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Credit Supply Responses to Reserve Requirement: Loan-level evidence from macroprudential policy*

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Abstract

This paper estimates the impact of reserve requirements (RR) on credit supply in Brazil, exploring a large loan-level dataset. We use a difference-in-difference strategy, first in a long panel, then in a cross-section. In the first case, we estimate the average effect on credit supply of several changes in RR from 2008 to 2015 using a macroprudential policy index. In the second, we use the bank-specific regulatory change to estimate credit supply responses from (1) a countercyclical easing policy implemented to alleviate a credit crunch in the aftermath of the 2008 global crisis; and (2) from its related tightening. We find evidence of a lending channel where more liquid banks mitigate RR policy. Exploring the two phases of countercyclical policy, we find that the easing impacted the lending channel on average two times more than the tightening. Foreign and small banks mitigate these effects. Finally, banks are prone to lend less to riskier firms.

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1. Introduction

Reserve requirements (RR) operate directly on the narrow credit channel defined by the supply reaction of bank credit to a change in funding composition (Calomiris and Khan, 1991, Stein, 1998, Diamond and Rajan, 2011, Calomiris et al., 2015). This reaction may depend on the state of the macroeconomy, and on bank characteristics, such as liquidity or capital (Kashyap and Stein (2000), Holmstrom and Tirole (1997), Mora (2014)). It has also implications for the composition of credit along the riskiness of the borrowers (Camors et al. (2016)). In this paper, we estimate the impact of RR on credit supply in Brazil.

Quantitative estimates of the effect of RR in the supply of credit, as well as its complementarity or substitution relations with other variables, are important for emerging markets that traditionally use RR policy to smooth the credit cycle (Montoro and Moreno (2011), Cordella et al. (2014)). Yet, with the exception of Camors et al. (2016), there is no loan-level evidence of the impact of such policies in these markets. We build on their work, but exploring a larger and longer dataset with both tightening and loosening cycles. Additionally, we provide our analysis using a long panel to capture macroeconomic effects along with bank heterogeneity effects.

We use quarterly data from 2008Q1 to 2015Q2 from "Sistema de Informações de Crédito" (SCR), Central Bank of Brazil (BCB) credit registry dataset covering virtually all loans to private non-financial firms[1]. During this time span, BCB made several macroprudential interventions using RR including a major countercyclical one in the aftermath of the global crisis. The intervention consisted of: (1) an easing, i.e. releasing RR in November 2008 in response to a credit crunch following the global financial crisis;

[1] Up to December 2011 it covered all loans greater than BRL 5,000 (USD 3,000 in 2011), and, after that, all loans greater than BRL 1,000 (USD 425 in 2014).

and (2) a tightening, i.e. reversing the easing policy on March 2010, when credit growth was overheated.

BCB made other interventions though. For instance, a tightening in December 2010, in the context of high capital inflows and credit growth[2]; and several easing innovations starting with the reversal of this policy in 2012, but also along 2013 and to 2015 during an economic downturn. Before and after this period, RR ratios were mostly flat and revolving around the long-term average of 23% of liabilities subject to reserve requirements (LRR).

The measurement of reserve requirement innovation and sample selection is a central piece in the identification strategy. We evaluate two different approaches. In the first approach, we build an index, adding or subtracting one unit upon tightening or easing of RR policy, respectively, interact this with a treatment indicator for banks with non-zero reservable liabilities, and use a long panel with controls for macroeconomic confounding factors. Notice that the identification comes from both variation in the index and bank treatment status, and is improved with the inclusion of macro controls. In the second approach, we define bank level treatment variables based on RR counterfactuals. Specifically, we define a bank-level treatment as the excess variation in RR over the counterfactual variation one would observe in RR under the old regulation. Notice that the counterfactual filters out determinants of reserve requirement other than the regulatory changes. The counterfactuals are separately calculated to capture the regulatory changes of November 2008 (easing - following "bad times"), and of March 2010 (tightening - following "good times"). Relative to the first approach, our identification benefits from the continuous nature of the treatment variable and the filtering of other determinants of reserve requirements directly in the treatment variable..

[2] See Barroso et.al (2015) for evidence on the link between capital inflows and credit growth.

We identify the complementarity or substitution relations with RR policy by introducing interaction terms in our models. We explore interactions with bank control variables such as size, liquidity, capital ratio and risk proxies.

Following Khwaja and Mian (2008) and Jiménez et al. (2014)[3], we focus on firms with multiple bank relationships and firm (or firm*bank) fixed effects to partially control for credit demand. In order to explore interactions of the treatment variable with firm or firm-bank characteristics such as credit risk of a particular firm, we also include bank fixed effects.

This paper contributes to the scarce literature estimating the effects of changes in RR on credit supply. It also addresses synergies between macroprudential and bank and firm heterogeneity, covering a very large dataset of firm loans. The dynamics of the Brazilian case allow the study of both macroprudential loosening and tightening separately.

We find in the long panel that RR policy impacts credit in the expected direction, which is RR easing increases credit, while RR tightening decreases credit on the treated banks relatively to the non-treated banks. The exact quantitative impact depends on the specification, and it is sensibly higher in the long-run (one-year ahead cumulative effect) than in the short-run (one-quarter ahead). In the cross-section approach, we find that the tightening phase of countercyclical RR events affected the lending channel on average less than the easing one, suggesting that bank credit supply is more reactive to the easing than to the tightening.

We also find bank and firm heterogeneity in the composition of the events of interest. Foreign and small banks mitigate the policy effects. On the risk-taking channel,

[3] In contrast with Jiménez el al (2014), we can study the risk-taking channel without the triple interaction proposed in that paper. That is, the capital ratio is not a source of identification.

we find that banks more affected by countercyclical RR policy avoid riskier firms. These results are of great concern to policymakers in charge of financial stability, because riskier firms are the ones more affected by credit crunches and more prone to leverage during credit booms.

2. Literature review

The rationale for reserve requirements effects on credit supply follows Stein (1998), and Kashyap and Stein (2000). They explore imperfect substitution between insured and reservable bank liabilities on one side, and noninsured and non-reservable bank liabilities on the other. The risk-taking channel on macroprudential policy follows mostly Adrian and Shin (2009) and Dell'Ariccia et al. (2009). They show that changing the cost of liabilities affects banks' leverage and therefore the incentives for banks to monitor. The interaction with banks' liquidity and capital are presented in Kashyap and Stein (2000), and Holmstrom and Tirole (1997), respectively.

Tovar et al. (2012), Montoro and Moreno (2011), and Bustamante and Hamman (2015) highlight the use of reserve requirements with macroprudential purposes, especially to foster financial stability. First, it can serve as a countercyclical tool to manage the credit cycle in a broad context, limiting the excessive leverage of borrowers in the upswing and operating as a liquidity buffer in the downswing. Second, it can help to contain systemic risk accumulation by improving the liquidity of the banking system. Third, RR can target specific sectors to ease (or impose) liquidity constraints. Fourth, it can be a complementary tool for capital requirements.

Cerutti et al. (2015) document that macroprudential policies are more effective and used more broadly in less developed and more closed economies, with effectiveness measured by the correlation with credit aggregates. Cordella et al. (2014) argue that developing countries use reserve requirements for stabilizing capital flows and the credit cycle when there are severe limits on the typical monetary policy ability to smooth the level of credit and/or economic activity. According to these authors, the financial stability and business cycle-driven uses of reserve requirements cannot be separated one from the other. When reserve requirements are used to prevent financial instability, they can contribute to macroeconomic stabilization, whereas when they are used to smooth activity, they also smooth the credit cycle and promote financial stability.

There is a growing empirical literature exploring the risk-taking channel of monetary policy. Jiménez et al (2014) find that banks extend more credit to riskier firms during monetary policy easing cycles. Altumbas et.al (2012) show solvency problems during the crisis were more severe for banks in jurisdictions with low interest rates for a long time and for banks with less capital. Maddaloni and Peydró (2011) show a deterioration in lending standards across several jurisdictions in response to lower short-term interest rates. Lee et.al (2015) use syndicated loan data to show that, before the crisis, lenders invest in riskier loans in response to a decline in short-term US rates while, after it, in response to a decline in long-term US interest rates.

In passing it through, the effect of typical monetary policy on credit supply and risk taking could be, in theory, similar to reserve requirements, although operating through other channels. Cerutti et al. (2012) document with macro data that RR affects credit growth, but has no implications for risk-taking. However, recent loan-level evidence from Camors et al. (2016) and Jiménes et al. (2017) is the opposite of what one would expect from the analogy with monetary policy. While suggesting a similar bank lending channel, these authors find a positive risk-taking channel. In other words, they find a "search-for-yield" or positive risk-taking response to the tightening of RR and countercyclical dynamic provisions respectively.

Camors et al. (2016) is the closest paper to ours in the literature. Using loan level data and an identification strategy equal to ours, they show that an increase in RR in Uruguay implies a contraction of credit supply. However, the macroprudential tightening event they explore is different in nature. While we explore countercyclical RR events motivated by a credit crunch and later by a credit boom, the tightening RR they explore is motivated by intense foreign cash inflows (bypassing monetary policy). Their results for the lending channel is of similar magnitude to ours, i.e. a RR increase of 1 percentage point (pp) translates into a credit supply contraction of 0.66% for the most affected bank relatively to the same firm. The authors also find that the most affected banks mitigate this tightening contracting less credit to the riskier firms. We find a similar risk-taking channel to the easing, but not to the tightening.

3. Background

The ratio of reserve requirement to deposits in Brazil is large by international standards. It averages 23% of total liabilities subject to RR (LRR) from 2008 to 2015, while Montoro and Moreno (2015) report emerging market ratios below 15% and developed market ratios below 5%. The ratio in Brazil is mostly flat before the global financial crisis. During the crisis, in face of a liquidity squeeze in the interbank and credit market, BCB reduces RR to the historical low levels of 18% in November 2008. In March 2010, RR is rebuilt to its prior levels, in the first countercyclical policy use of this kind. The easing policy was highly relevant with an immediate release of cash into the financial system worth 3.27% of total banks´ assets (or 15% of banks' liquid assets).

In response to an increase in capital flows and high credit growth, a major tightening cycle starts in December 2010. Relative to other local macroprudential policies implemented during the same period, RR is arguably the macroprudential tool with broadest scope and biggest impact[4]. Along 2012, with growing external uncertainties, decrease of international capital flows and reduced credit supply from private banks, RR is eased again to pre-crisis levels (this latest tightening cycle is complete). See Figures 1 and 2.

