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Buying insurance at low economic cost – the effects of bank capital buffer increases since the pandemic

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Abstract

Using granular data from the European corporate credit register, we examine how increases in macroprudential capital buffer requirements since the pandemic have affected bank lending behaviour in the euro area. Our findings reveal that, for the average bank, the buffer requirement increases did not have a statistically significant impact on lending to non-financial corporations. Furthermore, while we document relatively slower loan growth for banks with less capital headroom, also these banks did not decrease lending in absolute terms in response to higher requirements. These findings are robust in various specifications and emerge for both loan growth at the bank-firm level and the propensity to establish new bank-firm relationships. At the firm level, we document some heterogeneity depending on firm type and firm size. Firms with a single bank relationship and small and micro enterprises experienced a relative reduction in lending following buffer increases, although substitution effects mitigated real effects at the firm level. Overall, the results suggest that the pronounced macroprudential tightening since late 2021 did not exert substantial negative effects on credit supply. Hence, activating releasable capital buffers at an early stage of the cycle appears to be a robust policy strategy, since the costs of doing so are expected to be low.

Keywords: credit supply, bank lending, macroprudential policy, capital buffers

JEL classification: E5, E51, G18, G21

Non-technical summary

In this paper, we use granular data from the European corporate credit register to examine how increases in capital buffer requirements since the pandemic have affected bank lending behaviour in the euro area. Having a good understanding of this issue is essential for policy makers, who may be concerned about possible procyclicality of the measures.

Our findings reveal that, for the average bank, buffer requirement increases did not have a statistically significant negative impact on lending to non-financial corporations. Absolute loan volumes remained stable or even tended to increase after the measures, suggesting that they did not have an overly constraining effect on aggregate credit supply in the euro area.

Despite the overall muted impact, our analysis uncovers some differential effects across banks and firms. Specifically, banks with less capital headroom exhibited slower loan growth than their better capitalised peers after the buffer requirement increases, although also the less capitalised banks did not decrease lending in absolute terms. Moreover, the relative lending reduction by less capitalised banks tends to be more pronounced for firms with a single bank relationship, and for smaller firms. However, these relative effects did not result in overall lending contractions at the firm level, also thanks to credit substitution effects.

Overall, our findings confirm that the increases in capital buffer requirements since the pandemic had only a modest impact on corporate lending in the euro area, thanks to the overall comfortable capital positions of euro area banks that prevented stronger adjustments. This illustrates that the economic costs of increasing buffer requirements when banking sector conditions are favourable can be expected to be low. Against this background, activating releasable capital buffers at an early stage of the financial or economic cycle appears to be a robust policy strategy, as it allows policy makers to ‘buy insurance at low economic cost’.

1 Introduction

Macroprudential policy was introduced after the global financial crisis of 2008-09, with the objective to contain systemic risks to financial stability (Brunnermeier et al. 2009, Hanson et al. 2011). The capital buffer framework is an essential part of the macroprudential toolkit and inter alia comprises broad-based countercyclical and sectoral capital buffers. Such buffers can be released when systemic risks materialise, aiming to make it easier for banks to absorb losses while continuing to provide key financial services to the real economy (Basel Committee on Banking Supervision 2019, 2022b). Prior to the pandemic, the build-up of such releasable buffers was primarily guided by cyclical risk conditions, for example relating to the presence of excessive credit growth in the case of the countercyclical capital buffer (Drehmann et al. 2011, Lang et al. 2019). While this provided structure to the setting of these buffers, it also resulted in too little build-up of them, so that authorities needed to make use of somewhat unconventional capital relief measures when the pandemic hit (Couaillier et al. 2022, Basel Committee on Banking Supervision 2022a, European Central Bank 2022).

Since the pandemic, and following up on the lessons learned, macroprudential authorities in the euro area have actively increased releasable capital buffer requirements beyond previously observed levels.[1] The tightening wave started in late 2021, amid a swift economic recovery after the pandemic, and continued well into 2022, also after the outbreak of the war in Ukraine and the resulting economic challenges for many European countries. While the primary objective of the measures was to preserve or further strengthen the banking sector's resilience against possible shocks, policy makers carefully considered potential repercussions of tighter capital requirements on bank credit supply, to avoid potential procyclicality amid

[1] The need to increase macroprudential space in the form of releasable capital buffers is one of the key lessons learned from the pandemic (Basel Committee on Banking Supervision 2021, Behn et al. 2023). Besides the factors already cited above, possible obstacles to the usability of non-releasable buffers have been a key driver of the strive to increase releasable capital (Behn et al. 2020, Couaillier et al. 2024).

a challenging economic environment. In this respect, banks' comfortable capital positions and solid profitability levels were widely believed to mitigate the risk of procyclical effects arising from tighter policy measures.[2] Overall, the actions taken represent a paradigm shift in the conduct of macroprudential policy, with stronger emphasis on buffer activation early on in the financial cycle, when the economic costs of doing so are expected to be low.

In this paper, we inform the debate around the capital buffer increases since the pandemic by examining whether they indeed had a muted impact on corporate lending in the euro area. Specifically, we use granular data from the European corporate credit register ('AnaCredit') and put particular emphasis on cross-sectional heterogeneity with respect to the observed outcomes – both at bank and at borrower level.[3] In this respect, the scope and the granularity of our data set are key for our identification strategy. First, we use granular supervisory data to construct a precise measure of policy impact at bank level, combining information on the bank-specific change in capital requirements and the bank's pre-policy capital headroom (i.e., the distance between the bank's capital ratio and its capital requirement ahead of the policy change). Second, by looking at adjustments in lending behaviour by different banks for exposures to the same firm in the same period, we effectively control for credit demand and other time-varying firm-specific factors of relevance, thus enabling proper identification of supply side effects (following the seminal paper by Khwaja and Mian 2008).

Our findings reveal that, for the average bank, buffer requirement increases since the pandemic did not have a statistically significant negative impact on lending to non-financial corporations. This applies both at the intensive and at the extensive margin of lending, with the former looking at lending adjustments in existing bank-firm relationships and the latter

[2] See, e.g., the ECB's Governing Council statement on macroprudential policies, 2 November 2022.

[3] At the bank level, previous literature has explored how the effects of changes in capital requirements depend on macro-financial or banking sector conditions (Jiménez et al. 2017, Behn et al. 2019, Lang and Menno 2023). At the firm level, the literature has paid special attention to specific types of borrower, e.g., small firms that tend to be more reliant on bank lending (Petersen and Rajan 1994, Boot 2000).

looking at the creation of new relationships. Absolute loan volumes remained stable or even tended to increase following buffer increases, suggesting that the measures did not have an overly constraining effect on aggregate credit supply in the euro area.

Despite the overall muted impact of the policy measures, our analysis uncovers some differential effects across banks and across firms. Specifically, banks with less capital headroom (distance to the combined buffer requirement smaller than 4% of risk-weighted assets) exhibited slower loan growth than their better capitalised peers after the buffer requirement increases. Reflecting the generally comfortable capital position of euro area banks during the period under consideration, such differential patterns emerge only when looking at the lower end of the capital headroom distribution (i.e., below the first tercile). Moreover, also the less capitalised banks did not decrease lending in absolute terms, but only relative to their better capitalised peers. Again, these patterns come out consistently at both the intensive and the extensive margin of lending and persist in a broad range of robustness tests.

On the firm side, we document that the relative lending reduction by less capitalised banks following buffer increases tends to be more pronounced for firms with a single bank relationship, and for smaller firms. Possible explanations for this relate to informational asymmetries enabling lenders to exploit monopolistic power over single relationship firms (Sharpe 1990, Degryse and Ongena 2005, Schenone 2010), and to higher (perceived) riskiness of SME lending that may result in such lending being more affected by bank-specific shocks (Popov and Udell 2012, Jiménez et al. 2014). The effect is meaningful from an economic perspective, as following a buffer increase of 1 pp, banks with capital headroom below the first tercile [quartile, quintile] of the distribution reduce lending to single relationship firms by about 1.6 [1.8, 2.1] pp. For SME lending, the effect is statistically significant only for the most constrained banks below the first quintile of the capital headroom distribution, who contract such lending by about 0.6 to 1.0 pp relative to their better capitalised peers.

In a final step, we move the analysis to the firm level, to analyse whether the observed lending contractions had any real implications for firms' overall ability to access funds. This is necessary to account for the possibility of credit substitution by firms that borrow primarily from banks with less capital headroom. Indeed, the firm-level analysis confirms that the effects of recent buffer requirement increases have been very modest, also thanks to credit substitution. While the results indicate that such substitution may be more difficult for small and micro firms with a single bank relationship, also these firms did not see an overall contraction in lending compared with the average firm borrowing from unconstrained banks.

Overall, our findings confirm that the increases in capital buffer requirements since the pandemic had only a modest impact on corporate lending in the euro area. Thanks to their comfortable capital headroom, most euro area banks were able to absorb the buffer requirement increases without constraining credit supply. Not surprisingly, the least capitalised banks reduced lending in relative terms, but in general this did not result in absolute lending reductions. Single relationship firms and smaller firms borrowing from the most affected banks experienced somewhat stronger negative effects, although credit substitution by better capitalised banks seems to have mitigated the firm-level impact in the latter case. In sum, the findings illustrate that the economic costs of increasing buffer requirements when banking sector conditions are favourable can be expected to be low, thus lending support to the aforementioned paradigm shift in the conduct of macroprudential policy.

Our paper contributes to a growing empirical literature on the effects of capital-based macroprudential policy measures (for recent surveys, see Galati and Moessner 2018 or Biljanovska et al. 2023). Studies range from broad-based, cross-country analyses looking at the effects of measures from an aggregate perspective (Claessens et al. 2013, Vandenbussche et al. 2015, Cerutti et al. 2017, Bergant and Forbes 2021) to papers using more granular, bank balance sheet or even loan-level data in order to examine specific aspects in more detail.

For example, recent papers have studied the effects of increases in structural capital buffer requirements (e.g., Behn and Schramm 2021, Cappelletti et al. 2022, Degryse et al. 2023), policies targeted at mortgage lending (e.g., Basten 2020, Auer et al. 2022), the release of capital requirements during the pandemic (e.g., Couaillier et al. 2022, Mathur et al. 2023), or possible leakage of macroprudential policies (Aiyar et al. 2014a). A seminal paper looking at time-varying macroprudential requirements is the one by Jiménez et al. (2017), which studies the effects of dynamic provisioning in Spain around the global financial crisis of 2008 and finds the effects of regulatory adjustments to be particularly pronounced in 'bad times'. We contribute to this literature with a comprehensive, cross-country assessment of the effects of the increases in countercyclical capital buffers in European countries since the pandemic, representing the most significant tightening wave in time-varying macroprudential capital requirements to date. In doing so, we put particular emphasis on potential heterogeneity in adjustment strategies, in line with the idea that the impact of higher capital requirements in terms of credit supply is largely determined by banking sector conditions.

We also add to a more general empirical literature on the relation between changes in bank capital requirements and bank lending behaviour. Several recent papers point towards a positive long-run impact of higher capital requirements on financial intermediation capacity, since better capitalised and more resilient institutions should be better able to absorb shocks while sustaining lending in all phases of the credit cycle (Gambacorta and Shin 2018, Begenau 2020, Bahaj and Malherbe 2020). In the short-term, however, banks may constrain lending as part of the adjustment process when adapting to higher capital requirements (Aiyar et al. 2014b, Bridges et al. 2014, Behn et al. 2016, Gropp et al. 2019, De Jonghe et al. 2020, Fraisse et al. 2020, Imbierowicz et al. 2021). Our paper shows that the strength of such transitional effects strongly depends on banking sector conditions, which is a crucial aspect to consider when trading off potential costs and benefits of higher capital requirements.

The paper proceeds as follows: Section 2 introduces the data and provides descriptive statistics. Section 3 lays out the estimation strategy, while Section 4 includes the main results. Further robustness checks are provided in Section 5, before Section 6 concludes.

2 Data

We construct a comprehensive dataset by combining two ECB proprietary data sources. We start by collecting bank balance sheet characteristics and minimum capital requirements (including buffer requirements) for 2,146 banks operating in the euro area, with the sample period ranging from the first quarter of 2021 to the second quarter of 2023. Bank-level information are gathered from the ECB Supervisory Banking Data and are available on a quarterly frequency. We match the supervisory data with bank-firm level data taken from *AnaCredit*, the pan-European credit register, containing information on all individual bank loans larger than €25,000 to euro area firms. *AnaCredit* encompasses several loan attributes including the type of credit (overdraft, revolving credit, credit line, term loan, financial lease, other loan), outstanding balance, interest rate, maturity and amount at origination. Importantly, for each loan we observe the lender via a bank identifier and information about the borrower (firm identifier, country location, postal and NACE codes). Credit register data is collected by the ECB from the National Central Banks of the Eurosystem in a harmonised manner to ensure consistency across euro area countries. For the purpose of this paper, we perform the main analysis by collapsing the various instrument types at the bank-firm level. However, in a robustness check, we also look at term loans, separately. In addition, to avoid that changes in loan volume are determined by firms drawing on existing credit lines, we define the loan volume as the total agreed contractual amount, therefore including any undrawn credit lines rather than focusing only on the outstanding amount.

Table 1 reports the summary statistics for the bank-level (Panel A) and the bank-firm level (Panel B) data. Our first main variable of interest, ΔCBR, measures the difference between the announced future and the currently implemented combined buffer requirement (i.e., it measures by how much the bank's buffer requirement will increase or decrease in the period ahead under the assumption that the affected exposure stays constant, taking advantage of the fact that authorities usually announce such adjustments a couple of quarters in advance).[4] The variable displays a mean of 19 basis points, indicating that combined buffer requirements in the average bank-quarter were increased by this amount during our sample period. The relatively small magnitude of the increase masks considerable heterogeneity across banks, since about 50% of the banks in our sample did not see any or only very small changes in the CBR over the sample period (Figure 1). Indeed, conditioning on observations with a positive value for ΔCBR, the average increase is more sizeable, amounting to approximately 50 basis points (bps), with a 25th-75th percentile range of 0 to 80 bps and a maximum value of around 105 bps. Moreover, as shown in Figure 2, ΔCBR varies not only across but also within countries, thereby limiting endogeneity concerns related to the homogeneous impact of changes in capital requirements for banks in the same country.

