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HIGHER CAPITAL REQUIREMENTS AND CREDIT SUPPLY: EVIDENCE FROM ITALY

by Maddalena Galardo* and Valerio Vacca*

Abstract

We use a rich dataset on bank loans to Italian firms matched to information on firms' and banks' characteristics, and exploit the implementation of Basel III reforms in Italy to investigate the impact of higher risk-based capital requirements on credit supply. While we do not address the steady state impact of capital requirements, we find that the introduction of higher requirements is associated with credit tightening in the early years after the reform. Banks affected to a larger extent by the new requirements tighten credit supply towards risky firms in favour of sounder ones. We also show that banks with particularly strong or particularly weak pre-reform capital positions tighten credit to a lesser extent, i.e. the lending supply response is U-shaped with respect to initial capital, as predicted by the forced safety effect (Bahaj and Malherbe 2020). Finally, firms borrowing more from less capitalized banks were only partially able to switch their lenders; they experienced worsening lending conditions and invested less compared with other firms after the implementation of Basel III.

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* Banca d'Italia, Directorate General for Economics, Statistics and Research, Financial Stability Directorate.

1 Introduction[1]

Over the last decade, the relationship between lending and capital requirements has been at the center of intensive debates. Both theoretical and empirical works have tried to shed light on the link between capital requirements, lending, and the real economy. Results are mixed. Some studies argue that an increase in capital requirements might, under some conditions, reduce average banks' funding costs and thus increase bank lending. On the contrary, others suggest that an increase in the risk-based capital requirement increases the bank's funding cost, making lending less attractive, at least during a transition phase (see Section 2 for a review). A recent paper by Bahaj and Malherbe 2020 connects the two conflicting views showing that one should not necessarily expect a monotonic relationship between capital requirements and lending. They develop a model in which raising the capital requirement reduces lending, through a composition effect (an increase in costly liabilities), but it also makes the bank safer. This forced safety effect (FSE) alleviates the composition effect; as the default boundary for the bank is shifted, there will be more states of the world where banks' shareholders will benefit from the potential surplus of loans. Therefore, a loan that would have been passed on by a low-capital bank, will be underwritten by the same bank once equipped with more capital to

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comply with tighter regulation. The forced safety effect makes the lending response to higher requirements less negative, and after a given level it may dominate the composition effect, thus inducing an increase in lending. Bahaj and Malherbe 2020 show that in their model the lending response is typically U-shaped in requirements and that the forced safety effect could be relevant under plausible conditions.

This paper focuses on the short-term effects on credit supply conditions of a wide-ranging reform in bank capital requirements, labelled as Basel III, which was started under the initiative of the G20 in the aftermath of the Lehman collapse (2008), and the subsequent Global Financial Crisis. We exploit data from a large number of banks and use the variance in the levels of capital ratios before Basel III as a proxy for the variation in the tightness of new capital requirements, by assuming that different levels of the pre-reform capital ratio correspond to different distances from the new requirement, and hence a different bindingness thereof.

To test convincingly the impact of capital regulation on credit supply, some identification challenges need to be addressed.

First, we need sufficient variation in capital ratios. Although the higher requirements introduced by Basel III were levied on all banks at the same time, they affected banks differentially due to their pre-reform capital ratios. To isolate the regulatory impact in the first years after the reform, we, therefore, exploit the fact that, at the time of the Basel III implementation (2014), some banks had balance sheet indices that made them more exposed to the new, stricter capital standards; by contrast, other banks were in a

stronger financial position to comply with the new rules.[2] After defining the two groups of more and less exposed banks, we measure the differential changes in credit supply conditions applied post-reform by banks in the treated group (more exposed banks), with respect to the supply conditions applied by the untreated group (less exposed banks). Our main identification strategy relies on the fact that the behaviour of the two groups of banks looks very similar before the reform as we show by performing parallel trends tests on treated and untreated bank-firm relationships.

Second, the supply of credit needs to be disentangled from demand. We exploit detailed datasets virtually encompassing the universe of bank-firm relationships in Italy, from 2009 to 2018. A rich information set on lenders, borrowers, and their relationships serves to isolate supply-side effects caused by changes in the requirement from other confounding factors. Analysis based only on macro data or bank-level data may suffer from an omitted-variables problem. We also include granular fixed effects to control for credit demand and to account for the possibility that credit supply and demand are driven by endogenous matching between lenders and borrowers and for unobservable changes in the pool of borrowers. Third, the trigger of the increase in capital requirements should be exogenous to economic conditions. A country's business cycle conditions affect the capital position of a bank, as in the ascending phase risks appear lower while lending volumes tend to increase, and vice-versa in the descending phase. We exploit as a

[2]Please note that, as banks hold voluntary buffers to reduce the chance that they breach regulatory requirements, their reaction to increases in the latter also depends on their desired amount of excess capital, which is however unobservable (De Jonghe, Dewachter, and Ongena 2020).

shock to capital requirements the increase in required risk-based capital due to the implementation of the Basel III reform in Italy. The Basel III reform was agreed at a global level to strengthen the resilience of the financial system, mitigating the vulnerabilities uncovered by the Global Financial Crisis (see the Appendix A for details on the Basel III reforms). The decision and the content of the reform were independent of Italian economic conditions. The implementation of the Basel III regime in Italy occurred in January 2014, although the reform was originally agreed in 2010. Therefore, the introduction of the reform was largely expected, but it was implemented worldwide according to different timelines.

We find evidence supporting the view that higher capital requirements are associated with lower credit growth and higher cost of credit, consistent with a tightening of credit supply in the early years after the reform. The reduction reflects a risk shifting: banks facing more stringent requirements relocate credit supply from risky to sounder firms, which is to a large extent an intended effect of the Basel III reforms. Moreover, we show that for lower and higher values of the ex ante capital ratio the credit tightening is weaker, i.e., the lending response is U-shaped in the stringency of the requirement consistently with the existence of a forced safety effect as theorized by Bahaj and Malherbe 2020. Our results on credit quantities are confirmed also using data on interest rates.

Furthermore, we complement the main bank-firm analysis with a firm-level analysis. Through this different analysis we ascertain that stricter capital requirements did not trigger a mere relocation of bank debt from constrained

to unconstrained banks, but they entailed, for some firms, an effective reduction in credit volumes, an increase in credit costs, and eventually a negative impact on firm investment.

We contribute to the existing literature in different ways. We investigate the effects of higher capital requirements through granular datasets that allow us to deploy state-of-the-art techniques to control for confounding factors, both time-invariant and time-varying. By contrast, previous works on the topic rely either on aggregate data (without banks or firms details) or on bank-level data, with no firm-level details, entailing a higher risk to confuse demand- and supply-driven factors (Aiyar, Calomiris, and Wieladek 2014, Banerjee and Mio 2018). Acharya, Berger, and Roman 2018 and Gropp et al. 2019 use bank-firm data but from a sample of syndicated loans, a market typically skewed towards bigger and less bank-dependent firms, rather than from the universe of bank loans within a credit market. Other studies adopt an identification approach similar to ours, while not directly addressing the effects of the higher risk-based capital requirements introduced with the Basel III regulation package: this is the case, e.g., of Fraisse, Lé, and Thesmar 2020, or Behn, Haselmann, and Wachtel 2016, featuring French and German loan-level data, respectively. As for the Italian credit market, Gallo 2021 studies how the introduction of the internal ratings-based (IRB) method, which makes capital more risk-sensitive compared to the Basel standard approach, impacts credit supply. He shows that banks adopting the IRB approach raise interest rates and reduce credit to high-risk borrowers compared to low-risk ones. Bonaccorsi di Patti, Moscatelli, and Pietrosanti

2020 study the effect of a change in capital requirements on the cost of credit by exploiting the introduction of the "Small and Medium Enterprises (SME) Supporting Factor".[3] They estimate a reduction in interest rates charged to SMEs of 9.5 basis points per percentage point drop in capital requirements. As in these studies, we infer that capital requirements are a relevant factor in banks' lending decisions.

After having established that higher risk-based capital requirements are associated with reduced lending and higher interest rates, we use the richness of our data to dig deeper into how banks rebalance the riskiness of their portfolios. Juelsrud and Wold 2020 already provide evidence of portfolio rebalancing due to the introduction of risk-weighted capital requirements. They focus on the shift from corporate to household lending, assuming that corporate loans are riskier. In this paper, in line with Acharya, Berger, and Roman 2018, we identify borrowers' riskiness by using measures of the expected default at the firm level. We employ Z-score computed following Altman 1968 by the Cerved Group, a private company selling valuations about Italian firms to banks (Albareto et al. 2011). We show that - in the early years after Basel III - low-capitalized banks granted less credit to risky companies while easing credit supply to more creditworthy firms, in line with the objectives of the Basel III reform. Finally yet importantly, we check whether the reaction of banks varies across different ex ante levels of their capital endowment, which is only possible in a sample with sufficient

[3]The "SME Supporting Factor" is a capital relief introduced in the EU to mitigate the stricter capital rules enforced by the capital requirements regulation (CRR) and the capital requirements directive IV (CRD IV) for specific exposures towards small borrower firms.

dispersion in the latter. The empirical analysis of Bahaj et al. 2016 and Bahaj and Malherbe 2017 rely on a data set encompassing only 18 banks: their panel does not provide enough variation in requirements to test the U-shaped relationship between credit supply and the enforced capital requirements. To our best knowledge, this paper is the first to offer a test of the shape of this relationship. This way, we provide novel empirical evidence on the forced safety effect that, as explained by Bahaj and Malherbe 2020, might lead the lending response to be U-shaped in the stringency of the requirement. Our findings show that a forced safety effect surfaces, but is not large enough to make the lending response to higher requirements positive.

We also contribute to the growing literature that hinges on granular data to assess the impact of credit supply shocks on the real economy (Chodorow-Reich 2014 and Paravisini et al. 2015, among others).[4] We find that firms relying more on less capitalized banks were only partially able to switch their lenders and experienced a worsening in lending conditions. In the early years after Basel III implementation firms exposed to higher risk-based capital requirements through their lenders eventually invested less than peers. While this last analysis takes a step towards the ultimate real economic consequences of higher capital requirements, it remains to some extent partial as we cannot assess the quality of the unfunded investments.

All in all, higher capital requirements succeed in increasing resilience by leading banks to reduce lending to risky borrowers, that as shown by Bonaccorsi di Patti and Kashyap 2017 are responsible for most loan losses

[4]For Italy, using as a shock to credit supply the liquidity drought in interbank markets that followed the 2007 financial crisis, Cingano, Manaresi, and Sette 2016 show that firm investment decisions are highly sensitive to bank credit availability.

when a profitability shock occurs. In bad times, banks with higher capital buffers are more able to maintain credit to the real economy, which is relevant from a macroprudential viewpoint (see among others, Gambacorta and Mistrulli 2004 and Jiménez et al. 2017). However, consistently with Martinez-Miera and Suarez 2014, this gain comes at the cost of lowering credit and investments in the capital building phase.

The rest of the paper is organized as follows. Sections 2 and 3 summarize the relevant literature and our contribution thereto, as well as the hypotheses we are testing. Section 4 describes the data and the econometric strategy. In section 5 we comment on the results of the main bank-firm level analysis and in 6 we complement it with the firm-level findings. Section 7 provides some robustness checks and 8 concludes. In addition, the Appendix provides some details on the Basel III reform.

2 Theory and Empirical Evidence

When confronted with increased requirements, banks can increase their regulatory capital ratios in two ways: they can increase their levels of regulatory capital (the numerator of the capital ratio) or they can shrink their risk-weighted assets (the denominator of the capital ratio). The latter may be achieved by reducing the assets' risk density, the assets themselves, or both. Reducing assets has potentially adverse effects on the economy if many banks simultaneously engage in cutting credit supply (Hanson, Kashyap, and Stein 2011). Both theoretical and empirical works have tried to shed light on the link between higher capital requirement, lending, and

the real economy. Thakor 1996 shows that capital requirements linked solely to credit risk increase credit rationing in equilibrium and lower aggregate lending. An increase in the risk-based capital requirement, by raising the bank's loan-funding cost, makes lending less attractive, especially towards risky borrowers and borrowers who have less bargaining power. In the same vein, Repullo and Suarez 2013 and Martinez-Miera and Suarez 2014 show that higher capital requirements reduce systemic risk but at the cost of reducing credit and output in non-crisis times. A related view is that higher capital levels may curtail risk-taking since managers and shareholders would have more skin in the game that incentivizes them to behave prudently (Furlong and Keeley 1989; Acharya, Mehran, and Thakor 2016; Barth and Seckinger 2018). A quite large strand of the empirical literature finds evidence of a tightening in lending after capital requirements are stepped up (see among others Aiyar et al. 2014; Aiyar, Calomiris, and Wieladek 2014; Acharya, Berger, and Roman 2018; Gropp et al. 2019); consistently Juelsrud and Wold 2020 document that banks improve capital ratios by reducing risk-weighted assets and also show that most of the reduction is obtained through reducing risk weights, suggesting that higher capital requirements provide *risk-mitigating incentives*.

A stream of the theoretical literature on the consequences of the principal-agent asymmetric information problem suggests that higher requirements may foster risk-taking under some conditions. Dewatripont and Tirole 1994 conclude that banks with low leverage have an incentive to take on more risk. Admati et al. 2018 show that if a firm has superior

information about its asset quality, shareholders would prefer to reduce leverage by selling safer assets and retaining the riskier ones, without issuing equity. To raise capital ratios by boosting earnings, banks may choose to lend more to riskier borrowers, applying higher fees and interest rates. Consistently with this view, the empirical findings by Wieladek and Uluc 2016 and Dautović 2020 suggest that higher capital requirements intended to make a bank more resilient may also end up increasing the riskiness of its balance sheet.

On the other side, there are theoretical studies supporting the idea that higher capital requirements can potentially boost lending even in the short term (i.e., over and beyond their steady-state effect). Begenau 2020 shows that a higher capital requirement, by reducing ceteris paribus the supply of deposits, increases households' willingness to hold deposits at a lower deposit rate. As a result, an increase in capital requirements might, under some conditions, reduce average banks' funding costs, as the deposit rate decreases, and thus increase bank lending. Admati et al. 2013 argue that the return on equity contains a risk premium that goes down as capital requirements increase so that higher requirements would not necessarily reduce lending. Bassett and Berrospide 2018 find that higher capital requirements implied by supervisory stress tests relative to those suggested by banks' own models do not restrict loan growth.

Recently, Bahaj and Malherbe 2020 show that these contrasting views may coexist. Bank's lending response to an increase in the requirement needs not

be negative. Raising the capital needed to comply with higher requirement reduces lending, through the *composition effect* on liabilities (i.e, by raising the average cost of funding), but it also makes the bank safer, shifting the default boundary. As a result, there are more states of the world in which revenues from lending accrue to the income of bank's shareholders, thus increasing the bank's willingness to lend. As this second effect reflects the fact that the requirement forces the bank toward safety, Bahaj and Malherbe 2020 name it the *forced safety effect* (FSE). They show that the FSE can be positive and can dominate the composition effect, which is why lending can increase with the capital requirement.