BCB manages mainly four RR components; RR on demand deposits (unremunerated), savings (remunerated according to savings accounts), time and term deposits (remunerated at the overnight funds rate, SELIC), and an additional component comprised of three subcomponents, one for each of the previous components, (all remunerated at the daily prime rate, SELIC). BCB also manages RR deductibles, conditional deductibles, exemption thresholds, eligible liabilities and remuneration. The details of the regulatory changes in the period considered in the paper are complex. We only summarize the most relevant measures in the following subsections and present more details in Chart 1.

Main measures

The global financial crisis led to a liquidity squeeze that affected mostly small financial institutions. Moreover, banks' risk aversion (stemming from both bigger and smaller institutions) substantially affected domestic credit growth. In response, BCB eased reserve requirements, increased deductions, and created conditional deductibles to stimulate larger banks to provide liquidity support to small and medium-sized ones.

It is worth noticing a "fly-to-quality" movement, with depositors from smaller banks running to bigger ones (perceived as safer). Smaller financial institutions were

[4] During the post-crisis environment of large global liquidity, the Central Bank of Brazil issued many within sector regulations focusing on financial stability, such as loan-to-value caps on housing loans (Araujo et al., 2016) and higher capital requirements on auto-loans (Martins and Schetchman, 2013). However, RR is arguably the more representative measure. See Pereira da Silva and Harris (2012).

mostly weaved from RR because of a minimum capital threshold to start computing LRR. Consequently, RR easing mostly affected bigger banks (also more representative in term of credit provided to firms), because smaller institutions use the cash release to recompose liquidity (Schiozer et al., 2016, Oliveira et al., 2015).

Around 75% of the bank institutions are unaffected by RR, the remaining ones receive smaller or larger shocks pending on their ex-ante exposure to the more affected liabilities. Figure 3 illustrates the average impact on these two groups (5%).

The countercyclical measures adopted in November 2008[5] are the following:

(i) Reduction in RR ratios for demand deposits, term deposits and the additional component;

(ii) Higher deductions, lower remuneration and changes in eligible liabilities for time and term deposits and in the additional component that released some small banks from RR and reduced significantly RR on big banks.

(iii) Conditional deductibles on certain exposures (from mostly big banks) to small-and-medium sized financial institutions.

Measure "(i)" releases close to BRL 26 billion and the two remaining ones combined, BRL 40 billion. In March 2010, BCB reverses the policy adopted during the crisis[6] (Figure 4)

Counterfactual RR

The Central Bank of Brazil routinely computes counterfactual RR to monitor the implementation of its policies. In light of these constant changes in RR, comparing current

[5] Two announcements are worth mentioning. The first announcement happens at the end of October, and the most relevant one at the beginning of November, where banks had only 15 days to comply.

[6] In March 2010, BCB also creates a deductible on Term Deposits and on the Additional component conditional on the capital of banks, virtually exempting small institutions from RR (Circular 3,485/2010).

and counterfactual RR is useful to summarize these changes in one figure. The counterfactual is straightforward to calculate. The liabilities subject to RR (LRR) are the same[7], but RR ratios, deductibles, conditional deductions and exemptions are calculated for every bank based on the pre-changes' rule.

In this paper, we take the pre-crisis state counterfactual for November 2008. In particular, the counterfactual rules available until October 2008 were:

- 15% on term deposits;
- 45% for demand deposits;
- 20% for savings deposits;
- In the additional components, (8% on demand and term deposits; and 10% on savings).

In the cross-section strategy, we compute the difference between the counterfactual RR and the current new rules for each bank as a treatment variable to study the event of November 2008. Similarly, we also build the counterfactual to capture the event of March 2010.

4. Data and Methodology

The main dataset of the paper is the Brazilian Credit Register (SCR), which encompasses virtually all corporate loans in the domestic financial system. Data is quarterly from 2008Q1 to 2015Q2. The dependent variable of interest is the log change in the credit granted to a firm (f), by a bank (b) in a quarter (t), winsorized at the 2nd and 98th percentile. We restrict our sample to firms with loans granted from more than one

[7] Eligible liabilities changed in 2010 for six months and comprehend the inclusion of a bond called "letra financeira" with maturities over 2 years in the eligibility list. Tracing these effects is a limitation of this study. Other changes are also untraceable. For instance, changes in remuneration of RR components (Chart 1).

bank. This sample has over 36 million data points (27 periods, 132 banks and 478 thousand firms). See Tables 1 and 2 for summary data and variables´ definition.

The firm risk indicator is the loan level provision to non-performing loans (PNL) weighted across all banks to which the firm has a credit exposure[8] (Firm Risk), or simply the PNL given by the bank to a particular firm (Firm-Bank Risk).

Reserve Requirements

We measure reserve requirement innovations in two ways. In one measure, we build a simple index, adding or subtracting a unit respectively, on a tightening or easing policy event. In order to do so, we use the events from Chart 1. The change in the index is the policy innovation.

For the second measure, we use the counterfactual treatment variable described above and represented in equation (1).

$$\Delta ReservReq_{t+1}^{b} = 100 * \left[\Delta\left(\frac{\text{Current}_{t+1}^{b} - \text{Counterfactual}_{t+1}^{b}}{\text{Liabilities}_{t+1}^{b}}\right)\right] \tag{1}$$

where *b* refers to a bank and *t* to quarter.

In equation (1), we use the variation in counterfactual reserves to filter out the determinants of reserve requirements other than the regulatory changes. Additionally, using equation (1) as a treatment variable implies that total liabilities are not endogenously changing in response to RR shocks. This may look as a strong assumption,

[8] Ratings go from "AA" (highest quality) to "H" (lowest quality), and provisioning increases nonlinearly with each step. Measured as the required provision, the ratings relate on average to expected losses and from "AA" to "H" are 0.005, 0.01, 0.03, 0.1, 0.3, 0.5, 0.7 and 1, respectively. There is a close correspondence between such provisions and the following scale of days overdue, 0, 15-30, 31-60, 61-90, 91-120, 121-150, 151-180, >180.

especially because changes are not homogenous across components and may leave room to changes towards unaffected liabilities.

We take that regulatory changes are unexpected and substitution is gradual and lags behind the regulatory innovations. Notice that we measure the treatment variable in in the announcement quarter *t*. In principle, making substantial changes in the liabilities mix is costly and takes time, but assuming no substitution during the implementation quarter seems reasonable. Camors et al. (2016) use the same treatment variable and identification strategy. We follow them for greater comparability.

Identification Strategy

We present our results in two sections. The first section comprises the long panel estimates using the RR index. The second section presents the cross-sectional estimates around the two countercyclical changes in RR.

Long Panel

The long panel models considered in this paper are special cases of the following linear regression. For simplicity, we omitted the coefficients:

$$\Delta ln\left(\text{Credit}_{f,t}^{b}\right) * 100 = \sum_{i} \Delta ReservReq_{t-i} * treat + \sum_{i} \Delta ReservReq_{t-i} * \text{treat} * X_{f.t-i}^{b} + \sum_{i} X_{f.t-i}^{b} + \alpha_{t}^{b*f} + \varepsilon_{f,t}^{b} \quad (2)$$

The dependent variable is the log change in credit to a firm *f* in a specific bank *b* and quarter *t*. The treatment variable, $\Delta ReservReq$, is the index innovation in reserve requirement. This time index reflects the number of RR interventions in place and $\Delta ReservReq$ becomes a (+1) or (-1) indicator depending if the RR are tightening or easing in the quarter *t-1*. There are several policy events happening in different periods. Since the index makes no distinction over the intensity of the shock for different periods or different banks, there is also a presumption that no single event dominates the sample. In our data, this assumption is about right, since the regulation authority implements and later reverses the policy experiments, so that effects are balanced.

Treat is a dummy variable for the banks belonging to conglomerates that are affected by the policies, and zero otherwise. We are also interested in interaction terms of the policy innovation with *Treat* and a vector of control variables denoted by X in the equation. In this interaction, we consider macro variables, bank, firm and firm-bank controls. The term α_t^{b*f} represents the fixed effects introduced in the model. We introduce firm*bank and time fixed effects across our regressions. The last term in the equation refers to an idiosyncratic error term. We cluster standard errors at the bank and quarter level. Additionally, we use a distributed lag model, as well as a model with a simple lag structure.

Cross-section

This identification strategy fully replicates Camors et al. (2016). In this monthly diff-in-diff, the dependent variable is the change in the log of credit between *t-1* and *t+2*. The treatment variable is the same presented in equation (1) and measured in *t*, the announcement month. We take all controls from *t-1* to alleviate endogeneity concerns. We precisely estimate equation (3) on our most saturated regression. We measure the results relatively to *t+2*, because *t+1* is still part of the implementation lag (that can take up to two weeks pending on RR subcomponents that are affected by the regulation):

$$\Delta ln\left(\text{Credit}_{f,t-2,t+1}^{b}\right) = \Delta ReservReq_t^b + \Delta ReservReq_t^b * X_{f,t-2}^b + X_{f,t-2}^b + \alpha_f^b \qquad (3)$$

We start estimating the lending channel, then bank interactions and firm interactions (risk-taking) progressively, and introducing firm fixed effects, bank controls and bank fixed effects in the risk-taking channel.

5. Results

We present two sets of results. The first set uses the long panel from 2008Q2 to 2015Q2 and the second set analyses the two shocks of the countercyclical RR policy. While the long panel measures the average shock across different events, the cross-section studies independently the easing and the tightening of countercyclical policies.

Long Panel

In Table 3, we present the single lag regressions.

The average effect of a (positive) change in RR in the treatment group is a credit contraction lying in the range of 0.73% to 1.16% (Table 3) in the following quarter. The exact absolute value of the elasticity is sensitive to the set of interactions included in the model. In the last column for example, this short run effect (of -1.16) is statistically and economically significant when considering both bank and firm heterogeneity interactions.

In Table 4, we use distributed lag model to estimate the one-year accumulated average effect of the same change in RR. Since there is no feedback from credit growth into the model, we assume complete transmission after one year. In this case, the average effect on the treatment group of a positive shock is a credit contraction lying in the range of 1.08% to 1.64%.