Besides ΔCBR, Panel A of Table 1 also includes descriptive statistics for a range of bank-level control variables and for $D2CBR$, our second main variable of interest. The variable measures the distance to the combined buffer requirement (CBR), i.e., the difference between a bank's current capital ratio and its current capital requirement (including the CBR sitting

[4] For the countercyclical capital buffer, which is accountable for the bulk of adjustments during our sample period, European legislation prescribes that increases in the buffer rate must be announced twelve months in advance (except in cases where extraordinary circumstances justify a faster implementation), to provide banks with sufficient time for adjustment. For some other buffers there are no specific legal requirements on the implementation period, but nevertheless authorities usually announce buffer increases several quarters in advance. In contrast, buffer releases do not have to be announced in advance and are usually implemented swiftly after a shock that justifies a release. Since our focus is on buffer increases and since buffer releases were anyway very scarce during our sample period, this does not pose any empirical challenges for us.

at the very top).[5] The background for looking at this variable is that we expect the effects of changes in capital requirements to be stronger for more capital-constrained banks, that is, banks with smaller capital headroom above the CBR. Figure 3 plots a histogram of this variable, with dashed vertical lines indicating different quantiles of the distribution that are used as cut-off points in our econometric identification strategy. Specifically, the median distance to CBR in the first quarter of 2021 is 6.3%, whilst banks in the first tercile, quartile and quintile have a distance to the CBR below 4.7%, 4.1% and 3.6%, respectively.

Panel B of Table 1 displays the summary statistics for our main dependent variables at the bank-firm level. First, $\Delta ln(loans)$ refers to the quarterly change in overall lending from bank i to firm j, expressed in logarithmic terms. It is positive on average, with a mean of around 2% and a moderate level of variability. Second, $D(newrel)$ is a dummy variable indicating the establishment of a new bank-firm relationship, taking the value one when relationship first appears in our data set and zero otherwise. It exhibits an average value of 4%, indicating that a substantial amount of new bank-firm relationships has been created during our sample period. Finally, Table 2 visualises the country coverage in terms of number and percentages of observations and banks included in the sample. Most observations are concentrated in Italy (33.2%), Spain (20%), France (18.45%) and Germany (13.35%), in line with the importance of those countries for the euro area economy. Table A1 reports a detailed definition of the variables used in the analyses and their data sources.

[5] See Annex A for a detailed explanation of euro area banks' capital stack and the distance to CBR.

3 Estimation strategy

To estimate how increased capital buffer requirements after the pandemic have affected bank lending in the euro area, we start by estimating simple panel regressions of the following type:

$$\Delta ln(loans)_{i,j,t} = \beta \Delta CBR_{i,t} + \alpha_i + \alpha_{j,t} + X'_{i,t-1}\gamma + \varepsilon_{i,j,t}, \quad (1)$$

where i denotes the bank, j denotes the borrower, and t denotes the quarter. The dependent variable, $\Delta ln(loans)_{i,j,t}$, is the quarterly change in the overall volume of loans granted by bank i to borrower j at time t. Our main variable of interest, $\Delta CBR_{i,t}$, is the difference between the announced and the currently implemented combined buffer requirement for bank i at time t (see Section 2 for further details). $X'_{i,t-1}$ is a vector of time-varying, bank-specific control variables, lagged by one quarter to account for possible endogeneity, including the overall risk-based capital requirement, the CET1 capital ratio, the logarithm of total assets, the ratio of risk-weighted assets to total assets, the cash-to-asset ratio, the return on equity, the non-performing loans ratio, the deposit-to-asset ratio, and the loan-to-asset ratio.[6] In addition, we include a granular set of fixed effects to account for both observed and unobserved heterogeneity across different groups of observations, including bank fixed effects, α_i, and borrower × quarter interactions, $\alpha_{j,t}$. The latter are particularly important since they ensure that our main coefficients are identified from variation in lending from different banks to the same firm in the same period, thus controlling for differences in firms' demand for credit as well as other firm-specific and time-varying heterogeneity that

[6] A correlation matrix for the variables included in the econometric specification is provided in Table A2.

may affect observed outcomes (see Khwaja and Mian 2008).[7] Finally, $\varepsilon_{i,j,t}$ is a random error term, where standard errors in all our regressions are clustered at the bank level to account for possible correlation in the error terms.

Equation (1) estimates a baseline effect of changes in capital buffer requirements on bank lending. Since the main policy changes during our sample period are due to increases of the countercyclical capital buffer, an exposure-based measure, the magnitude of $\Delta CBR_{i,t}$ will be higher the more of a bank's overall credit risk exposures are located in countries that substantially increased the corresponding buffer rate (see Table A5 for an overview of the policy measures during our sample period).[8] Hence, the variable already induces variation on the bank-specific treatment intensity of the policy changes in each quarter. However, besides the magnitude of the change in requirements, we believe that the treatment intensity also depends on a bank's current balance sheet position, since banks that are more capital constrained can be expected to react more strongly to the same increase in requirements than less constrained banks. Therefore, in a second step, we expand the equation as follows:

$$\begin{aligned} \Delta ln(loans)_{i,j,t} = & \ \alpha_i + \alpha_{j,t} + \beta_1 \left[\Delta CBR_{i,t} \times D(D2CBR < \tau)_i\right] \\ + & \ \beta_2 \Delta CBR_{i,t} + X'_{i,t-1}\gamma + \varepsilon_{i,j,t}, \end{aligned} \tag{2}$$

where all variables are defined as above, while $D(D2CBR < \tau)_i$ is a dummy variable indicating whether a bank's capital headroom (defined as the distance between the bank's

[7]In Table A3 of the Appendix, we also account for the endogenous matching between banks and firms through the inclusion of bank × firm fixed effects, as in Poligrova and Santos (2017). The inclusion of bank × firm fixed effects allows to control for lending relationships and information asymmetries between the bank and borrower that may affect access to credit as well as by a compositional change in the pool of borrowers and lenders. In addition, in Table A4 of the Appendix, we augment the baseline specification with country × time fixed effects, where the country refers to the nationality of the lender (rather than borrower), to account for time-variant credit developments in national banking sectors.

[8]The institution-specific rate for the countercyclical capital buffer is calculated as a weighted average of the buffer rates in countries to which the respective bank has credit risk exposures, using the amount of these exposures as a weight.

current CET1 ratio and the level of its combined buffer requirement) at the onset of our sample horizon is in the lower half [tercile, quartile, quintile] of the overall distribution (the thresholds τ are computed with the distribution as of 2021 Q1). If the hypothesis that more capital constrained banks with a stronger increase in the combined buffer requirement expand lending less than other banks is true, we would expect to see a negative coefficient on β_1. In alternative specifications, we replace the borrower $\times$ quarter interactions with industry $\times$ location $\times$ quarter interactions (following Degryse et al. 2019), to allow for the inclusion of single relationship borrowers that are otherwise dropped from the regression, or replace the dependent variable with a dummy variable indicating the establishment of new bank $\times$ firm relationships. Finally, we further expand equation (2) via inclusion of a triple interaction term with a variable indicating the borrower's size, to test whether any of our observed effects are stronger for small and medium enterprises that tend to be particularly reliant on bank lending (see, e.g., Petersen and Rajan 1994, Boot 2000).

4 Results

4.1 Intensive Margin

We start by examining how overall loan volumes at the bank $\times$ firm level have changed in response to higher capital buffer requirements. That is, we look at the intensive margin of lending and report the corresponding regression results in Table 3. The results in column 1 relate to equation (1), whilst columns 2 to 5 report estimation results for equation (2). The econometric specifications incorporate borrower-time fixed effects, therefore looking at adjustments in loan supply by banks with heterogeneous increases in capital buffer requirements lending to the same firm in the same period. They also account for time-invariant bank-specific unobserved characteristics via the inclusion of bank fixed effects.

Regression results in column 1 show that, on average, changes in buffer requirements since the pandemic did not exert a significant impact on banks' corporate lending in the euro area. The estimated coefficient for $\Delta CBR_{i,t}$ is positive and statistically insignificant. We do find, however, that the effect on lending depends on banks' distance to the CBR – measured prior to any announced increase in capital buffers (i.e., in 2021-Q1). As described in Section 2, euro area banks exhibited sizable capital headroom during our sample period (recall Figure 3 in particular), with the median distance to the CBR in 2021-Q1 standing at 6.3%. Correspondingly, we do not observe differential lending effects when splitting the sample at the median (column 2), likely because many banks in the lower group are still far away from the CBR. However, we document a statistically significant relative contraction in corporate lending for those banks that are below the tercile [quartile, quintile] of the distribution. Following a 1 pp increase in $\Delta CBR_{i,t}$, banks with a distance to the CBR below the first tercile [quartile, quintile] reduce corporate lending by about 1.6 [1.4, 1.7] pp, relative to banks further away from the regulatory threshold. The cut-offs correspond to a distance to the CBR of 4.7% for the tercile, 4.1% for the quartile and 3.6% for the quintile.[9]

Notwithstanding the statistically significant relative reduction in lending for banks closer to the CBR, F-tests for joint significance do not indicate an absolute lending contraction following a CBR increase for these banks. Although mostly negative with varying degrees of magnitude, the sum of the coefficients for $\Delta CBR_{i,t}$ and its interaction with $D(D2CBR < \tau)_i$ are statistically insignificant in all of the specifications displayed in Table 3 (see bottom of the table). This result is in line with literature on the state-dependent effects of changes in capital requirements (Jiménez et al. 2017, Lang and Menno 2023), documenting that

[9]Besides the voluntary buffer, the numbers quoted above also include the Pillar 2 Guidance, which is not a formal requirement but a supervisory recommendation and currently stands at 1.3% on average in the banking union (see the information and corresponding links in this press release: https://www.bankingsupervision.europa.eu/press/pr/date/2023/html/ssm.pr231219~e35067c504.en.html).

capital requirement increases in a fast growing economy with a well capitalised banking sector tend to have little or no impact on lending. Although the flipped coefficient signs for standalone and interaction terms in Table 3 suggest some reshuffling from less capitalised to well capitalised banks (see below for further analysis), not even the former group of banks decreases lending in absolute terms following the buffer increases.

The results presented in Table 3 focus on firms borrowing from multiple banks to perform regressions à la Khwaja and Mian (2008). One limitation of this econometric identification strategy is the exclusion of single-relationship firms that are absorbed by borrower × time fixed effects. In our sample, firms with a single bank relationship represent the largest fraction of all firms in most euro area countries (Figure 4). To enable the inclusion of these firms in the estimation, we follow the approach employed by Acharya et al. (2019), Degryse et al. (2019), and Berg et al. (2021), and replace borrower × time fixed effects with industry-location-size (ILS) × quarter fixed effects, acknowledging limitations related to the omission of time-varying, firm-specific characteristics. To classify the industrial sectors we use the NACE Rev.2 code, where the industry cluster is based on 4-digit NACE codes. The location cluster is based on postal codes, whilst for size we use the definition given in *AnaCredit*.[10]

The results reported in Table 4 are qualitatively similar to the baseline results. Again, we do not find any statistically significant lending contraction to NFCs following capital buffer increases for the average bank (column 1). Still, we document a relative reduction in lending by banks with a distance to the CBR below the tercile of the distribution, where

[10]AnaCredit follows the EU Commission's standard classification for SMEs (`https://single-market-economy.ec.europa.eu/smes_en`). In accordance with this definition, we use the following dummy variables to classify firm size: 'Micro' is a dummy variable that is equal to 1 for enterprises that employ less than 10 employees and whose annual turnover and/or annual balance sheet total does not exceed EUR 2 million, and 0 otherwise. 'Small' is a dummy variable that takes the value 1 for enterprises that employ less than 50 employees and have an annual turnover and/or annual balance sheet total that does not exceed EUR 10 million, and 0 otherwise. 'Medium' is a dummy variable that takes the value of 1 for enterprises that employ less than 250 but more than 50 employees, have an annual turnover not exceeding EUR 50 million and/or an annual balance sheet total not exceeding EUR 43 million, and 0 otherwise.

the magnitude of the coefficient on the interaction term increases for lower percentiles of the distribution (columns 2 to 6). As before, the sum of the coefficients for the standalone and interaction terms is statistically indistinguishable from zero in most of the cases. The exception is column 5, where we find that a 1pp increase in $\Delta CBR_{i,t}$ is connected with an absolute lending contraction of 1.5 pp for banks within the first quintile of distance to CBR.

The observation that effects get somewhat stronger when single relationship firms are included in the sample suggests that these firms could be driving the observed reduction in lending by the least capitalised banks. In line with this argument, Detragiache et al. (2000) show that firms borrowing from multiple banks can shield their borrowing from bank-specific shocks relative to firms borrowing from a single bank. Firms with a single bank relationship may also suffer from the so called "lock in" effect (Sharpe 1990, Degryse and Ongena 2005), whereby the lender exploits monopolistic power resulting from its costly access to proprietary information in relation to the firm. If banks are aware that such information asymmetries result in higher switching costs, they may be less susceptible to calls for more funding from such firms, or offer the funding at worse conditions when compared with multiple relationship firms where they compete with other banks for market share (Schenone 2010).