3 Testable Hypotheses

Following the theoretical literature, we formulate four non-alternative testable hypotheses about the impact of an increase in the risk-based capital requirement

- **H1 - Credit Supply**: The increase in the risk-based capital requirement causes banks to tighten credit supply in the early years after the reform (lower amounts granted or higher costs applied).
- **H2 - Risk-mitigating effect**: The increase in the risk-based capital requirement pushes banks to rebalance their portfolio away from high-risk borrowers.
- **H3 - Forced safety effect**: Lending is U-shaped in the requirement

as the forced safety effect makes the lending response to requirements' increase less negative and possibly positive beyond a given requirement threshold.

- **H4 - Real effects on firms**: The negative credit supply shock due to higher capital requirements worsens credit conditions for firms borrowing from affected banks, which in turn dampens their investments in the early period post-reform.

The next section describes the data and the empirical strategy we use to test these hypotheses.

4 Data and Empirical Strategy

4.1 Data

We build a unique data-set for a period that spans from 2009 to the end of 2018 by exploiting three main sources of data: banks' balance sheets data from supervisory reporting, firms' balance sheet and income statements from the Cerved Group database, and loan level information from the Italian Central Credit Register.

The Bank of Italy Supervisory reports provide detailed data on banks' assets and liabilities. Particularly, we use bank-specific capital ratios to identify banks more exposed to the increase in capital requirement. Since Basel III standards have been applied to all Italian banks in our sample in a substantially uniform manner (see Appendix A), we lack a genuine control

group of thoroughly unregulated (untreated) lenders to run a textbook difference-in-difference exercise. Consistently with the approach used by recent studies (see among others, FSB 2019; Juelsrud and Wold 2020) to isolate the regulatory impact on lending, we exploit the fact that, at the time of the Basel III reforms, some banks had balance sheet indices that made them more exposed to the new, harsher capital standards, as their capital ratios were barely above or even below the new standards; by contrast, other banks were in a stronger financial position to comply with the new rules. We identify banks' exposure to the reform using the average Tier 1 capital ratio before the reform (the period spanning from 2009 to 2013). Banks with capital ratios in the bottom quartile of the distribution before the reform are identified as "more exposed" to the reform.[5] Intuitively, credit supply from less capitalized banks is more likely to be constrained by an increase in capital requirement than the credit supply from better-capitalized banks. After the introduction of Basel III, banks increased their capital ratio: as shown in Figure 1, the distribution of the Tier 1 ratio shifted to the right. The shift was more pronounced for more-exposed banks (Figure 2) compared to the others. Banks more exposed to the increase in capital requirements due to Basel III were on average larger in terms of total assets compared to other banks (Table 1). More-exposed banks had lower operating costs as a percentage of total assets and a higher loan to asset ratio. After 2014, the increase in the share of non-performing loans was marked for both groups but the profitability deteriorated the most for more-exposed banks. We will

[5]Results are robust identifying "more exposed" banks as those with capital ratios below the median value of the distribution. Please refer to Table B.1.

control for these characteristics in all our specifications.

The Italian Credit Register (CR) collects detailed information on bank debt exposure of each borrower whose total debt from a bank is at least 30,000 euros. We focus on the end-of-year bank-firm relationships that are not reported as bad loans (i.e., granted credit is larger than zero).[6] We complement data on the amount granted with the individual loan rates priced on credit lines by a large sample of Italian banks from the Sample Survey of Lending Rates (a survey encompassing over 70% of all credit granted to the Italian economy). Loan rates are computed as the ratio of interest expenditures to the quantity of credit used.

We merge information from the CR on corporate borrowers from 2009 to 2018 with balance-sheet data from Cerved Group, a private company providing a database for a large sample of Italian firms, which contains detailed information about firms' activity, balance sheets, and riskiness, reported on a yearly basis.[7]

Our bank-firm dataset includes banks' balance sheets indicators, firms' characteristics and information about the borrower-lender relationships. Our estimation sample includes around 6.5 million observations pertaining to half a million firms; 22 percent of the bank-firm relationships involve

[6]We exclude firms whose loans were reported to the CR as bad loans; during the period we analyze banks carried out several bad loan securitizations, which however do not affect our calculated changes in extended credit.

[7]Cerved Group sells this information to several banks that can use it for their lending decisions (Albareto et al. 2011).

"more-exposed" bank. Table 2 shows that on average before 2014 the main features of these affected bank-firm relationships do not differ significantly from the others. In the following of the paper, we formally explore whether the parallel trend assumption holds, i.e. whether firms borrowing from affected and non-affected banks displayed similar trends in relevant variables before the reform.

4.2 Empirical Strategy

We study the effect of higher capital requirements on banks' credit supply in the early period after their introduction (i.e. an adjustement effect), while we do not address the steady state impact of reforming bank capital requirements. To this end, we use individual, bank-firm level annual data to disentangle credit supply from credit demand. We estimate the following regression specification:

$$y_{bit} = \alpha + \beta_{RBC}(RBC_t * Affected_b) + \gamma_f FirmC_{i,t-1} + \\ + \gamma_b BankC_{b,t-1} + FirmBank_{ib} + LocationTime_{i,t} + u_{bit} \quad (1)$$

where y_{bit} is alternatively the amount of credit granted by bank b to firm i (log change over a 1 year period) or the short term interest rates paid by firm i to bank b (level), RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform in Italy (see Appendix A), $Affected_b$ is a dummy variable that equals 1 if for bank b the average tier 1 ratio between 2008 and 2013 was below the first quartile of the

distribution, $FirmC_{i,t}$ are time-varying controls at the firm level including riskiness (Cerved score), size (log of total assets) and a dummy for the eligibility of the credit relationship to the SME Supporting factor.[8] $BankC_{b,t}$ is a vector of time-varying controls at the bank level including the log of total assets, loans-to-assets ratio, bad loans ratio, deposit ratio, tier 1 capital ratio, liquidity ratio, ROE, and operating costs ratio.[9] To reduce concerns that our findings are the results of demand-driven factors, we add location-by-time fixed effects ($LocationTime$) to control for local cycles at the province level. We also include bank-by-firm fixed effects ($FirmBank$). In this way, we control for time-invariant observable, for instance, the sector of activity of the firm, and unobservable characteristics as it is common when firms and banks fixed effects are introduced separately. Beyond this, the inclusion of bank-by-firm effects accounts for unobservable changes in the pool of borrowers and for the possibility that changes in the credit supply reflect endogenous matching between lenders and borrowers. This set of fixed effects enables exploiting the difference in lending from the same bank towards the same borrower. Differently from Khwaja and Mian 2008 that limit the analysis only to multi-banks firms, our approach also exploits information from single lenders, while looking at the same bank-firm relationship over

[8] A capital relief for loans to SMEs introduced by the CRR/CRD IV in Europe. Several studies show that the SME Supporting factor makes lending constraints less binding for SMEs (Mayordomo and Rodríguez-Moreno 2018; Lecarpentier et al. 2019; Bonaccorsi di Patti, Moscatelli, and Pietrosanti 2020).

[9] The balance sheet ratios are defined as follows: bad loans ratio is the ratio of bad loans to total loans; deposit ratio is the ratio of total deposits to total assets; liquidity ratio is the ratio of cash, central banks accounts and liquid securities over total assets; operating costs ratio is operating cost over total asset.

time.[10] Since error terms are likely to be correlated across the relationships of the same firm with the banking system over time, we run estimations by clustering standard errors at the firm level (as in Albertazzi and Bottero 2014, Banerjee, Gambacorta, and Sette 2017, Schäfer 2019).[11] Therefore, β_{RBC} measures the differential changes in credit supply conditions applied post-reform by banks in the treated group (heavily hit banks), with respect to the supply conditions applied by banks hit to a lesser extent. A negative coefficient estimated for β_{RBC} would support H1, see Section 3. To examine H2 and H3, we will decompose β_{RBC} along ex ante firms' riskiness and banks' capital ratio, respectively.

5 Results

5.1 Capital Requirements and Credit Supply (H1)

First, we apply our identification strategy to the full sample of bank-firm relationships within our dataset, regardless of the size and riskiness of the firm. In Table 3 Panel (a), we address the impact of Basel III on the change in committed credit by banks to Italian firms, controlling for firm-bank fixed effects. In the first specification, in place of the location-by-time fixed effects ($LocationTime$) we include macro variables (sovereign yield, GDP

[10] Further, we investigate the robustness of our findings including industry-location-time fixed effects to account for changes in loan demand in line with Degryse et al. 2019. Table B.2 reports the results.

[11] As a robustness check, we also assume that the standard errors are clustered at the bank-time level and multi-clustered simultaneously at the bank, firm, and time level, in line with Jiménez et al. 2012, and Jiménez et al. 2014. Tables B.3 and B.4 report the results.

growth, unemployment rate, credit to GDP gap, and 3 months short term interest rate) and the standalone post-Basel III dummy, RBC_t . We find that in the years following the increase in capital requirements a reduction in committed credit to firms took place. Of course, this reduction could depend on several confounding coincident factors. In the second column we, therefore, apply our identification tools, interacting the Basel III timing with the banks being likely to be capital-constrained ($RBC_t * Affected_b$). We detect a statistically negative sign only for the interaction term while RBC_t is no longer statistically significant, suggesting that the credit squeeze was triggered by the reaction of the capital-constrained bank to the new regulatory environment. In our preferred specification (third column), we deploy a set of borrower location-by-year fixed effects to control more rigorously for confounding factors, thus dropping the RBC_t dummy variable. The coefficient of the dummy $RBC_t * Affected_b$ remains statistically negative: After the Basel III implementation, the annual growth of credit to firms is estimated to be 1.5 percentage points lower for affected banks compared to other banks.

Another way to measure changes to the supply of credit is by looking at loan rates. When a bank wants to tighten credit supply quickly, an effective way to do so is to increase interest rates. We investigate the rates paid on overdraft facilities (i.e. credit lines), as the bank is allowed to unilaterally change at short notice the interest rate charged on these open-ended credit lines. Furthermore, as these loans are highly standardized and typically uncollateralised, a cross-firm comparison of the cost of credit is not affected by

loan-contract-specific covenants that are unobservable to an econometrician. In line with the results obtained for loan amounts, we find also for the cost of credit evidence of a tightening in credit supply after the introduction of Basel III: Table 3 Panel (b) shows that banks more exposed to the reform charged higher interest rates than their peers afterwards. According to our preferred specification, column (3), the interest rate charged by affected banks was 16 basis points higher than the rate charged by banks affected to a lesser extent, against an average rate in our sample over the whole period equal to 5.68 per cent.

Finally, Column (4) shows that our findings are robust to the inclusion of firm-by-time fixed effects as in Khwaja and Mian 2008, that restrict the analysis only to multi-bank firms. The impact of higher capital requirements may be particularly significant for SMEs, as these are heavily dependent on banks while they have limited access to non-bank finance. In Table 4, we focus our analysis on SME borrowers.[12] Again, the introduction of tighter risk-based capital requirements translates into a lower yearly growth of committed credit for banks belonging to the lowest quartile of capitalization, all other factors being equal, including the quality and the location of the borrower firm. Poorly capitalized banks also apply on average higher interest rates to borrower firms.

Our identification framework rests on a difference-in-difference (DD) analysis based on comparing the lending behavior of more-exposed banks (Tier 1 ratio

[12]In line with the definition used for credit risk exposures under Basel III and for benefitting of the SMEs supporting factor, we identify SMEs as those firms whose annual sales are less than 50 million. These firms account for the majority of bank-firm relationship in our whole sample. We cannot apply the SME identification criterion based on employees, owing to lack of data.

below the first quartile) to other banks'. In this framework, the identification assumption hinges on parallel trends: absent the Basel reform, lending from more-exposed and other banks would have evolved along the same path. To facilitate a transparent examination of pre-trends in the data, we estimate a year-by-year DD on bank-firm relationships,[13] to assess the lending behavior of highly constrained banks compared to less constrained banks. The results (Figure 3 for credit growth and 4 for interest rates) confirm that the parallel trends assumption holds: only two of the coefficients estimated for the pre-reform periods, 2009 and 2011, are statistically significant but very small in magnitude compared to the post-reform. They might be the results of some anticipation of the reform by banks, or they might reflect the capital-strengthening initiatives that occurred before 2014, such as the EU-wide stress test exercise and the EBA capital exercise. Both initiatives only involved the five largest Italian banking groups. The EBA capital exercise in 2011 and 2012 had the objective to create an exceptional and temporary capital buffer to address market concerns over sovereign risk and other credit risks related to the difficult market environment due to the sovereign debt crisis.[14] Ahead of the 2011 EU-wide stress test exercise, EBA encouraged banks to strengthen their capital positions by increasing capital in early 2011.[15] Without these capital increases, 20 European banks, including one Italian group, would have breached the minimum

[13]In other words, we re-estimate equation 1 setting a cut-off date between pre-treatment and post-treatment at different years within the sample period.

[14]For detail, please refer to `https://www.eba.europa.eu/risk-analysis-and-data/eu-capital-exercise`.

[15]For detail, please refer to `https://www.eba.europa.eu/risk-analysis-and-data/eu-wide-stress-testing/2011`.

threshold of the Core Tier 1 ratio (5%) under the adverse scenario. The statistically significant coefficient we detect for 2011 might reflect these events.[16] However, the trend analysis suggests that these concurrent events had transitory and smaller effects compared to the introduction of Basel III in 2014. According to robustness checks reported in Tables 7 and 13, our main results are confirmed in a subsample excluding banks involved in the capital-strengthening initiatives preceding 2014 and restricting the estimation to the 2012-2016 period. Summing up, Figure 3 and 4 show that the year 2014 marks a clear dislocation in trends, consistent with the fact that the new higher level of required capital has become binding only in that year.

5.2 Risk-mitigating effect (H2)

In this section, we explore banks' risk-taking behavior in response to Basel III implementation. To this aim, we need to identify risky customers. First, we proxy firms' riskiness using their size. Due to the large difference in average risk weights between micro and other firms, it can be plausibly assumed that the reduction in average risk weights can be achieved through *lending away* from micro firms (firms with less than 10 employees) if there are risk-mitigating incentives. The first two columns of Table 5 report the coefficient β_{RBC} decomposed for micro firms and other firms. After the implementation of Basel III, the reduction in credit granted, column (1),

[16] If we estimate the parallel trends excluding the institutions most affected by the 2011 stress test exercise, pre-reform coefficients are no longer different from zero (please refer to Figure B.1 and B.2).

as well as the increase in loan rate, column (2), was almost double towards micro firms than towards others, suggesting that the capital constraints of the lenders favored a portfolio reallocation across borrows of different size.[17] Secondly, we exploit differences in creditworthiness. We split the coefficient β_{RBC} into three components, measuring the reaction of banks towards firms of low, medium, and elevated riskiness, as quantified ex ante using credit Z-scores from Cerved Group, a private company selling information about Italian firms to banks. These scores range from 1 to 9, scores below 3 typically indicate sound firms (low risk) and scores above 7 identify financially fragile firms (high risk). The last two columns of Table 5 show that after Basel III implementation, low-capitalized banks, compared to other banks, granted less credit to companies having a medium or high level of ex ante riskiness while re-directing loans to sounder firms, column (3). The same capital-constrained banks, with respect to more capitalised banks, applied relatively tighter credit conditions to riskier firms and looser conditions to more creditworthy firms, column (4). Acharya, Berger, and Roman 2018 find similar results for the US credit market by studying the implications of bank stress test on lending. In line with the objectives of Basel III, the increase of risk-based capital contributes to tempering risk-taking.

5.3 Forced Safety Effect (H3)

In this section we test H3 of Section 3, i.e. we check whether the lending response is U-shaped in the requirements as theorized by Bahaj and Malherbe

[17] Our findings are confirmed excluding micro firms from the estimation sample (Table B.5).

