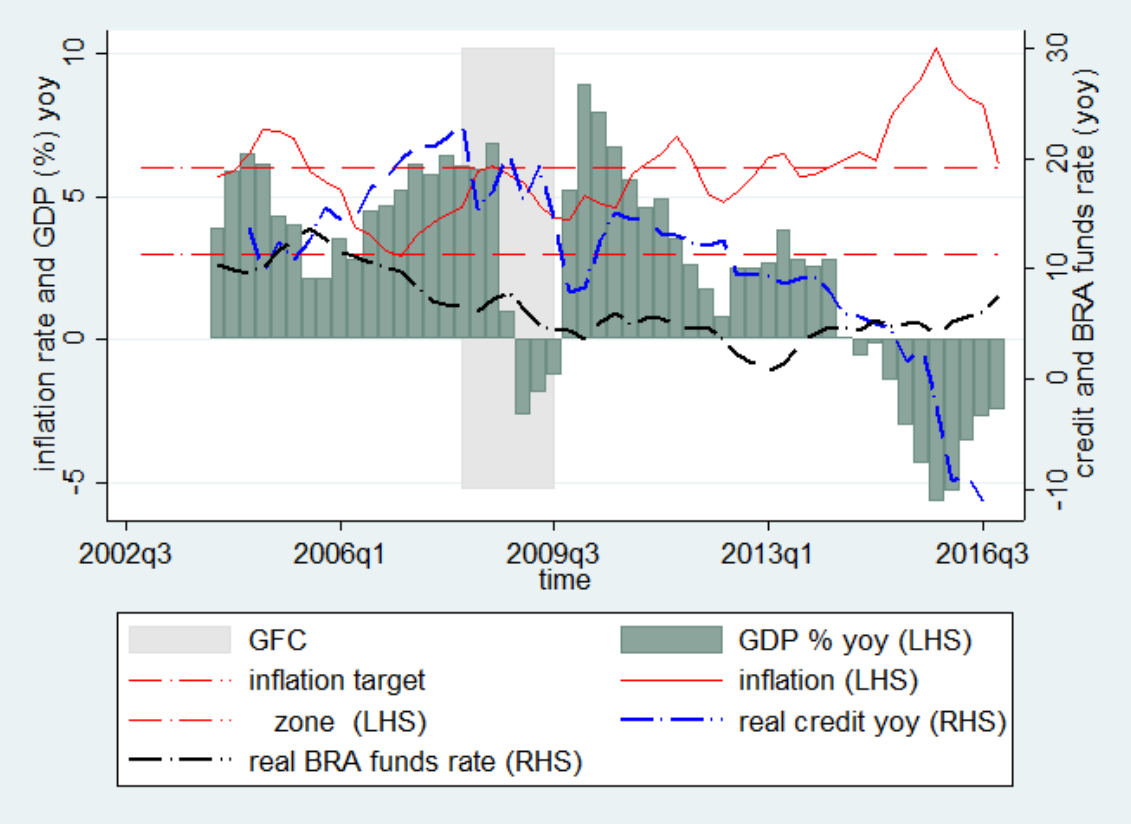


Figure 1: Monetary policy, GDP and credit growth in Brazil

Since the bankruptcy of Lehman Brothers, both developed and emerging markets have faced real economy and financial sector challenges. In Brazil, the GFC has first affected FX and the stock exchange negatively but only after September, 2008. Between September and October, export finance contracts fell by 30% and rollover ratio of foreign debt decreased from over a 100% to 22% in November (Mesquita and Toros, 2010). The USD liquidity shortage triggers several BCB interventions, including derivatives' sales, spot USD sales, and direct lending to the trade sector. Monetary policy was initially contractionary in response to large capital outflows, but later relaxed to stimulate both credit and consumption in 2009 (Pereira da Silva, L. A., Harris, R. (2012)).

Immediately after the GFC (2010-2011), in light of credit and aggregate demand recovery, BCB and several other EMEs started a monetary policy tightening cycle. Unconventional monetary policy, particularly QE2, interfered in this recovery as large (short-term) capital inflows caused appreciation of many currencies, especially the Brazilian real (BRL).

After these two years of quick recovery; investment contraction, excessive public expenditure aggravated by political scandals put the country into inflation decontrol and credit slowdown. A local monetary policy tightening cycle starts (arguably late) in 2013 to tackle inflation, but it is largely ineffective amidst "stagflation". Other corruption scandals have contributed to production, credit and aggregate demand steep decline since the re-election of president Dilma Rouseff in 2014. In particular, an investigation carried by the Federal Policy denominated "Car Wash" unfolds into several other scandals leading to the impeachment of the recently elected president in 2016. Since then, hawkish monetary policy allied to several relevant fiscal initiatives successive put inflation back in its target zone (Figure 1).

It is worth noticing that local monetary policy in Brazil has fluctuated intensively besides constant expansionary policy in the US after the GFC.

The bank sector during and post the GFC

In the banking sector, during the GFC, a large public bank (Banco do Brasil) capitalized a medium-sized one (Votorantim), but without taking control of its operations. Liquidity issues with the large bank Unibanco motivated its merger with Itau, resulting in the largest bank in Latin America. However, it was the smaller banks that bared the highest costs. In particular, a crunch in the repo market and a "fly-to-quality" movement from their depositors to the larger banks severely impacted these banks health (Oliveira, Schiozer, Barros, L. (2015)). The BCB responded with many alleviating macroprudential policies, including a massive release of reserve requirements (Barroso, Gonzalez, Van Doornik, 2017). Moreover, the deposit insurance organization, ("Fundo Garantidor de Crédito" - FGC), created a successful program increasing the protection extended to depositors of these banks.