Table 5 appears to confirm the reasoning in the aforementioned strand of literature. It replicates the findings in Table 4 while restricting the sample to single relationship firms. Results indicate that less capitalised banks contract lending to such firms following a buffer increase, both in relative and in absolute terms. In particular, following a buffer increase of 1 pp, banks with a distance to the CBR below the first tercile [quartile, quintile] reduce lending by about 1.6 [1.8, 2.1] pp when considering only single relationship firms.

The analysis of single relationship firms paves the way to studying whether CBR increases after the pandemic had heterogeneous effects depending on firm size, since smaller firms tend to be more reliant on their single relationship lenders (Petersen and Rajan 1994, Boot 2000).[11] Figure 5 shows that about 80% of large and medium firms have multiple bank relationships, while the share decreases progressively for small and micro enterprises to around 65% and 30%, respectively. Against this background, we should expect that capital constrained banks experiencing a CBR increase curtail lending mostly to small and micro firms, especially if these firms have only a single bank relationship.

Estimation results for an augmented version of equation (2) that includes a triple interaction term with a firm size dummy are reported in Table 6. Columns 1-4 show the results for firms with multiple bank relationships, whilst columns 5 to 8 focus on single relationship firms. We do not identify any differential effects of buffer increases for SME lending when differentiating banks by the median [tercile; quartile] of the distance to CBR distribution. The triple interaction terms are all statistically indistinguishable from zero. In contrast, we observe a relative reduction in credit to SMEs following a buffer increase for banks with a distance to CBR below the first quintile of the distribution (distance to CBR $< 3.6\%$). The magnitude of the coefficients is economically meaningful, with a 1pp increase in $\Delta CBR_{i,t}$ resulting in a relative lending contraction to SMEs of around 60bps (100bps) for multiple (single) relationship firms. The stronger effect for single relationship firms is consistent with the literature on the role information asymmetries cited above. Besides, a stronger lending contraction to SMEs for the least capitalised banks could be driven by (perceived) higher riskiness of these firms, for example because they tend to have fewer tangible assets (Popov and Udell 2012).[12] Higher firm risk makes losses more likely, so that the least capitalised

[11] There are several reasons for this pattern. For example, in contrast to large and medium corporations, small and micro firms do not rely on market-based funding as a substitute to bank credit (Becker and Ivashina 2014, Becker and Ivashina 2018). In addition, they are subject to greater lender discretion and thus face a disadvantage when requesting credit from banks (Chodorow-Reich et al. 2022).

[12] Figure 6 shows that small and micro firms have about 40 bps more accumulated impairments relative to large and medium enterprises, confirming a higher level of risk for smaller firms. A t-test for a difference in means is statistically significant at the 1% level.

banks may reduce their exposure to SMEs to mitigate the possibility of breaching the CBR.

4.2 Extensive Margin

In this section, we extend the scope of analysis and focus on the extensive margin of lending. In particular, we study whether CBR increases since the pandemic affected the propensity to establish new bank-firm relationships. In doing so, we follow a similar structure as in the previous subsection, only exchanging the dependent variable in the regressions. Here, we use a dummy variable called *D(new rel)*, taking the value 1 if: i) a new firm that did not have any relationships in the previous quarter enters the *AnaCredit* registry; or ii) a firm that had one or more relationships in the previous quarter starts borrowing from a new bank (Farinha et al. 2019, De Jonghe et al. 2020, Correa et al. 2023, Paravisini et al. 2023).

Table 7 reports the baseline regression results for this setup. Given the focus on new firms with and without pre-existing relationships, we directly rely on specifications with ILS $\times$ time (rather than firm $\times$ time) fixed effects. In line with the results for the intensive margin, column 1 shows that, on average, changes in buffer requirements since the pandemic did not affect the propensity to establish new bank-firm relationships in the euro area. The estimated coefficient for $\Delta CBR_{i,t}$ is positive and statistically insignificant.

As before, the effect of increases on lending depends on banks' distance to the CBR. In this case, we observe a statistically significant lower relative probability to establish new lending relationships starting from the median of the distribution. This seems to be in line with the literature on information asymmetries, whereby shocks to banks' health affect the cost of setting up new lending relationships (Stiglitz and Weiss 1981, Petersen and Rajan 1994, Chodorow-Reich 2014).[13] Following a 1 pp increase in $\Delta CBR_{i,t}$, banks with a distance

[13]Changes in buffer requirements do not affect bank health but still bring capital ratios closer to regulatory requirements. Hence, they may induce similar behavioural adjustments as shocks to bank health or solvency.

to the CBR below the median [tercile, quartile, quintile] reduce the probability to start new bank-firm relationships by about 1.4 [1.5, 1.9, 2.3] pp, relative to banks further away from the regulatory threshold. The magnitude of the coefficients is inversely related to CBR proximity, with banks below the median of the distance to CBR exhibiting an around 0.9 pp higher propensity to establish new relationships than banks below the first quintile. In line with the findings on the intensive margin, the sum of the coefficients for $\Delta CBR_{i,t}$ and its interaction with $D(D2CBR < \tau)_i$ is statistically insignificant in all the specifications shown in Table 7. Thus, capital buffer increases since the pandemic were not associated with an absolute decrease in the propensity to establish new bank-firm relationships, not even at the most capital-constrained banks.

While the estimations in Table 7 included new firms both with and without pre-existing credit relationships, Tables 8 and 9 report separate results for these two types of firms. Results are somewhat stronger for firms without pre-existing credit relationships, as the coefficient estimates in Table 9 tend to be statistically more significant and around 1 pp larger in magnitude than the ones in Table 8. In addition, while the F-tests for the significance of the sum of $\Delta CBR_{i,t}$ and its interaction with $D(D2CBR < \tau)_i$ are far from being statistically significant for firms with pre-existing relationships (p-value > 0.6 in all econometric specifications of Table 8), they are only marginally insignificant for firms without pre-existing relationships in some of the specifications (in columns 4 and 5 of Table 9 p-value are 0.15 and 0.11, respectively). A possible explanation for this pattern is that capital-constrained banks may still be more willing to establish new relationships with firms exhibiting a solid credit history, compared with firms borrowing for the first time that are generally younger, smaller, with unstable earnings and with less collateral to be pledged (Gopalan et al. 2011).

4.3 Firm-level Analysis

Our analysis thus far indicates that capital buffer increases since the pandemic had only very modest effects on credit supply. Only for the most capital-constrained banks, we document absolute lending contractions in some of the specifications. To analyse whether these lending contractions had any real implications for firms' overall ability to access funds, we now move the analysis to the firm level. This is necessary because, in principle, firms borrowing from banks closer to the CBR may be able to offset any contraction in credit from these banks by borrowing more from banks further away from the regulatory threshold. To formally test the relevance of such substitution effects, we estimate the following equation:

$$\Delta ln(borrowing)_{j,t} = \beta HighExposure_{j,t} + X'_{j,t-1}\gamma + \alpha_{ils,t} + \epsilon_{j,t}, \tag{3}$$

where $\Delta ln(borrowing)_{j,t}$ is the change in aggregate borrowing of firm j at time t. Our variable of interest is the dummy $HighExposure_{j,t}$, taking the value 1 for firms that have more than 50% of their credit originating from banks below the first quintile of the distance to CBR distribution ($< 3.6\%$) and affected by a positive increase in buffer requirements.[14] A negative coefficient γ would indicate that firms primarily borrowing from banks more affected by buffer requirement increases exhibit a reduction in aggregate borrowing, compared with firms borrowing from less affected banks. The vector $X'_{j,t-1}$ includes weighted averages of bank control variables, using the fraction of the respective bank's loans to the firm in the firm's total loans as a weight. In alternative econometric specifications, we also investigate differential effects for firms with single-bank relationships and for small and micro enterprises. The specification includes ILS × time fixed effects, $\alpha_{ils,t}$, to control for potential heterogeneity

[14] We select the first quintile of the distance to the CBR distribution to focus on firms exposed to the most capital-constrained banks, exhibiting the strongest relative lending reduction in the loan-level regressions.

in credit demand across firms. Standard errors are clustered at the firm level.

Table 10 shows the results of the firm-level analysis. Column 1 reports the estimates with the standalone dummy $HighExposure_{j,t}$, whilst in columns 2 and 3 we incrementally include interaction terms with dummy variables indicating single relationship firms (*Single Relationship*) and small and micro enterprises (SM), respectively. The coefficient on the $HighExposure_{j,t}$ dummy is negative but statistically insignificant (column 1). This indicates that firms borrowing from less capitalised banks did not face a decline in overall loans following buffer requirement increases, relative to firms borrowing from less exposed banks.

In column 2, the coefficient for the standalone dummy $HighExposure_{j,t}$ is positive and statistically significant at the 5% level. This indicates that exposed firms with multiple bank relationships showcase a relative increase in overall borrowing following buffer requirement increases, possibly because they were able to increase borrowing from their less affected banks after the policy change. The interaction term $HighExposure_{j,t} \times$ *Single Relationship* is negative and statistically significant at the 5% level, indicating that such substitution was not possible for single relationship firms. In terms of magnitudes, the two coefficients roughly offset each other, implying that also single relationship firms borrowing from more affected banks did not experience a borrowing contraction relative to firms borrowing from less affected banks after the policy changes. Indeed, the F-test for joint significance of the coefficients is statistically insignificant (p-value > 0.86; see bottom of the table).

Finally, column 3 shows that the relative reduction in aggregate borrowing for single relationship firms borrowing from more affected banks is driven by small and micro enterprises, as evidenced by the statistically significant coefficient for the triple interaction term. Again, the F-test for joint significance is statistically insignificant, rejecting the hypothesis of an overall borrowing contraction relative to firms borrowing from less affected banks (p-value > 0.82). This is because small and micro firms with multiple bank relationships primarily borrowing from more affected banks even increase aggregate borrowing relative to the average firm borrowing from less affected banks. Indeed, while the single coefficient $HighExposure_{j,t}$, indicating the effect for larger firms with multiple bank-relationships, is negative but statistically insignificant, the sum of the single coefficient $HighExposure_{j,t}$ and the double interaction $HighExposure_{j,t} \times SM$ is positive and statistically significant at the 5% level. This result is in line with literature on market-based funding as a substitute of bank credit (Becker and Ivashina 2014, 2018), indicating that larger firms facing a credit contraction may switch to alternative funding sources (e.g., bond issuance) outside of the banking sector, while small and micro firms may try to substitute their borrowing needs with other (less affected) banks. Finally, borrowing primarily from more affected banks also did not have any negative consequences for larger single relationship firms (as evidenced by the insignificant double interaction term $HighExposure_{j,t} \times Single\ Relationship$), possibly because their larger size made these firms more important clients to their respective banks.

Overall, the firm-level analysis confirms that the effects of recent buffer requirement increases on corporate lending in the euro area have been very modest, as the possibility of switching to other banks has further mitigated the impact at the firm level. While the results indicate that such substitution may be more difficult for small and micro firms with a single bank relationship, also these firms did not see an overall contraction in lending compared with the average firm borrowing from unconstrained banks.

5 Robustness

5.1 Restricting the sample to term loans

Throughout the paper, our intensive margin endogenous variable, $\Delta log(loans)_{i,j,t}$, is constructed by aggregating all loan contracts at the bank-firm-quarter level, comprising several different product types (e.g., term loans, credit lines, overdrafts, etc.). If firms borrow from less capitalised banks via different types of products that are differently affected by a capital shock, or if less capitalised banks have fewer or more products with the same firm than better capitalised banks, our coefficients might be biased. To exclude this possibility, we re-run the baseline regressions (Table 3) by still considering firms with multiple bank relationships but further restricting the sample to one product type only. Specifically, we focus on term loans exclusively, since this is the most common loan category in $AnaCredit$.

Results on the further restricted sample are reported in Table 11. Despite the significant drop in the number of observations (the sample shrinks by 54%), the results are in line with those in the baseline specification. In particular, the baseline impact of changes in buffer requirements on corporate lending in the euro area remains statistically insignificant also when considering only a single product type (column 1). Still, we observe a relative reduction in lending by banks at the lower end of the capital headroom distribution. As in Table 3, there are no differential lending effects when splitting the sample at the median, but we document a statistically significant relative contraction in corporate lending for those banks that are below the tercile [quartile, quintile] of the distribution.

Contrarily to the baseline specification, however, the point estimates are doubled and the F-test for joint significance of the sum of the coefficient for $\Delta CBR_{i,t}$ and its interaction with $D(D2CBR < Quintile)$ is statistically significant at the 10% level (p-value = 0.06), indicating that banks below the quintile of the capital headroom distribution decrease lending in absolute terms following capital buffer requirement increases. A possible interpretation for the stronger effect in this sample is that less capitalised banks are particularly reluctant to bind capital for longer, while the result also suggests that relying on different types of products (and banks, as before) can shield firms from negative credit supply shocks.

5.2 Continuous distance to the CBR

As a second robustness check, we replace the dummies identifying banks closer to the CBR with two continuous measures of capital headroom. The first, *D2CBR (continuous)*, refers to the distance to CBR lagged by one quarter whilst the second, *D2CBR_21Q1 (continuous)*, is computed by taking its value as of 2021-Q1 and keeping it fixed over the sample period. Although the dummy specification has the advantage of allowing for non-linearity in the impact of distance to CBR on bank lending supply following capital buffer increases, employing a continuous specification allows for a better estimation of the intensity of the effect and also makes the results less dependent on the specific choice of the threshold.[15]

The results of this test are reported in Table 12. As before, the baseline impact of a change in buffer requirements is statistically insignificant. The interaction terms between ΔCBR and D2CBR expressed as a continuous variable are positive and statistically significant (at the 10% level in both econometric specifications), suggesting that banks further away from the CBR adjust lending more positively than less capitalised banks in response to higher capital buffer requirements. The magnitude of the effect is rather modest, however, with each pp greater distance to the CBR resulting in 7.2 to 11.7 bps higher corporate lending after a 1 pp increase in ΔCBR.

