



Asymmetric transmission of a bank liquidity shock[☆]



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ABSTRACT

We investigate whether banks that receive a positive liquidity shock make up for the reduction in the amount of credit supplied by banks that suffer a negative liquidity shock. For identification, we use the exogenous shock to the Brazilian banking system caused by the international turmoil of 2008 that sparked a run on small and medium banks toward systemically important banks. We find that a reduction in liquidity causes banks to strongly decrease their loan supply, whereas a positive liquidity shock has a small (if any) effect on the loan supply. Our evidence shows that this asymmetric effect of liquidity on the loan supply occurs both at the intensive and the extensive margins. Our findings are consistent with the theories that predict that borrowers face switching costs and that banks tend to hold on to liquidity during periods of systemic uncertainty.

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1. Introduction

Recent studies show that shocks that decrease bank liquidity negatively affect the credit supply to firms (Khwaja and Mian, 2008; Schnabl, 2012; Ongena et al., 2013; Iyer et al., 2014). Shocks that increase bank liquidity are less frequent in the literature. Paravisini (2008) explores an Inter-American Development Bank (IDB) on-lending program that increases bank liquidity in Argentina and finds that the banks expand lending.

What happens when, instead of the one-sided shocks previously explored in the literature, liquidity is redistributed across banks? In other words, when some banks receive a positive liquidity shock and the others receive a negative liquidity shock, do the former increase their lending and compensate for the contraction in the amount of credit supplied by latter?

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The effects of liquidity on the credit supply may be asymmetric because, on the one hand, banks can cut lending relatively easily and quickly in the face of liquidity constraints. On the other hand, banks that receive a positive shock may choose to hoard cash for precautionary or speculative motives (Gale and Yorulmazer, 2013), particularly in a scenario of systemic uncertainty. In addition, switching costs for firms and banks' inability to quickly adjust their factors of production may hinder new lending relationships. If firms cannot replace the loans they would obtain from the constrained banks with loans from the unconstrained banks or with other sources of financing, such as the capital markets or trade credit, investment and economic growth may be harmed.

The goal of this paper is to investigate whether the effects of a decrease in liquidity on the credit supply are symmetric to the effects of an increase of liquidity. We explore a shock to the Brazilian banking system triggered by the international turmoil of 2008, which led to a massive redistribution of the deposit base. Deposits fled from small and medium banks to systemically important banks. This particular natural experiment is richer in terms of cross-sectional variation than those previously explored in the literature and thus allows us to assess the importance of frictions that curtail the ability of borrowers to switch between constrained and unconstrained banks.

Oliveira et al. (2015) investigate that episode and find evidence that depositors' perception of a too-big-to-fail policy caused the run. Their main result, that bank fundamentals play a minor role in the redistribution of deposits, allows us to use this shock as an exogenous change to bank liquidity. Specifically, depositors' decision to run from the small and medium banks to the big banks

is unrelated to the pre-crisis quality of the loan portfolio. Another important finding is that the big banks did not actively seek deposits by raising rates.

To assess whether changes in liquidity cause changes in lending, we have to consider the possibility that the banks that lose deposits and the banks that gain deposits previously lent to firms that were differently affected by the crisis. For example, suppose that firms that had investment opportunities or risk negatively affected by the crisis previously borrowed mainly from the banks that lose deposits. We would then falsely assume that the negative change in bank liquidity caused the decrease in lending, but, instead, the decrease in lending could be due to less demand or increased risk. To address this identification issue, we follow Khwaja and Mian (2008) and Schnabl (2012) and use borrower fixed effects to analyze the change in loans within borrowing firms. In other words, we look at the same firm borrowing from different banks.

We also conduct several robustness tests to ensure that our results are driven by a liquidity supply effect rather than changes in loan demand or risk. Namely, we control for pre-crisis loan characteristics (working capital, revolving credit lines, export loans, etc.) and bank features, such as size, asset liquidity, profitability and bank ownership (private, governmental and foreign). Our results are also robust to varying the time window of the pre- and post-crisis periods.

We find asymmetric effects of the bank liquidity shock on lending. Our within-firm estimations show that a 1% decrease in deposits significantly reduces the loan supply by 0.4–0.8%, whereas a positive deposit shock of 1% does not significantly increase the loan supply.

We also find asymmetric effects of bank liquidity on lending at the extensive margin¹. A 1% decrease in deposits relates to an approximate 0.27 percentage point increase in the probability of a bank ending an existing loan relationship. Conversely, a 1% increase in deposits relates to a 0.08 percentage point decrease (only marginally statistically significant) in the probability of a bank ending an existing loan relationship. These results are consistent with the literature that views banks as relationship lenders, such as Petersen and Rajan (1994), Berger and Udell (1995) and Bharath et al. (2008), and suggest that firms that have relationships with banks that become constrained are not able to readily switch their borrowing to banks that have excess liquidity.