Some interactions are also noteworthy. First, banks´ ex-ante *liquidity* ratio mitigates the effects of changes in RR, particularly one-year after the policy. Moreover, *importance* (i.e., total banks´ ex-ante exposure to the firm relatively to its total capital) seems to reinforce the impact from RR policy. In other words, banks contract more credit to the firms that are more representative in their portfolio; or, increase diversification. These results are statistically and economically significant.

In the Appendix, we present a different strategy for the long panel, where we do not incorporate a treatment group and time fixed effects. This identification strategy allows us to assess synergies with macroeconomic conditions or monetary policy stances. Particularly, we use the following linear regression:

$$\Delta ln\left(\text{Credit}_{f,t}^{b}\right) * 100 = \sum_{i} \Delta ReservReq_{t-i} + \sum_{i} \Delta ReservReq_{t-i} * X_{f.t-i}^{b} + \sum_{i} X_{f.t-i}^{b} + \alpha^{b*f} + \varepsilon_{f,t}^{b} \quad (4)$$

We run equation 4 to assess the average effect of a shock on one-quarter ahead credit (Appendix 1) and one-year ahead (Appendix 2). Results are consistent with the ones we find in Tables 3 and 4, but the magnitudes are a bit higher and only partially significant. We find weak evidence of synergies between monetary policy (measured as *Selic*) and RR shocks.

Cross-session

In Table 5, we present the results of the bank lending channel of countercyclical RR policy from the least to the most saturated regressions. We use identical identification strategies to both the easing (November, 2008) and the tightening (March, 2010) phases of the RR policy.

The results of our bank lending channel are statistically and economically significant. During the easing, we find that a 1pp decrease in RR, increases credit supply on the range of 1.30% to 1.43% on the most affected bank relatively to same firm. Similarly, a 1 pp increase in RR decreases credit supply on the range of 0.45% to 0.66%. These results suggest that the tightening phase of countercyclical policy affects the bank lending channel of RR on average less than the easing one. In other words, bank credit supply could be more reactive to the easing than to the tightening of countercyclical policy.

We also find compositional effects in credit supply related to banks´ ex-ante observable characteristics. In Tables 6 and 7, we explore several bank interactions of the easing and tightening of countercyclical policy respectively.

During the easing phase, we find that foreign and small banks mitigate the effects of the policy by extending less credit to firms. Relatively to the same firm, a 1pp decrease in RR stimulates big, private and domestic banks to expand credit on average by 3% (Table 6). During tightening, big domestic banks respond contracting credit by 0.93% and big domestic private banks by 1.7% (Table 7). These results suggest that foreign banks respond primarily to the state of the global financial cycle (Moraes et al., 2017). In 2008, when global liquidity is short, foreign banks rebuild liquidity buffers, but do not extend credit in response to the easing policy. During tightening, they more than offset the policy, importing global liquidity, bypassing local macroprudential policy, and (contrary to domestic banks) extending credit.

As we mentioned, smaller banks suffered a liquidity squeeze because of a "fly-to-quality" movement from depositors (Oliveira et al., 2015). These banks fully mitigate the policy, because they are rebuilding liquidity buffers using the cash release. On the other hand, during tightening (Table 7), the small domestic banks expand credit.

In Tables 8 and 9, we present results for firm heterogeneity and the risk-taking channel of the easing and tightening of countercyclical policy, including firm and bank fixed effects.

We use two risk proxies. $Firm\ Risk_{t-1}$ is the weighted average provision against the same firm across the banking sector and $Future\ Default_{t+12}$ is a dummy variable that takes the value of 1 if the firm defaults in any of the 12 months in the future We also control for the number of employees of each firm.

During the easing phase, we find that banks extend less credit to firms considered riskier and, particularly, to firms that defaulted more in the future. These results suggest bank risk aversion during the easing phase of countercyclical policy In other words, credit extensions provided during (and empowered by the resources of) the easing policy are more carefully assessed by banks. Similarly, a "reach-for-yield" response is put in motion to compensate profitability losses during tightening. These results are both statistically and economically significant. Firms that end–up defaulting on their bank lending relationships 12 months into the future receive on average 40% less credit than the other firms during the easing (Table 8) and 36% more during tightening (Table 9)[9]. This result corroborates to the hypothesis of a positive risk-taking channel (or reach-for-yield response) of the macroprudential policy. It is also in line with Camors et al. (2016) and Jimenez et al. (2017).

In Table 10, we collapse our sample to the firm level to assess real effects. We find that the average firm ends up with 0.93% more credit in response to a decrease in

[9] Future default is measured 12 months into the future. Changes in credit during the policy are reassessed one year ahead. For instance, firm-bank relationships that were not in default in January, 2009 but turn to be in the default between November and January of 2010 take the value of one in $Future\ Default_{t+12}$.

RR of 1pp. We also find significant and lower results for the tightening (0.6%). These results are not as strong as the ones of the loan-level sample, suggesting that firms (more likely related to small and foreign banks) end-up with less credit during easing

Robustness

As a robustness check, we estimate the lending channel in placebo periods for both counterfactuals independently, 12 months after the tightening (when RR levels are relatively stable – Figure 2). Results are insignificant (Table 11).

6. Conclusion

We address the effects of reserve requirement (RR) changes on credit supply using different identification strategies applied to a large panel with several episodes of both loosing and tightening episodes, and two cross-sections focusing on the major countercyclical RR policies in Brazil.

The evidence is suggestive that RR policy impacts credit in the expected direction, i.e. RR easing increases credit, while RR tightening decreases credit. The exact quantitative impact depends on the specification, and it is sensibly higher in the long-run than in the short-run. We find suggestive evidence that higher *ex-ante* bank liquidity appears to reduce the impact of change in reserve requirements.

Exploring cross-section results, we find economically and statistically significant estimates of a bank lending channel of macroprudential policy using RR as an instrument. We find that during countercyclical easing, the more affected banks increase credit supply to the same firm on average by 1.3 to 1.4% in response to a 1pp RR reduction. During tightening, banks were less responsive and decrease credit supply to the same firm on average by 0.45% to 0.66% in response to a 1pp increase in RR.

We also find compositional bank effects. Foreign banks mitigate the easing policy and bypass the tightening more in line with the global financial cycle. We also find suggestive evidence that smaller banks caught in a liquidity trap during a "fly-to-quality" episode are less likely to extend credit during easing.

Similarly to Jiménez et al. (2017) and Camors et al. (2016), we find a positive risk-taking channel on countercyclical RR policy. We find this channel to be economically and statistically significant during the easing and tightening of countercyclical RR policy. This has direct implications for policy-makers in charge of financial stability.

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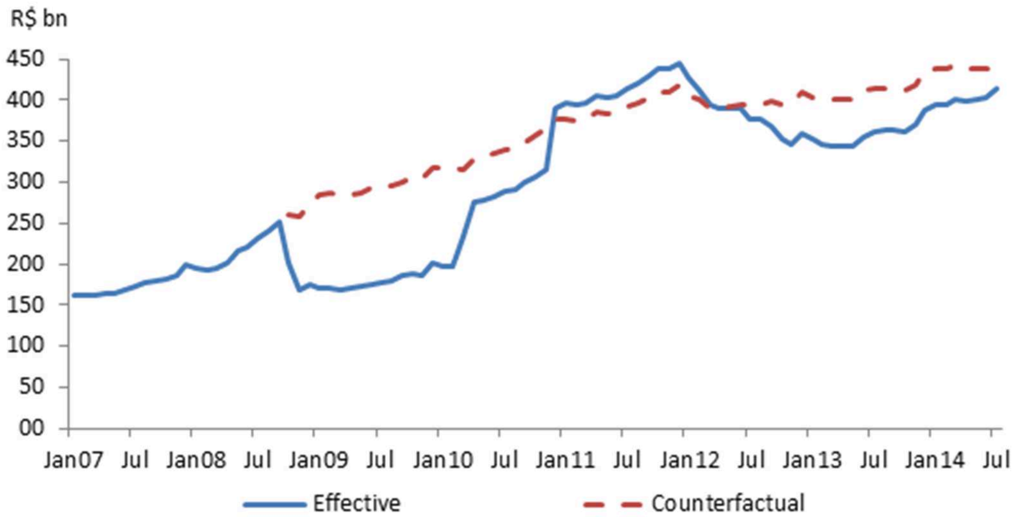
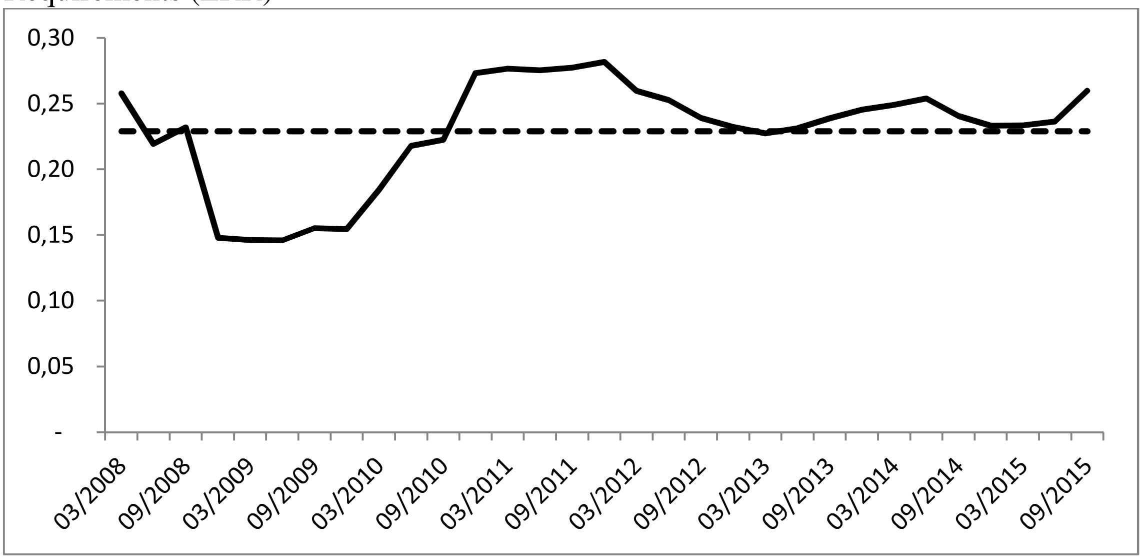
Figures, Chart and Tables

Figure 1. Total Reserve Requirements in Brazil (BRL in billions)



Notes: (i) Total includes all public, private domestic and private foreign banks operating in Brazil. (ii) Counterfactual reserve requirements are calculated based on regulation in place before September 2008.