2020 (see Section 2). To this aim, we assess whether the reaction of banks to higher capital requirements varies across different ex ante levels of capital ratio. For banks having a lower capital ratio before the reform, the impact of the increase in the requirement is larger than for banks having more capital. We therefore implicitly assume that there is a continuum of actual stringency in capital requirements, owing to the enforcement of new homogeneous capital requirements against heterogeneous initial levels of compliance. We estimate the following extension of equation 1

$$y_{bit} = \alpha + \sum_{c=5}^{12} \beta^{c}_{RBC}(RBC_t * Affected^{c}_{b}) + \gamma_f FirmC_{i,t-1} + \\ + \gamma_b BankC_{b,t-1} + FirmBank_{ib} + LocationTime_{i,t} + u_{bit} \quad (2)$$

$Affected^{c}_{b}$ is a dummy taking value 1 if bank b had an average Tier 1 ratio in the range $[c - 0.5$ to $c + 0.5)$, over the period 2009 to 2013. The starting level of pre-reform capital in each bucket, c, ranges from 5 to 12 per cent, which includes Tier 1 ratios encompassing the low-range of the capital distribution across Italian banks.[18] Therefore, the coefficients β^{c}_{RBC} measure the response of credit supply to higher capital requirement for banks belonging to eight different buckets of capital strength. H3 is accepted if the coefficients for low and high values of the pre-Basel III capital ratio are larger than the coefficients estimated for mid-range values. Figure 5 plots the lending response showing that it is U-shaped in the requirement, with

[18]More precisely, 12 per cent corresponds to the 40^{th} percentile for the pre-reform Tier 1 ratio. We focus on the low range of the distribution, since for high-capital banks we anticipate milder effects of higher capital requirements on credit supply.

peaks in relative tightening reached for banks with pre-reform Tier 1 ratios of around 9 per cent. However, the forced safety effect is insufficient to make the lending response positive: for both low and large values of the initial capital ratio, the overall impact on credit remains negative. We explore if the existence of the forced safety effect is confirmed also using data on interest rates. To endorse H3, the relation between the loan rate and the requirement should be inverse-U-shaped, because a negative β_{RBC} would indicate an easing and a positive one a tightening of credit supply. The lower panel of Figure 5 confirms a forced safety effect also when the cost of credit is used as an alternative measure of credit supply, with peaks in relative tightening reached for banks with pre-reform Tier 1 ratios in the range 6 to 8 per cent.

6 Assessing the real effects on firms (H4)

6.1 Empirical Strategy and Predictions

The previous section establishes that, following the Basel III implementation, relatively constrained banks decreased the amount of loan granted and charged higher interest rates compared to other banks. However, we are not able to ascertain whether the credit supply shock induced by the increase in capital requirements caused a credit restriction for Italian non-financial firms or just a reallocation of debt from constrained to unconstrained banks. In the former case, the ensuing credit constraints could curtail investment ability of affected borrowers. This section explores this issue moving closer

to those contributions that investigate the real effects of an exogenous shock to credit supply (Chodorow-Reich 2014 and Paravisini et al. 2015, among others). To this aim, we collapse our dataset moving from the bank-borrower level to the borrower level and follow a generalized difference-in-difference approach with continuous treatment. The treatment period corresponds, as in previous sections, to the years after the implementation of more stringent capital requirements (2014). Treated firms are identified as those that were borrowing from constrained banks; the share of credit that each firm obtained from constrained banks identifies the intensity of treatment. This econometric approach leverages the extensive literature showing that borrowers and lenders form relationships that help to overcome informational asymmetries, and therefore borrowers of capital-constrained banks could not be able to smoothly switch to borrowing from less constrained banks (Berger and Udell 2002, Presbitero and Zazzaro 2011, Chodorow-Reich 2014, Bolton et al. 2016, among others).

As for the exercises presented in the previous sections, our empirical strategy rests on the parallel trends hypothesis: Conditional on a set of firm-level observables, the credit conditions and the investment decisions of a firm exposed to constrained banks and firms not exposed would have been similar in the absence of the credit supply shock. Figures 6 to 8 show that these identifying assumptions hold, and therefore our difference-in-difference estimates will have a valid causal interpretation. Therefore, we test two difference-in-difference (DD) predictions:

o Prediction 1: There is a negative relationship between a firm's initial

exposure (i.e., before the introduction of the reform) to capital-constrained banks and the credit conditions obtained afterwards.

o Prediction 2: There is a negative relationship between initial firms' exposure to capital-constrained banks and subsequent investment decisions. We estimate the following model:

$$y_{it} = \alpha + \beta_{RBC}(RBC_t * Exposed_i) + \gamma_f FirmC_{i,t-1} + \\ + LocationTime_{i,t} + Firm_i + \epsilon_{it} \quad (3)$$

where y_{it} is, alternatively, credit growth at the corporate level, the firm average interest rate on bank loans, or one year ahead investment, i.e., the investment by the firm in time $t+1$. RBC_t is a dummy taking value 1 since 2014, i.e., the implementation date of risk-based capital reform in Italy (Section A), $Exposed_i$ is the average share of loans that firm i takes from pre-reform constrained banks, as defined above. We control for time-invariant observable, as the sector of activity, and unobservable firm's features by including firm fixed effects, $Firm_i$, for time-varying characteristics of the firm, $FirmC_{i,t}$, including risk (Cerved score) and size (total assets); we also introduce location-by-time fixed effects ($LocationTime$) to control for local cycles.[19] Standard errors are clustered by sector of activity to account for correlation within each sector.[20]

[19]Our findings are confirmed also by including industry-by-location-by-time fixed effects (Table B.7).

[20]Results are robust to multi-clustering errors at the main bank-sector of activity level and at the sector of activity and location level. (Tables B.8 and B.9).

6.2 Results

We begin with the test of Prediction 1. Columns (1) and (2) of Table 6 show that exposed firms experienced reductions in the amount of obtained credit and an increase in the average interest rate in the early years after Basel III, i.e. after 2014. Because of the differential banks' responses to the more stringent capital requirement, firms that relied more on constrained banks to access credit were negatively affected by the implementation of Basel III. The results suggest that there was less than complete substitution between constrained and unconstrained banks. A firm fully relying on affected banks before 2013 would experience an annual lending growth almost one percentage point lower compared to other firms from 2014 to 2018. Finally, Column (3) adds some evidence supporting Prediction 2. Companies more exposed to the increase in capital requirement through their lenders experienced a drop in investments: investments by firms fully relying on affected banks before the Basel reform were, on average, 5 percent lower after 2014.

7 Robustness Checks

In this section, we explore the robustness of our results along many dimensions. First, we test whether our results are driven by banks using the internal ratings-based (IRB) method. The first IRB models have been validated in Italy in late 2008. Gallo 2021 shows that banks adopting IRB raise interest rates and reduce credit to high-risk borrowers compared to

low-risk ones. Therefore, the implementation of the IRB approach by some large banks in the same observation period may challenge our findings. To reassure the reader that IRB banks are not driving our results, we re-estimate our main specifications excluding IRB banks.[21] Using this subsample, by excluding the largest banking groups, also enables us to establish that our findings are not driven by a few lenders, e.g. those most affected by concurring events, like the Asset Quality Review that involved large European groups in 2014 (Abbassi et al. 2020). Table 7 reports the estimations excluding IRB banks, results confirm H1, H2, and H3.

Our sample encompasses the whole Italian banking system. This delivers a more comprehensive analysis but includes intermediaries that have very different business models. Particularly, we include cooperative banks (banche di credito cooperativo or BCCs) that have different institutional features than the other banks (Bologna, Cornacchia, Galardo, et al. 2020). BCCs tend to be more capitalized (Figure 9) as law provisions require them not to distribute a large fraction of their annual profits, at least 70 percent. Moreover, between 2007 and 2014, cooperative banks increased their presence on local markets, expanding their branch network while other banks' networks shrank, and bolstered their market share of loans to households and firms (Stefani et al. 2016). Due to their high capital ratios, BCCs were not immediately affected by the Basel III reforms; this, along with the increase in credit market shares they experienced in the

[21] We are grateful to Raffaele Gallo for sharing his dataset on IRB implementation by Italian banks.

period we analyze, may raise the doubt that the differential response we detect between high- and low-capitalized banks is driven by structural differences in banks' segments rather than Basel III impact. We, therefore, re-run the estimation by splitting the sample into a no-Bcc and an only-Bcc subsample. The stringency of capital requirements, in terms of quartiles of the pre-Basel III Tier 1 ratio, is re-defined according to the distribution across the relevant sub-sample. Table 8 reports estimation excluding BCCs; for this subsample our findings are confirmed. Table 9 reports estimations for a subsample focusing only on BCCs. For cooperative banks, no difference between the behavior of less-capitalized banks and other banks is clearly detected. Estimations covering only credit relationships involving BCCs should be taken with a grain of salt as observations shrink to 14 percent of our initial sample. However, they seem to confirm that banks having high Tier 1 capital ratios already before the Basel reform, as it was the case for BCCs, were not materially affected in the early years after the reform implementation.

Our main analysis assumes that banks equipped with more capital before the reform were less affected by the introduction of Basel III, but this could not always be the case. There may be banks that, despite having higher capital ratios, also have higher requirements to meet because of their riskier portfolios. In these cases, the level of the capital ratio *per se* is no longer a sufficient measure of the exposure to the reform. To deal with this possibility, affected banks should be identified using their capital headroom

over the requirement. However, it is difficult to collect data on bank-level requirements. We obtained information on the amount of Common Equity Tier 1 (CET1) capital that each bank was expected to hold based on the Supervisory Review and Evaluation Process in 2016 (SREP 2016), the year for which this requirement is available that is closest to Basel III implementation date. We used it to have a measure of the required Tier 1 capital ratio.[22] We then calculate the capital headroom as the difference between the average Tier 1 capital ratio before Basel III and the required Tier 1 capital ratio based on SREP 2016. While the capital headroom gives a better picture of the amount of capital needed due to the introduction of Basel III, it poses some endogeneity issues as the level of the requirement depends on each bank's portfolio riskiness.[23] Although there is no perfect measure of the exposure to Basel III, Table 10 shows that our main findings are confirmed using banks' capital headrooms as a measure of the exposure.

The first years of our estimation sample are characterized by the European sovereign debt crisis, a period when several European countries, including Italy, experienced rapidly rising bond yield spreads in government securities and market pressure on financial institutions that reduced lending (Bofondi, Carpinelli, and Sette 2017; Bottero, Lenzu, and Mezzanotti 2020). The

[22]For further details on SREP exercises, we refer to `https://www.bankingsupervision.europa.eu/banking/srep/2016/html/index.en.html` and `https://www.bankingsupervision.europa.eu/banking/srep/2017/html/index.en.html`.

[23]Moreover, the new measure does not address the possibility that some banks aim to keep unchanged their capital headroom against higher capital requirements: under this (unobservable) desired management buffer hypothesis, higher requirements would affect banks with high and low capital ratio or capital headroom to the same extent.

sovereign crisis reached its peak in 2011 and pressures started to alleviate in the second half of 2012. In 2013 the spread on Italian Government bonds fell significantly and the trend continued in the early months of 2014 (see Banca d'Italia 2014). Therefore, the tensions connected to the sovereign debt crisis were over in 2014 (Lo Duca et al. 2017), which is the turning point in our identification strategy. However, one might be concerned that banks most affected by the sovereign debt crisis were also those most exposed to the increase in capital requirements. If this is the case, the coefficients we estimate would not be a clean measure of the effect of higher capital requirements. To account for this possibility, we first add among banks' controls a proxy of the exposure to the sovereign debt crisis (Italian sovereign debt held by each bank to total assets, at the end of each year). Table 11 shows that accounting for the exposure to the sovereign does not affect our results. To further challenge our findings, we add to our specification an interaction term, $HighSoveregn_b * SoveregnCrisis_t$, where $HighSoveregn_b$ is a dummy taking value 1 for banks having an exposure to the Italian sovereign between 2009 and 2012, as calculated above, above the fourth quartile of the distribution and $SoveregnCrisis_t$ is a dummy taking value 1 from 2011 to 2013. Our results are confirmed, see Table 12.[24]

Finally, our analysis covers a long period, from 2009 to 2018, where different confounding factors may affect our findings. We restrict the estimation sample to two years around the introduction of Basel III. Table 13 shows that results are robust.

[24]The significance and magnitude of our coefficients of interest remain unaffected if $SoveregnCrisis_t$ is defined to take value 1 over a longer window, from 2011 to 2018.

8 Concluding remarks

In the aftermath of the financial crisis, the G20 launched a comprehensive program of financial reforms to increase the resilience of the global financial system; a pivotal role in this regulatory overhaul was assigned to stricter capital requirements for banks. The economic implications of such higher capital requirements remain a matter of discussion. This paper, while disregarding the medium-to-long term effects of bank capital regulation, investigates the impact of higher risk-based capital requirements on credit supply in the early period post-reform (i.e. the adjustment effect). To this end, it uses a rich dataset on banks' relationships with firms from the Italian Credit Register matched to information on firms' and banks' characteristics and exploiting the implementation of Basel III in Italy as an exogenous shock to capital requirements. Granular data along with a large set of controls at the bank and borrower level disentangle credit supply from demand. We find evidence supporting the view that, in the first years after their enforcement, higher requirements are associated with tighter credit supply. We show that banks dealing with more stringent requirements tighten credit supply towards risky firms in favor of sounder ones, confirming that higher requirements encourage de-risking behavior. Moreover, we estimate the shape of the relationship between lending supply and capital requirement, explicitly testing the forced safety effect theorized by Bahaj and Malherbe 2020. We exploit the dispersion in the level of the Tier 1 capital ratio across Italian banks measured before the introduction of Basel III to estimate different lending responses corresponding to different stringency of the new

capital requirements. We show that the lending response is U-shaped in the stringency of the requirement. Nevertheless, differently from the conclusions of Bahaj and Malherbe 2020, we find that the forced safety effect does not appear sufficiently large to fully offset the composition effect of costlier liabilities, thus reverting the overall impact of higher requirements on credit tightening. Finally, we complement bank-firm analysis by exploring the consequences of higher requirements at firm level. We find that firms relying more on banks that were less capitalized before Basel III experienced a worsening in lending conditions and invested less compared to other firms. Our results suggest that the more stringent requirements introduced by Basel III encouraged less capitalized banks to reduce lending to risky borrowers in the few subsequent years. However, this gain came at the cost of lowering credit and investments by these borrowers.

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Table 1: Comparison of Affected and other banks

	All banks	Affected banks	Others	before 2014		after 2014	
				Affected banks	Others	Affected banks	Others
VARIABLES							
TIER1 ratio (%)	17.53	10.63	19.51	9.712	18.89	12.08	20.26
Log of Bank Total Assets	13.05	13.67	12.87	13.56	12.79	13.83	12.97
Loans to Asset ratio (%)	79.95	81.57	79.49	83.79	81.44	78.09	77.16
Deposit to Asset ratio (%)	64.34	53.64	67.42	48.62	60.55	61.53	75.57
Operating cost over total asset (%)	2.542	2.162	2.652	2.255	2.675	2.016	2.625
NPL ratio (%)	9.161	10.15	8.876	5.751	4.681	17.07	13.86
Bad Loans ratio (%)	7.542	8.684	7.213	5.934	4.903	13.01	9.958
Bank: Return on Equity (%)	2.478	0.443	3.064	1.404	3.539	-1.068	2.499
Number of banks	659	162	497				

Source: Supervisory data.
Affected banks are defined as those having the average tier 1 ratio between 2008 and 2013 below the first quartile of the distribution.