The quick economic recovery of 2010-2011, FX appreciation, and expansionary policy in the US causes certain euphoria and many domestic banks increase credit in domestic currency (Barroso, Pereira da Silva, Soares, 2016). It is worth noticing that the median banks' non-core / core liabilities (i.e., foreign debt/deposits) does not materially change from pre-GFC to QE2/3 period though (Figure 2). In other words, after a short drop during the GFC, this figure returns to its pre-crisis levels during QE2/3 when global liquidity is abundant and short shadow rates dive deep in negative territory.

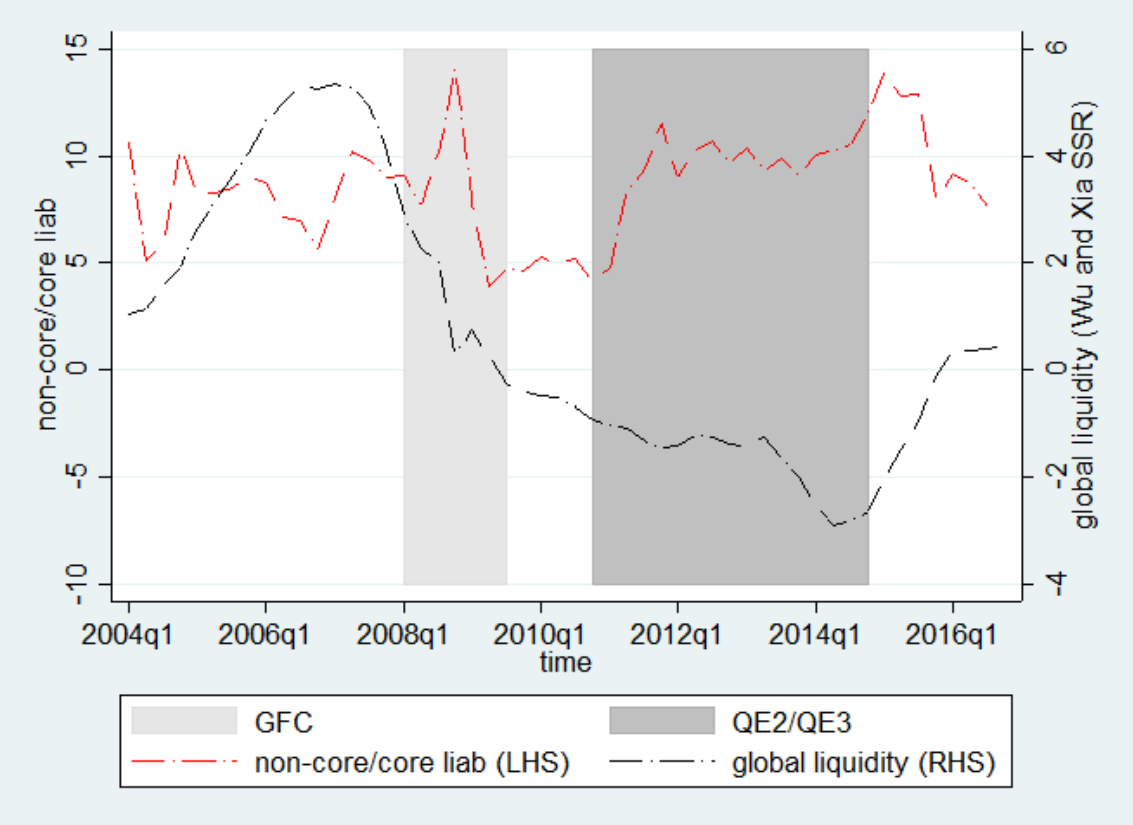


Figure 2: Global liquidity and banks' median non-core/core liabilities ratio in Brazil

3. Data and identification strategy

In this paper, I use three data sets matched by firm's tax id number: (1) the credit register of the BCB (``Nova Central de Risco''), (2) a formal employment registry from the Brazilian Ministry of Labor and Employment ("Relação Anual de Informações Sociais (RAIS)", and (3) the Brazilian payment system ("Sistema de Pagamentos Brasileiro - SPB"). I augment this data with bank balance-sheet and macroeconomic variables. My final panel sample spans all calendar quarters from 2004 to 2016.

The Credit Registry of the BCB (1) contains detailed and comprehensive information of the underlying credit contracts larger than BRL 5,000[2], including credit

[2] For computational reasons, I sample the data from the original database by firm (i.e., I collect a random sample of firms ever represented in the credit registry and withdrawn their credit histories from all financial institutions that ever lend to these firms). This sample covers 10% of the firms that have credit from at least two banks in at least one quarter during the sample period.

volumes (either committed or drawn), as well as monthly information on each loan performance (i.e. delinquency). I further aggregate these loan-level credit exposures into the firm-bank level to calculate total committed credit provided by each bank to each firm. The aggregation is at the bank holding company level in order to mitigate any concerns about credit supply dependence of banks with common management. I follow the quarterly dynamics of each bank-firm pair throughout the sample. My main dependent variable is the growth rate of the firm-bank credit exposure (in log terms) winsorized at the 1% and 99% percentiles.