Figure 2. Reserve requirement ratios, i.e. total RR to liabilities subjected to Reserve Requirements (LRR)



Notes: (i) Total includes all public, private domestic and private foreign banks operating in Brazil.
(ii) Dashed line is the long-term average, 23%.

Chart 1: Changes in RR

Reserve requirements rates

Period		Demand deposits	Time deposits	Savings accounts Housing	Savings accounts Rural	Foreign exchange short position	Interf. Deposits Leasing companies	Additional Demand deposits	Additional Time deposits	Additional Savings deposits
Before 2008		45%	15%	20%	20%	-	-	8%	8%	10%
2008	May	"	"	"	"	-	5% 2/	"	"	"
	Jul	"	"	"	"	-	10% 2/	"	"	"
	Sep	"	"	"	"	-	15% 2/	"	"	"
	Oct	42%	"	"	"	-	"	5%	5%	"
	Nov	"	"	"	15%	-	"	"	"	"
2009	Jan	"	"	"	"	-	0% 3/	"	4%	"
	Sep	"	13,5%	"	"	-	"	"	"	"
2010	Mar	"	15%	"	"	-	"	8%	8%	"
	Jun	43%	"	"	16%	-	"	"	"	"
	Dec	"	20%	"	"	-	"	12%	12%	"
2011	Apr	"	"	"	"	60% 4/	"	"	"	"
	Jun	"	"	"	17%	"	"	"	"	"
	Jul	"	"	"	"	60% 5/	"	"	"	"
2012	Jul	44%	"	"	"	" 5/	"	6%	"	"
	Sep	"	"	"	"	" 5/	"	0%	"	"
	Oct	"	"	"	"	" 5/	"	"	11%	"
	Dec	"	"	"	"	" 6/	"	"	"	"
2013	Jul	"	"	"	18%	0% 6/	"	"	"	"
2014	Jul	45%	"	"	19%	0% 6/	"	"	"	"
	Out	"	"	"	13%	"	"	"	"	"
2015	Jun	"	"	25%	16%	"	"	"	"	6%
	Ago	"	25% 7/	"	"	"	"	"	"	"

1/ Reserve requirements were equal to the sum of the following components:
I - Reserve requirements calculated according to the regulations effective on June 30, 1994 (50%) applicable in the following calculation periods:
a - group "A" institutions: from 23 to June 29, 1994, denominated "base period";
b - group "B" institutions: from 27 to June 30, 1994, denominated "base period".
II - 100% of the increase in the average value in the calculation period as compared to the average value in the "base period".
2/ It also included 100% of the variation, if positive, of the calculation base defined on January 31, 2008.
3/ Interfinancial Deposits issued by leasing companies were included in the calculation base of time deposits' reserve requirements.
4/ Rates applied over the sum of short positions (daily average) minus the sum of long positions deducted from the smaller value between US$3 billion and Level I Reference Net Worth.
5/ Rates applied over the sum of short positions (moving average of five consecutive days) minus the sum of long positions deducted from the smaller value between R$1billion and Level I Reference Net Worth.
6/ Rates applied over the sum of short positions (moving average of five consecutive days) minus the sum of long positions deducted by US$3 billion.
7/ As of the calculation period of August 31,2015 to September 4, 2015.

Figure 3: Average easing shock of November 2008 on affected and non-affected banks.

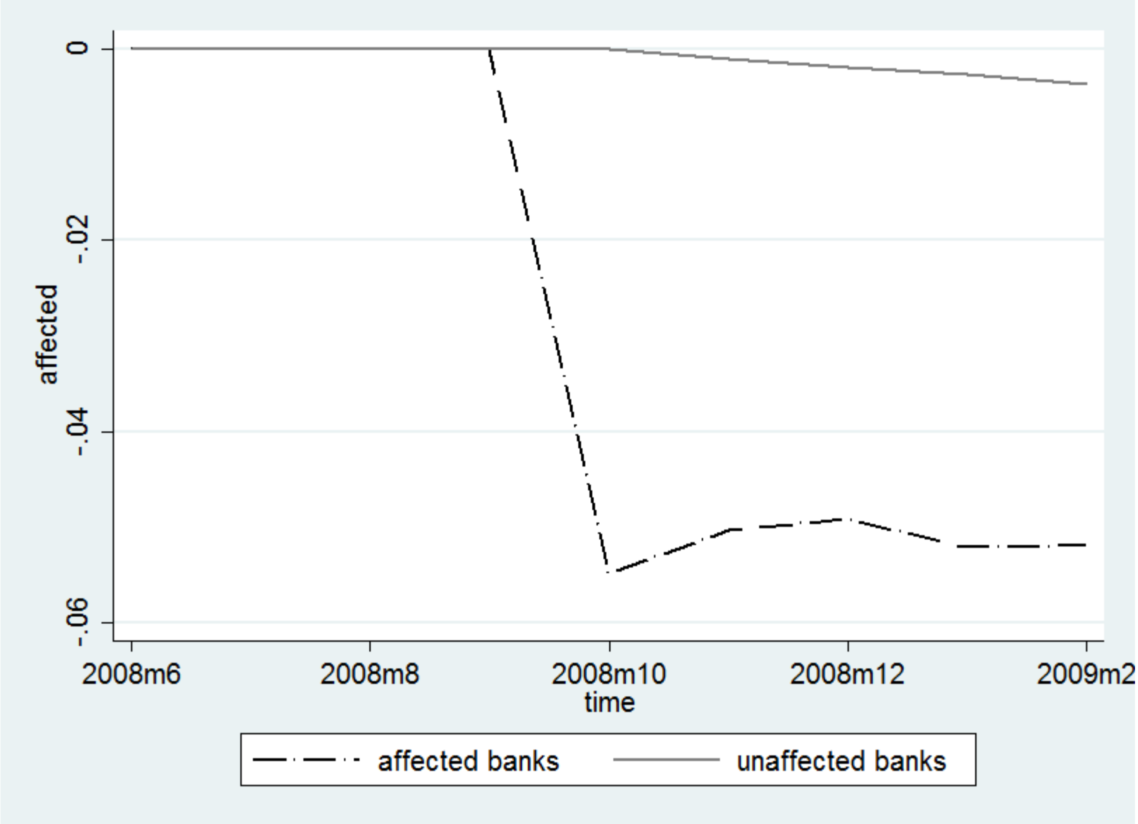


Figure 4: Average tightening shock of March 2010 on affected and non-affected banks.