Table 2: Comparison of affected and non-affected bank-firm relationships

				Before 2014			After 2014		
	All	Non-affected	Affected	Non-affected	Affected	Diff	Non-affected	Affected	Diff
VARIABLES									
Firm characteristics									
Log of Total Assets	7.750	7.700	7.929	7.712	7.911	0.199	7.687	7.952	0.265
Rating (Score from 1 to 9)	4.929	4.907	5.008	5.070	5.198	0.128	4.721	4.762	0.041
Firm age (years)	19.96	19.98	19.89	18.67	18.59	-0.08	21.48	21.58	0.1
Firm age (log years)	2.762	2.766	2.751	2.691	2.675	-0.016	2.851	2.849	-0.002
Number of bank relationships of the firm	4.018	3.914	4.391	3.933	4.385	0.452	3.893	4.399	0.506
Labour Cost	1721	1602	2149	1520	1982	462	1697	2365	668
Labour Cost (log)	5.000	4.989	5.041	4.918	4.950	0.032	5.070	5.158	0.088
Investments	727.3	668.2	939.9	718.5	1018	299.5	610.8	838.9	228.1
Investments (log)	3.056	2.997	3.270	3.081	3.315	0.234	2.901	3.213	0.312
Firm-Bank relationship characteristics									
Total granted loan in 000 EUR	858975	842423	918510	886766	936564	49798	791751	895099	103348
Total amount Firm owed to Bank in 000 EUR	566324	540239	660149	568445	673744	105299	508008	642521	134513
Long Term loan in 000 EUR	468408	445954	549171	457917	556683	98766	432284	539430	107146
Log of Total Loan	12.48	12.45	12.57	12.52	12.62	0.1	12.37	12.50	0.13
Changes in Log of Total Loan (%)	-5.072	-4.709	-6.380	-5.595	-6.588	-0.993	-3.696	-6.110	-2.414
Short term interest rate on outstanding credit lines (%)	5.675	5.740	5.383	6.063	5.723	-0.34	5.321	4.830	-0.491
Credit owed to the Bank over credit granted by the Bank	55.51	54.00	61.05	54.28	60.62	6.34	53.70	61.57	7.87
Firm-Bank relation eligible for EU SME Supporting Factor	0.141	0.146	0.123	0.138	0.115	-0.023	0.155	0.134	-0.021
Dummy taking value 1 if new relation	0.142	0.140	0.146	0.140	0.148	0.008	0.141	0.145	0.004
Length of firm-bank relationship (years)	7.100	7.013	7.407	6.254	6.833	0.579	7.861	8.150	0.289
Number of firms	543,382	484,683	214,469	409,821	175,833		372,677	146,930	
Observations	6,575,251	5,144,895	1,430,356	2,743,824	807,561		2,401,071	622,795	

Sources: Credit Register and Cerved Group data.
Affected firm-bank relationships are relationships involving banks having the average tier 1 ratio between 2008 and 2013 below the first quartile of the distribution.

Table 3: H1 - Credit Supply

	(1)	(2)	(3)	(4)
Panel (a): Committed credit (delta log)				
$RBC_t * Affected_b$		-1.486***	-1.520***	-1.844***
		(0.0808)	(0.0832)	(0.118)
RBC_t	-0.415***	-0.0970		
	(0.117)	(0.119)		
Observations	6575251	6575251	6575251	4787270
R^2	0.260	0.260	0.261	0.514
Prov-Date FE	No	No	Yes	No
Firm-Bank FE	Yes	Yes	Yes	Yes
Firm-Date FE	No	No	No	Yes
Panel (b): Short Term Rate				
$RBC_t * Affected_b$		0.225***	0.160***	0.111***
		(0.00879)	(0.00907)	(0.0111)
RBC_t	0.209***	0.168***		
	(0.00644)	(0.00668)		
Observations	4197519	4197519	4197519	2994641
R^2	0.794	0.794	0.798	0.888
Prov-Date FE	No	No	Yes	No
Firm-Bank FE	Yes	Yes	Yes	Yes
Firm-Date FE	No	No	No	Yes

Notes: The Table reports results for the ordinary least squares estimation of equation 1. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $Affected_b$ is a dummy variable that equals 1 for banks having the average tier 1 ratio between 2008 and 2013 below the first quartile of the distribution. Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: H1 - Credit Supply for SMEs

	(1)	(2)	(3)	(4)
Panel (a): Committed credit (delta log)				
$RBC_t * Affected_b$		-1.516***	-1.557***	-1.782***
		(0.0823)	(0.0848)	(0.122)
RBC_t	-0.526***	-0.204*		
	(0.119)	(0.120)		
Observations	6345772	6345772	6345772	4564740
R^2	0.262	0.262	0.263	0.521
Prov-Date FE	No	No	Yes	No
Firm-Bank FE	Yes	Yes	Yes	Yes
Firm-Date FE	No	No	No	Yes
Panel (b): Short Term Rate				
$RBC_t * Affected_b$		0.219***	0.151***	0.0842***
		(0.00905)	(0.00935)	(0.0116)
RBC_t	0.212***	0.172***		
	(0.00656)	(0.00681)		
Observations	4034493	4034493	4034493	2839120
R^2	0.793	0.793	0.796	0.889
Prov-Date FE	No	No	Yes	No
Firm-Bank FE	Yes	Yes	Yes	Yes
Firm-Date FE	No	No	No	Yes

Notes: The Table reports results for the ordinary least squares estimation of equation 1 for the subsample of SMEs (firms whose annual sales are less than 50 million). RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $Affected_b$ is a dummy variable that equals 1 for banks having the average tier 1 ratio between 2008 and 2013 below the first quartile of the distribution. Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: H2 - Risk-mitigating effect

	(1) Credit Growth	(2) Loan Rate	(3) Credit Growth	(4) Loan Rate
$RBC_t * Affected_b * Micro_i$	-1.961***	0.262***		
	(0.104)	(0.0129)		
$RBC_t * Affected_b * Other_i$	-1.067***	0.0822***		
	(0.117)	(0.0115)		
$RBC_t * Affected_b * LowRisk_i$			0.327*	-0.100***
			(0.179)	(0.0215)
$RBC_t * Affected_b * MedRisk_i$			-1.438***	0.130***
			(0.108)	(0.0116)
$RBC_t * Affected_b * HighRisk_i$			-2.835***	0.341***
			(0.154)	(0.0169)
Observations	6575251	4197519	5926396	3884583
R^2	0.261	0.798	0.250	0.793
Prov-Date FE	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes
Cluster SE	Firm	Firm	Firm	Firm

Notes: The table reports the coefficients estimated using least squares. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $Affected_b$ is a dummy variable that equals 1 for banks having the average tier 1 ratio between 2008 and 2013 below the first quartile of the distribution. $Micro_i$ is a dummy identifying firms with less than 10 employees and $Other_i$ firms with at least 10 employees. $LowRisk_i$ is a dummy taking value 1 for firms with a score from Cerved Group below 3 (sound firms, low risk), $MedRisk_i$ equals 1 for firms with a score between 3 and 6 (medium risk) and $HighRisk_i$ identifies firms with a score above 7 (financially fragile firms, high risk). Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: H4 - The effect of Bank exposure on Firm credit and investment

VARIABLES	(1) Credit growth	(2) Loan rate	(3) Investment (log)
$RBCt * Exposed_i$	-0.858***	0.0553***	-0.0507***
	(0.154)	(0.0144)	(0.0130)
Z-Score==2	-1.420***	-0.0635	-0.0660***
	(0.177)	(0.0391)	(0.0138)
Z-Score==3	-2.697***	-0.0396	-0.129***
	(0.348)	(0.0728)	(0.0202)
Z-Score==4	-3.447***	0.0252	-0.187***
	(0.338)	(0.0916)	(0.0248)
Z-Score==5	-5.285***	0.164*	-0.235***
	(0.286)	(0.0945)	(0.0306)
Z-Score==6	-7.651***	0.296***	-0.269***
	(0.481)	(0.0968)	(0.0345)
Z-Score==7	-9.936***	0.428***	-0.298***
	(0.654)	(0.0922)	(0.0377)
Z-Score==8	-16.61***	0.637***	-0.357***
	(1.202)	(0.0869)	(0.0363)
Z-Score==9	-30.24***	1.076***	-0.510***
	(1.195)	(0.0590)	(0.0525)
Unscored	-11.83***	0.856***	-0.324***
	(1.172)	(0.123)	(0.0512)
Observations	2993857	1892717	2537323
R^2	0.228	0.786	0.651
Prov-Date FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes

Notes: The Table reports results for the ordinary least squares estimation of equation 3. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $Exposed_i$ is the average share of loans that firm i takes from 2009 to 2013 from affected banks, i.e. banks having the average tier 1 ratio pre-Reform below the first quartile of the distribution. Z-scores are dummies corresponding to the riskiness scores provided by Cerved group, whereby higher scores reflect higher riskiness. Standard errors are clustered at the sector level. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Excluding banks using IRB

	H1		H2		H3	
	Loan	Rate	Loan	Rate	Loan	Rate
	(1)	(2)	(3)	(4)	(5)	(6)
$RBC_t * Affected_b$	-1.142***	0.316***				
	(0.0946)	(0.0101)				
$RBC_t * Affected_b * LowRisk_i$			0.379**	0.0998***		
			(0.186)	(0.0228)		
$RBC_t * Affected_b * MedRisk_i$			-1.284***	0.304***		
			(0.119)	(0.0127)		
$RBC_t * Affected_b * HighRisk_i$			-1.902***	0.460***		
			(0.168)	(0.0182)		
$RBC_t * Tier1RatioBelow10PCT_b$					-0.989***	0.383***
					(0.178)	(0.0212)
$RBC_t * Tier1RatioFrom10To25PCT_b$					-1.795***	0.342***
					(0.112)	(0.0115)
$RBC_t * Tier1RatioFrom25To50PCT_b$					-1.152***	0.0810***
					(0.106)	(0.0108)
Observations	4111183	2427226	3682048	2237742	4111183	2427226
R^2	0.267	0.815	0.257	0.812	0.267	0.815
Prov-Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table reports the coefficients estimated for a sample excluding banks allowed to use the internal ratings-based (IRB) method for supervisory purposes. For Columns (1), (3), and (5) the dependent variable is log change over a 1 year period of the loan granted by bank b to firm i. For Columns (2), (4), and (6) the dependent variable is the short-term interest rates paid by firm i to bank b. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $Affected_b$ is a dummy variable that equals 1 for banks having the average tier 1 ratio between 2008 and 2013 below the first quartile of the distribution. $LowRisk_i$ is a dummy taking value 1 for firms with a score provided by Cerved Group below 3 (sound firms, low risk), $MedRisk_i$ equals 1 for firms with a score between 3 and 6 (medium risk) and $HighRisk_i$ identifies firms with a score above 7 (financially fragile firms, high risk). $Tier1RatioBelow10PCT_b$ identifies banks with a pre-reform average tier 1 ratio below the 10^{th} percentile of the distribution, $Tier1RatioFrom10To25PCT_b$ bank with average tier 1 ratio between the 10^{th} and the 25^{th} and $Tier1RatioFrom25To50PCT_b$ bank with average tier 1 ratio between the 25^{th} and the 50^{th}. Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Excluding BCC

	H1		H2		H3	
	Loan	Rate	Loan	Rate	Loan	Rate
	(1)	(2)	(3)	(4)	(5)	(6)
$RBC_t * Affected_b$	-1.789***	0.196***				
	(0.0947)	(0.0101)				
$RBC_t * Affected_b * LowRisk_i$			-0.190	-0.0495**		
			(0.200)	(0.0236)		
$RBC_t * Affected_b * MedRisk_i$			-1.921***	0.182***		
			(0.122)	(0.0129)		
$RBC_t * Affected_b * HighRisk_i$			-2.571***	0.340***		
			(0.176)	(0.0190)		
$RBC_t * Tier1RatioBelow10PCT_b$					-0.967***	0.167***
					(0.167)	(0.0200)
$RBC_t * Tier1RatioFrom10To25PCT_b$					-2.916***	0.181***
					(0.112)	(0.0115)
$RBC_t * Tier1RatioFrom25To50PCT_b$					-1.866***	-0.0571***
					(0.0935)	(0.00890)
Observations	5629221	3937048	5101491	3649158	5629221	3937048
R^2	0.260	0.792	0.249	0.787	0.260	0.792
Prov-Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table reports the coefficients estimated for a sample excluding all cooperative banks (BCCs). For Columns (1), (3), and (5) the dependent variable is log change over a 1 year period of the loan granted by bank b to firm i. For Columns (2), (4), and (6) the dependent variable is the short-term interest rates paid by firm i to bank b. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $Affected_b$ is a dummy variable that equals 1 for banks having the average tier 1 ratio between 2008 and 2013 below the first quartile of the distribution. $LowRisk_i$ is a dummy taking value 1 for firms with a score provided by Cerved Group below 3 (sound firms, low risk), $MedRisk_i$ equals 1 for firms with a score between 3 and 6 (medium risk) and $HighRisk_i$ identifies firms with a score above 7 (financially fragile firms, high risk). $Tier1RatioBelow10PCT_b$ identifies banks with a pre-reform average tier 1 ratio below the 10^{th} percentile of the distribution, $Tier1RatioFrom10To25PCT_b$ bank with average tier 1 ratio between the 10^{th} and the 25^{th} and $Tier1RatioFrom25To50PCT_b$ bank with average tier 1 ratio between the 25^{th} and the 50^{th}. Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Only BCC

	H1		H2		H3	
	Loan	Rate	Loan	Rate	Loan	Rate
	(1)	(2)	(3)	(4)	(5)	(6)
$RBC_t * Affected_b$	-0.156	0.000515				
	(0.213)	(0.0297)				
$RBC_t * Affected_b * LowRisk_i$			0.677	-0.124**		
			(0.412)	(0.0553)		
$RBC_t * Affected_b * MedRisk_i$			-0.329	-0.00564		
			(0.262)	(0.0348)		
$RBC_t * Affected_b * HighRisk_i$			-0.194	0.0987**		
			(0.340)	(0.0457)		
$RBC_t * Tier1RatioBelow10PCT_b$					-0.342	0.425***
					(0.437)	(0.0939)
$RBC_t * Tier1RatioFrom10To25PCT_b$					0.338	0.113***
					(0.259)	(0.0379)
$RBC_t * Tier1RatioFrom25To50PCT_b$					0.586***	0.172***
					(0.201)	(0.0340)
Observations	946221	253197	823246	228508	946221	253197
R^2	0.253	0.829	0.237	0.822	0.253	0.829
Prov-Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table reports the coefficients estimated for a subsample including only cooperative banks (BCCs). For Columns (1), (3), and (5) the dependent variable is log change over a 1 year period of the loan granted by bank b to firm i. For Columns (2), (4), and (6) the dependent variable is the short-term interest rates paid by firm i to bank b. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $Affected_b$ is a dummy variable that equals 1 for banks having the average tier 1 ratio between 2008 and 2013 below the first quartile of the distribution. $LowRisk_i$ is a dummy taking value 1 for firms with a score provided by Cerved Group below 3 (sound firms, low risk), $MedRisk_i$ equals 1 for firms with a score between 3 and 6 (medium risk) and $HighRisk_i$ identifies firms with a score above 7 (financially fragile firms, high risk). $Tier1RatioBelow10PCT_b$ identifies banks with a pre-reform average tier 1 ratio below the 10^{th} percentile of the distribution, $Tier1RatioFrom10To25PCT_b$ bank with average tier 1 ratio between the 10^{th} and the 25^{th} and $Tier1RatioFrom25To50PCT_b$ bank with average tier 1 ratio between the 25^{th} and the 50^{th}. Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Banks' Capital Headroom