I also focus on firms with multiple bank relationship for identification of credit supply using firm fixed effects estimator (e.g. Khwaja and Mian, 2008). This step restricts the original sample to the 86% more representative firms in terms of total credit extended by all financial institutions. I also exclude from the loan-level analysis financial firms, as well as loans that are not originated by commercial banks (8%). With the exception of two larger institutions, most foreign banks in Brazil are involved in investment banking rather than in commercial activity. These two banks remain in the sample for the larger part of my analysis. As an additional exercise, I also analyze firm-level credit dynamics (including credit extended by all these excluded financial institutions) to better access real effects for firms.

Moreover, I focus on credit supply in local currency, and drop firm-bank observations with at least one loan indexed to currencies other than Brazilian Real (BRL). In the original sample, they represent less than 0.5% of the loans.

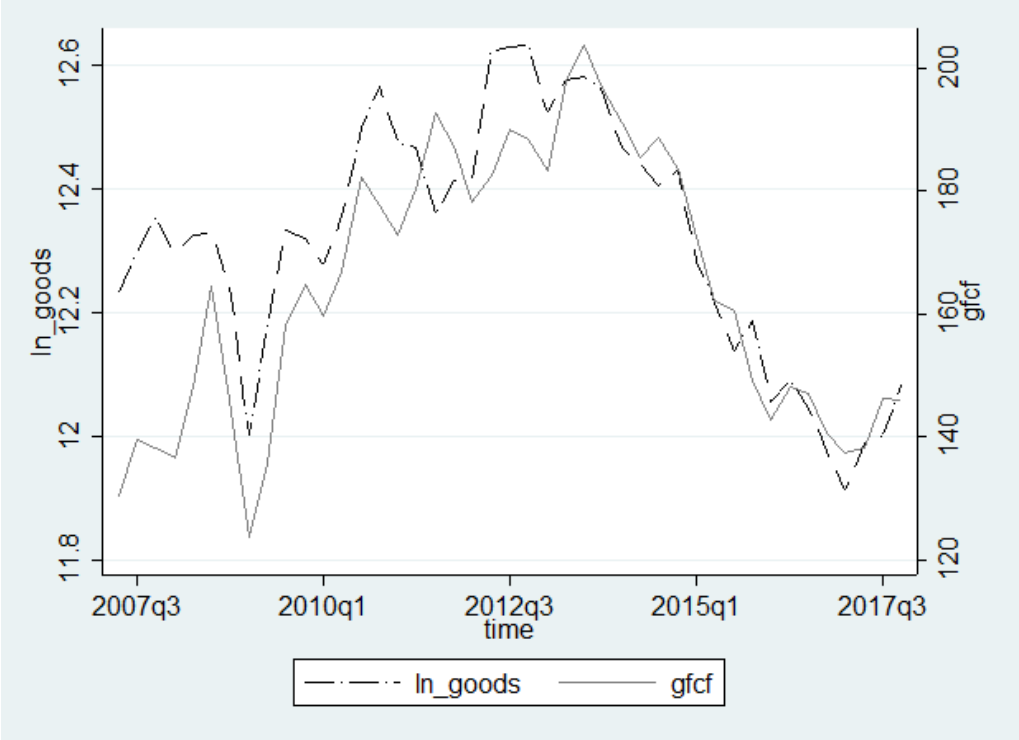
The RAIS database (2) collects information on each job spell defined by the work start and end dates matched by employer-employee tax numbers. I then calculate the (log of) the number of formal employees and their average wages as of the end of each quarter in each firm between Dec, 2003 and Dec, 2016 to build control variables. Moreover, I use the quarterly change in firm employment as a dependent variable to trace the real effects of shrinking (or expanding) credit supply.

The third database, SPB[3] (3), contains information on electronic transfers (generically, payments) made between any two counterparties identified by tax number.

[3] The SPB is comprised of two subsystems. The "Sistema de Transferência de Reservas" - STR is managed by the BCB and contains information on the electronic transfers between those financial intermediaries. Similarly, the "Sistema de Transferência de Fundos" - SITRAF is managed by an independent organization called CIP. In this paper, we merge the two.

I use this data to build a firm-level investment, or gross fixed capital formation, proxy. This investment proxy consists of all aggregated payments between firms in our sample and the producers of capital and durable goods identified by its 2-digit sector identifier. I use the firm level sum of all such quarterly payments in log terms to trace the real effects of credit supply changes via bank lending channel to investment. This proxy is highly correlated with the aggregated gross fixed capital formation (gfcf) index from the National Accounts[4] (Figure 3).

Figure 3: Gross fixed capital formation (GFCF) from the national accounts and the investment proxy (i.e., the quarterly log transfers from all firms in the payment system to producers of capital and durable good). The correlation is 89.7%



Sources: Central Bank of Brazil (STR), CIP (SITRAF) and the national accounts (IBGE).

[4] The definition of the National Accounts (IBGE) is broader though. While we focus on cash transfers to producers of capital and durable goods (CNAE sectors 26 to 29) to proxy the acquisition of such goods, the definition from the National Accounts also considers second-hand acquisitions, in-house production, construction and infra-estructure, and more properly treats the disposal of investment. The pool of firms surveyed by IBGE is narrower though (50k firms), while the payment system has data on 3.5M of distinct firms from 2007 to 2017.

I present detailed summary tables, including all loan, bank and firm level data in the Appendix (see Tables A1, A2 and A3).