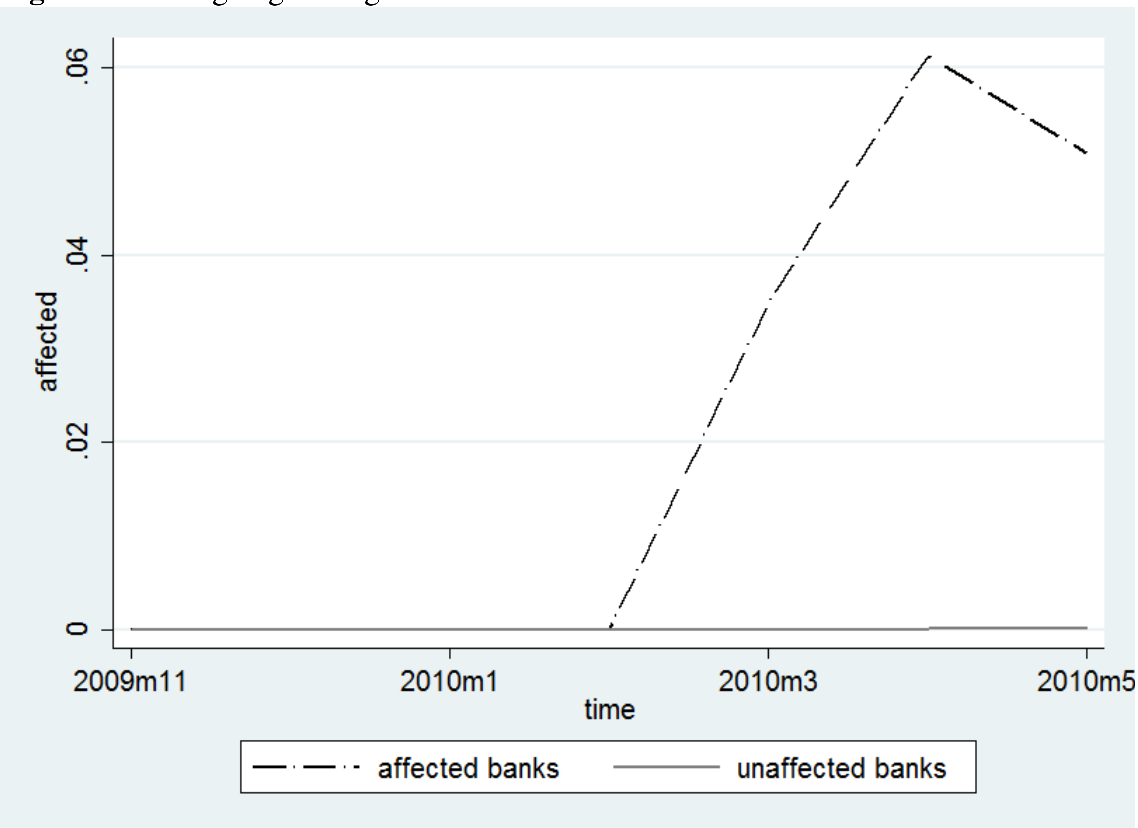


Table 1. Variables´ definitions

Variable name	Definition
amount	One standard difference of outstanding loan amount of bank *b* with borrower *i* in quarter *t*, winsorized on 98%/2% level
macrotool	Dummy that takes the value of +1 if the macroprudential tool has been tightened in a given quarter and -1 if it has been eased. It is zero if no changes have occurred during that quarter.
treat	Dummy variable for the banks belonging to conglomerates that are affected by the policies, and zero otherwise
capital	Ratio of capital to total assets, demeaned and winsorized on 98%/2% level
liquidity	Ratio of liquidity to total assets, demeaned and winsorized on 98%/2% level
big	Dummy variable that takes the value one if bank is a "big" bank, and zero otherwise
size	Log of bank´s total assets, demeaned and winsorized on 98%/2% level
non-core	Ratio of non-core liabilities to total assets, demeaned and winsorized on 98%/2% level
fxsec	Ratio of foreign securities issue by bank *b* to total assets, demeaned and winsorized on 98%/2% level
NPL	Ratio of non-performing loans to total assets, demeaned and winsorized on 98%/2% level
commercial	Dummy variable that takes the value one if bank is a commercial bank, and zero otherwise
selic	One year delta benchmark Selic base interest rate (overnight t-bill funds rate)
gdp	One year delta of the Brazilian gross domestic product
D_3	Dummy variable that takes the value one if quarter *t* is the first quarter of the year, and zero otherwise
D_6	Dummy variable that takes the value one if quarter *t* is the second quarter of the year, and zero otherwise
D_9	Dummy variable that takes the value one if quarter *t* is the third quarter of the year, and zero otherwise
foreign currency	Outstanding loan amount in foreign currency of bank *b* with borrower *i* in quarter *t*, winsorized on 98%/2% level
default	Dummy variable that takes the value one in the presence of past due amount over 90 days of borrower *i* with bank *b* in quarter *t*, and zero otherwise
market_share	Ratio of outstanding loan amount of bank *b* with borrower *i* in quarter *t* to total loan amount of borrower *i* in quarter *t*, winsorized on 98%/2% level
scline	Share of credit lines over total outstanding loans of bank *b* with borrower *i* in quarter *t*, winsorized on 98%/2% level
importance	Ratio of outstanding loan amount of bank *b* with borrower *i* in quarter *t* to total capital of bank *b* in quarter *t*, winsorized on 98%/2% level
interest	Log weighted interest rate of bank *b* with borrower *i* in quarter *t*, winsorized on 98%/2%
collateral	Ratio of outstanding debt amount guaranteed by any type of collateral
firm_risk	Ratio of total due amount provisioned by banks to borrower *i* at quarter *t*, according to Resolution 2.682/1999 of the Central Bank of Brazil
risk	Ratio of total due amount provisioned by bank *b* to borrower *i* at quarter *t*, according to Resolution 2.682/1999 of the Central Bank of Brazil
Time	Linear trend
Time2	Quadratic trend
Time3	Cubic trend

Table 2. Descriptive Statistics

	Min	Max	Mean	Median	St. Dev.
amount	-1.214	1.668	-0.06	-0.08	0.329
macrotool	-2	3	0.24	0	1.166
treat	0	1	0.827	1	0.378
capital	0.000	0.689	0.104	0.080	0.096
liquidity	0.001	0.682	0.160	0.134	0.086
big	0	1	0.709	1	0.454
size	15.502	27.213	26.209	27.158	1.563
non-core	0.000	0.693	0.140	0.118	0.091
fxsec	0.000	0.214	0.013	0.002	0.022
npl	0.000	0.604	0.059	0.056	0.023
commercial	0	1	0.871	1	0.335
selic	-0.477	0.398	0.011	0.111	0.277
gdp	-0.023	0.087	0.023	0.025	0.028
foreign currency	0.000	1.000	0.030	0.000	0.172
default	0.000	1.000	0.080	0.000	0.271
marketshare	0.000	1.000	0.146	0.090	0.169
scline	0.000	1.000	0.125	0.000	0.209
importance	-1.311	12.293	0.004	0.000	0.089
interest	-0.278	5.460	3.088	3.066	1.027
Observations					20,299,481

Table 3. Credit Channel using Long Panel: bank and firm heterogeneity

The dependent variable is the change in the natural log of credit given by bank *b* to firm *f* (intensive margin) between *t+1* and *t*, Dln(credit b,f,t+1), where t is in quarters. The announcement and the change in RR are observed during quarter *t* and we measure its effects on the following quarter using an index. For instance, one tightening is identified as a +1 change in the index, and a loosening as a -1. We present the main results for the treatment group, i.e. dummy variable for the banks belonging to conglomerates that are affected by the policies (treat). The control group, i.e. small independent banks represent the unaffected bank institutions. The bank controls are the natural log (ln) of bank assets (size), the ln of the capital adequacy ratio - core capital to total assets (CAR), the ln of the liquidity ratio - total liquid assets to total assets (liquidity), the ln of non-performing loans to total credit (NPL), the ln of non-core liabilities to total liabilties (non-core), the ln of foreign securities issued to total liabilities (fxsec), a dummy variable for commercial banks, a dummy variable for banks that belong to a bank conglomerate, and a dummy variable for small bank institutions . The firm-bank controls are the share of firm-bank credit to bank capital (importance), the share of firm-bank credit to total firm credit (market_share), the weighted firm-bank provisions allocated across all loans of these firm-bank relationship (risk), the share of credit lines to total exposure (scline), a dummy variable for firm-bank relationships with loans indexed in foreign currency (foreign_currency) and a dummy variable for loans in default. All bank and firm-bank controls are measured in the previous quarter, t-1. Apart from the dummies, all bank controls have been demeaned in t-1 and windsorized at the 98% level. All models have Firm and Time FE. Standard errors are clustered at the bank level. *** is significance at 1%, ** is significance at 5% and * is significance at 10%.

Dependent variable: $\Delta \ln(credit_{b,f,t+1})$

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
*treat**ΔResReq $_t$	-0.726*	-0.728	-0.824**	-0.737*	-0.745*	-0.919**	-0.737*	-0.730*	-1.159**
	(0.415)	(0.434)	(0.397)	(0.426)	(0.410)	(0.409)	(0.413)	(0.418)	(0.465)
*treat**ΔResReq $_t$									
* CAR $_{t-1}$		0.097							-0.997
		(0.546)							(1.266)
* liquidity $_{t-1}$			2.414**						3.309**
			(1.124)						(1.469)
* non-core $_{t-1}$				0.497					1.503
				(1.066)					(1.527)
* fxsec $_{t-1}$					3.258				2.798
					(3.399)				(3.862)
*size $_{t-1}$						0.088			0.119
						(0.054)			(0.087)
* importance $_{t-1}$							-1.271***		-1.136**
							(0.349)		(0.431)
* firm risk $_{t-1}$								0.241	0.073***
								(0.477)	(0.020)
Observations	20,299,481	20,299,481	20,299,481	20,299,481	20,299,481	20,299,481	20,299,481	20,299,481	20,299,481
R-squared	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.175	0.175
Firm-Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm Controls	<>	<>	<>	<>	<>	<>	<>	<>	<>
Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank-Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

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

Table 4. Credit Channel using Long Panel: bank and firm heterogeneity (distributed lags)

The dependent variable is the change in the natural log of credit given by bank *b* to firm *f* (intensive margin) between *t+1* and *t*, Dln(credit b,f,t+1), where t is in quarters. The announcement and the change in RR are observed during quarter *t* and we measure its effects on the following quarter using an index. For instance, one tightening is identified as a +1 change in the index, and a loosening as a -1. This is the distributed lags model and the coefficients represent the one-year accumulated average effect (across all shocks), i.e. treatment group dummy variable (treat) is interacted with Dln(credit b,f,t+1) and all controls in four lags independently. Coefficients and standard erros are calculated after that to reflect the accumulated results of these four lags' interactions. The bank controls are the natural log (ln) of bank assets (size), the ln of the capital adequacy ratio - core capital to total assets (CAR), the ln of the liquidity ratio - total liquid assets to total assets (liquidity), the ln of non-performing loans to total credit (NPL), the ln of non-core liabilities to total liabilties (nocore), the ln of foreign securities issued to total liabilities (fxsec), a dummy variable for commercial banks, a dummy variable for banks that belong to a bank conglomerate, and a dummy variable for small independent bank institutions (mostly unaffected by RR changes). The firm-bank controls are the share of firm-bank credit to bank capital (importance), the share of firm-bank credit to total firm credit (market_share), the weighted firm-bank provisions allocated across all loans of these firm-bank relationship (risk), and a dummy variable for firm-bank relationships with loans indexed in foreign currency (foreign_currency). All bank and firm-bank controls are measured in the previous quarter, t-1.We introduce four lags of controls accordingly. Apart from the dummies, all bank controls have been demeaned in t-1 and windsorized at the 98% level.All models have firm and Time FE. Standard errors are clustered at the bank level. *** is significance at 1%, ** is significance at 5% and * is significance at 10%.

Dependent variable: Δln(credit $_{b,f,t+2}$)

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
*treat**$\Sigma\Delta$ResReq $_t$	-1.085**	-1.033*	-1.315*	-1.025*	-1.134*	-1.273***	-1.099*	-1.066*	-1.642*
	(0.535)	(0.619)	(0.711)	(0.559)	(0.634)	(0.458)	(0.584)	(0.622)	(0.964)
*treat**$\Sigma\Delta$ResReq $_t$									
* CAR $_{t-1}$		-1.909							-1.067
		(1.590)							(3.265)
* liquidity $_{t-1}$			5.397**						6.036**
			(2.235)						(2.847)
* non-core $_{t-1}$				-1.470					0.0131
				(1.555)					(3.284)
* fxsec $_{t-1}$					0 2.429				4.654
					(8.924)				(9.778)
*size $_{t-1}$						0.0868			0.0863
						(0.105)			(0.198)
* importance $_{t-1}$							-1.447**		-1.293*
							(0.672)		(0.741)
* firm risk $_{t-1}$								-0.0406	1.344
								(1.415)	(1.845)
Observations	20,299,481	20,299,481	20,299,481	20,299,481	20,299,481	20,299,481	20,299,481	20,299,481	20,299,481
R-squared	0.174	0.174	0.174	0.174	0.175	0.174	0.174	0.175	0.176
Firm-Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm Controls	<>	<>	<>	<>	<>	<>	<>	<>	<>
Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank-Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses (computed using distributed lags)

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

Table 5: Credit Channel using DiD: 2 shocks

The dependent variable is the change in the natural log of credit given by bank b to firm f (intensive margin) between t+2 and t-1, $\Delta \ln(credit_{b,f,t+2})$, where t represents one month. The announcement date of the RR change is t, and we measure its effects using a counterfactual treatment variable in t. Because of the implementation lag (in t or t+1, pending on RR subcomponents), we measure effects on bank-firm credit between t-1 and t+2, i.e. a quarterly change. The treatment variable is the change in RR of bank b measured in t relatively to its comtemporaneuous conterfactual, $\Delta ResReq_{b,t}$. The bank controls are the ln of total assets (size), the ln of the capital adequacy ratio or core capital to total assets (capital), the ln of the liquidity ratio - total liquid assets to total assets (liquidity), the ln of foreign securities issued to total liabilities (fxsec) and the one-year return on equity (ROE). We use a dummy variable for government banks (gov) , foreign banks (foreign), commercial banks (commercial) and small banks (small). Apart from the dummies, all bank controls have been demeaned in t-1 and windsorized at the 99% level.The firm controls are ln of total credit (firm_credit), and the ln of the firms´ number of employees (n_employees) , firm sector (sector) and county level dummies (municipality). The firm-bank control is the weighted firm-bank provisions allocated across all loans of this firm-bank relationship (risk). Models (1)-(5) represent the loosening of RR and models (6)-(10) represent the tightening. Models (1) and (6) represent our least saturated regression using only DResReq b,t as an explanatory variable. Models (2) and (7) introduce firm and firm-bank controls. Models (3) and (8) introduce firm FE. Models (4) and (9) introduce bank controls (without firm FE); and, models (5) and (10) represent our most saturated regressions with FE and bank controls. Standard errors are clustered at the bank level. *** is significance at 1%, ** is significance at 5% and * is significance at 10%.