5.3 Different quantiles of the capital headroom distribution

In the baseline specification, we defined as less capitalised those banks with a distance to the CBR (as of 2021-Q1) below the median, first tercile, first quartile and first quintile of the distance to the CBR distribution, with the cut-offs corresponding to a distance to the CBR

[15]The latter point is also addressed by our approach of showing the results for various different thresholds. The use of dummies to capture non-linearity in the level of capitalisation is widely employed by other studies in the banking literature (see, amongst others, Gropp et al. 2019).

of 6.3% for the median, 4.7% for the tercile, 4.1% for the quartile and 3.6% for the quintile. Thanks to the large sample of banks at our disposal, we can further expand on this and test whether the results hold also when considering banks with a distance to CBR below the first sextile (3.3%), first septile (3.1%) and first octile (2.9%) of the distribution. We expect a stronger relative lending contraction as banks get closer to the CBR.

While the coefficient for the interaction term is statistically insignificant for banks below the first sextile of the distance to the CBR distribution, the results for the first septile and first octile are statistically significant (at the 10% level; see Table 13). The point estimates are also larger than those reported in Table 3. This is consistent with the fact that those banks are even closer to the CBR and, therefore, cut back on corporate lending following increases in capital buffer requirements relative to banks further away from the CBR. However, and as in the baseline specification of Table 3, F-tests for joint significance do not indicate an absolute lending contraction following a CBR increase.[16]

6 Conclusion

In this paper, we have examined the impact of capital buffer requirement increases since the pandemic on corporate lending in the euro area. Our results suggest overall very modest effects. For the average bank, buffer requirement increases did not exert a statistically significant impact on corporate lending. This reflects the overall comfortable capital position of euro area banks, which allowed them to adapt to higher requirements without constraining credit supply. Moreover, while we do observe a relative reduction in lending by less capitalised banks (distance to the combined buffer requirement smaller than 4% of risk-weighted assets)

[16] In the Appendix, we perform two additional robustness checks. In Table A6 we control for the logarithm of the length (measured in months) in bank-firm relationships, hence further controlling for relationship lending. In Table A7 we make sure that our main findings remain valid also in the period of fast and pronounced interest rate hikes since mid-2022.

following buffer requirement increases, this did not result in absolute lending reductions or contractions in aggregate firm borrowing, suggesting limited real implications of such differential adjustments. Single relationship firms and smaller firms borrowing from the most affected banks experienced somewhat stronger negative effects, although credit substitution by better capitalised banks seems to have mitigated the firm-level impact.

Overall, our findings confirm that the increases in capital buffer requirements since the pandemic had only a modest impact on corporate lending in the euro area. This illustrates that the economic costs of increasing buffer requirements when banking sector conditions are favourable can be expected to be low. Against this background, activating releasable capital buffers at an early stage of the financial or economic cycle appears to be a robust policy strategy, as it allows policy makers to 'buy insurance at low economic cost'.

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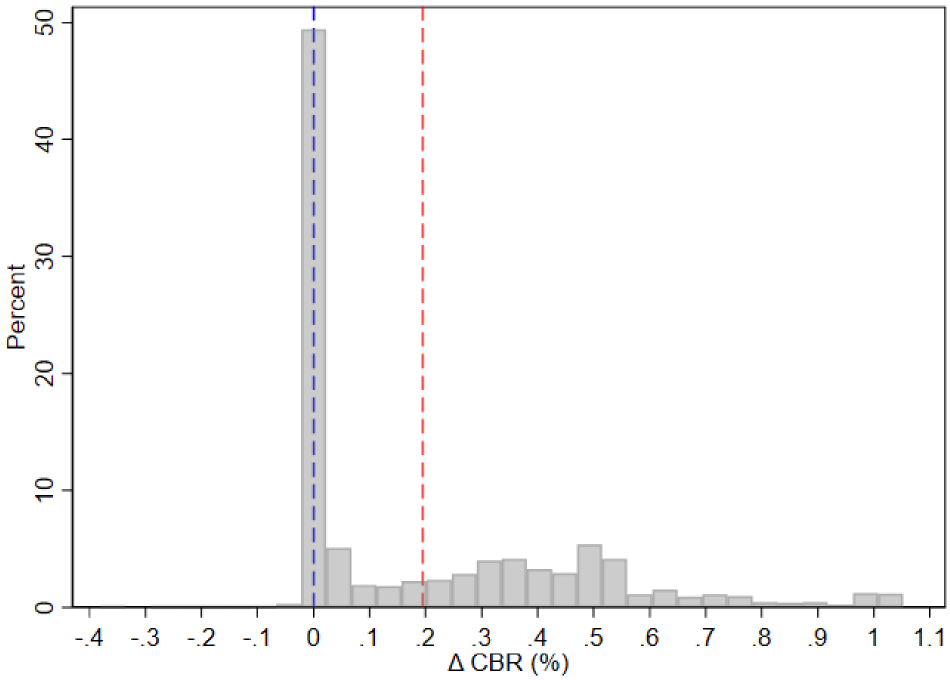


Figure 1: Distribution ΔCBR across banks averaged over 2021Q2 - 2023Q2

Notes: The figure reports the distribution of ΔCBR across banks averaged over 2021Q2-2023Q2. ΔCBR is the difference between the announced and the actual CBR. The vertical blue dotted line represents the median whilst the vertical red dotted line the mean.

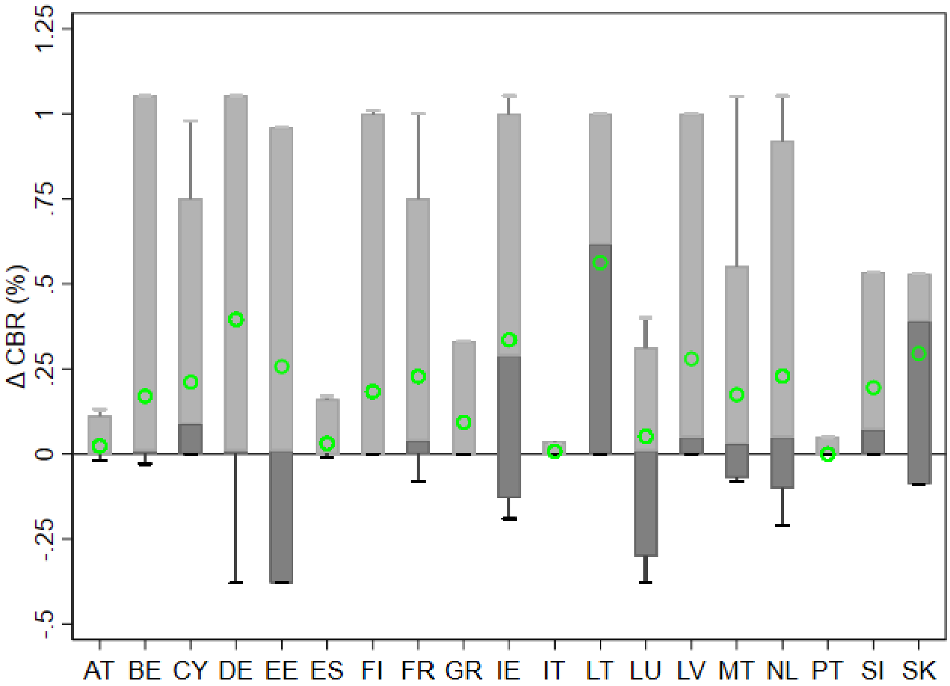


Figure 2: Distribution ΔCBR across countries averaged over 2021Q2 - 2023Q2

Notes: The figure reports box plots of ΔCBR across euro area countries. The lime coloured circle represents the mean. The intersection between the light and dark grey bars represents the median. The light and dark grey bars indicate the upper and lower quartile, respectively. Highest and lowest values are represented by the two lines outside the box.

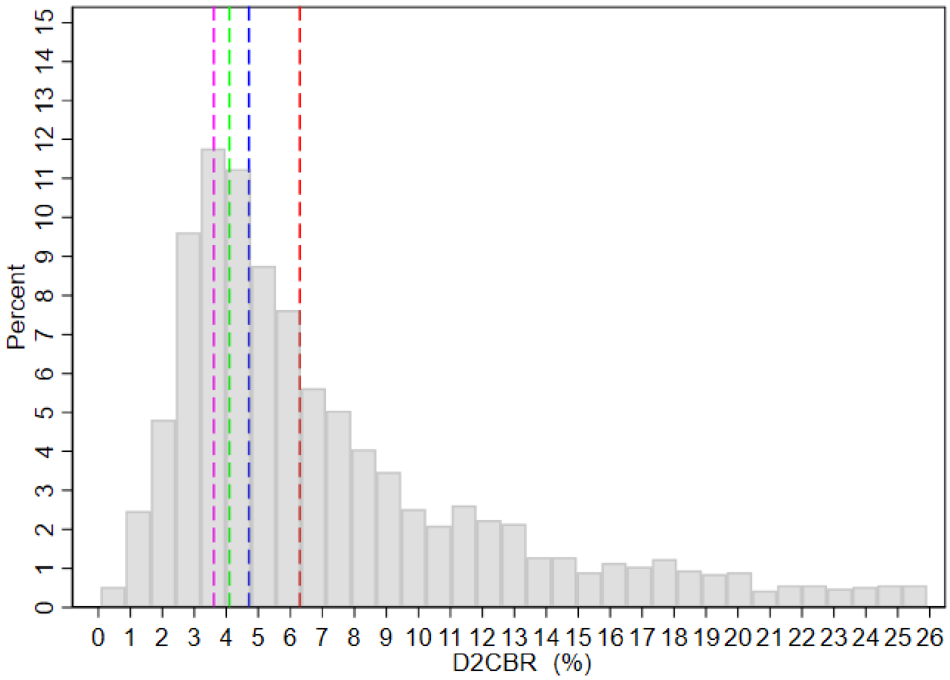


Figure 3: Distribution of D2CBR across banks averaged over 2021Q2 - 2023Q2

Notes: The figure reports the distribution of D2CBR across banks. D2CBR is defined as the distance between the bank's current CET1 ratio and the level of its CBR at the onset of our sample period (2021Q1). D(D2CBR) is a dummy variable indicating whether a bank's capital headroom is in the lower half [tercile, quartile, quintile] of the overall distribution. The red, blue, lime and magenta dashed vertical lines represent the median (6.3%), the tercile (4.7%), the quartile (4.1%) and the quintile (3.6%), respectively.

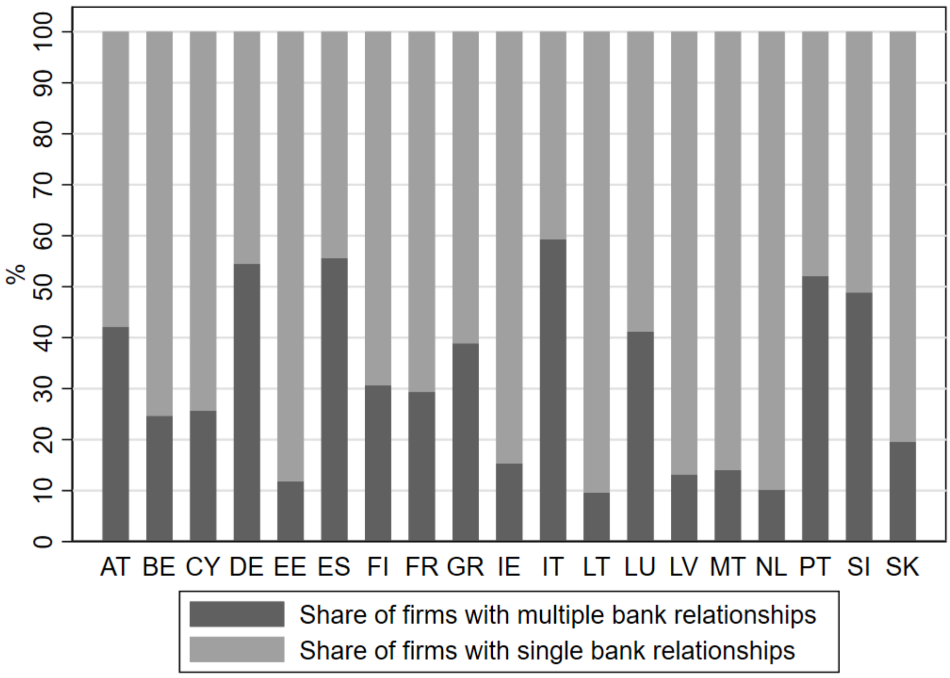


Figure 4: Share of firms with single/multiple bank relationships per country

Notes: The figure reports the share of firms with single/multiple bank relationships per country in the AnaCredit sample matched with supervisory bank-level data. The numbers show the average across the time period (2021Q2-2023Q2).