4. Results

I start estimating the lending-channel of monetary policy using the core transmission variables (size, capital and liquidity) that are common to the empirical literature, but I mostly focus my analysis on bank capital (e.g. Jimenez et al., 2014). Table 1 reports a baseline regression and monetary policy interactions.

Insert Table 1 about here

Columns (1) to (4) are estimated with firm*time fixed effects to control for observable and unobservable credit demand shifts. On average, bigger and more capitalized banks increase credit supply relatively to the same firm and quarter during the 13 years of my estimating window. Similarly, government banks increase their relative share of credit supply on average by 1.95% per quarter. In column (3), I interact all core bank characteristics with the one year change in the overnight Brazilian funds rate (selic); and, in column (4), I horserace all bank controls against macro variables that are endogenous to monetary policy in a Taylor rule (i.e., yearly GDP growth, inflation, and inflation expectations). All the results are in line with Kashyap and Stein (2000). In light of a monetary policy (MP) tightening of 1%, banks with a 3% less capital and liquidity ratio decrease credit on average by 0.11% and 0.05% more than the mean bank, respectively. In column (5), I present a less saturated model (without firm*time fixed effects) augmented with macroeconomic and firm observables to assess the mean effects of a 1% MP tightening on credit supply. These level estimates are consistent with the compositional results of column (4). Moreover, bigger firms (with more employees) increase on average credit supply, those that are more indebted ex-ante and have a more skilled labor force (with higher average wages) decrease.

The sample years encompass periods of easing and tightening of MP, two crises, as well as heterogeneous conditions in global liquidity, risk aversion, commodity prices, and two recessionary episodes. In this respect, understanding the dynamics of the

lending channel across time is particularly relevant. In Table 2, I regress the most saturated regression of Table 1 (column 4) in alternative time spans. The main results hold when excluding the GFC quarters (columns 2) and the recessionary quarters of 2014 and 2015, when Brazil is in crisis – column (3)). I also analyze the channel both before (3) and after the GFC (4) and look into changes in the lending-channel pass-through. Comparing these estimates, I find that the channel related to bank's liquidity is stronger after the GFC and this difference is statistically significant (columns 5 and 6). In other words, after the GFC banks with lower liquidity positions become more responsive to MP.

Insert Table 2 about here

I run two robustness exercises "horseracing" the base estimates against a number of global shocks possibly connected to the pass-through of MP as suggested by Rey (2015): (1) global liquidity (proxied by the US short shadow rate), (2) fed funds rate (3) global uncertainty (proxied by VIX) and (4) changes in commodity prices (Table 3). I focus on the bank capital channel, but I simultaneously horserace bank's size and capital against all these variables in the related column. None of these variables seem to directly affect the lending channel of monetary policy. In the second robustness exercise, I "horserace" the base estimates against local macro variables of interest: (1) Political Uncertainty (Baker, Bloom and Dale, 2016), (2) Industrial Capacity Usage (ICU), (3) Changes in the Current Account-to-GDP rations, and (4) Changes in the fiscal position of Brazil (Debt-to-GDP ratio).

Insert Table 3 and 4 about here

I find that ICU, the current account, and changes in the fiscal position are indeed correlated with bank credit supply: within firm and quarter, a 1% positive change in ICU, increases credit from the riskier bank (with a 3% lower capital ratio) in 0.14%, almost offsetting the effect of a 1% tightening on the same bank. A strengthening of the Brazilian current account deficit, have statistically but non-economically significant positive effects on riskier bank lending decisions. However, I find that the weakening of the country's

fiscal position have very strong effects on bank supply. Whereas a 1% easing of MP, would expand lending of the riskier bank in 0.16% (column 4), a 1.65% increase in the debt-to-GDP ratio within the same year would, on average, offset such effect (Table 4). This result has important policy implications suggesting that countercyclical fiscal expenditure can be credit contractionary.

Finally, I assess the real effects of MP to the firms. I first collapse the panel to the firm-time dimension weighting the risk and bank observables with the ex-ante share of the bank credit exposure. This approach allows testing the implications of MP on (overall) firm's credit exposure, employment, and investment (Table 5) and provide elasticities that are more appealing to policy-makers, banks and academia.

Insert Table 5 about here

In column (1), I use as a dependent variable the quarterly change in each firm total credit (including credit from non-bank financial institutions and investment banks that are not in the sample). The results at the firm-level are consistent with the previous ones, suggesting that on-average firms do not insulate from the lending channel of MP. The average effect of a 1% MP tightening on the average firm is -0.20%. The real effects on quarterly employment of the same MP shock are also statistically and economically significant, -0.09% (columns (2)). A firm connected to riskier banks (with a 3% lower share of capital ratio) receives a substantially higher MP shock, and face on average a -0.34% quarterly contraction in credit and -0.11% contraction in employment. As a final exercise, I look into the logarithm of the electronic transfers in each quarter between the firms in my sample and producers of capital goods and real estate firms (the investment proxy). I also find that firms connected to riskier banks are likely to make less investments in light of a MP tightening. These results hold for the introduction of time FEs (columns 2, 4 and 6).

5. Conclusions

This paper evaluates the lending channel of monetary policy in Brazil and its real effects using bank, firm, and loan-level data. I find a strong lending channel operating through bank capital and consistent with the theoretical and empirical literature. This channel has important real effects for firms. I also find that the fiscal position of the country has

relevant and strong effects for the transmission of monetary policy. On the other hand, I do not find evidence that local monetary policy directly respond to global financial shocks via the same bank capital channel.