The asymmetric effect of the liquidity shock is also heterogeneous across firm size. While we find that there is a positive differential in loan supply to existing small borrowers (compared with larger firms), small firms are more likely to have their loan relationship with a bank terminated after a shock, regardless of whether the shock that hits the bank is positive or negative.

Understanding the source of this asymmetric effect can provide insights into crisis management for policy makers. For example, the measures taken by the Central Bank of Brazil in an attempt to spread liquidity throughout the system appear to have had a limited effect. Our evidence suggests that a series of frictions would have to be addressed to alleviate the firms' need for credit. For example, the finding that liquidity unconstrained banks do not increase lending supply at the extensive margin indicates the existence of frictions related to informational asymmetry that hinder new banking relationships. Although determining the exact reason why the unconstrained banks failed to compensate for the decrease in the credit supply of the constrained banks is beyond the scope of this paper, efforts such as enhancing data quality in credit bureaus and allowing for a more efficient system for placing collateral could help

reduce ex-ante informational asymmetry and increase the chance of building new relationships.

Our findings relate to the literature that investigates the effects of changes in bank funding on the loan supply, such as the studies by Khwaja and Mian (2008), Paravisini (2008), Imai and Takarabe (2011) Schnabl (2012), Ongena et al. (2013) and Iyer et al. (2014). Our results also relate to research on financing frictions and bank lending (Kashyap et al., 1993; Holmstrom and Tirole, 1997; Stein, 1998; Peek and Rosengren, 2000).

In addition, our paper speaks to the literature on loan supply and the business cycle, such as Bernanke and Gertler (1989) and Diamond and Rajan (2005), and the vast literature on the bank lending channel (e.g., Bernanke and Blinder, 1992; Kashyap and Stein, 2000; Campello, 2002; Ashcraft, 2006).

2. Effects of the global financial crisis on the Brazilian banking system

Until September 2008, Brazil and the other emerging economies had not yet suffered the consequences of the subprime crisis that started in the previous year in the US and the Eurozone. On the contrary, emerging economies benefited from the continued increase in commodity prices and improved domestic macroeconomic conditions.

Brazil was doing particularly well until the third quarter of 2008. Inflation had been under control for more than a decade. Two major rating agencies upgraded its sovereign debt to the status of investment grade in the previous quarter, and there was a record inflow of foreign direct investment. The Brazilian capital markets witnessed their largest wave of initial public offerings in 2007. All of these features resulted in consistent GDP growth and very good forecasts for the coming years.

Lehman Brothers' bankruptcy in mid-September 2008 triggered a wave of nervousness and distrust among depositors around the world (Allen and Carletti, 2010). To avoid bank runs, many countries introduced blanket guarantees on deposits or extended deposit insurance coverage. Brazil did not take any such measures at that time, and its deposit insurance coverage remained limited to 60,000 Brazilian Reals (approximately 35,000 USD).

From mid-September 2008 until the beginning of January 2009, Brazil's small and medium banks lost almost 20% of their certificates of deposit to the big banks. As mentioned previously, Oliveira et al. (2015) study this episode in detail and find evidence that the perception of a too-big-to-fail policy drove depositors' behavior. Depositors' response to economic fundamentals is a second-order effect. One clear piece of evidence that the big banks did not actively search for deposits is that, on average, they reduced interest rate premiums on certificates of deposit, while the other banks raised the premium that they pay (Oliveira et al., 2015). Additionally, the shift in bank deposits was unrelated to changes in the exchange rate because domestic investors are only allowed to hold deposits in Brazilian Reals (BRL).

To mitigate the effects of the liquidity crunch suffered by the small and medium banks, the Central Bank of Brazil took several measures in an attempt to spread liquidity throughout the system (i.e., from the big banks to the other banks). For example, the big banks could obtain a rebate on their reserve requirements to provide interbank loans to the small and medium banks or to buy a share of their loan portfolio. Mesquita and Torós (2010) provide a detailed description of those measures and also of the macroeconomic effects of the crisis.

Fig. 1 shows the distribution of the changes in customer and total (i.e., customer + interbank) deposits from June to December 2008. The extreme negative variation in total deposits is smaller than that for customer deposits, but the cross-sectional variation in

¹ The extensive margin refers to the denial of credit to existing and new borrowers or to the granting of credit to new borrowers, whereas the intensive margin refers to a reduction or increase in the amount of lending to already existing borrowers.

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