Dependent variable: $\Delta \ln(credit_{b,f,t+2})$

	Easing of countercyclical RR (November, 2008 shock)					Tightening of countercyclical RR (March, 2010 shock)				
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\Delta ResReq_{b,t}$	-1.303**	-1.285**	-1.204**	-1.508***	-1.431***	-0.449***	-0.450***	-0.473***	-0.664***	-0.663***
	(0.608)	(0.636)	(0.575)	(0.460)	(0.444)	(0.160)	(0.155)	(0.138)	(0.150)	(0.129)
Observations	493,137	493,137	493,137	493,137	493,137	571,581	571,581	571,581	571,581	571,581
R-squared	0.006	0.019	0.387	0.035	0.398	0.002	0.012	0.354	0.019	0.359
Firm-Bank Controls	NO	YES	YES	YES	YES	NO	YES	YES	YES	YES
Firm Controls	NO	YES	<>	YES	<>	NO	YES	<>	YES	<>
Bank Controls	NO	NO	NO	YES	YES	NO	NO	NO	YES	YES
Firm FE	NO	NO	YES	NO	YES	NO	NO	YES	NO	YES
Cluster	bank_id	bank_id	bank_id	bank_id	bank_id	bank_id	bank_id	bank_id	bank_id	bank_id
N firms	184533	184533	184533	184533	184533	202946	202946	202946	202946	202946
N sectors	71	71	71	71	71	71	71	71	71	71
N counties	3048	3048	3048	3048	3048	3068	3068	3068	3068	3068
N banks	111	111	111	111	111	111	111	111	111	111
ΔResReq	Count. 08	Count. 08	Count. 08	Count. 08	Count. 08	Count. 10	Count. 10	Count. 10	Count. 10	Count. 10

Robust standard errors in parentheses

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

Table 6: Credit Channel using DiD: bank heterogeneity (easing)

In this table we present bank control variables interacted with the treatment variable, $\Delta ResReq_{b,t}$. The dependent variable is the change in the natural log of credit given by bank b to firm f (intensive margin) between t+2 and t-1 $\Delta ln(credit_{b,f,t+2})$, where t represents one month. The announcement date of the RR change is t, and we measure its effects using a counterfactual treatment variable in t. Because of the implementation lag (in t or t+1, pending on RR subcomponents), we measure effects on bank-firm credit between t-1 and t+2, i.e. a quarterly change. The treatment variable is the change in RR of bank b measured in t relatively to its comtemporaneuous conterfactual, $\Delta ResReq_{b,t}$ The bank controls are the ln of total assets (size), the ln of the capital adequacy ratio or core capital to total assets (capital), the ln of the liquidity ratio - total liquid assets to total assets (liquidity), the ln of foreign securities issued to total liabilities (fxsec) and the one-year return on equity (ROE). We use a dummy variable for government banks (gov), foreign banks (foreign), commercial banks (commercial), and small banks (small). Apart from the dummies, all bank controls have been demeaned in t-1 and windsorized at the 99% level. The firm-bank control is the weighted firm-bank provisions allocated across all loans of these firm-bank relationship (risk). All models have firm FE and bank controls. Standard errors are clustered at the bank level. *** is significance at 1%, ** is significance at 5% and * is significance at 10%.

Dependent variable: $\Delta ln(credit_{b,f,t+2})$

	Easing of countercyclical RR							
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta ResReq_{b,t}$	-1.431***	-1.436***	-1.403***	-2.361***	-1.904***	-2.182***	-2.905***	-3.053***
	(0.444)	(0.421)	(0.446)	(0.459)	(0.479)	(0.505)	(0.378)	(0.387)
$\Delta ResReq_{b,t}$								
* $capital_{t-1}$		-1.514**					-1.669	-0.919
		(0.607)					(1.175)	(1.453)
* ROE_{t-1}			0.036				0.045	0.068
			(0.041)				(0.088)	(0.095)
* gov_{t-1}				2.522***				0.838
				(0.603)				(0.755)
* $foreign_{t-1}$					2.911***		2.723***	3.058***
					(0.942)		(0.871)	(0.929)
* $small_{t-1}$						2.149***	3.043***	2.486***
						(0.669)	(0.561)	(0.838)
Observations	493,137	493,137	493,137	493,137	493,137	493,137	493,137	493,137
R-squared	0.398	0.399	0.398	0.400	0.399	0.399	0.401	0.401
Firm-Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES
Firm Controls	<>	<>	<>	<>	<>	<>	<>	<>
Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Cluster	bank_id	bank_id	bank_id	bank_id	bank_id	bank_id	bank_id	bank_id
N firms	184,533	184,533	184,533	184,533	184,533	184,533	184,533	184,533
N sectors	71	71	71	71	71	71	71	71
N counties	3,048	3,048	3,048	3,048	3,048	3,048	3,048	3,048
N banks	111	111	111	111	111	111	111	111

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

Table 7: Credit Channel using DiD: bank heterogeneity (tightening)

In this table we present bank control variables interacted with the treatment variable, $\Delta ResReq_{b,t}$. The dependent variable is the change in the natural log of credit given by bank b to firm f (intensive margin) between t+2 and t-1 $\Delta ln(credit_{b,f,t+2})$, where t represents one month. The announcement date of the RR change is t, and we measure its effects using a counterfactual treatment variable in t. Because of the implementation lag (in t or t+1, pending on RR subcomponents), we measure effects on bank-firm credit between t-1 and t+2, i.e. a quarterly change. The treatment variable is the change in RR of bank b measured in t relatively to its comtemporaneuous conterfactual, $\Delta ResReq_{b,t}$ The bank controls are the ln of total assets (size), the ln of the capital adequacy ratio or core capital to total assets (capital), the ln of the liquidity ratio - total liquid assets to total assets (liquidity), the ln of foreign securities issued to total liabilities (fxsec) and the one-year return on equity (ROE). We use a dummy variable for government banks (gov), foreign banks (foreign), commercial banks (commercial), and small banks (small). Apart from the dummies, all bank controls have been demeaned in t-1 and windsorized at the 99% level. The firm-bank control is the weighted firm-bank provisions allocated across all loans of these firm-bank relationship (risk). All models have firm FE and bank controls. Standard errors are clustered at the bank level. *** is significance at 1%, ** is significance at 5% and * is significance at 10%.

Dependent variable: $\Delta ln(credit_{b,f,t+2})$

	Tightening of countercyclical RR							
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta ResReq_{b,t}$	-0.663***	-0.106	-0.611***	-0.668***	-0.685***	-0.664***	-0.926**	-1.691***
	(0.129)	(0.180)	(0.171)	(0.128)	(0.122)	(0.128)	(0.385)	(0.619)
$\Delta ResReq_{b,t}$								
* $capital_{t-1}$		-5.265***					-0.274	2.822
		(1.586)					(2.238)	(2.738)
* ROE_{t-1}			-0.048				0.240*	0.612**
			(0.086)				(0.142)	(0.271)
* gov_{t-1}				-2.092				-7.195
				(3.026)				(4.709)
* $foreign_{t-1}$					5.010***		6.599***	9.728***
					(1.264)		(2.054)	(2.776)
* $small_{t-1}$						1.367	2.606	7.693**
						(1.609)	(2.257)	(3.741)
Observations	571,581	571,581	571,581	571,581	571,581	571,581	571,581	571,581
R-squared	0.359	0.360	0.359	0.359	0.360	0.359	0.360	0.360
Firm-Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES
Firm Controls	<>	<>	<>	<>	<>	<>	<>	<>
Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Cluster	bank_id	bank_id	bank_id	bank_id	bank_id	bank_id	bank_id	bank_id
N firms	202,946	202,946	202,946	202,946	202,946	202,946	202,946	202,946
N sectors	71	71	71	71	71	71	71	71
N counties	3,068	3,068	3,068	3,068	3,068	3,068	3,068	3,068
N banks	111	111	111	111	111	111	111	111

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

Table 8: Firm heterogeneity and risk-taking channel: easing

In this table we present firm and firm-bank variables interacted with the treatment variable, $\Delta ResReq_{b,t}$, to explore the risk-taking channel of countercyclical policy and firm heterogeneity.The dependent variable is the change in the natural log of credit given by bank b to firm f (intensive margin) between t+2 and t-1 $\Delta ln(credit_{b,f,t+2})$, where t represents one month. The announcement date of the RR change is t, and we measure its effects using a counterfactual treatment variable in t. Because of the implementation lag (in t or t+1, pending on RR subcomponents), we measure effects on bank-firm credit between t-1 and t+2, i.e. a quarterly change. The treatment variable is the change in RR of bank b measured in t relatively to its comtemporaneuous conterfactual, DResReq b,t. The bank controls are the ln of total assets (size), the ln of the capital adequacy ratio or core capital to total assets (capital), the ln of the liquidity ratio - total liquid assets to total assets (liquidity), the ln of foreign securities issued to total liabilities (fxsec) and the one-year return on equity (ROE). We use a dummy variable for government banks (gov), foreign banks (foreign), commercial banks (commercial), and small banks (small). Apart from the dummies, all bank controls have been demeaned in t-1 and windsorized at the 99% level.The firm-bank control is the weighted firm-bank provisions allocated across all loans of these firm-bank relationship (risk). All models have bank and firm-bank controls. Models (7) and (9) present our most staturated model with firm and bank FEs. Standard errors are clustered at the bank and firm sector level. *** is significance at 1%, ** is significance at 5% and * is significance at 10%.