6. References

Barroso, J., Gonzalez, R., Van Doornik, B. (2017). Credit Supply Responses to Reserve Requirement: loan-level evidence from macroprudential policy. BIS Working Paper Series, n. 674.

Barroso, J., Pereira da Silva, L., Soares, A. (2016). Quantitative Easing and Related Capital Flows into Brazil: measuring its effects and transmission channels through a rigorous counterfactual evaluation. *Journal of International Money and Finance*, v.67 (October), pp. 102–122.

Bernanke, B., Blinder, S. (1992). The Federal Funds Rate and the Channels of Monetary Policy Transmission. *American Economic Review*, v.82, 901-921.

Bernanke, B., Gertler, M. (1995). Inside the Black Box: The Credit Channel of Monetary Policy Transmission. NBER Working Paper, n. 5146.

Gambacorta, L., van Rixtel, A., Stefano, S. (2017). Changing Business Models in International Bank Funding. BIS Working Paper, n. 614.

Gonzalez, R., Khametshin, D., Peydró, J.L., Polo, A. (2018). Hedger of Last Resort: Evidence from Brazil on FX Interventions, Local Credit and Global Financial Cycles. UPF Working Paper

Jiménez, G., Ongena, S., Peydró, J.L., Saurina, J. (2012). Credit Supply and Monetary Poliy: Indentifying the Bank Balance-Sheet with Loan Applications. *The American Economic Review*. pp. 2301-2326

Jiménez, G., Ongena, S., Peydró, J.L., Saurina, J. (2014). Hazardous Times for Monetary Policy: What do Twenty-Three Million Bank Loans Say About the Effects of Monetary Policy on Credit Risk-Taking. *Econometrica*, V.82 (2), pp. 463-505.

Kashyap, A., Stein, J. (2000). What Do a Million Observations on Banks Say about the Transmission of Monetary Policy? *The American Economic Review*, v. 90, No. 3, pp. 407-428.

Meirelles, H. (2009). Ten years of floating exchange rates in Brazil. Speech by Mr Henrique Meirelles, Governor of the Central Bank of Brazil, to celebrate 10 years of floating exchange rates in Brazil, Central Bank of Brazil, Brasília, January 19

Mesquita, M., Toros, M (2010). Brazil and the 2008 panic. BIS Papers, n.54

Miranda-Agrippino, S. and Rey, H. (2015). World Asset Markets and Global Financial Cycle. Technical Report, Working Paper, London Business School

Obstfeld, M. (2015). Trilemmas and Tradeoff: Living With Financial Globalization. BIS Working Paper n. 480.

Oliveira, R., Schiozer, R., Barros, L. (2015). Depositors' Perception of 'Too-Big-to-Fail'. *Review of Finance*. 19: 191-227.

Pereira da Silva, L. A., Harris, R. (2012). Sailing through the Global Financial Storm: Brazil's recent experience with monetary and macroprudential policies to lean against the financial cycle and deal with systemic risks. Central Bank of Brazil, Working Paper, n. 290.

Peydró, J. L., Morais, B., Ruiz, C. (2018). The international bank-lending channel of monetary policy rates and QE: credit supply, reach-for-yield, and real effects, *Journal of Finance,* forthcoming

Rey, H. (2015) Dilemma, not trilemma: the global cycle and monetary policy independence. Jackson Hole Speech

Tables and Appendix

Table 1: lending-channel of monetary policy at loan-level

	$\Delta \ln(\text{credit})_{b,f,t:t+3}$				
	(1)	(2)	(3)	(4)	(5)
Δovernight rate$_{t-1}$					
* size$_{t-1}$			0.106*	0.135***	0.129**
			(0.056)	(0.042)	(0.056)
* capital$_{t-1}$		0.010	0.028	0.035*	0.037*
		(0.013)	(0.018)	(0.018)	(0.020)
* liquidity$_{t-1}$			0.021**	0.018*	0.025**
			(0.011)	(0.011)	(0.012)
risk$_{t-1}$	-1.153***	-1.153***	-1.139***	-1.143***	-2.738***
	(0.223)	(0.222)	(0.217)	(0.221)	(0.283)
default$_{t-1}$	-3.525***	-3.524***	-3.531***	-3.549***	-3.633***
	(0.648)	(0.645)	(0.639)	(0.619)	(0.795)
size$_{t-1}$	0.839***	0.833***	0.900***	0.900***	0.908***
	(0.292)	(0.292)	(0.291)	(0.273)	(0.284)
capital$_{t-1}$	0.216**	0.219**	0.225**	0.217**	0.205*
	(0.091)	(0.090)	(0.088)	(0.096)	(0.105)
liquidity$_{t-1}$	-0.046	-0.047	-0.039	-0.043	-0.054
	(0.041)	(0.042)	(0.043)	(0.039)	(0.052)
fx debt$_{t-1}$	-0.049**	-0.049**	-0.049**	-0.048**	-0.048*
	(0.019)	(0.019)	(0.019)	(0.019)	(0.026)
gov$_{t-1}$	1.907***	1.926***	1.979***	1.947***	1.589**
	(0.701)	(0.687)	(0.683)	(0.665)	(0.700)
foreign$_{t-1}$	-0.984*	-0.984*	-0.980*	-0.986	-0.610
	(0.559)	(0.566)	(0.565)	(0.625)	(0.627)
firm credit$_{t-1}$					-1.987***
					(0.122)
n employees$_{t-1}$					1.966***
					(0.106)
avg payroll$_{t-1}$					-0.262***
					(0.063)
Observations	4,071,643	4,071,643	4,071,643	4,071,643	4,071,642
R-squared	0.408	0.408	0.408	0.409	0.018
Seasonal effects	<>	<>	<>	<>	Yes
Macro controls	<>	<>	<>	<>	Yes
Bank controls	Yes	Yes	Yes	Yes	Yes
Firm-Bank Controls	Yes	Yes	Yes	Yes	Yes
Firm Controls	<>	<>	<>	<>	Yes
Firm*Time FE	Yes	Yes	Yes	Yes	No
{ΔCPI$_{t-1}$, CPI*$_{t-1}$,ΔGDP$_{t-1}$} * Bank Controls$_{t-1}$	No	No	No	Yes	Yes
{Δovernight rate$_{t-1}$} * Bank Controls$_{t-1}$	No	No	Yes	Yes	Yes