	H1		H2		H3	
	Loan	Rate	Loan	Rate	Loan	Rate
	(1)	(2)	(3)	(4)	(5)	(6)
$RBC_t * LowCapitalHeadroom_b$	-1.246***	0.197***				
	(0.0858)	(0.00946)				
$RBC_t * LowCapitalHeadroom_b * LowRisk_i$			0.313*	-0.175***		
			(0.177)	(0.0233)		
$RBC_t * LowCapitalHeadroom_b * MedRisk_i$			-1.374***	0.181***		
			(0.109)	(0.0122)		
$RBC_t * LowCapitalHeadroom_b * HighRisk_i$			-2.069***	0.404***		
			(0.152)	(0.0180)		
$RBC_t * CapitalHeadroomBelow10PCT_b$					-0.557***	0.158***
					(0.158)	(0.0247)
$RBC_t * CapitalHeadroomFrom10To25PCT_b$					-1.984***	0.206***
					(0.0984)	(0.0103)
$RBC_t * CapitalHeadroomFrom25To50PCT_b$					-1.290***	0.0136
					(0.0840)	(0.00857)
Observations	6574466	4197693	5925753	3884744	6574466	4197693
R^2	0.258	0.794	0.247	0.789	0.258	0.794
Prov-Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table reports the coefficients estimated using least squares. For Columns (1), (3), and (5) the dependent variable is log change over a 1 year period of the loan granted by bank b to firm i. For Columns (2), (4), and (6) the dependent variable is the short-term interest rates paid by firm i to bank b. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. Capital headroom is considered as the difference between a bank's capital requirements and its capital ratio. $LowCapitalHeadroom_b$ is a dummy taking value 1 for banks having a capital headroom below the 25^{th} percentile of the distribution. $CapitalHeadroomBelow10PCT_b$ identifies banks with capital headroom below the 10^{th} percentile of the distribution, $CapitalHeadroom10To25PCT_b$ bank with capital headroom between the 10^{th} and the 25^{th} and $CapitalHeadroomFrom25To50PCT_b$ bank with capital headroom between the 25^{th} and the 50^{th}. $LowRisk_i$ is a dummy taking value 1 for firms with a score provided by Cerved Group below 3 (sound firms, low risk), $MedRisk_i$ equals 1 for firms with a score between 3 and 6 (medium risk) and $HighRisk_i$ identifies firms with a score above 7 (financially fragile firms, high risk). Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

Table 11: Sovereign Debt Crisis

	H1		H2		H3	
	Loan	Rate	Loan	Rate	Loan	Rate
	(1)	(2)	(3)	(4)	(5)	(6)
$RBC_t * Affected_b$	-1.438***	0.168***				
	(0.0833)	(0.00923)				
$RBC_t * Affected_b * LowRisk_i$			0.0222	-0.0724***		
			(0.179)	(0.0219)		
$RBC_t * Affected_b * MedRisk_i$			-1.579***	0.154***		
			(0.108)	(0.0119)		
$RBC_t * Affected_b * HighRisk_i$			-2.032***	0.311***		
			(0.155)	(0.0175)		
$RBC_t * Tier1RatioBelow10PCT_b$					-0.911***	0.152***
					(0.153)	(0.0192)
$RBC_t * Tier1RatioFrom10To25PCT_b$					-2.312***	0.150***
					(0.0981)	(0.0105)
$RBC_t * Tier1RatioFrom25To50PCT_b$					-1.465***	-0.0536***
					(0.0814)	(0.00834)
$ExposureSovereign_{bt}$	-0.00601***	0.000284***	-0.00573***	0.000370***	-0.00584***	0.000293***
	(0.000510)	(3.21e-05)	(0.000525)	(3.36e-05)	(0.000510)	(3.20e-05)
Observations	6569658	4195768	5921427	3883149	6569658	4195768
R^2	0.258	0.794	0.247	0.789	0.259	0.794
Prov-Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table reports the coefficients estimated using least squares. For Columns (1), (3), and (5) the dependent variable is log change over a 1 year period of the loan granted by bank b to firm i. For Columns (2), (4), and (6) the dependent variable is the short-term interest rates paid by firm i to bank b. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $Affected_b$ is a dummy variable that equals 1 for banks having the average tier 1 ratio between 2008 and 2013 below the first quartile of the distribution. $LowRisk_i$ is a dummy taking value 1 for firms with a score provided by Cerved Group below 3 (sound firms, low risk), $MedRisk_i$ equals 1 for firms with a score between 3 and 6 (medium risk) and $HighRisk_i$ identifies firms with a score above 7 (financially fragile firms, high risk). $Tier1RatioBelow10PCT_b$ identifies banks with a pre-reform average tier 1 ratio below the 10^{th} percentile of the distribution, $Tier1RatioFrom10To25PCT_b$ bank with average tier 1 ratio between the 10^{th} and the 25^{th} and $Tier1RatioFrom25To50PCT_b$ bank with average tier 1 ratio between the 25^{th} and the 50^{th}. Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

Table 12: Sovereign Debt Crisis

	H1		H2		H3	
	Loan	Rate	Loan	Rate	Loan	Rate
	(1)	(2)	(3)	(4)	(5)	(6)
$RBC_t * Affected_b$	-1.419***	0.191***				
	(0.0838)	(0.00925)				
$RBC_t * Affected_b * LowRisk_i$			0.0504	-0.0490**		
			(0.179)	(0.0219)		
$RBC_t * Affected_b * MedRisk_i$			-1.565***	0.178***		
			(0.109)	(0.0119)		
$RBC_t * Affected_b * HighRisk_i$			-2.026***	0.335***		
			(0.155)	(0.0175)		
$RBC_t * Tier1RatioBelow10PCT_b$					-0.962***	0.187***
					(0.154)	(0.0192)
$RBC_t * Tier1RatioFrom10To25PCT_b$					-2.327***	0.187***
					(0.0997)	(0.0105)
$RBC_t * Tier1RatioFrom25To50PCT_b$					-1.468***	-0.0109
					(0.0837)	(0.00846)
$HighSoveregn_b * SoveregnCrisis_t$	-0.408***	-0.156***	-0.373***	-0.165***	-0.0831	-0.154***
	(0.0739)	(0.00621)	(0.0766)	(0.00643)	(0.0760)	(0.00625)
Observations	6568019	4195768	5920228	3883149	6568019	4195768
R^2	0.258	0.794	0.247	0.789	0.258	0.794
Prov-Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

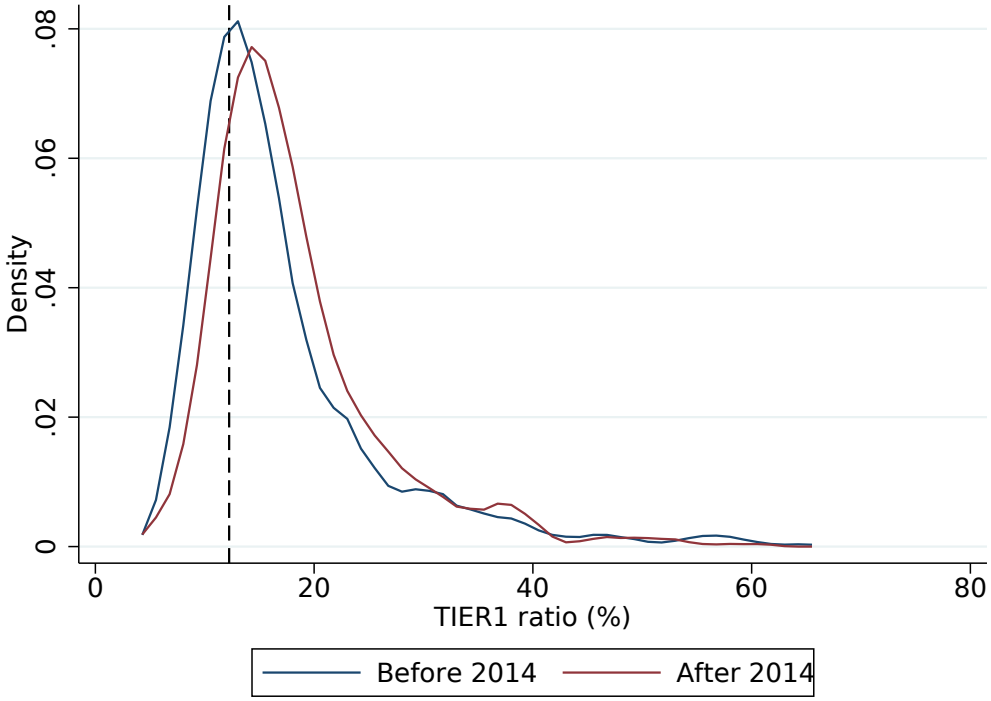
Notes: The table reports the coefficients estimated using least squares. For Columns (1), (3), and (5) the dependent variable is log change over a 1 year period of the loan granted by bank b to firm i. For Columns (2), (4), and (6) the dependent variable is the short-term interest rates paid by firm i to bank b. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $Affected_b$ is a dummy variable that equals 1 for banks having the average tier 1 ratio between 2008 and 2013 below the first quartile of the distribution. $LowRisk_i$ is a dummy taking value 1 for firms with a score provided by Cerved Group below 3 (sound firms, low risk), $MedRisk_i$ equals 1 for firms with a score between 3 and 6 (medium risk) and $HighRisk_i$ identifies firms with a score above 7 (financially fragile firms, high risk). $Tier1RatioBelow10PCT_b$ identifies banks with a pre-reform average tier 1 ratio below the 10^{th} percentile of the distribution, $Tier1RatioFrom10To25PCT_b$ bank with average tier 1 ratio between the 10^{th} and the 25^{th} and $Tier1RatioFrom25To50PCT_b$ bank with average tier 1 ratio between the 25^{th} and the 50^{th}. $HighSoveregn_b$ is a dummy taking value 1 for banks that between 2009 and 2012 have an average exposure towards Italian sovereign debt above the fourth quartile of the distribution. $SoveregnCrisis_t$ is a dummy taking value 1 from 2011 to 2013. Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

Table 13: Short Sample

	H1		H2		H3	
	Loan	Rate	Loan	Rate	Loan	Rate
	(1)	(2)	(3)	(4)	(5)	(6)
$RBC_t * Affected_b$	-1.640***	0.164***				
	(0.109)	(0.00831)				
$RBC_t * Affected_b * LowRisk_i$			-0.356	-0.00170		
			(0.240)	(0.0203)		
$RBC_t * Affected_b * MedRisk_i$			-1.774***	0.159***		
			(0.143)	(0.0106)		
$RBC_t * Affected_b * HighRisk_i$			-2.321***	0.272***		
			(0.198)	(0.0151)		
$RBC_t * Tier1RatioBelow10PCT_b$					-1.190***	0.0934***
					(0.193)	(0.0169)
$RBC_t * Tier1RatioFrom10To25PCT_b$					-2.576***	0.132***
					(0.131)	(0.00954)
$RBC_t * Tier1RatioFrom25To50PCT_b$					-1.603***	-0.118***
					(0.113)	(0.00820)
Observations	2534531	1605836	2288387	1485008	2534531	1605836
R^2	0.357	0.862	0.350	0.861	0.357	0.862
Prov-Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

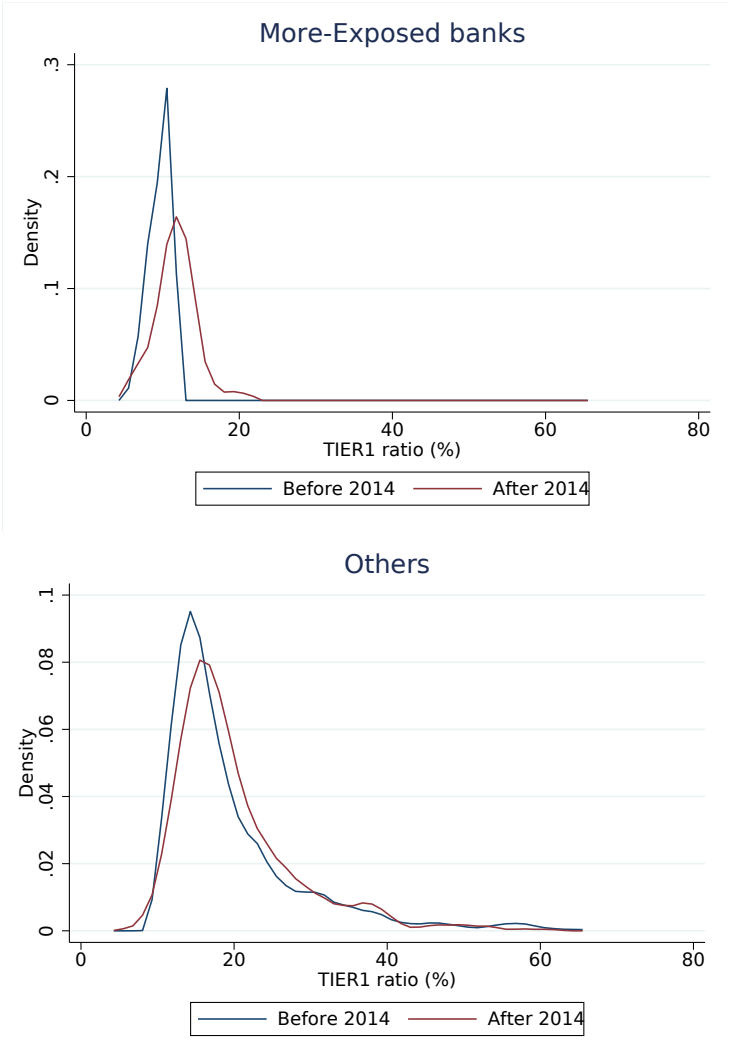
Notes: The table reports the coefficients estimated for the period 2012-2016. For Columns (1), (3), and (5) the dependent variable is log change over a 1 year period of the loan granted by bank b to firm i. For Columns (2), (4), and (6) the dependent variable is the short-term interest rates paid by firm i to bank b. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $Affected_b$ is a dummy variable that equals 1 for banks having the average tier 1 ratio between 2008 and 2013 below the first quartile of the distribution. $LowRisk_i$ is a dummy taking value 1 for firms with a score provided by Cerved Group below 3 (sound firms, low risk), $MedRisk_i$ equals 1 for firms with a score between 3 and 6 (medium risk) and $HighRisk_i$ identifies firms with a score above 7 (financially fragile firms, high risk). $Tier1RatioBelow10PCT_b$ identifies banks with a pre-reform average tier 1 ratio below the 10^{th} percentile of the distribution, $Tier1RatioFrom10To25PCT_b$ bank with average tier 1 ratio between the 10^{th} and the 25^{th} and $Tier1RatioFrom25To50PCT_b$ bank with average tier 1 ratio between the 25^{th} and the 50^{th}. Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