Dependent variable: $\Delta ln(credit_{b,f,t+2})$

	Easing of countercyclical RR							
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta ResReq_{b,t}$	-1.431***	-1.433***	-1.479***	-1.429***	-1.279***		-1.273***	
	(0.363)	(0.364)	(0.365)	(0.360)	(0.455)		(0.452)	
$\Delta ResReq_{b,t}$								
* firm risk $_{t-1}$		0.078			-0.029	-0.096	-0.042	-0.067
		(0.106)			(0.133)	(0.084)	(0.119)	(0.081)
* future default $_{t+12}$			0.618**		0.817***	0.493**	0.808***	0.516**
			(0.254)		(0.243)	(0.245)	(0.240)	(0.234)
* n_employees $_{t-1}$				-0.016			-0.032	0.081
				(0.062)			(0.060)	(0.066)
future default $_{t+12}$			7.806***		8.252***	6.385***	8.222***	6.463***
			(0.909)		(0.717)	(0.787)	(0.737)	(0.750)
Observations	493,137	493,137	493,137	493,137	493,137	493,137	493,137	493,137
R-squared	0.398	0.398	0.399	0.398	0.388	0.408	0.388	0.408
Firm-Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES
Firm Controls	<>	<>	<>	<>	<>	<>	<>	<>
Bank Controls	YES	YES	YES	YES	YES	<>	YES	<>
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	NO	NO	NO	NO	NO	YES	NO	YES
Cluster	bank sector	bank sector	bank sector	bank sector	bank sector	bank sector	bank sector	bank sector
N firms	184,533	184,533	184,533	184,533	184,533	184,533	184,533	184,533
N sectors	71	71	71	71	71	71	71	71
N counties	3,048	3,048	3,048	3,048	3,048	3,048	3,048	3,048
N banks	111	111	111	111	111	111	111	111

Robust standard errors in parentheses

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

Table 9: Firm heterogeneity and risk-taking channel: tightening

In this table we present firm and firm-bank variables interacted with the treatment variable, $\Delta ResReq_{b,t}$, to explore the risk-taking channel of countercyclical policy and firm heterogeneity.The dependent variable is the change in the natural log of credit given by bank b to firm f (intensive margin) between t+2 and t-1 $\Delta ln(credit_{b,f,t+2})$, where t represents one month. The announcement date of the RR change is t, and we measure its effects using a counterfactual treatment variable in t. Because of the implementation lag (in t or t+1, pending on RR subcomponents), we measure effects on bank-firm credit between t-1 and t+2, i.e. a quarterly change. The treatment variable is the change in RR of bank b measured in t relatively to its comtemporaneuous conterfactual, DResReq b,t. The bank controls are the ln of total assets (size), the ln of the capital adequacy ratio or core capital to total assets (capital), the ln of the liquidity ratio - total liquid assets to total assets (liquidity), the ln of foreign securities issued to total liabilities (fxsec) and the one-year return on equity (ROE). We use a dummy variable for government banks (gov), foreign banks (foreign), commercial banks (commercial), and small banks (small). Apart from the dummies, all bank controls have been demeaned in t-1 and windsorized at the 99% level.The firm-bank control is the weighted firm-bank provisions allocated across all loans of these firm-bank relationship (risk). All models have bank and firm-bank controls. Models (7) and (9) present our most staturated model with firm and bank FEs. Standard errors are clustered at the bank and firm sector level. *** is significance at 1%, ** is significance at 5% and * is significance at 10%.

Dependent variable: $\Delta ln(credit_{b,f,t+2})$

	Tightening of countercyclical RR							
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta ResReq_{b,t}$	-0.663***	-0.661***	-0.666***	-0.660***	-0.472***		-0.470***	
	(0.099)	(0.098)	(0.102)	(0.103)	(0.107)		(0.114)	
$\Delta ResReq_{b,t}$								
* firm risk $_{t-1}$		0.071*			0.071*	0.028	0.069	0.034
		(0.040)			(0.036)	(0.026)	(0.045)	(0.034)
* future default $_{t+12}$			0.194**		0.119	0.167**	0.119	0.169*
			(0.084)		(0.076)	(0.083)	(0.078)	(0.086)
* n_employees $_{t-1}$				-0.010			-0.004	0.013
				(0.025)			(0.027)	(0.024)
future default $_{t+12}$			4.131***		4.965***	3.732***	4.966***	3.728***
			(0.695)		(0.831)	(0.468)	(0.831)	(0.469)
Observations	571,581	571,581	571,581	571,581	571,581	571,581	571,581	571,581
R-squared	0.359	0.359	0.359	0.359	0.355	0.371	0.355	0.371
Firm-Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES
Firm Controls	<>	<>	<>	<>	<>	<>	<>	<>
Bank Controls	YES	YES	YES	YES	YES	<>	YES	<>
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	NO	NO	NO	NO	NO	YES	NO	YES
Cluster	bank sector	bank sector	bank sector	bank sector	bank sector	bank sector	bank sector	bank sector
N firms	202,946	202,946	202,946	202,946	202,946	202,946	202,946	202,946
N sectors	71	71	71	71	71	71	71	71
N counties	3,068	3,068	3,068	3,068	3,068	3,068	3,068	3,068
N banks	111	111	111	111	111	111	111	111

Robust standard errors in parentheses

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

Table 10: Credit Channel at the firm level using DiD: 2 shocks

The dependent variable is the change in the natural log of credit given to firm *f* between *t-1* and *t+2* $\Delta \ln(credit_{f,t+2})$, where t represents one month. All controls are weighted-averaged at the firm level including the treatment variable.The announcement date of the RR change is *t*, but we measure its effects using a counterfactual treatment variable in *t*, because of the implementation lag. The announcement date of the RR change is t, and we measure its effects using a counterfactual treatment variable in t. Because of the implementation lag (in t or t+1, pending on RR subcomponents), we measure effects on bank-firm credit between t-1 and t+2, i.e. a quarterly change. The treatment variable is the change in RR of bank b measured in t relatively to its comtemporaneuous conterfactual, $\Delta ResReq_{b,t}$. The weighted bank controls are the same as the ones in the previous tables, i.e. the ln of total assets (size), the ln of the capital adequacy ratio - core capital to total assets (capital), the ln of the liquidity ratio - total liquid assets to total assets (liquidity), the ln of foreign securities issued to total liabilities (fxsec) and the one-year return on equity (ROE). We use weighted dummy variables for government banks (gov) , foreign banks (foreign), commercial banks (com), and small banks (small) . Apart from the dummies, all bank controls have been demeaned in t-1 and windsorized at the 99% level.The firm controls are ln of total credit (firm_credit), ln of total number of employees (n_employees), and the weighted firm provisions allocated across all loans of the firm (firm_risk). Models (1)-(3) represent the easing of RR and models (4)-(6) represent the tightening. Standard errors are clustered at the level of the bank holding the maximum exposure of each firm (or its only exposure) . *** is significance at 1%, ** is significance at 5% and * is significance at 10%.

Dependent variable: $\Delta \ln(credit_{f,t+2})$

	Easing of countercyclical RR (November, 2008 shock)			Tightening of countercyclical RR (March, 2010 shock)		
Model	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta ResReq_{f,t}$	-0.961***	-0.876**	-0.934**	-0.610***	-0.584***	-0.602***
	(0.321)	(0.346)	(0.365)	(0.073)	(0.070)	(0.071)
firm risk$_{t-1}$	-7.476***	-7.521***	-7.609***	-9.861***	-9.850***	-9.850***
	(0.572)	(0.590)	(0.608)	(0.519)	(0.512)	(0.484)
firm_credit$_{t-1}$	-6.000***	-6.063***	-6.164***	-4.408***	-4.426***	-4.547***
	(0.183)	(0.181)	(0.162)	(0.271)	(0.278)	(0.275)
n_employees$_{t-1}$	4.738***	4.861***	4.894***	3.724***	3.740***	3.845***
	(0.413)	(0.405)	(0.352)	(0.368)	(0.364)	(0.370)
w_capital$_{t-1}$	6.159**	6.251**	6.436**	-0.353	-0.525	-0.680
	(2.912)	(2.946)	(2.916)	(2.777)	(2.707)	(2.700)
w_liquidity$_{t-1}$	0.910	0.967	1.287	5.501**	5.447**	5.372***
	(2.616)	(2.682)	(2.672)	(2.103)	(2.095)	(2.024)
w_size$_{t-1}$	1.133	1.151	1.098	1.177	1.007	0.914
	(1.280)	(1.348)	(1.374)	(0.995)	(1.000)	(1.061)
w_gov$_{t-1}$	2.755	2.884	3.067	-4.617*	-4.615*	-4.455*
	(3.298)	(3.402)	(3.480)	(2.486)	(2.406)	(2.361)
w_foreign$_{t-1}$	-4.699*	-4.427*	-4.894*	-3.386	-3.219	-3.131
	(2.459)	(2.574)	(2.693)	(2.485)	(2.552)	(2.644)
w_small$_{t-1}$	-1.906	-2.247	-2.317	2.315	1.580	1.300
	(5.269)	(5.304)	(5.422)	(4.368)	(4.453)	(4.647)
w_commercial$_{t-1}$	-4.486	-4.864	-5.767	-16.269**	-16.480**	-16.511**
	(6.167)	(6.352)	(6.330)	(6.708)	(6.760)	(6.603)
w_fxsec$_{t-1}$	-3.312*	-2.931*	-2.970	3.410	3.606	3.671
	(1.669)	(1.655)	(1.805)	(2.099)	(2.251)	(2.346)
w_ROE$_{t-1}$	-0.123	-0.118	-0.127	0.036	0.030	0.034
	(0.115)	(0.117)	(0.116)	(0.118)	(0.118)	(0.116)
Observations	184,533	184,533	184,533	202,946	202,946	202,946
R-squared	0.041	0.060	0.129	0.031	0.048	0.114
Firm-Bank Controls	YES	YES	YES	YES	YES	YES
Firm Controls	YES	YES	YES	YES	YES	YES
Bank Controls	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	<>	YES	YES	<>
Region FE	NO	YES	<>	NO	YES	<>
Industry*Region FE	NO	NO	YES	NO	NO	YES
Cluster	max_bank	max_bank	max_bank	max_bank	max_bank	max_bank
N sectors	71	71	71	71	71	71
N counties	3048	3048	3048	3068	3068	3068
N max banks	95	95	95	89	89	89