Robust standard errors in parentheses : *** p<0.01, ** p<0.05, * p<0.1. *Notes:* This table presents the the main results of the paper. The number of firms in the sampe are 119986, the number of 2-digit sectors is 76, the number of country regions is 98, the number of banks 97 across 52 quarters. In last column, all macro controls are jountly estimated and I also use sectory*region FEs for demand control. All standard errors are clustered at the bank and sector*quarter dimension.

Table 2: Time Robustness

	$\Delta\ln(\text{credit})_{b,f,t:t+3}$					
	(1)	(2)	(3)	(4)	(5)	dif (4) - (5)
	All quarters (2004Q1 - 2016Q4)	(-) BRA crisis downturn (2014Q2-2015Q4)	(-) GFC crisis quarters (2008Q3-2009Q3)	Pre - GFC quarters (2004Q1-2008Q2)	Post - GFC quarters (2016Q1-2016Q4)	
Δovernight rate$_{t-1}$						
* size$_{t-1}$	0.135***	0.146***	0.097**	0.128**	0.144*	-0.036
	(0.042)	(0.043)	(0.045)	(0.058)	(0.080)	(0.097)
* capital$_{t-1}$	0.035*	0.040**	0.036*	0.044**	0.086***	0.054
	(0.018)	(0.017)	(0.020)	(0.017)	(0.028)	(0.034)
* liquidity$_{t-1}$	0.018*	0.020*	0.021*	-0.002	0.052***	0.035*
	(0.011)	(0.011)	(0.012)	(0.008)	(0.019)	(0.018)
Observations	4,071,643	3,376,620	3,587,329	833,732	2,753,597	
R-squared	0.409	0.406	0.409	0.389	0.417	
Bank controls	Yes	Yes	Yes	Yes	Yes	
Firm-Bank Controls	Yes	Yes	Yes	Yes	Yes	
Firm*Time FE	Yes	Yes	Yes	Yes	Yes	
{ΔCPI$_{t-1}$, CPI*$_{t-1}$,ΔGDP$_{t-1}$} * Bank Controls$_{t-1}$	Yes	Yes	Yes	Yes	Yes	
{Δovernight rate$_{t-1}$} * Bank Controls$_{t-1}$	Yes	Yes	Yes	Yes	Yes	
N firms	119986	116512	117708	44367	98291	
N sectors	76	76	76	75	74	
N regions	98	98	98	98	98	
N banks	97	97	97	76	81	
N quarters	52	45	45	16	29	
Cluster	bank sector*quarter	bank sector*quarter	bank sector*quarter	bank sector*quarter	bank sector*quarter	

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

Table 3: Global finance robustness

	(1)	(2)	(3)	(4)
Δovernight rate$_{t-1}$ *				
size$_{t-1}$	0.147***	0.151***	0.135***	0.122***
	(0.037)	(0.037)	(0.036)	(0.040)
capital$_{t-1}$	0.042**	0.044***	0.046***	0.042**
	(0.016)	(0.016)	(0.015)	(0.016)
liquidity$_{t-1}$	0.018*	0.018*	0.018*	0.017*
	(0.010)	(0.010)	(0.010)	(0.009)
Δshort shadow rate$_{t-1}$ *				
capital$_{t-1}$	0.017			
	(0.037)			
ΔFED funds rate$_{t-1}$ *				
capital$_{t-1}$		-0.070		
		(0.072)		
Δcommodity prices$_{t-1}$ *				
capital$_{t-1}$			0.004	
			(0.004)	
global uncertainty$_{t-1}$*				
capital$_{t-1}$				0.003
				(0.006)
Observations	4,071,643	4,071,643	4,071,643	4,071,643
R-squared	0.409	0.409	0.409	0.409
Bank controls	Yes	Yes	Yes	Yes
Firm-Bank Controls	Yes	Yes	Yes	Yes
Firm*Time FE	Yes	Yes	Yes	Yes
{ΔCPI$_{t-1}$, CPI*$_{t-1}$,ΔGDP$_{t-1}$} * Bank Controls$_{t-1}$	Yes	Yes	Yes	Yes
{Δovernight rate$_{t-1}$} * Bank Controls$_{t-1}$	Yes	Yes	Yes	Yes
{G global variable$_{t-1}$} * Bank Controls$_{t-1}$	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Local finance robustness