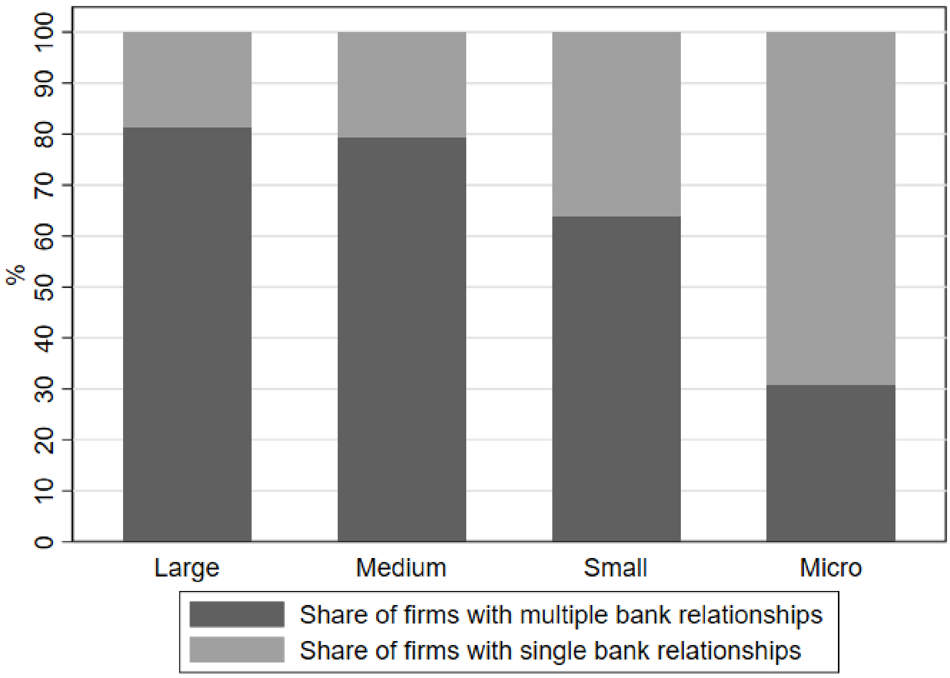


Figure 5: Share of firms with single/multiple bank relationships per firm size

Notes: The figure reports the share of firms with single/multiple bank relationships per firm size in the AnaCredit sample. The numbers show the average across the time period (2021Q2-2023Q2). Micro refers to enterprises that employ less than 10 employees and whose annual turnover and/or annual balance sheet total does not exceed EUR 2 million. Small refers to enterprises that employ less than 50 employees and have an annual turnover and/or annual balance sheet total that does not exceed EUR 10 million. Medium refers to enterprises that employ less than 250 but more than 50 employees, have an annual turnover not exceeding EUR 50 million and/or an annual balance sheet total not exceeding EUR 43 million. Large firm employs more than 250 employees; has an annual turnover greater than EUR 50 million; and annual balance sheet greater than EUR 43 million.

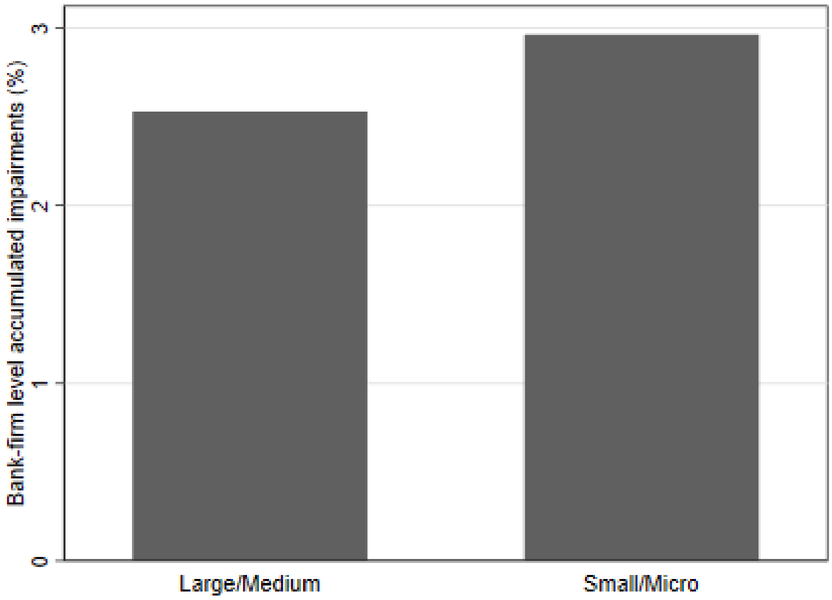


Figure 6: Bank firm level accumulated impairments and firm size

Notes: The figure reports the bank-firm level share of accumulated impairment to loan ratio for large and medium firms (left bar) and small and micro firms (right bar). The share is averaged over the sample period. Micro refers to enterprises that employ less than 10 employees and whose annual turnover and/or annual balance sheet total does not exceed EUR 2 million. Small refers to enterprises that employ less than 50 employees and have an annual turnover and/or annual balance sheet total that does not exceed EUR 10 million. Medium refers to enterprises that employ less than 250 but more than 50 employees, have an annual turnover not exceeding EUR 50 million and/or an annual balance sheet total not exceeding EUR 43 million. Large firm employs more than 250 employees; has an annual turnover greater than EUR 50 million; and annual balance sheet greater than EUR 43 million. T-test for a difference in means between the two groups is statistically significant at the 1% level.

Table 1: Descriptive statistics

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Panel A: Bank-level							
ΔCBR (%)	6,733	0.194	0.365	-0.380	0.00	0.080	1.052
TSCR (%)	6,733	8.194	1.400	4.500	7.441	9.144	10.500
CET1_r (%)	6,733	18.800	6.540	9.994	14.486	20.971	37.714
TA (log)	6,733	7.732	1.562	6.107	6.444	8.457	12.989
RWA/TA (%)	6,733	48.612	14.654	20.961	36.961	59.619	78.880
CASH/TA (%)	6,733	8.291	8.100	0.366	2.125	11.121	36.559
ROA (%)	6,733	0.375	0.519	-0.906	0.090	0.628	1.941
NPLs (%)	6,733	2.588	2.518	0.464	0.961	3.168	13.303
DEP/TA (%)	6,733	85.137	10.284	31.716	85.070	90.010	92.619
LOAN/TA (%)	6,733	69.351	15.743	38.135	57.417	83.308	95.121
Panel B: Bank-firm level							
Δ Ln (loans)	15,168,808	0.022	0.269	-1.006	-0.070	0.000	1.196
Δ Ln (borrowing)	22,698,199	-0.020	0.252	-0.971	-0.069	0.00	1.203
D(new rel)	18,445,061	0.040	0.195	0.000	0.000	0.000	1.000

Table 2: Number of banks by country

Country	N.obs	N.banks	Percentage
AT	334,699	443	2.21
BE	383,264	20	2.53
CY	39,205	10	0.26
DE	2,024,457	834	13.35
EE	12,243	8	0.08
ES	3,043,246	75	20.06
FI	347,326	160	2.29
FR	2,799,151	110	18.45
GR	142,996	15	0.94
IE	42,678	13	0.28
IT	5,048,197	234	33.28
LT	7,063	8	0.05
LU	53,877	49	0.36
LV	3,069	12	0.02
MT	3,813	10	0.03
NL	29,653	19	0.20
PT	758,392	104	5.00
SI	54,889	13	0.36
SK	40,590	9	0.27
TOT	15,168,808	2,146	100

Table 3: Intensive Margin

This table shows the results of the bank-firm level panel regressions. For a detailed definition of the variables refer to Table A1. *, **, *** indicate statistical significance of 1%, 5% and 10% respectively.

	Endogenous variable: Δ ln (loans)				
	(1)	(2)	(3)	(4)	(5)
ΔCBR	0.7738	1.4231	1.3991	1.2464	1.3327
	(1.021)	(0.891)	(1.083)	(1.065)	(1.081)
ΔCBR × D(D2CBR<Median)		-0.9808			
		(0.747)			
ΔCBR × D(D2CBR<Tercile)			-1.6271**		
			(0.726)		
ΔCBR × D(D2CBR<Quartile)				-1.3956*	
				(0.795)	
ΔCBR × D(D2CBR<Quintile)					-1.7355**
					(0.899)
TSCR_{t-1}	-0.2653	-0.2265	-0.2358	-0.2361	-0.2414
	(0.237)	(0.237)	(0.238)	(0.238)	(0.238)
CET1_{t-1}	0.1063	0.1031	0.1066	0.1042	0.1028
	(0.096)	(0.096)	(0.097)	(0.097)	(0.097)
$ln\text{TA.}_{t-1}$	0.0098	0.0129	0.0130	0.0126	0.0131
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
RWA/TA_{t-1}	0.0791	0.0727	0.0693	0.0684	0.0686
	(0.058)	(0.059)	(0.059)	(0.059)	(0.059)
CASH/TA_{t-1}	0.0133	0.0126	0.0114	0.0092	0.0088
	(0.043)	(0.043)	(0.044)	(0.044)	(0.044)
ROA_{t-1}	0.0133***	0.0132***	0.0134***	0.0135***	0.0132***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
NPLs_{t-1}	0.0020	0.0021	0.0021	0.0021	0.0021
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
DEP/TA_{t-1}	0.0968	0.0924	0.0897	0.0909	0.0885
	(0.065)	(0.062)	(0.062)	(0.061)	(0.060)
LOAN/TA_{t-1}	-0.0170	-0.0167	-0.0155	-0.0169	-0.0181
	(0.049)	(0.048)	(0.048)	(0.049)	(0.048)
Observations	15,148,271	14,907,333	14,907,333	14,907,333	14,907,333
Bank FE	Yes	Yes	Yes	Yes	Yes
Borrower*Time FE	Yes	Yes	Yes	Yes	Yes
Cluster S.E.	Bank	Bank	Bank	Bank	Bank
Joint coeff		0.439	-0.229	-0.149	-0.403
p-value		0.72	0.82	0.89	0.71

Table 4: Intensive margin: industry-location-size

This table shows the results of the bank-firm level panel regressions. For a detailed definition of the variables refer to Table A1. *, **, *** indicate statistical significance of 1%, 5% and 10% respectively.

	Endogenous variable: Δ ln (loans)				
	(1)	(2)	(3)	(4)	(5)
ΔCBR	-0.0145	0.4214	0.4264	0.3853	0.4613
	(0.503)	(0.448)	(0.512)	(0.515)	(0.527)
ΔCBR × D(D2CBR<Median)		-0.7951			
		(0.686)			
ΔCBR × D(D2CBR<Tercile)			-1.5445**		
			(0.711)		
ΔCBR × D(D2CBR<Quartile)				-1.6179**	
				(0.819)	
ΔCBR × D(D2CBR<Quintile)					-1.9640**
					(0.901)
$TSCR_{t-1}$	-0.0990	-0.0815	-0.1017	-0.1057	-0.1176
	(0.202)	(0.198)	(0.193)	(0.192)	(0.189)
$CET1_{t-1}$	0.0406	0.0375	0.0388	0.0366	0.0354
	(0.083)	(0.082)	(0.082)	(0.082)	(0.082)
$ln TA_{t-1}$	0.0156	0.0169	0.0171	0.0167	0.0172
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
RWA/TA_{t-1}	0.0806*	0.0756	0.0709	0.0692	0.0687
	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)
$CASH/TA_{t-1}$	-0.0230	-0.0230	-0.0231	-0.0243	-0.0238
	(0.034)	(0.033)	(0.033)	(0.034)	(0.033)
ROA_{t-1}	0.0106***	0.0105***	0.0107***	0.0107***	0.0104***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
$NPLs_{t-1}$	0.0018	0.0019	0.0019	0.0019	0.0019
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
DEP/TA_{t-1}	0.1296*	0.1229**	0.1153*	0.1135*	0.1094*
	(0.067)	(0.062)	(0.060)	(0.058)	(0.057)
$LOAN/TA_{t-1}$	-0.0165	-0.0174	-0.0164	-0.0164	-0.0171
	(0.047)	(0.046)	(0.047)	(0.047)	(0.046)
Observations	32,165,694	31,870,382	31,870,382	31,870,382	31,870,382
Bank FE	Yes	Yes	Yes	Yes	Yes
ILS*Time FE	Yes	Yes	Yes	Yes	Yes
Cluster S.E.	Bank	Bank	Bank	Bank	Bank
Joint coeff		-0.37	-1.11	-1.23	-1.50
p-value		0.621	0.133	0.134	0.077

Table 5: Intensive margin - Only single bank relationships

This table shows the results of the bank-firm level panel regressions. For a detailed definition of the variables refer to Table A1. *, **, *** indicate statistical significance of 1%, 5% and 10% respectively.

	Endogenous variable: Δ ln (loans)				
	(1)	(2)	(3)	(4)	(5)
ΔCBR	-0.4233	-0.1047	-0.0825	-0.0604	0.0074
	(0.394)	(0.349)	(0.383)	(0.386)	(0.395)
ΔCBR × D(D2CBR<Median)		-0.6687			
		(0.671)			
ΔCBR × D(D2CBR<Tercile)			-1.5039**		
			(0.705)		
ΔCBR × D(D2CBR<Quartile)				-1.7876**	
				(0.796)	
ΔCBR × D(D2CBR<Quintile)					-2.0998**
					(0.852)
$TSCR_{t-1}$	-0.0051	-0.0086	-0.0394	-0.0504	-0.0655
	(0.206)	(0.197)	(0.186)	(0.182)	(0.179)
$CET1_{t-1}$	-0.0136	-0.0154	-0.0160	-0.0187	-0.0198
	(0.069)	(0.068)	(0.068)	(0.068)	(0.068)
$ln TA_{t-1}$	0.0229	0.0229*	0.0231	0.0227	0.0230
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
RWA/TA_{t-1}	0.0903*	0.0874*	0.0808*	0.0780*	0.0771*
	(0.047)	(0.046)	(0.045)	(0.044)	(0.044)
$CASH/TA_{t-1}$	-0.0558*	-0.0542*	-0.0531*	-0.0526	-0.0513
	(0.033)	(0.032)	(0.032)	(0.032)	(0.032)
ROA_{t-1}	0.0084***	0.0084***	0.0085***	0.0085***	0.0082***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
$NPLs_{t-1}$	0.0017	0.0017	0.0017	0.0018	0.0018
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
DEP/TA_{t-1}	0.1628**	0.1544**	0.1414**	0.1352**	0.1299**
	(0.075)	(0.068)	(0.063)	(0.060)	(0.059)
$LOAN/TA_{t-1}$	-0.0226	-0.0246	-0.0234	-0.0219	-0.0220
	(0.046)	(0.045)	(0.046)	(0.046)	(0.046)
Observations	17,388,363	17,331,922	17,331,922	17,331,922	17,331,922
Bank FE	Yes	Yes	Yes	Yes	Yes
ILS*Time FE	Yes	Yes	Yes	Yes	Yes
Cluster S.E.	Bank	Bank	Bank	Bank	Bank
Joint coeff		-0.77	-1.58	-1.84	-2.09
p-value		0.247	0.023	0.015	0.008

Table 6: Firm size interaction

This table shows the results of the bank-firm level panel regressions. For a detailed definition of the variables refer to Table A1. *, **, *** indicate statistical significance of 1%, 5% and 10% respectively.