Robust standard errors in parentheses

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

Table 11: Placebo Credit Channel using DiD: 2 shocks

In this table, we reproduce Table 4 in one stable placebo period exactly one year after the second shock. Placebos are estimated independently using the easing and tightening counterfactuals. The dependent variable is the change in the natural log of credit given by bank b to firm f (intensive margin) between t+2 and t-1, $\Delta \ln(credit_{b,f,t+2})$, where t represents one month. The announcement date of the RR change is t, and we measure its effects using a counterfactual treatment variable in t. Because of the implementation lag (in t or t+1, pending on RR subcomponents), we measure effects on bank-firm credit between t-1 and t+2, i.e. a quarterly change. The treatment variable is the change in RR of bank b measured in t relatively to its comtemporaneuous conterfactual, DResReq b,t. The bank controls are the ln of total assets (size), the ln of the capital adequacy ratio or core capital to total assets (capital), the ln of the liquidity ratio - total liquid assets to total assets (liquidity), the ln of foreign securities issued to total liabilities (fxsec) and the one-year return on equity (ROE). We use a dummy variable for government banks (gov) , foreign banks (foreign), commercial banks (commercial) and small banks (small). Apart from the dummies, all bank controls have been demeaned in t-1 and windsorized at the 99% level.The firm controls are ln of total credit (firm_credit), and the ln of the firms´ number of employees (n_employees) , firm sector (sector) and county level dummies (municipality). The firm-bank control is the weighted firm-bank provisions allocated across all loans of these firm-bank relationship (risk). Models (1)-(5) represent the loosening of RR and models (6)-(10) represent the tightening. Models (1) and (6) represent our are least saturated regression using only $\Delta ResReq_{b,t}$ as an explanatory variable. Models (2) and (7) introduce firm and firm-bank controls. Models (3) and (8) introduce firm FE. Models (4) and (9) introduce bank controls (without firm FE); and, models (5) and (10) represent our most saturated regressions with FE and bank controls. Standard errors are clustered at the bank level. *** is significance at 1%, ** is significance at 5% and * is significance at 10%.

Dependent variable: $\Delta \ln(credit_{b,f,t+2})$

	Easing of countercyclical RR (March, 2011 placebo shock)					Tightening of countercyclical RR (March, 2011 placebo shock)				
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\Delta ResReq_{b,t}$	0.306	0.281	0.217	0.003	0.022	0.391	0.374	0.407	0.672	0.666
	(0.220)	(0.210)	(0.184)	(0.419)	(0.362)	(0.344)	(0.347)	(0.282)	(0.550)	(0.456)
Observations	706,620	706,620	706,620	706,620	706,620	669,807	669,807	669,807	669,807	669,807
R-squared	0.000	0.009	0.328	0.013	0.331	0.001	0.010	0.324	0.016	0.328
Firm-Bank Controls	NO	YES	YES	YES	YES	NO	YES	YES	YES	YES
Firm Controls	NO	YES	<>	YES	<>	NO	YES	<>	YES	<>
Bank Controls	NO	NO	NO	YES	YES	NO	NO	NO	YES	YES
Firm FE	NO	NO	YES	NO	YES	NO	NO	YES	NO	YES
Cluster	bank_id	bank_id	bank_id	bank_id	bank_id	bank_id	bank_id	bank_id	bank_id	bank_id
ΔResReq	Count. 08	Count. 08	Count. 08	Count. 08	Count. 08	Count. 10	Count. 10	Count. 10	Count. 10	Count. 10

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

Appendix 1. Credit Channel using Long Panel: bank and firm heterogeneity

The dependent variable is the change in the natural log of credit given by bank *b* to firm *f* (intensive margin) between *t+1* and *t*, Dln(credit b,f,t+1), where t is in quarters. The announcement and the change in RR are observed during quarter *t* and we measure its effects on the following quarter using an index. For instance, one tightening is identified as a +1 change in the index, and a loosening as a -1. We present the main results for the treatment group, i.e. dummy variable for the banks belonging to conglomerates that are affected by the policies (treat). The control group, i.e. small independent banks represnt the unaffected bank institutions. The bank controls are the natural log (ln) of bank assets (size), the ln of the capital adequacy ratio - core capital to total assets (CAR), the ln of the liquidity ratio - total liquid assets to total assets (liquidity), the ln of non-performing loans to total credit (NPL), the ln of non-core liabilities to total liabilties (non-core), the ln of foreign securities issued to total liabilities (fxsec), a dummy variable for commercial banks, a dummy variable for banks that belong to a bank conglomerate, and a dummy variable for small bank institutions. The firm-bank controls are the share of firm-bank credit to bank capital (importance), the share of firm-bank credit to total firm credit (market_share), the weighted firm-bank provisions allocated across all loans of these firm-bank relationship (risk), the share of credit lines to total exposure (scline), a dummy variable for firm-bank relationships with loans indexed in foreign currency (foreign_currency) and a dummy variable for loans in default. All bank and firm-bank controls are measured in the previous quarter, t-1. Apart from the dummies, all bank controls have been demeaned in t-1 and windsorized at the 98% level.All models have Firm and Time FE. Standard errors are clustered at the bank level. *** is significance at 1%, ** is significance at 5% and * is significance at 10%.

Dependent variable: $\Delta \ln(\text{credit}_{b,f,t+1})$

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
$\Delta ResReq_t$	-0.186	-0.183	-0.233	-0.190	-0.178	-0.137	-0.185	-0.131	-0.207*	-0.194	-0.141
	(0.156)	(0.160)	(0.140)	(0.156)	(0.147)	(0.163)	(0.173)	(0.156)	(0.120)	(0.150)	(0.251)
$\Delta ResReq_t$											
* CAR_{t-1}		-0.557									-1.568
		(0.636)									(1.482)
* $liquidity_{t-1}$			2.585**								2.539*
			(0.950)								(1.307)
* $non\text{-}core_{t-1}$				-1.307							0.192
				(1.163)							(1.930)
* $fxsec_{t-1}$					8.338***						7.398
					(2.312)						(4.541)
*$size_{t-1}$						-0.107*					-0.091
						(0.058)					(0.107)
* $importance_{t-1}$							-0.383				-0.521
							(0.251)				(0.370)
* GDP_{t-1}								-15.642			-16.751*
								(9.522)			(9.141)
* $Selic_{t-1}$									-1.325***		-1.227**
									(0.407)		(0.514)
* $firm\ risk_{t-1}$										-0.259	-0.271
										(0.897)	(0.834)
Observations	14,504,485	14,504,485	14,504,485	14,504,485	14,504,485	14,504,485	14,504,485	14,504,485	14,504,485	14,504,485	14,504,485
R-squared	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.151	0.151	0.151	0.151
Firm-Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm Controls	<>	<>	<>	<>	<>	<>	<>	<>	<>	<>	<>
Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank-Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

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

Appendix 2. Credit Channel using Long Panel: bank and firm heterogeneity (distributed lags)

The dependent variable is the change in the natural log of credit given by bank *b* to firm *f* (intensive margin) between *t+1* and *t*, Dln(credit b,f,t+1), where t is in quarters. The announcement and the change in RR are observed during quarter *t* and we measure its effects on the following quarter using an index. For instance, one tightening is identified as a +1 change in the index, and a loosening as a -1. This is the distributed lags model and the coefficients represent the one-year accumulated average effect (across all shocks), i.e. treatment group dummy variable (treat) is interacted with Dln(credit b,f,t+1) and all controls in four lags independently. Coefficients and standard erros are calculated after that to reflect the accumulated results of these four lags' interactions. The bank controls are the natural log (ln) of bank assets (size), the ln of the capital adequacy ratio - core capital to total assets (CAR), the ln of the liquidity ratio - total liquid assets to total assets (liquidity), the ln of non-performing loans to total credit (NPL), the ln of non-core liabilities to total liabilties (nocore), the ln of foreign securities issued to total liabilities (fxsec), a dummy variable for commercial banks, a dummy variable for banks that belong to a bank conglomerate, and a dummy variable for small independent bank institutions (mostly unaffected by RR changes). The firm-bank controls are the share of firm-bank credit to bank capital (importance), the share of firm-bank credit to total firm credit (market_share), the weighted firm-bank provisions allocated across all loans of these firm-bank relationship (risk), and a dummy variable for firm-bank relationships with loans indexed in foreign currency (foreign_currency). All bank and firm-bank controls are measured in the previous quarter, t-1.We introduce four lags of controls accordingly. Apart from the dummies, all bank controls have been demeaned in t-1 and windsorized at the 98% level.All models have firm and Time FE. Standard errors are clustered at the bank level. *** is significance at 1%, ** is significance at 5% and * is significance at 10%.

Dependent variable: Δln(credit $_{b,f,t+2}$)

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
$\Sigma\Delta$ResReq $_t$	-2.089***	-2.237***	-2.250**	-2.219***	-2.026**	-2.095***	-2.086***	-2.243	-0.588	-2.026***	-2.528***
	(0.645)	(0.706)	(0.886)	(0.663)	(0.799)	(0.678)	(0.646)	(1.392)	(0.982)	(0.654)	(0.937)
$\Sigma\Delta$ResReq $_t$											
* CAR $_{t-1}$		-1.841									-1.986
		(1.670)									(3.997)
* liquidity $_{t-1}$			6.002***								7.534**
			(2.240)								(3.092)
* non-core $_{t-1}$				-2.605							0.00979
				(1.954)							(3.994)
* fxsec $_{t-1}$					4.987						9.499
					(11.23)						(13.33)
*size $_{t-1}$						-0.0810					-0.0401
						(0.117)					(0.195)
* importance $_{t-1}$							-0.409				-0.440
							(0.391)				(0.558)
* GDP$_{t-1}$								9.507			
								(21.34)			
* Selic$_{t-1}$									-6.961***		
									(2.297)		
* firm risk $_{t-1}$										-0.0569	1.274
										(1.870)	(2.585)
Observations	14,504,485	14,504,485	14,504,485	14,504,485	14,504,485	14,504,485	14,504,485	14,504,485	14,504,485	14,504,485	14,504,485
R-squared	0.151	0.151	0.151	0.151	0.151	0.151	0.151	0.151	0.152	0.152	0.152
Firm-Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm Controls	<>	<>	<>	<>	<>	<>	<>	<>	<>	<>	<>
Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank-Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

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

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