	(1)	(2)	(3)	(4)
Δovernight rate$_{t-1}$ *				
size$_{t-1}$	0.119***	0.137***	0.109***	0.151***
	(0.040)	(0.045)	(0.037)	(0.044)
capital$_{t-1}$	0.041**	0.049***	0.035**	0.053***
	(0.017)	(0.017)	(0.017)	(0.019)
liquidity$_{t-1}$	0.016	0.018*	0.015*	0.024**
	(0.010)	(0.010)	(0.009)	(0.010)
Political Uncertainty (Brazil)$_{t-1}$ *				
capital$_{t-1}$	0.000			
	(0.001)			
ICU$_{t-1}$ *				
capital$_{t-1}$		-0.047**		
		(0.021)		
ΔCurrent Accounts-to-GDP$_{t-1}$ *				
capital$_{t-1}$			-0.003**	
			(0.002)	
ΔDebt-to-GDP$_{t-1}$ *				
capital$_{t-1}$				0.032***
				(0.009)
Observations	4,071,643	4,071,643	4,071,643	4,071,643
R-squared	0.409	0.409	0.409	0.409
Bank controls	Yes	Yes	Yes	Yes
Firm-Bank Controls	Yes	Yes	Yes	Yes
Firm*Time FE	Yes	Yes	Yes	Yes
{ΔCPI$_{t-1}$, CPI*$_{t-1}$,ΔGDP$_{t-1}$} * Bank Controls$_{t-1}$	Yes	Yes	Yes	Yes
{Δovernight rate$_{t-1}$} * Bank Controls$_{t-1}$	Yes	Yes	Yes	Yes
{L local variable$_{t-1}$} * Bank Controls$_{t-1}$	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Firm-level and real effects of changes in the overnight funds rates in employment and gfcf

	$\Delta\ln(\text{credit})_{f,t:t+3}$		$\Delta\ln(\text{n employees})_{f,t:t+3}$		$\Sigma\ln(\text{gfcf})_{f,t+1:t+3}$	
	(1)	(2)	(3)	(4)	(5)	(6)
Δovernight rate$_{t-1}$						
* size$_{t-1}$	0.127**	0.007	0.117	0.007	0.117	0.138***
	(0.053)	(0.014)	(0.226)	(0.012)	(0.226)	(0.040)
* capital$_{t-1}$	0.045***	0.038***	0.007*	0.007*	0.128***	0.038***
	(0.013)	(0.012)	(0.004)	(0.003)	(0.034)	(0.012)
* liquidity$_{t-1}$	0.033***	0.018**	0.008***	0.008***	0.027	0.018**
	(0.011)	(0.008)	(0.002)	(0.002)	(0.046)	(0.008)
risk$_{t-1}$	-3.955***	-3.959***	-4.658***	-4.681***	-6.824	-3.959***
	(0.759)	(0.759)	(0.355)	(0.355)	(6.169)	(0.759)
default$_{t-1}$	-3.380***	-3.386***	-2.322***	-2.318***	-0.296	-3.386***
	(0.273)	(0.262)	(0.123)	(0.123)	(2.446)	(0.262)
size$_{t-1}$	0.900***	0.827***	-0.105	-0.086	-12.779***	0.827***
	(0.253)	(0.243)	(0.088)	(0.088)	(2.566)	(0.243)
capital$_{t-1}$	0.165	0.148	-0.037	-0.032	-0.676	0.148
	(0.129)	(0.129)	(0.058)	(0.060)	(0.704)	(0.129)
liquidity$_{t-1}$	-0.126**	-0.144***	-0.000	0.005	0.689***	-0.144***
	(0.056)	(0.051)	(0.011)	(0.010)	(0.173)	(0.051)
fx debt$_{t-1}$	-0.050***	-0.049***	0.007*	0.006	0.937***	-0.049***
	(0.018)	(0.015)	(0.004)	(0.004)	(0.214)	(0.015)
gov$_{t-1}$	1.500**	1.463**	-0.774*	-0.753*	-9.830***	1.463**
	(0.670)	(0.679)	(0.396)	(0.399)	(2.937)	(0.679)
foreign$_{t-1}$	1.126	1.136	-0.997**	-0.992**	-7.254	1.136
	(0.933)	(0.941)	(0.444)	(0.445)	(4.936)	(0.941)
Δovernight rate$_{t-1}$	-0.195**		-0.092***		-0.003	
	(0.091)		(0.032)		(0.729)	
ΔGDP$_{t-1}$	0.110		-0.038		-0.260	
	(0.103)		(0.051)		(1.115)	
ΔCPI$_{t-1}$	0.083		-0.245***		-1.271	
	(0.156)		(0.077)		(1.720)	
CPI*$_{t-1}$	-1.385**		0.192		2.051	
	(0.656)		(0.238)		(5.068)	
Observations	1,611,353	1,611,353	1,611,353	1,611,353	1,611,353	1,611,353
R-squared	0.054	0.055	0.046	0.046	0.311	0.311
Seasonal effects	Yes	<>	Yes	<>	Yes	<>
Macro controls	Yes	<>	Yes	<>	Yes	<>
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	No	Yes	No	Yes	No	Yes
{ΔCPI$_{t-1}$, CPI*$_{t-1}$,ΔGDP$_{t-1}$} * Bank Controls$_{t-1}$	Yes	Yes	Yes	Yes	Yes	Yes
{Δovernight rate$_{t-1}$} * Bank Controls$_{t-1}$	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. *Notes:* This table presentsfirm-level results and real effects. The number of firms in the sampe are 119986, the number of 2-digit sectors is 76, the number of country regions are 98, the number of banks to which firm are more exposed (max bank) is 94 across 52 quarters. I use all macro controls and sector*region FEs for demand control. All standard errors are clustered at the max bank (the one to which the firm is more exposed at a certain quarter) and sector*quarter dimension.