	Endogenous variable: Δ ln (loans)							
	Multiple bank-relationships				*Single bank-relationships*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔCBR	2.0089	1.6785	1.4299	1.5924	-0.2289	-0.3046	-0.2995	-0.3841
	(1.336)	(1.483)	(1.434)	(1.520)	(0.474)	(0.407)	(0.404)	(0.415)
ΔCBR*SMEs	-0.8163	-0.3905	-0.2609	-0.3669	0.1299	0.2303	0.2486	0.4063
	(0.746)	(0.652)	(0.604)	(0.698)	(0.396)	(0.346)	(0.328)	(0.317)
ΔCBR*Median D2CBR	-1.0924				-0.7620			
	(0.908)				(0.734)			
Median D2CBR*SMEs	-0.0027*				-0.0009			
	(0.001)				(0.001)			
ΔCBR*Median D2CBR*SMEs	0.1391				0.0972			
	(0.385)				(0.417)			
ΔCBR*Tercile D2CBR		-1.4613**				-1.2273*		
		(0.722)				(0.713)		
Tercile D2CBR*SMEs		0.0025				0.0004		
		(0.003)				(0.001)		
ΔCBR*Tercile D2CBR*SMEs		-0.3134				-0.2897		
		(0.317)				(0.365)		
ΔCBR*Quartile D2CBR			-1.0972				-1.5032*	
			(0.791)				(0.805)	
Quartile D2CBR*SMEs			0.0033				0.0008	
			(0.003)				(0.002)	
ΔCBR*Quartile D2CBR*SMEs			-0.5047				-0.2983	
			(0.334)				(0.391)	
ΔCBR*Quintile D2CBR				-1.3916				-1.1474
				(0.912)				(0.908)
Quintile D2CBR*SMEs				0.0025				0.0020
				(0.003)				(0.002)
ΔCBR*Quintile D2CBR*SMEs				-0.5911*				-0.9994***
				(0.342)				(0.367)
Observations	14,376,060	14,376,060	14,376,060	14,376,060	17,331,922	17,331,922	17,331,922	17,331,922
Bank FE No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower*Time FE	Yes	Yes	Yes	Yes	No	No	No	No
ILS*Time FE	No	No	No	No	Yes	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 7: Extensive margin - new firms with and without pre-existing credit relationships

This table shows the results of the bank-firm level panel regressions. For a detailed definition of the variables refer to Table A1. *, **, *** indicate statistical significance of 1%, 5% and 10% respectively.

	Endogenous variable: D(new rel)				
	(1)	(2)	(3)	(4)	(5)
ΔCBR	0.3265	1.0193	0.7667	0.7265	0.7985
	(1.111)	(0.866)	(1.006)	(0.996)	(1.000)
ΔCBR × D(D2CBR<Median)		-1.4514*			
		(0.790)			
ΔCBR × D(D2CBR<Tercile)			-1.4932**		
			(0.769)		
ΔCBR × D(D2CBR<Quartile)				-1.9556**	
				(0.881)	
ΔCBR × D(D2CBR<Quintile)					-2.3016**
					(0.963)
$TSCR_{t-1}$	-0.4034	-0.1661	-0.1872	-0.1949	-0.2104
	(0.328)	(0.252)	(0.256)	(0.258)	(0.261)
$CET1_{t-1}$	0.2260**	0.1622*	0.1631*	0.1603*	0.1596*
	(0.091)	(0.084)	(0.085)	(0.085)	(0.084)
$ln TA_{t-1}$	0.0853***	0.0978***	0.0990***	0.0986***	0.0996***
	(0.023)	(0.019)	(0.019)	(0.019)	(0.019)
RWA/TA_{t-1}	0.1462***	0.1095***	0.1041**	0.1023**	0.1022**
	(0.050)	(0.042)	(0.042)	(0.042)	(0.042)
$CASH/TA_{t-1}$	0.0120	-0.0266	-0.0284	-0.0292	-0.0305
	(0.049)	(0.037)	(0.037)	(0.037)	(0.037)
ROA_{t-1}	0.0043	0.0044	0.0047	0.0048	0.0045
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
$NPLs_{t-1}$	0.0001	0.0008	0.0008	0.0008	0.0008
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
DEP/TA_{t-1}	0.0204	0.0119	0.0093	0.0075	0.0036
	(0.085)	(0.068)	(0.067)	(0.067)	(0.066)
$LOAN/TA_{t-1}$	0.0278	0.0076	0.0063	0.0063	0.0053
	(0.062)	(0.051)	(0.050)	(0.050)	(0.050)
Observations	37,961,874	37,575,926	37,575,926	37,575,926	37,575,926
Bank FE	Yes	Yes	Yes	Yes	Yes
ILS*Time FE	Yes	Yes	Yes	Yes	Yes
Cluster S.E.	Bank	Bank	Bank	Bank	Bank
Joint coeff		-0.43	-1.05	-1.22	-1.50
p-value		0.740	0.351	0.311	0.225

Table 8: Extensive margin - new firms with pre-existing credit relationships

This table shows the results of the bank-firm level panel regressions. For a detailed definition of the variables refer to Table A1. *, **, *** indicate statistical significance of 1%, 5% and 10% respectively.

	Endogenous variable: D(new rel)				
	(1)	(2)	(3)	(4)	(5)
ΔCBR	0.4845	1.2909	1.1905	1.0601	1.1562
	(1.598)	(1.179)	(1.458)	(1.438)	(1.448)
ΔCBR × D(D2CBR<Median)		-1.0241			
		(0.715)			
ΔCBR × D(D2CBR<Tercile)			-1.4932**		
			(0.589)		
ΔCBR × D(D2CBR<Quartile)				-1.3185**	
				(0.672)	
ΔCBR × D(D2CBR<Quintile)					-1.7086**
					(0.759)
$TSCR_{t-1}$	-0.4210	-0.1332	-0.1432	-0.1460	0.1554
	(0.378)	(0.240)	(0.243)	(0.243)	(0.242)
$CET1_{t-1}$	0.2504**	0.1544*	0.1569*	0.1540*	0.1535*
	(0.100)	(0.088)	(0.088)	(0.088)	(0.088)
$lnTA_{t-1}$	0.0910***	0.1086***	0.1092***	0.1088***	0.1097***
	(0.027)	(0.017)	(0.017)	(0.017)	(0.017)
RWA/TA_{t-1}	0.1281**	0.0726	0.0698	0.0693	0.0695
	(0.059)	(0.046)	(0.046)	(0.046)	(0.046)
$CASH/TA_{t-1}$	0.0254	-0.0279	-0.0285	-0.0299	-0.0319
	(0.055)	(0.036)	(0.036)	(0.036)	(0.036)
ROA_{t-1}	0.0040	0.0040	0.0043	0.0043	0.0041
	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
$NPLs_{t-1}$	-0.0005	0.0003	0.0003	0.0004	0.0003
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
DEP/TA_{t-1}	-0.0054	-0.0169	-0.0185	-0.0175	-0.0206
	(0.091)	(0.061)	(0.061)	(0.061)	(0.060)
$LOAN/TA_{t-1}$	0.0786	0.0571	0.0562	0.0555	0.0539
	(0.071)	(0.053)	(0.052)	(0.053)	(0.052)
Observations	18,443,773	18,121,421	18,121,421	18,121,421	18,121,421
Bank FE	Yes	Yes	Yes	Yes	Yes
Borrower*Time FE	Yes	Yes	Yes	Yes	Yes
Cluster S.E.	Bank	Bank	Bank	Bank	Bank
Joint coeff		0.266	-0.302	-0.258	-0.552
p-value		0.87	0.81	0.84	0.67

Table 9: Extensive margin - new firms without pre-existing credit relationships

This table shows the results of the bank-firm level panel regressions. For a detailed definition of the variables refer to Table A1. *, **, *** indicate statistical significance of 1%, 5% and 10% respectively.

	Endogenous variable: D(new rel)				
	(1)	(2)	(3)	(4)	(5)
ΔCBR	0.3031	0.9669	0.6007	0.6206	0.6811
	(0.903)	(0.790)	(0.832)	(0.824)	(0.829)
ΔCBR × D(D2CBR<Median)		-1.7972*			
		(0.933)			
ΔCBR × D(D2CBR<Tercile)			-2.1374**		
			(1.030)		
ΔCBR × D(D2CBR<Quartile)				-2.4989**	
				(1.137)	
ΔCBR × D(D2CBR<Quintile)					-2.7912**
					(1.231)
$TSCR_{t-1}$	-0.2789	-0.1968	-0.2283	-0.2439	-0.2609
	(0.308)	(0.305)	(0.314)	(0.320)	(0.327)
$CET1_{t-1}$	0.1992**	0.1659**	0.1649**	0.1619**	0.1610**
	(0.085)	(0.082)	(0.083)	(0.082)	(0.082)
$ln TA_{t-1}$	0.0842***	0.0882***	0.0901***	0.0896***	0.0906***
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
RWA/TA_{t-1}	0.1492***	0.1309***	0.1216***	0.1184***	0.1178***
	(0.050)	(0.045)	(0.045)	(0.044)	(0.044)
$CASH/TA_{t-1}$	-0.0005	-0.0236	-0.0275	-0.0268	-0.0271
	(0.048)	(0.043)	(0.043)	(0.043)	(0.043)
ROA_{t-1}	0.0049	0.0056	0.0059	0.0059	0.0056
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
$NPLs_{t-1}$	0.0011	0.0012	0.0013	0.0013	0.0013
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
DEP/TA_{t-1}	0.0524	0.0408	0.0363	0.0305	0.0258
	(0.086)	(0.075)	(0.071)	(0.070)	(0.070)
$LOAN/TA_{t-1}$	-0.0184	-0.0357	-0.0376	-0.0362	-0.0364
	(0.056)	(0.052)	(0.051)	(0.051)	(0.051)
Observations	20,010,151	19,871,979	19,871,979	19,871,979	19,871,979
Bank FE	Yes	Yes	Yes	Yes	Yes
ILS*Time FE	Yes	Yes	Yes	Yes	Yes
Cluster S.E.	Bank	Bank	Bank	Bank	Bank
Joint coeff		-0.83	-1.53	-1.87	-2.11
p-value		0.481	0.206	0.150	0.118

Table 10: Firm-level regression

This table shows the results of the firm-level panel regressions. For a detailed definition of the variables refer to Table A1. *, **, *** indicate statistical significance of 1%, 5% and 10% respectively.

	Endogenous variable: Δ ln (borrowing)		
	(1)	(2)	(3)
High exposure	-0.0032	0.0097**	-0.0008
	(0.003)	(0.004)	(0.004)
Single Relationship		-0.0707***	-0.0805***
		(0.002)	(0.003)
High exposure x Single Relationship		-0.0092**	0.0021
		(0.004)	(0.004)
High exposure x SM			0.0118**
			(0.005)
Single Relationship x SM			0.0107***
			(0.003)
High exposure x Single Relationship x SM			-0.0125***
			(0.005)
L.wTSCR	-0.2455***	-0.2992***	-0.2997***
	(0.072)	(0.100)	(0.100)
L.wCET1	0.0105	0.0362	0.0364
	(0.018)	(0.022)	(0.022)
L.wTA.log	-0.0009	-0.0003	-0.0003
	(0.001)	(0.001)	(0.001)
L.wRWA/TA	0.0002	-0.0021	-0.0018
	(0.007)	(0.010)	(0.010)
L.wCASH/TA	-0.0365**	-0.0461**	-0.0456**
	(0.015)	(0.022)	(0.022)
L.wROA	0.0050**	0.0039	0.0039
	(0.002)	(0.003)	(0.003)
L.wNPLs	0.0006	-0.0003	-0.0003
	(0.000)	(0.001)	(0.001)
L.wDEP/TA	-0.0037	0.0191*	0.0192*
	(0.009)	(0.010)	(0.010)
L.wLOAN/TA	-0.0112	-0.0182	-0.0181
	(0.009)	(0.011)	(0.011)
Observations	22,698,199	22,698,199	22,698,199
ILS*Time FE	Yes	Yes	Yes
Cluster S.E.	Largest lender	Largest lender	Largest lender
Joint coeff		0.0004	
p-value		0.867	

Table 11: Intensive Margin: Term loans only

This table shows the results of the bank-firm level panel regressions. For a detailed definition of the variables refer to Table A1. *, **, *** indicate statistical significance of 1%, 5% and 10% respectively.