Figure 1: TIER1 ratio



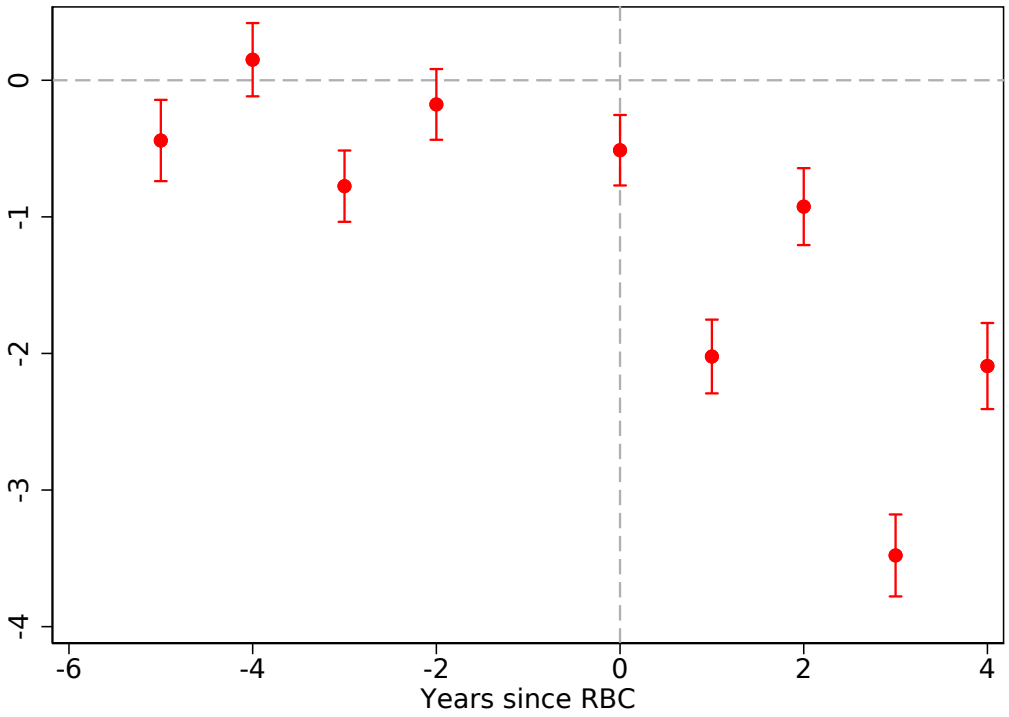
Notes: The vertical black dashed line signs the first quartile of the distribution.

Figure 2: TIER1 ratio - More-Exposed banks vs Others



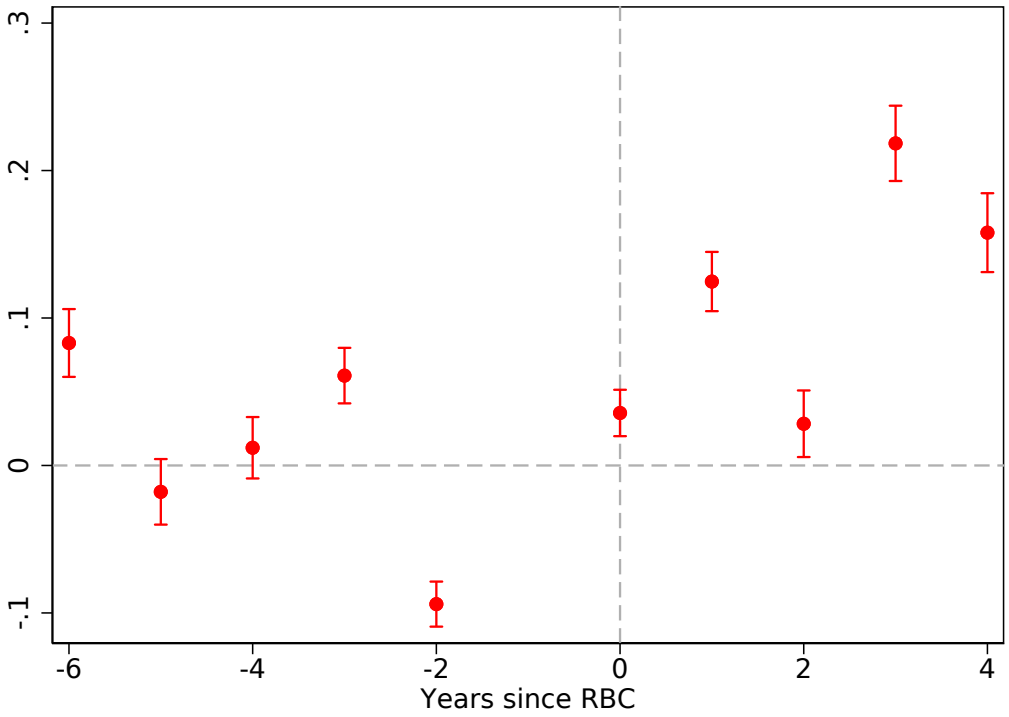
Notes: *Others* refers to banks having the average tier ratio pre-2014 above the first quartile of the distribution. *More-Exposed* banks refer to banks having the average tier ratio pre-2014 below the first quartile of the distribution.

Figure 3: Committed Credit (delta log)



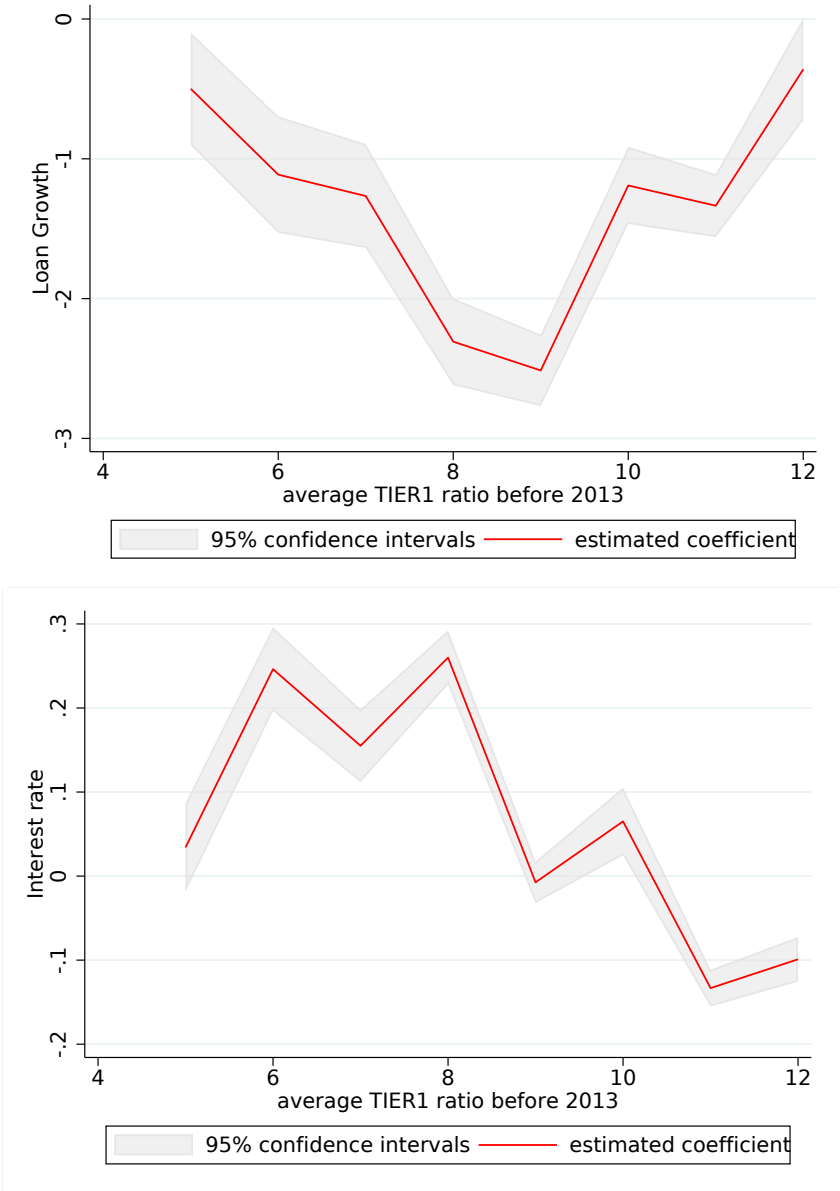
Notes: This figure plots the difference in yearly credit growth by banks that were more exposed to the regulatory reform and others. The coefficients are obtained from estimating year-by-year equation 1. The bars show 95 percent confidence intervals, $\tau = 0$ refers to the implementation of Basel III more stringent capital requirements in 2014, the period analyzed is 2009-2018.

Figure 4: Short term rate



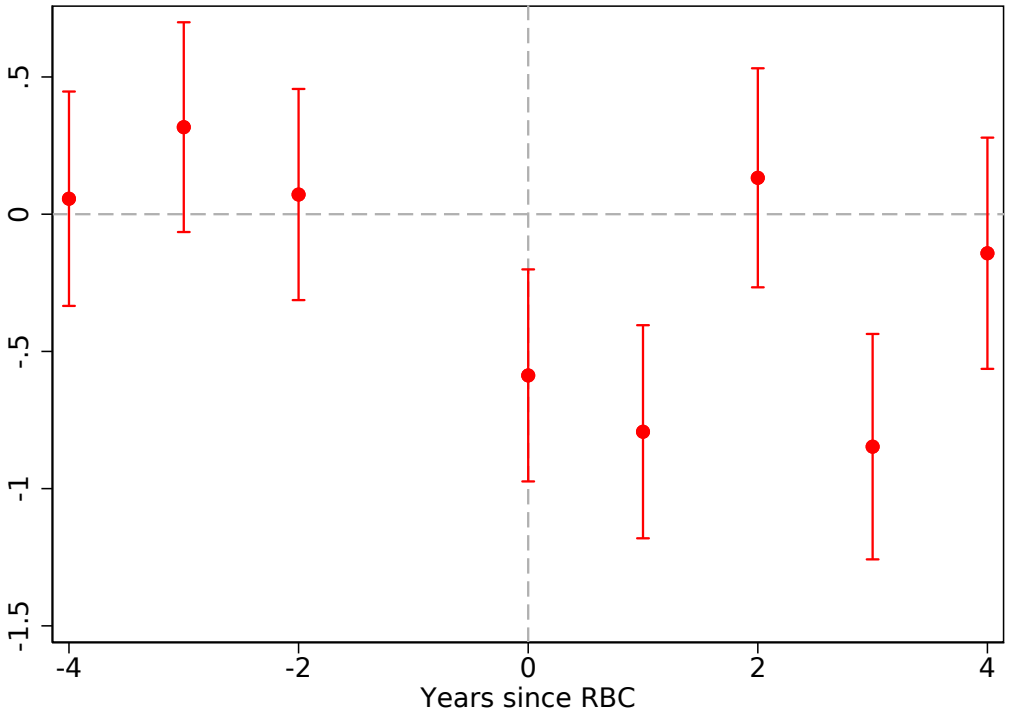
Notes: This figure plots the difference in short-term interest rate paied to banks that were more exposed to the regulatory reform and others. The coefficients are obtained from estimating year-by-year equation 1. The bars show 95 percent confidence intervals, $\tau = 0$ refers to the implementation of Basel III more stringent capital requirements in 2014, the period analyzed is 2009-2018.

Figure 5: Forced safety effect



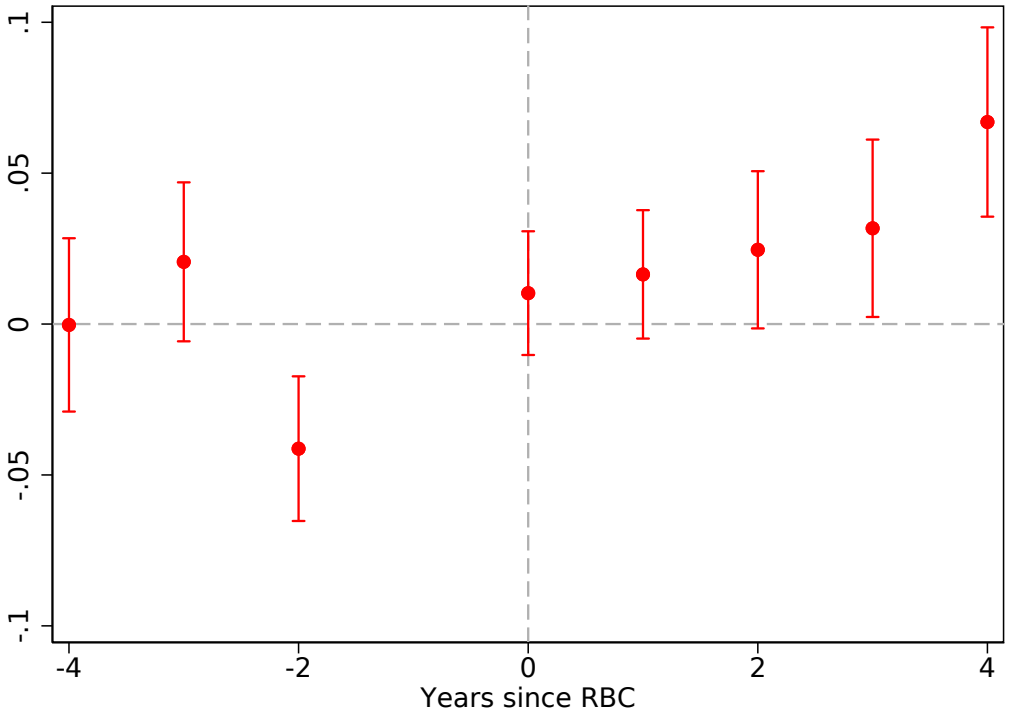
Notes: This figure plots the estimated difference in credit growth (upper panel) and in interest rate (lower panel) as a function of the average tier capital ratio between 2008 and 2013.

Figure 6: Firm level Credit



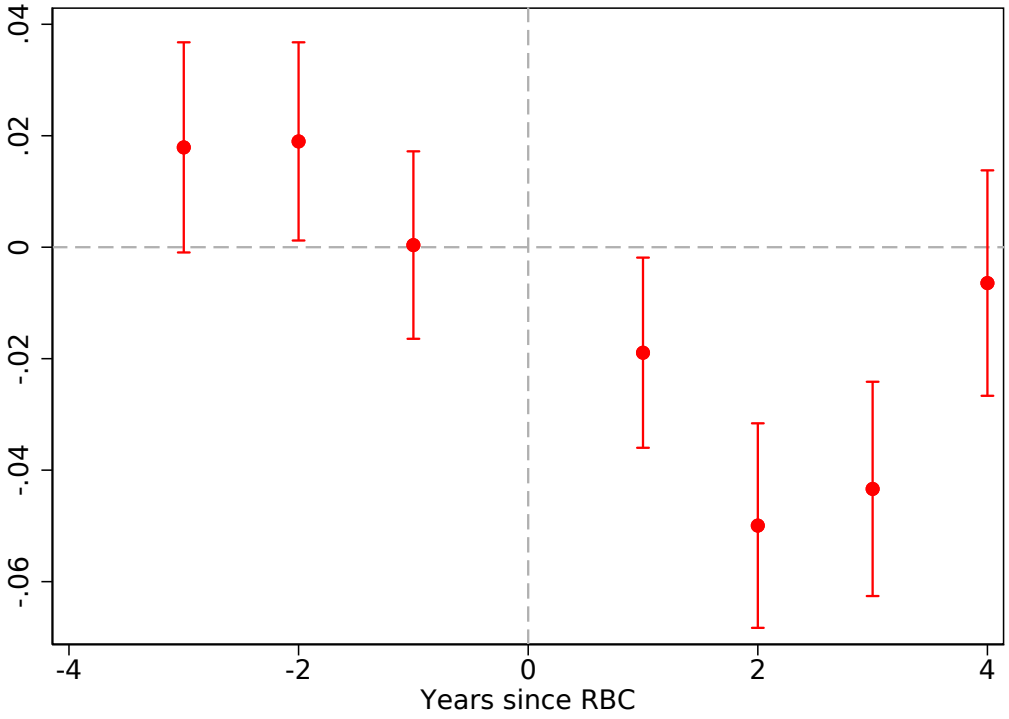
Notes: This figure plots the difference in yearly credit growth between firms exposed to the regulatory reform due to their main bank and others. The bars show 95 percent confidence intervals, $\tau = 0$ refers to the implementation of Basel III more stringent risk based capital (RBC) requirements in 2014, the period analyzed is 2009-2018.