Table A1: Loan level - summary

	Unit	min	p25	p50	mean	p75	max	sd
Dependent								
$\Delta \ln(\text{credit})_{b,f,t:t+3}$	%	-144.24	-15.57	-4.55	-0.89	5.18	188.62	45.60
Loan controls								
risk_{t-1}	Ln(1 + %)	0.00	0.41	0.55	0.98	1.28	4.62	1.03
default_{t-1}	0/1	0.00	0.00	0.00	0.06	0.00	1.00	0.24
Firm Controls								
firm credit_{t-1}	Ln	9.62	12.14	14.44	14.69	17.52	29.74	2.20
n employees_{t-1}	Ln	0.00	1.39	2.20	2.38	3.09	11.31	1.39
avg payroll_{t-1}	Ln	0.00	6.50	6.84	6.67	7.18	10.35	1.29
Bank Controls								
size_{t-1}	Ln (BRL Millions)	16.94	26.02	26.86	26.43	27.32	27.76	1.31
capital_{t-1}	% of assets	3.19	6.93	10.00	9.68	11.63	92.50	4.02
liquidity_{t-1}	% of assets	1.60	12.52	18.46	19.50	23.79	89.49	8.29
fx debt_{t-1}	% of deposits	0.00	6.50	10.10	11.61	14.39	857.16	10.73
foreign_{t-1}	0/1	0.00	0.00	0.00	0.16	0.00	1.00	0.37
gov_{t-1}	0/1	0.00	0.00	0.00	0.40	1.00	1.00	0.49
N loans	4,071,643							
N firms	119,986							
N regions	98							
N sectors	76							
N banks	97							
N quarters	52							

Table A2: Firm level - summary

	Unit	min	p25	p50	mean	p75	max	sd
Dependent								
$\Delta\ln(\text{credit})_{f,t:t+3}$	%	-817.75	-19.85	-2.09	6.20	28.99	1079.26	62.12
$\Delta\ln(\text{n employees})_{f,t:t+3}$	%	-866.81	-6.45	0.00	-1.38	4.88	617.59	29.94
$\Sigma\ln(\text{gfcf})_{f,t+1:t+3}$	%	0.00	0.00	0.00	73.15	0.00	2140.26	276.56
Loan controls								
risk_{t-1}	Ln(1 + %)	0.00	0.39	0.58	0.88	0.99	4.62	0.91
default_{t-1}	0/1	0.00	0.00	0.00	0.05	0.00	1.00	0.18
Firm Controls								
firm credit_{t-1}	Ln	9.12	12.64	13.86	14.04	15.22	29.79	2.04
n employees_{t-1}	Ln	0.00	1.39	2.08	2.24	2.89	11.31	1.29
avg payroll_{t-1}	Ln	0.00	6.48	6.82	6.63	7.16	10.35	1.33
Bank Controls								
size_{t-1}	Ln (BRL Millions)	17.45	25.93	26.78	26.49	27.20	27.65	0.96
capital_{t-1}	% of assets	3.90	8.14	9.86	9.99	11.63	72.78	2.75
liquidity_{t-1}	% of assets	2.10	13.29	17.41	19.00	23.75	73.40	6.66
fx debt_{t-1}	% of deposits	0.00	6.50	10.10	11.61	14.39	857.16	10.73
foreign_{t-1}	0/1	0.00	0.00	0.00	0.15	0.23	1.00	0.25
gov_{t-1}	0/1	0.00	0.02	0.43	0.45	0.78	1.00	0.37

N firm*time	1,611,353
N firms	119,986
N regions	98
N sectors	76
N banks	97
N quarters	52

Table A3: Bank level - summary

	Unit	min	p25	p50	mean	p75	max	sd
Bank Controls								
$size_{t-1}$	Ln (BRL Millions)	16.94	20.73	22.05	22.18	23.40	27.76	2.19
$capital_{t-1}$	% of assets	3.19	9.64	13.87	17.06	20.29	92.50	12.13
$liquidity_{t-1}$	% of assets	1.60	14.92	22.85	26.19	34.13	89.49	15.11
fx $debt_{t-1}$	% of deposits	0.00	0.00	9.50	54.89	36.04	89.20	145.12
$foreign_{t-1}$	0/1	0.00	0.00	0.00	0.24	0.00	1.00	0.43
gov_{t-1}	0/1	0.00	0.00	0.00	0.15	0.00	1.00	0.35
N bank*time	3238							
N banks	97							
N quarters	52							

Correlation Matrix

	$size_{t-1}$	$capital_{t-1}$	$liquidity_{t-1}$	fx $debt_{t-1}$	$foreign_{t-1}$	gov_{t-1}
$size_{t-1}$	1					
$capital_{t-1}$	-0.571***	1				
$liquidity_{t-1}$	-0.126***	0.358***	1			
fx $debt_{t-1}$	0.0585***	-0.0576**	0.0842***	1		
$foreign_{t-1}$	0.147***	-0.0113	0.148***	0.489***	1	
gov_{t-1}	0.266***	-0.218***	0.238***	-0.140***	-0.232***	1

N 3238
t statistics in parentheses
* p<0.05 ** p<0.01 *** p<0.001