	Endogenous variable: Δ ln (loans)				
	(1)	(2)	(3)	(4)	(5)
ΔCBR	0.2068	0.7415	1.2067	1.2914	1.5176
	(1.574)	(1.197)	(1.530)	(1.526)	(1.537)
ΔCBR × D(D2CBR<Median)		-1.3199			
		(1.432)			
ΔCBR × D(D2CBR<Tercile)			-3.5645**		
			(1.544)		
ΔCBR × D(D2CBR<Quartile)				-3.9069**	
				(1.589)	
ΔCBR × D(D2CBR<Quintile)					-5.0570***
					(1.814)
$TSCR_{t-1}$	-0.6367*	-0.6156*	-0.6148	-0.6187	-0.6352*
	(0.371)	(0.373)	(0.379)	(0.380)	(0.380)
$CET1_{t-1}$	0.2103**	0.2151**	0.2270**	0.2277**	0.2250**
	(0.104)	(0.103)	(0.103)	(0.103)	(0.102)
$lnTA_{t-1}$	0.0569***	0.0592***	0.0587***	0.0583***	0.0594***
	(0.020)	(0.020)	(0.020)	(0.019)	(0.020)
RWA/TA_{t-1}	0.1025	0.1069	0.1025	0.1010	0.1003
	(0.080)	(0.081)	(0.081)	(0.080)	(0.080)
$CASH/TA_{t-1}$	0.0209	0.0266	0.0226	0.0219	0.0221
	(0.040)	(0.041)	(0.042)	(0.042)	(0.042)
ROA_{t-1}	0.0084***	0.0080***	0.0084***	0.0085***	0.0083***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
$NPLs_{t-1}$	0.0038**	0.0039**	0.0038***	0.0038***	0.0038***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
DEP/TA_{t-1}	0.1294	0.1229	0.1075	0.1042	0.0955
	(0.101)	(0.094)	(0.091)	(0.090)	(0.088)
$LOAN/TA_{t-1}$	-0.0154	-0.0142	-0.0145	-0.0152	-0.0140
	(0.050)	(0.049)	(0.049)	(0.049)	(0.049)
Observations	7,099,264	6,985,792	6,985,792	6,985,792	6,985,792
Bank FE	Yes	Yes	Yes	Yes	Yes
Borrower*Time FE	Yes	Yes	Yes	Yes	Yes
Cluster S.E.	Bank	Bank	Bank	Bank	Bank
Joint coeff		-0.57	-2.35	-2.61	-3.53
p-value		0.793	0.190	0.150	0.060

Table 12: Intensive Margin: Continuous distance to CBR

This table shows the results of the bank-firm level panel regressions. For a detailed definition of the variables refer to Table A1. *, **, *** indicate statistical significance of 1%, 5% and 10% respectively.

	Endogenous variable: Δ ln (loans)	
	(1)	(2)
ΔCBR	0.3262	-0.0042
	(1.105)	(1.453)
D2CBR (continuous)	-0.1328*	
	(0.078)	
ΔCBR*D2CBR (continuous)	7.2788*	
	(4.488)	
ΔCBR*D2CBR_21Q1 (continuous)		11.7457*
		(6.548)
$TSCR_{t-1}$	-0.4097*	-0.3129
	(0.230)	(0.243)
$CET1_{t-1}$	0.2258*	0.0812
	(0.123)	(0.100)
$lnTA_{t-1}$	0.0105	0.0207
	(0.017)	(0.018)
RWA/TA_{t-1}	0.0814	0.0706
	(0.057)	(0.066)
$CASH/TA_{t-1}$	0.0159	0.0110
	(0.043)	(0.047)
ROA_{t-1}	0.0130***	0.0124***
	(0.004)	(0.004)
$NPLs_{t-1}$	0.0018	0.0019
	(0.001)	(0.001)
DEP/TA_{t-1}	0.0901	0.0843
	(0.063)	(0.072)
$LOAN/TA_{t-1}$	-0.0168	-0.0055
	(0.048)	(0.049)
Observations	15,148,271	11,757,833
Bank FE	Yes	Yes
Borrower*Time FE	Yes	Yes
Cluster S.E.	Bank	Bank

Table 13: Quantiles granularity

This table shows the results of the bank-firm level panel regressions. For a detailed definition of the variables refer to Table A1. *, **, *** indicate statistical significance of 1%, 5% and 10% respectively.

	Endogenous variable: Δ *ln (loans)*		
	(1)	(2)	(3)
ΔCBR	1.2413	1.3724	1.3508
	(1.075)	(1.100)	(1.112)
ΔCBR $\times$ D(D2CBR<Sextile)	-1.6255		
	(1.085)		
ΔCBR $\times$ D(D2CBR<Septile)		-2.1478*	
		(1.278)	
ΔCBR $\times$ D(D2CBR<Octile)			-2.2785*
			(1.414)
$TSCR_{t-1}$	-0.2271	-0.2178	-0.2172
	(0.240)	(0.242)	(0.242)
$CET1_{t-1}$	0.1047	0.1046	0.1041
	(0.097)	(0.097)	(0.097)
$lnTA_{t-1}$	0.0130	0.0126	0.0124
	(0.017)	(0.017)	(0.017)
RWA/TA_{t-1}	0.0707	0.0698	0.0704
	(0.059)	(0.059)	(0.059)
$CASH/TA_{t-1}$	0.0076	0.0065	0.0071
	(0.044)	(0.044)	(0.044)
ROA_{t-1}	0.0132***	0.0132***	0.0131***
	(0.004)	(0.004)	(0.004)
$NPLs_{t-1}$	0.0021	0.0021	0.0021
	(0.001)	(0.001)	(0.001)
DEP/TA_{t-1}	0.0935	0.0926	0.0927
	(0.061)	(0.060)	(0.060)
$LOAN/TA_{t-1}$	-0.0194	-0.0210	-0.0207
	(0.048)	(0.047)	(0.047)
Observations	14,907,333	14,907,333	14,907,333
Bank FE	Yes	Yes	Yes
Borrower*Time FE	Yes	Yes	Yes
Cluster S.E.	Bank	Bank	Bank
Joint coeff	-0.34	-0.77	-0.92
p-value	0.755	0.548	0.486

Appendix

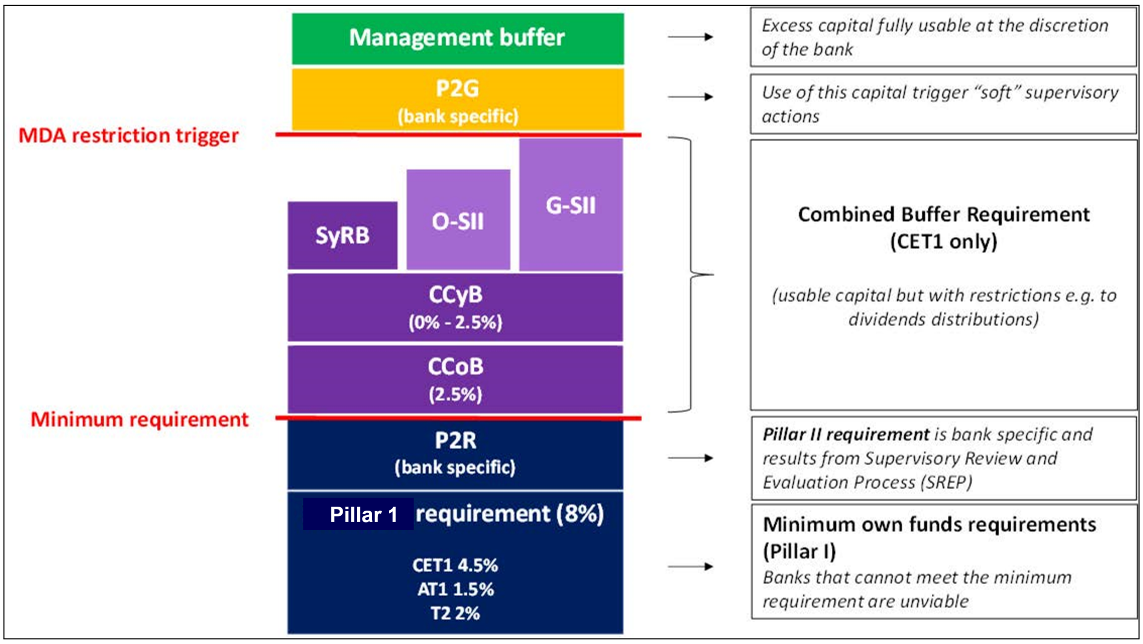
A Euro area banks' capital stack

Figure A1 shows the stacking order of capital requirements for euro area banks. As displayed, banks must fulfill *minimum requirements*, that are composed by a constant Pillar 1 element (8% of risk weighted assets, with at least 4.5% to be met with CET1) and by a bank-specific Pillar 2 requirement that is determined as part of the Supervisory Review and Evaluation Process (SREP) and is supposed to be met with a minimum of 56.25% of CET1. The sum of *minimum own funds requirements* and Pillar 2 requirements identifies the Total Srep Capital Requirement (TSCR).

The CBR sits on top of minimum capital requirements. In the European framework, the CBR consists of the capital conservation buffer (CCoB), the countercyclical buffer (CCyB), the (sectoral) systemic risk buffer (SyRB) and buffers for systemically important banks: Other systemically important intermediaries (O-SIIs) and globally systemically important banks (G-SIBs). The sum of TSCR and the CBR forms the Overall Capital Requirement (OCR). Above the CBR, banks are also supposed to fulfill the Pillar 2 Guidance (P2G). This is not strictly speaking a requirement as it is not legally binding.

The distance to the CBR, defined as the difference between a bank's capital ratio and its OCR, assumes particular relevance in shaping bank lending behaviour as dipping into the CBR triggers automatic restrictions on dividend distributions, bonuses and coupon payments according to the Maximum Distributable Amount (MDA) mechanism and forces banks to communicate a capital recovery plan to the supervisors. It follows that, *ceteris paribus*, an increase in capital buffer requirements reduces the distance to the CBR, pushing banks closer to CBR to deleverage to avoid dipping into the CBR.

Figure A1: Stacking Order of Capital Requirements



Source: ECB and Authors' Elaboration
Note: CET1: Common Equity Tier 1. AT1: additional Tier 1. T2: Tier 2. P2R: Pillar 2 requirement. CCoB: capital conservation buffer. CCyB: countercyclical capital buffer. G-SII and O-SII indicate, respectively, the structural buffers required for global systemically important institutions and for other systemically important institutions. SyRB: systemic risk buffer. P2G: Pillar 2 guidance

Table A1: Definitions of variables and their sources

Variable	Label	Definition	Source
Endogeneous variables:			
Lending growth	Δ *ln* (loans)	Change in the natural logarithm of the outstanding amounts granted from bank *b* to firm *f*	AnaCredit
Borrowing growth	Δ *ln* (Borrowing)	Change in the natural logarithm of the outstanding borrowing amounts for firm *f*	AnaCredit
New Relationships	D(new rel)	Dummy variable equal to 1 if: a) at time *t* a new firm did not have a relationship in the previous quarter enters the AnaCredit registry, and b) a firm that was in the sample in $t-1$ because it borrowed from the bank x also starts borrowing from bank y at time *t*, and equal to 0 otherwise.	AnaCredit
Variable of interest:			
ΔCombined Buffer Requirement	ΔCBR	Difference between the announced and the currently implemented CBR for bank *i* at time *t*	ECB Supervisory Data
Distance to CBR	D(D2CBR)	Dummy variables indicating whether a bank's capital headroom (defined as the distance between the bank's current CTE1 ratio and the level of its combined buffer requirement) at the onset of the sample (2021Q1) is in the lower half [tercile, quartile, quintile] of the overall distribution	ECB Supervisory Data
Bank control variables:			
Capital requirement	TSCR	Total SREP capital requirement ratio	ECB Supervisory Data
Capital ratio	CET1_r	The common equity tier1 ratio	ECB Supervisory Data
Bank size	*ln* (TA)	Natural logarithm of bank total assets	ECB Supervisory Data
Risk weight density	RWA/TA	The ratio of risk weighted assets to total assets	ECB Supervisory Data
Liquidity	Cash/TA	The ratio of cash incl. cash held at the central bank to total assets	ECB Supervisory Data
Profitability	ROA	The ratio of net income to total assets	ECB Supervisory Data
Non-performing loans	NPL ratio	The ratio of non-performing loans to gross loans	ECB Supervisory Data
Funding structure	Deposits/TA	The ratio of deposits to total assets	ECB Supervisory Data
Asset structure	LOAN/TA	The ratio of gross loans to total assets	ECB Supervisory Data
Bank-firm level variables:			
Relationship lending	*ln*Length relationship	The natural logarithm of the length of a bank-firm relationship measured in months	AnaCredit
Firm level variables:			
Exposed firms	High exposure	Dummy variable equal to 1 for firms that have more than 50% of their credit originating from banks below the first quintile of the distance to CBR and affected by a positive increase in buffer requirements	AnaCredit
Firm size	SM	Dummy variable equal to 1 for small and micro enterprises and 0 otherwise	AnaCredit

Table A2: Correlation matrix of covariates

The table shows the linear correlation coefficients of the bank-level covariates used in the regressions. The linear correlation coefficients have been computed on a pooled bank-quarter dataset. The total number of observations is 17,420. The number of banks considered is 2,088.

	ΔCBR	TSCR	CET1r	*ln*TA	RWA/TA	CASH/TA	ROA	NPLr	LOAN/TA
TSCR	-0.087								
CET1 ratio	-0.141	0.254							
*ln*TA	0.150	-0.358	-0.237						
RWA/TA	0.173	0.104	-0.403	-0.189					
CASH/TA	0.075	-0.050	-0.072	0.354	-0.108				
ROA	-0.329	0.047	0.180	-0.022	-0.067	-0.085			
NPL ratio	-0.192	0.001	0.084	-0.110	-0.063	0.091	0.001		
DEP/TA	0.039	0.070	-0.271	-0.337	0.047	-0.155	-0.137	-0.066	
LOAN/TA	-0.050	0.022	0.125	-0.293	0.078	-0.584	0.145	-0.228	0.105

Table A3: Intensive Margin: Bank x firm fixed effects

This table shows the results of the bank-firm level panel regressions. For a detailed definition of the variables refer to Table A1. *, **, *** indicate statistical significance of 1%, 5% and 10% respectively.