Figure 7: Firm level Loan rate



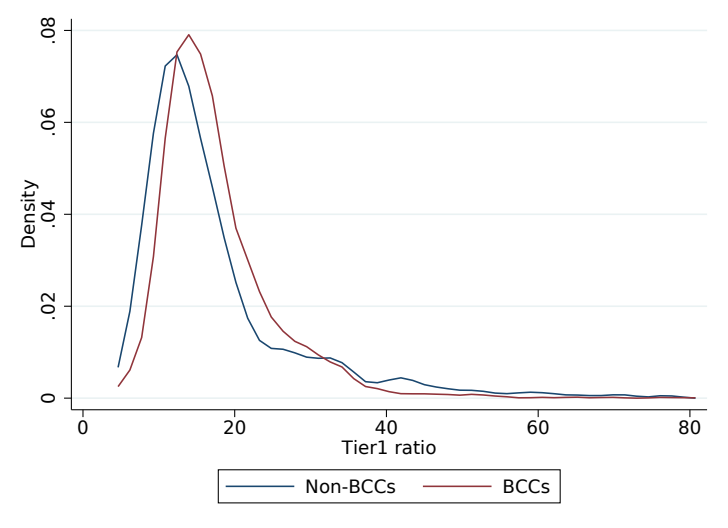
Notes: This figure plots the difference in interest rate between firms exposed to the regulatory reform due to their main bank and others. The bars show 95 percent confidence intervals, $\tau = 0$ refers to the implementation of Basel III more stringent risk based capital (RBC) requirements in 2014, the period analyzed is 2009-2018.

Figure 8: Investment (t+1)



Notes: This figure plots the difference in investment between firms exposed to the regulatory reform due to their main bank and others. The bars show 95 percent confidence intervals, $\tau = 0$ refers to the implementation of Basel III more stringent risk based capital (RBC) requirements in 2014, the period analyzed is 2009-2018.

Figure 9: TIER1 ratio - BCCs vs No-BCCs



Notes: *BCCs* refers to cooperative banks (banche di credito cooperativo), *Non-BCCs* to other banks.

Appendix

A The Basel III Reform

The global financial crisis demonstrated that a stronger capital and liquidity base (in terms of both quality and size) was needed to improve the ability of the global banking system to withstand severe economic shocks. In the aftermath of the crisis, the G20 launched a comprehensive program of financial reforms to increase the resilience of the global financial system. To improve the quality and quantity of capital, the Basel Committee on Banking Supervision agreed on detailed capital measures, commonly referred to as Basel III. Table A.1 briefly summarizes the main changes to the existing definition of regulatory capital and the increase of minimum Tier 1 capital requirements from 4 percent to 6 percent of risk-weighted assets. In addition to raising the quality of the capital base, the Basel Committee considerably strengthened the rules underlying counterparty credit risk and introduced a capital conservation buffer of 2.5 percent above the minimum, and the counter-cyclical buffer, allowing national regulators to require up to an additional 2.5 percent during periods of high credit growth. Basel III foresees a gradual transition to the stricter standards, with full implementation as of 1 January 2019. The new framework was introduced almost worldwide, although according to slightly different timelines and with limited specificities in selected jurisdictions. As of 30 June 2015, all large internationally active banks have met Basel III minimum capital requirements (BCBS 2016). In the EU the Basel III framework was implemented with the entry into force

of the Capital Requirements Directives IV (CRD IV) package on 17 July 2013.[25] Institutions were required to apply the new rules from 1 January 2014; the new Tier 1 requirement was fully implemented by 2015 and the capital conservation buffer was phased-in from 2016 until 2019. The European regulation enabled Member States to adopt stricter definitions or to anticipate the enforcement of the new capital requirements with respect to the Basel III time schedule. As of 1 January 2014, Italian banks were required to maintain a level of Tier 1 capital equal to 8.5 percent of risk-weighted assets, of which 2.5 percent as a capital conservation buffer requirement.[26] Therefore, the Basel III stricter requirements were defined at the global level, then translated into the European laws, and were not tailored to the specificities of the Italian economy; the new constraints were implemented in Italy without country-level departures from the common framework or further transitional periods. This makes the new framework independent of the Italian situation and enables us to isolate the effects of increased capital requirements as an exogenous shock.[27]

The 2014 also denotes the beginning of EU level initiatives favoring the supervision on the more stringent capital requirements implemented by Basel III: The Comprehensive assessments carried out by the ECB in cooperation

[25]The CRD IV package included the Capital Requirement Regulation (CRR).

[26]More precisely, banks were required to maintain 1.5 percent of additional Tier 1 and a level of Common Equity Tier 1 (CET1) capital equal to 7 percent of risk-weighted assets, of which 4.5 percent as a minimum requirement and 2.5 percent as a capital conservation buffer requirement. For banking groups the requirement was to be calculated on a consolidated basis. In January 2017, the Bank of Italy announced the decision to amend the fully loaded implementation of the capital conservation buffer (CCoB) in favor of the transitional arrangement provided for by the CRD IV, permitting its gradual phasing-in until 2019.

[27]Table B.6 shows that results are confirmed using alternative post-reform periods.

with national supervisors. The first assessment took place between November 2013 and October 2014. While the assessment affected only the largest Italian institutions, it represented the first ample valuation for the new definition of the capital requirements introduced in the EU with the implementation of Basel III.

Table A.1: Main changes to the definition of regulatory capital

	Basel II requirements	8%	Basel III requirements	8%
Tier 3			Abolished	
Tier 2	E.g. undisclosed reserves, subordinated debt - Deductions	4%	No substantial alterations	2%
Additional Tier 1	Some preference shares Hybrid capital - Deductions	2%	Some preference shares Portions of minority interests Hybrids with innovative features no longer accepted	1.5%
Core Tier 1	Common equity Retained earnings Minority interests Some preference shares - Deductions	2%	Common equity Retained earnings Portions of minority interests Preference shares generally excluded Silent partnerships generally excluded Portions of minority interests excluded - All existing Deductions - Additional Deductions (e.g. deferred tax assets)	4.5%

Source: ECB Financial Stability Review December 2010.

B Additional tables and figures

Table B.1: Identifying "more exposed" banks as those with capital ratios below the median

	H1		H2		H3	
	Loan	Rate	Loan	Rate	Loan	Rate
	(1)	(2)	(3)	(4)	(5)	(6)
$RBC_t * AffectedP50_b$	-1.734***	0.0338***				
	(0.0688)	(0.00720)				
$RBC_t * AffectedP50_b * LowRisk_i$			-0.268**	-0.269***		
			(0.123)	(0.0151)		
$RBC_t * AffectedP50_b * MedRisk_i$			-1.814***	0.0171*		
			(0.0833)	(0.00886)		
$RBC_t * AffectedP50_b * HighRisk_i$			-2.405***	0.212***		
			(0.112)	(0.0126)		
$RBC_t * Tier1RatioBelow10PCT_b$					-0.965***	0.157***
					(0.153)	(0.0192)
$RBC_t * Tier1RatioFrom10To25PCT_b$					-2.389***	0.152***
					(0.0979)	(0.0105)
$RBC_t * Tier1RatioFrom25To50PCT_b$					-1.500***	-0.0482***
					(0.0813)	(0.00836)
Observations	6575448	4197693	5926576	3884744	6575448	4197693
Prov-Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table reports the coefficients estimated using least squares. For Columns (1), (3), and (5) the dependent variable is log change over a 1 year period of the loan granted by bank b to firm i. For Columns (2), (4), and (6) the dependent variable is the short-term interest rates paid by firm i to bank b. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $AffectedP50_b$ is a dummy variable that equals 1 for banks having the average tier 1 ratio between 2008 and 2013 below the median values of the distribution. $LowRisk_i$ is a dummy taking value 1 for firms with a score provided by Cerved Group below 3 (sound firms, low risk), $MedRisk_i$ equals 1 for firms with a score between 3 and 6 (medium risk) and $HighRisk_i$ identifies firms with a score above 7 (financially fragile firms, high risk). $Tier1RatioBelow10PCT_b$ identifies banks with a pre-reform average tier 1 ratio below the 10^{th} percentile of the distribution, $Tier1RatioFrom10To25PCT_b$ bank with average tier 1 ratio between the 10^{th} and the 25^{th} and $Tier1RatioFrom25To50PCT_b$ bank with average tier 1 ratio between the 25^{th} and the 50^{th}. Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

Table B.2: Using industry-locatio-time fixed effect

	H1		H2		H3	
	Loan	Rate	Loan	Rate	Loan	Rate
	(1)	(2)	(3)	(4)	(5)	(6)
$RBC_t * Affected_b$	-1.522***	0.151***				
	(0.0832)	(0.00906)				
$RBC_t * Affected_b * LowRisk_i$			0.170	-0.0908***		
			(0.178)	(0.0215)		
$RBC_t * Affected_b * MedRisk_i$			-1.420***	0.117***		
			(0.108)	(0.0116)		
$RBC_t * Affected_b * HighRisk_i$			-2.816***	0.331***		
			(0.155)	(0.0168)		
$RBC_t * Tier1RatioBelow10PCT_b$					-0.977***	0.124***
					(0.153)	(0.0187)
$RBC_t * Tier1RatioFrom10To25PCT_b$					-2.425***	0.132***
					(0.0979)	(0.0103)
$RBC_t * Tier1RatioFrom25To50PCT_b$					-1.519***	-0.0600***
					(0.0813)	(0.00817)
Observations	6575251	4197519	5926396	3884583	6575251	4197519
R^2	0.262	0.799	0.251	0.794	0.262	0.799
Industry-Prov-Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table reports the coefficients estimated using least squares. For Columns (1), (3), and (5) the dependent variable is log change over a 1 year period of the loan granted by bank b to firm i. For Columns (2), (4), and (6) the dependent variable is the short-term interest rates paid by firm i to bank b. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $Affected_b$ is a dummy variable that equals 1 for banks having the average tier 1 ratio between 2008 and 2013 below the first quartile of the distribution. $LowRisk_i$ is a dummy taking value 1 for firms with a score provided by Cerved Group below 3 (sound firms, low risk), $MedRisk_i$ equals 1 for firms with a score between 3 and 6 (medium risk) and $HighRisk_i$ identifies firms with a score above 7 (financially fragile firms, high risk). $Tier1RatioBelow10PCT_b$ identifies banks with a pre-reform average tier 1 ratio below the 10^{th} percentile of the distribution, $Tier1RatioFrom10To25PCT_b$ bank with average tier 1 ratio between the 10^{th} and the 25^{th} and $Tier1RatioFrom25To50PCT_b$ bank with average tier 1 ratio between the 25^{th} and the 50^{th}. Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

Table B.3: Alternative errors clustering - 1

	H1		H2		H3	
	Loan	Rate	Loan	Rate	Loan	Rate
	(1)	(2)	(3)	(4)	(5)	(6)
$RBC_t * Affected_b$	-1.520***	0.160**				
	(0.583)	(0.0814)				
$RBC_t * Affected_b * LowRisk_i$			0.327	-0.100		
			(0.634)	(0.114)		
$RBC_t * Affected_b * MedRisk_i$			-1.438**	0.130		
			(0.598)	(0.0882)		
$RBC_t * Affected_b * HighRisk_i$			-2.835***	0.341***		
			(0.569)	(0.0709)		
$RBC_t * Tier1RatioBelow10PCT_b$					-1.011	0.148
					(1.180)	(0.0910)
$RBC_t * Tier1RatioFrom10To25PCT_b$					-2.414***	0.140
					(0.679)	(0.0986)
$RBC_t * Tier1RatioFrom25To50PCT_b$					-1.528**	-0.0548
					(0.701)	(0.0867)
Observations	6575251	4197519	5926396	3884583	6575251	4197519
R^2	0.261	0.798	0.250	0.793	0.261	0.798
Prov-Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster SE			Bank-Date			

Notes: The table reports the coefficients estimated using least squares. For Columns (1), (3), and (5) the dependent variable is log change over a 1 year period of the loan granted by bank b to firm i. For Columns (2), (4), and (6) the dependent variable is the short-term interest rates paid by firm i to bank b. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $Affected_b$ is a dummy variable that equals 1 for banks having the average tier 1 ratio between 2008 and 2013 below the first quartile of the distribution. $LowRisk_i$ is a dummy taking value 1 for firms with a score provided by Cerved Group below 3 (sound firms, low risk), $MedRisk_i$ equals 1 for firms with a score between 3 and 6 (medium risk) and $HighRisk_i$ identifies firms with a score above 7 (financially fragile firms, high risk). $Tier1RatioBelow10PCT_b$ identifies banks with a pre-reform average tier 1 ratio below the 10^{th} percentile of the distribution, $Tier1RatioFrom10To25PCT_b$ bank with average tier 1 ratio between the 10^{th} and the 25^{th} and $Tier1RatioFrom25To50PCT_b$ bank with average tier 1 ratio between the 25^{th} and the 50^{th}. *** p<0.01, ** p<0.05, * p<0.1.

Table B.4: Alternative errors clustering - 2

	H1		H2		H3	
	Loan	Rate	Loan	Rate	Loan	Rate
	(1)	(2)	(3)	(4)	(5)	(6)
$RBC_t * Affected_b$	-1.520**	0.160				
	(0.501)	(0.0876)				
$RBC_t * Affected_b * LowRisk_i$			0.327	-0.100		
			(0.838)	(0.141)		
$RBC_t * Affected_b * MedRisk_i$			-1.438**	0.130		
			(0.518)	(0.0982)		
$RBC_t * Affected_b * HighRisk_i$			-2.835***	0.341**		
			(0.581)	(0.110)		
$RBC_t * Tier1RatioBelow10PCT_b$					-1.011	0.148
					(1.305)	(0.103)
$RBC_t * Tier1RatioFrom10To25PCT_b$					-2.414***	0.140
					(0.383)	(0.115)
$RBC_t * Tier1RatioFrom25To50PCT_b$					-1.528**	-0.0548
					(0.517)	(0.118)
Observations	6575251	4197519	5926396	3884583	6575251	4197519
R^2	0.261	0.798	0.250	0.793	0.261	0.798
Prov-Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster SE	Bank Date Firm					

Notes: The table reports the coefficients estimated using least squares. For Columns (1), (3), and (5) the dependent variable is log change over a 1 year period of the loan granted by bank b to firm i. For Columns (2), (4), and (6) the dependent variable is the short-term interest rates paid by firm i to bank b. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $Affected_b$ is a dummy variable that equals 1 for banks having the average tier 1 ratio between 2008 and 2013 below the first quartile of the distribution. $LowRisk_i$ is a dummy taking value 1 for firms with a score provided by Cerved Group below 3 (sound firms, low risk), $MedRisk_i$ equals 1 for firms with a score between 3 and 6 (medium risk) and $HighRisk_i$ identifies firms with a score above 7 (financially fragile firms, high risk). $Tier1RatioBelow10PCT_b$ identifies banks with a pre-reform average tier 1 ratio below the 10^{th} percentile of the distribution, $Tier1RatioFrom10To25PCT_b$ bank with average tier 1 ratio between the 10^{th} and the 25^{th} and $Tier1RatioFrom25To50PCT_b$ bank with average tier 1 ratio between the 25^{th} and the 50^{th}. *** p<0.01, ** p<0.05, * p<0.1.