	Endogenous variable: Δ ln (loans)				
	(1)	(2)	(3)	(4)	(5)
ΔCBR	0.7425	1.4814*	1.4056	1.2096	1.3026
	(1.034)	(0.886)	(1.089)	(1.070)	(1.086)
ΔCBR × D(D2CBR<Median)		-1.1584			
		(0.746)			
ΔCBR × D(D2CBR<Tercile)			-1.7636**		
			(0.739)		
ΔCBR × D(D2CBR<Quartile)				-1.3993*	
				(0.784)	
ΔCBR × D(D2CBR<Quintile)					-1.7473*
					(0.893)
$TSCR_{t-1}$	-0.3912*	-0.3490	-0.3583	-0.3582	-0.3630
	(0.230)	(0.229)	(0.231)	(0.232)	(0.231)
$CET1_{t-1}$	0.1118	0.1062	0.1096	0.1070	0.1058
	(0.097)	(0.098)	(0.098)	(0.098)	(0.098)
$lnTA_{t-1}$	0.0165	0.0191	0.0191	0.0187	0.0192
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
RWA/TA_{t-1}	0.0774	0.0685	0.0646	0.0641	0.0643
	(0.059)	(0.060)	(0.060)	(0.060)	(0.060)
$CASH/TA_{t-1}$	0.0274	0.0254	0.0239	0.0216	0.0211
	(0.045)	(0.045)	(0.045)	(0.045)	(0.045)
ROA_{t-1}	0.0119***	0.0119***	0.0121***	0.0122***	0.0120***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
$NPLs_{t-1}$	0.0019	0.0020	0.0021	0.0021	0.0021
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
DEP/TA_{t-1}	0.0717	0.0662	0.0638	0.0660	0.0637
	(0.068)	(0.065)	(0.065)	(0.065)	(0.064)
$LOAN/TA_{t-1}$	0.0035	0.0036	0.0053	0.0035	0.0024
	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)
Observations	14,885,273	14,653,353	14,653,353	14,653,353	14,653,353
Bank*firm FE	Yes	Yes	Yes	Yes	Yes
Borrower*Time FE	Yes	Yes	Yes	Yes	Yes
Cluster S.E.	Bank	Bank	Bank	Bank	Bank
Joint coeff		0.32	-0.35	-0.18	-0.44
p-value		0.801	0.740	0.867	0.696

Table A4: Intensive Margin: Country x time fixed effects

This table shows the results of the bank-firm level panel regressions. For a detailed definition of the variables refer to Table A1. *, **, *** indicate statistical significance of 1%, 5% and 10% respectively.

	Endogenous variable: Δ ln (loans)				
	(1)	(2)	(3)	(4)	(5)
ΔCBR	0.9660	1.5381	1.5162	1.3735	1.4709
	(1.102)	(0.949)	(1.141)	(1.125)	(1.141)
ΔCBR × D(D2CBR<Median)		-0.9696			
		(0.755)			
ΔCBR × D(D2CBR<Tercile)			-1.6210**		
			(0.728)		
ΔCBR × D(D2CBR<Quartile)				-1.3933*	
				(0.799)	
ΔCBR × D(D2CBR<Quintile)					-1.7407*
					(0.902)
$TSCR_{t-1}$	-0.2887	-0.2482	-0.2571	-0.2580	-0.2636
	(0.236)	(0.237)	(0.238)	(0.238)	(0.237)
$CET1_{t-1}$	0.1065	0.1040	0.1074	0.1050	0.1038
	(0.096)	(0.097)	(0.097)	(0.097)	(0.097)
$ln TA_{t-1}$	0.0101	0.0130	0.0131	0.0127	0.0131
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
RWA/TA_{t-1}	0.0792	0.0734	0.0700	0.0692	0.0695
	(0.058)	(0.059)	(0.059)	(0.059)	(0.059)
$CASH/TA_{t-1}$	0.0130	0.0128	0.0117	0.0095	0.0091
	(0.043)	(0.043)	(0.044)	(0.044)	(0.044)
ROA_{t-1}	0.0134***	0.0133***	0.0135***	0.0135***	0.0133***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
$NPLs_{t-1}$	0.0020	0.0021	0.0021	0.0021	0.0021
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
DEP/TA_{t-1}	0.0969	0.0922	0.0894	0.0906	0.0880
	(0.065)	(0.062)	(0.062)	(0.061)	(0.061)
$LOAN/TA_{t-1}$	-0.0174	-0.0170	-0.0158	-0.0171	-0.0184
	(0.049)	(0.049)	(0.049)	(0.049)	(0.048)
Observations	15,148,271	14,907,333	14,907,333	14,907,333	14,907,333
Bank FE	Yes	Yes	Yes	Yes	Yes
Borrower*Time FE	Yes	Yes	Yes	Yes	Yes
Country*Time FE	Yes	Yes	Yes	Yes	Yes
Cluster S.E.	Bank	Bank	Bank	Bank	Bank
Joint coeff		0.56	-0.10	-0.02	-0.27
p-value		0.668	0.926	0.987	0.818

Table A5: Relevant policy changes during the sample period (2021 Q1 - 2023 Q2)

↑ and ↓ represent an increase or a decrease in the buffer rate respectively. The indication of the rate in percent refers to the fully loaded buffer rate, together with the number of banks and the sector (in parenthesis) affected, when relevant.

Country	Announcement	Implementation	Policy		
			CCyB	(s)SyRB	O-SII/G-SIB
Austria	1 Jun 2021	1 Jun 2021			↓ for 9 banks to 0.5-1%
	20 Dec 2022	1 Jan 2023			↑ for 1 bank to 1.75%
	20 Dec 2022	1 Jan 2024			↑ for 8 banks to 0.9-1.5%
	1 Jun 2021	1 Jun 2021		↓ for 8 banks to 0.5-1%	
	21 Dec 2022	1 Jan 2023		↓ for 1 bank to 0.5%	
Belgium	1 Dec 2022	1 Jan 2023			↓ for 2 banks to 0%
	29 Apr 2022	1 May 2022		↑ for 9 banks to 9% (RRE)	
	29 Sep 2023	1 Apr 2024		↓ for 9 banks to 6% (RRE)	
Cyprus	30 Nov 2022	30 Nov 2023	↑ to 0.5%		
	02 Jun 2023	02 Jun 2024	↑ to 1%		
	29 Nov 2021	1 Jan 2023			↓ for 5 banks to 0.25-1.5%
Germany	1 Feb 2022	1 Feb 2023	↑ to 0.75%		
	1 Dec 2021	1 Jan 2022			↑ for 1 bank to 0.75%
	1 Dec 2022	1 Jan 2023			↑ for 2 banks to 0.5-1%
	25 Mar 2022	1 Feb 2023		↑ to 2% (RRE)	
Estonia	30 Nov 2021	7 Dec 2022	↑ to 1%		
	29 Nov 2022	1 Dec 2023	↑ to 1.5%		
	26 Nov 2021	1 Jan 2022			↑ for 1 bank to 1.5%
	24 Oct 2022	1 Jan 2023			↑ for 1 bank to 2%
Spain	30 Jul 2021	21 Jul 2021			↓ for 1 bank to 0%
	30 Jul 2021	1 Jan 2023			↑ for 1 bank to 0.5%
Finland	28 Jun 2022	1 Jan 2023			↑ for 2 banks to 1.5-2.5%
	30 Mar 2023	1 Apr 2024		↑ for 1 bank to 1%	
France	7 Apr 2022	7 Apr 2023	↑ to 0.5%		
	2 Jan 2023	2 Jan 2024	↑ to 1%		
	1 Dec 2021	1 Jan 2023			↑ for 1 bank to 2%
	1 Dec 2022	1 Jan 2023			↓ for 1 bank to 1.5%
Greece	15 Dec 2021	1 Jan 2022			↓ for 3 banks to 0.75%
	21 Jul 2022	1 Jan 2023			↑ for 4 banks to 1%
Ireland	15 Jun 2022	1 Jun 2023	↑ to 0.5%		
	24 Nov 2022	24 Nov 2023	↑ to 1%		
	7 Jun 2023	7 Jun 2024	↑ to 1.5%		
Lithuania	3 Oct 2022	1 Oct 2023	↑ to 1%		
	26 Nov 2021	1 Jul 2022		↑ for 5 banks to 2% (RRE)	
Luxembourg	23 Dec 2021	1 Jan 2022			↑ for 1 bank to 1%
	22 Jan 2022	22 Jan 2022			↓ for 1 bank to 0%
Latvia	22 Dec 2021	1 Jan 2023			↑ for 1 bank to 1.75%
	22 Dec 2022	1 Jan 2023			↑ for 1 bank to 1.75%
Malta	12 Jan 2021	1 Jan 2025			↑ for 1 bank to 1%
	12 Jan 2023	1 Jan 2023			↓ for 1 bank to 1.25%
	12 Jan 2023	1 Jan 2026			↑ for 1 bank to 0.5%
	28 Mar 2023	31 Mar 2024		↑ to 1.5% (RRE)	
The Netherlands	25 May 2022	25 May 2023	↑ to 1%		
	31 May 2023	31 May 2024	↑ to 2%		
	31 May 2023	31 May 2024			↓ for 5 banks to 0.25-2%
Slovenia	28 Dec 2022	31 Dec 2023	↑ to 0.5%		
	1 Dec 2021	1 Jan 2023			↑ for 1 bank to 1.25%
	6 May 2022	1 Jan 2023		↑ to 1% (RRE) ↑ to 0.5% (unsecured)	
Slovakia	20 Jun 2022	1 Aug 2023	↑ to 1.5%		
	5 Jun 2021	1 Jan 2022			↑ for 3 banks to 1.5-2%
	7 Jun 2022	1 Jan 2023			↑ for 1 bank to 1.25%
	5 Jun 2021	1 Jan 2022		↓ for 3 banks to 0%	

Table A6: Intensive Margin: Bank-firm relationship length

This table shows the results of the bank-firm level panel regressions. For a detailed definition of the variables refer to Table A1. *, **, *** indicate statistical significance of 1%, 5% and 10% respectively.

	Endogenous variable: Δ ln (loans)				
	(1)	(2)	(3)	(4)	(5)
ΔCBR	0.7926	1.4457	1.4359	1.2863	1.3812
	(1.041)	(0.907)	(1.107)	(1.090)	(1.106)
ΔCBR × D(D2CBR<Median)		-1.0063			
		(0.789)			
ΔCBR × D(D2CBR<Tercile)			-1.7293**		
			(0.769)		
ΔCBR × D(D2CBR<Quartile)				-1.5065*	
				(0.841)	
ΔCBR × D(D2CBR<Quintile)					-1.8824**
					(0.948)
$TSCR_{t-1}$	-0.2369	-0.1975	-0.2075	-0.2093	-0.2158
	(0.246)	(0.245)	(0.246)	(0.247)	(0.246)
$CET1_{t-1}$	0.1121	0.1085	0.1118	0.1094	0.1081
	(0.097)	(0.097)	(0.097)	(0.097)	(0.097)
$ln TA_{t-1}$	0.0102	0.0132	0.0133	0.0130	0.0134
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
RWA/TA_{t-1}	0.0819	0.0757	0.0722	0.0712	0.0715
	(0.058)	(0.059)	(0.059)	(0.059)	(0.059)
$CASH/TA_{t-1}$	0.0142	0.0133	0.0121	0.0097	0.0093
	(0.044)	(0.043)	(0.044)	(0.044)	(0.044)
ROA_{t-1}	0.0136***	0.0136***	0.0138***	0.0139***	0.0136***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
$NPLs_{t-1}$	0.0020	0.0021	0.0021	0.0022	0.0021
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
DEP/TA_{t-1}	0.0948	0.0897	0.0862	0.0874	0.0846
	(0.067)	(0.063)	(0.063)	(0.062)	(0.061)
$LOAN/TA_{t-1}$	-0.0194	-0.0196	-0.0184	-0.0198	-0.0210
	(0.049)	(0.049)	(0.049)	(0.049)	(0.048)
lnLength $relationship_{t-1}$	-0.0075***	-0.0075***	-0.0075***	-0.0075***	-0.0075***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	14,630,382	14,392,334	14,392,334	14,392,334	14,392,334
Bank FE	Yes	Yes	Yes	Yes	Yes
Borrower*Time FE	Yes	Yes	Yes	Yes	Yes
Cluster S.E.	Bank	Bank	Bank	Bank	Bank

Table A7: Controlling for MP tightening

This table shows the results of the bank-firm level panel regressions. For a detailed definition of the variables refer to Table A1. *, **, *** indicate statistical significance of 1%, 5% and 10% respectively.

	Endogenous variable: Δ ln (loans)		
	(1)	(2)	(3)
ΔCBR	2.2930	2.2160	2.0814
	(1.834)	(1.791)	(1.851)
ΔCBR × MP tightening	-1.8886	-2.0353	-1.6870
	(1.909)	(1.860)	(1.941)
ΔCBR × D(D2CBR<Tercile)	-2.1766**		
	(1.010)		
D(D2CBR<Tercile) × MP tightening	-0.0021		
	(0.005)		
ΔCBR × D(D2CBR<Tercile) × MP tightening	1.0840		
	(0.949)		
ΔCBR × D(D2CBR<Quartile)		-2.0901*	
		(1.069)	
D(D2CBR<Quartile) × MP tightening		-0.0034	
		(0.006)	
ΔCBR × D(D2CBR<Quartile) × MP tightening		1.4301	
		(0.978)	
ΔCBR × D(D2CBR<Quintile)			-2.0739*
			(1.272)
D(D2CBR<Quintile) × MP tightening			-0.0027
			(0.005)
ΔCBR × D(D2CBR<Quintile) × MP tightening			0.8121
			(1.054)
Observations	14,907,333	14,907,333	14,907,333
Bank FE	Yes	Yes	Yes
Borrower*Time FE	Yes	Yes	Yes
Cluster S.E.	Bank	Bank	Bank

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