Table B.5: Excluding micro firms

	H1		H2		H3	
	Loan	Rate	Loan	Rate	Loan	Rate
	(1)	(2)	(3)	(4)	(5)	(6)
$RBC_t * Affected_b$	-1.552***	0.223***				
	(0.126)	(0.0123)				
$RBC_t * Affected_b * LowRisk_i$			-0.165	0.0267		
			(0.252)	(0.0292)		
$RBC_t * Affected_b * MedRisk_i$			-1.588***	0.226***		
			(0.158)	(0.0154)		
$RBC_t * Affected_b * HighRisk_i$			-2.754***	0.329***		
			(0.259)	(0.0254)		
$RBC_t * Tier1RatioBelow10PCT_b$					-0.882***	0.119***
					(0.247)	(0.0257)
$RBC_t * Tier1RatioFrom10To25PCT_b$					-2.585***	0.203***
					(0.146)	(0.0138)
$RBC_t * Tier1RatioFrom25To50PCT_b$					-1.212***	-0.0993***
					(0.125)	(0.0110)
Observations	2901135	2150222	2740926	2040721	2901135	2150222
R^2	0.247	0.749	0.239	0.744	0.247	0.749
Prov-Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table reports the coefficients estimated using least squares. For Columns (1), (3), and (5) the dependent variable is log change over a 1 year period of the loan granted by bank b to firm i. For Columns (2), (4), and (6) the dependent variable is the short-term interest rates paid by firm i to bank b. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $Affected_b$ is a dummy variable that equals 1 for banks having the average tier 1 ratio between 2008 and 2013 below the first quartile of the distribution. $LowRisk_i$ is a dummy taking value 1 for firms with a score provided by Cerved Group below 3 (sound firms, low risk), $MedRisk_i$ equals 1 for firms with a score between 3 and 6 (medium risk) and $HighRisk_i$ identifies firms with a score above 7 (financially fragile firms, high risk). $Tier1RatioBelow10PCT_b$ identifies banks with a pre-reform average tier 1 ratio below the 10^{th} percentile of the distribution, $Tier1RatioFrom10To25PCT_b$ bank with average tier 1 ratio between the 10^{th} and the 25^{th} and $Tier1RatioFrom25To50PCT_b$ bank with average tier 1 ratio between the 25^{th} and the 50^{th}.Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

Table B.6: Alternative post-reform periods

	(1)	(2)	(1)	(2)
	Loan		Rate	
VARIABLES	2012	2013	2012	2013
$Post_t * Affected_b$	-0.482***	-0.758***	0.0366***	0.106***
	(0.0865)	(0.0831)	(0.00843)	(0.00870)
Observations	6575251	6575251	4197519	4197519
R-squared	0.261	0.261	0.798	0.798
Prov-Date FE	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes

Notes: The table reports the coefficients estimated using least squares. For Columns (1) and (2) the dependent variable is log change over a 1 year period of the loan granted by bank b to firm i. For Columns (3)and (4) the dependent variable is the short-term interest rates paid by firm i to bank b. $Post_t$ is a dummy taking value 1 since the year reported in column label. $Affected_b$ is a dummy variable that equals 1 for banks having the average tier 1 ratio between 2008 and 2013 below the first quartile of the distribution. Standard errors are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1.

Table B.7: H4: Using industry-locatio-time fixed effect

VARIABLES	(1) Credit growth	(2) Loan rate	(3) Investment (log)
$RBCt * Exposed_i$	-0.473***	0.0681***	-0.0338***
	(0.121)	(0.0175)	(0.00892)
Z-Score==2	-1.345***	-0.0674	-0.0630***
	(0.187)	(0.0402)	(0.0133)
Z-Score==3	-2.569***	-0.0501	-0.123***
	(0.297)	(0.0757)	(0.0178)
Z-Score==4	-3.304***	0.0113	-0.180***
	(0.378)	(0.0983)	(0.0230)
Z-Score==5	-5.107***	0.145	-0.226***
	(0.357)	(0.104)	(0.0297)
Z-Score==6	-7.451***	0.274**	-0.260***
	(0.564)	(0.108)	(0.0353)
Z-Score==7	-9.716***	0.402***	-0.287***
	(0.749)	(0.106)	(0.0363)
Z-Score==8	-16.37***	0.607***	-0.346***
	(1.328)	(0.103)	(0.0357)
Z-Score==9	-30.10***	1.054***	-0.503***
	(1.300)	(0.0741)	(0.0488)
Unscored	-11.49***	0.806***	-0.314***
	(1.398)	(0.135)	(0.0507)
Observations	2992978	1892156	2536907
R^2	0.228	0.786	0.651
Industry-Prov-Date FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes

Notes: The Table reports results for the ordinary least squares estimation of equation 3. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $Exposed_i$ is the average share of loans that firm i takes from 2009 to 2013 from affected banks, i.e. banks having the average tier 1 ratio pre-Reform below the first quartile of the distribution. Z-scores are dummies corresponding to the riskiness scores provided by Cerved group, whereby higher scores reflect higher riskiness. Standard errors are clustered at the sector level. *** p<0.01, ** p<0.05, * p<0.1.

Table B.8: H4: Alternative errors clustering - 1

VARIABLES	(1) Credit growth	(2) Loan rate	(3) Investment (log)
$RBCt * Exposed_i$	-0.858***	0.0553	-0.0507***
	(0.272)	(0.0361)	(0.00994)
Z-Score==2	-1.420***	-0.0635***	-0.0660***
	(0.151)	(0.0161)	(0.00796)
Z-Score==3	-2.697***	-0.0396	-0.129***
	(0.188)	(0.0282)	(0.00838)
Z-Score==4	-3.447***	0.0252	-0.187***
	(0.176)	(0.0351)	(0.00946)
Z-Score==5	-5.285***	0.164***	-0.235***
	(0.175)	(0.0371)	(0.0109)
Z-Score==6	-7.651***	0.296***	-0.269***
	(0.248)	(0.0403)	(0.0120)
Z-Score==7	-9.936***	0.428***	-0.298***
	(0.296)	(0.0392)	(0.0124)
Z-Score==8	-16.61***	0.637***	-0.357***
	(0.465)	(0.0416)	(0.0129)
Z-Score==9	-30.24***	1.076***	-0.510***
	(0.911)	(0.0434)	(0.0215)
Unscored	-11.83***	0.856***	-0.324***
	(0.478)	(0.0658)	(0.0243)
Observations	2993857	1892717	2537323
R^2	0.228	0.786	0.651
Prov-Date FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Cluster SE	Sector-Bank	Sector-Bank	Sector-Bank

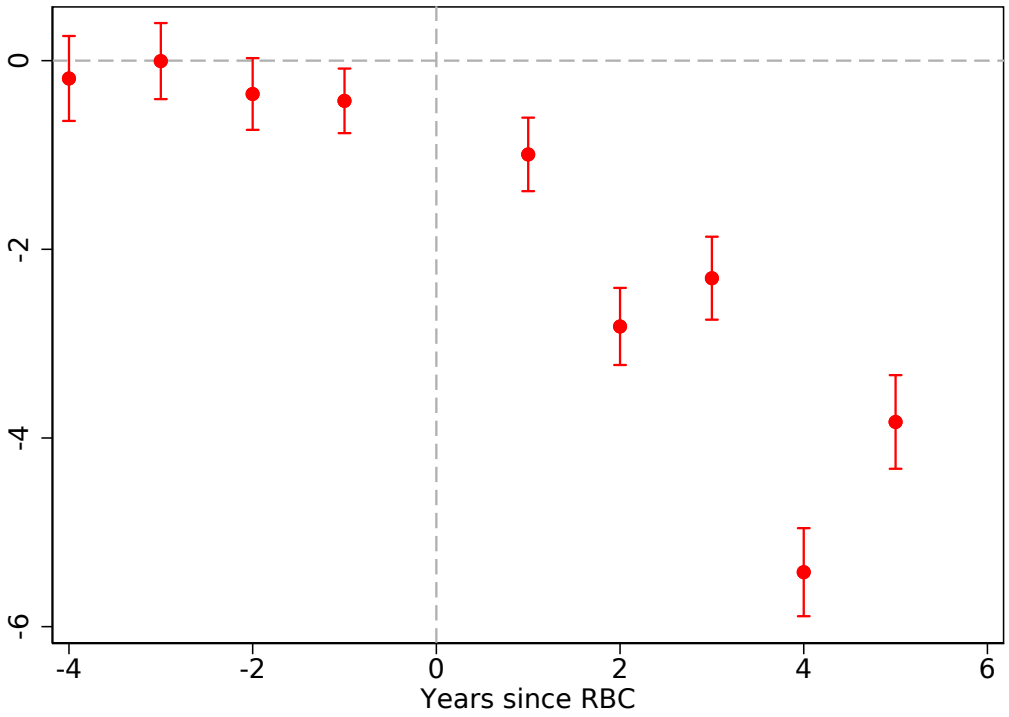
Notes: The Table reports results for the ordinary least squares estimation of equation 3. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $Exposed_i$ is the average share of loans that firm i takes from 2009 to 2013 from affected banks, i.e. banks having the average tier 1 ratio pre-Reform below the first quartile of the distribution. Z-scores are dummies corresponding to the riskiness scores provided by Cerved group, whereby higher scores reflect higher riskiness. *** p<0.01, ** p<0.05, * p<0.1.

Table B.9: H4: Alternative errors clustering - 2

VARIABLES	(1) Credit growth	(2) Loan rate	(3) Investment (log)
$RBCt * Exposed_i$	-0.858***	0.0553*	-0.0507***
	(0.214)	(0.0276)	(0.0143)
Z-Score==2	-1.420***	-0.0635	-0.0660***
	(0.157)	(0.0402)	(0.0157)
Z-Score==3	-2.697***	-0.0396	-0.129***
	(0.333)	(0.0731)	(0.0221)
Z-Score==4	-3.447***	0.0252	-0.187***
	(0.328)	(0.0913)	(0.0270)
Z-Score==5	-5.285***	0.164*	-0.235***
	(0.270)	(0.0942)	(0.0328)
Z-Score==6	-7.651***	0.296***	-0.269***
	(0.482)	(0.0969)	(0.0366)
Z-Score==7	-9.936***	0.428***	-0.298***
	(0.635)	(0.0929)	(0.0403)
Z-Score==8	-16.61***	0.637***	-0.357***
	(1.177)	(0.0883)	(0.0385)
Z-Score==9	-30.24***	1.076***	-0.510***
	(1.281)	(0.0679)	(0.0544)
Unscored	-11.83***	0.856***	-0.324***
	(1.139)	(0.131)	(0.0526)
Observations	2993857	1892717	2537323
R^2	0.228	0.786	0.651
Prov-Date FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Cluster SE	Secotr Prov	Secotr Prov	Secotr Prov

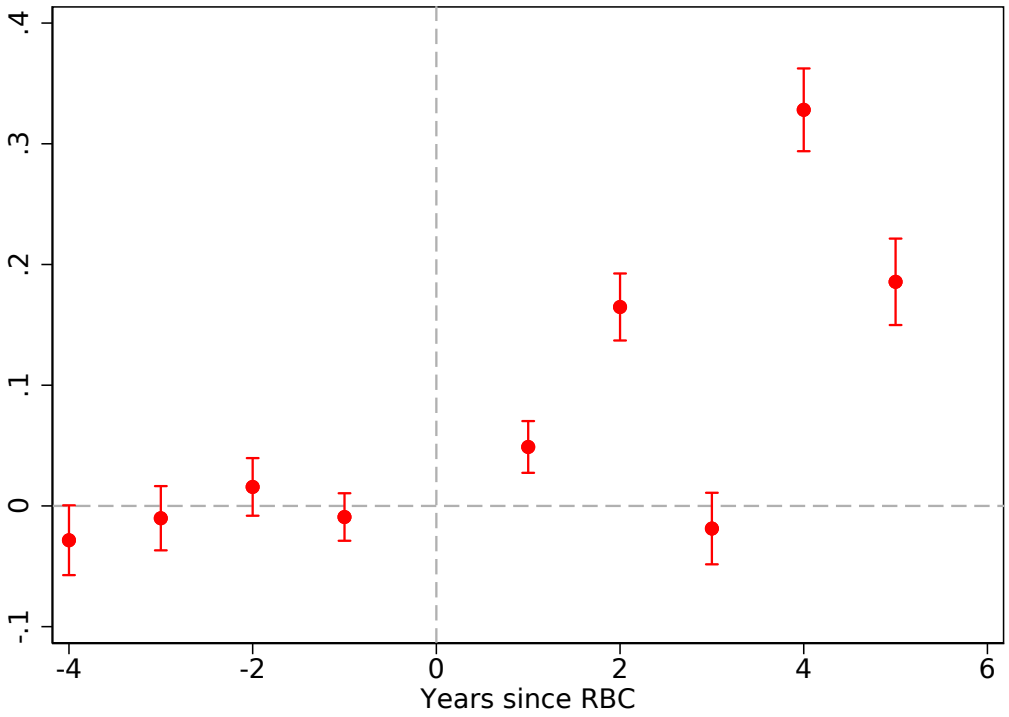
Notes: The Table reports results for the ordinary least squares estimation of equation 3. RBC_t is a dummy taking value 1 since 2014, i.e. the implementation date of risk-based capital reform (Basel III) in Italy. $Exposed_i$ is the average share of loans that firm i takes from 2009 to 2013 from affected banks, i.e. banks having the average tier 1 ratio pre-Reform below the first quartile of the distribution. Z-scores are dummies corresponding to the riskiness scores provided by Cerved group, whereby higher scores reflect higher riskiness. *** p<0.01, ** p<0.05, * p<0.1.

Figure B.1: Committed Credit (delta log)



Notes: This figure plots the difference in yearly credit growth by banks that were more exposed to the regulatory reform and others. The coefficients are obtained from estimating year-by-year equation 1. The bars show 95 percent confidence intervals, $\tau = 0$ refers to the implementation of Basel III more stringent capital requirements in 2014, the period analyzed is 2009-2018.

Figure B.2: Short term rate



Notes: This figure plots the difference in short-term interest rate paied to banks that were more exposed to the regulatory reform and others. The coefficients are obtained from estimating year-by-year equation 1. The bars show 95 percent confidence intervals, $\tau = 0$ refers to the implementation of Basel III more stringent capital requirements in 2014, the period analyzed is 2009-2018.

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