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One Policy, Many Reactions: Monetary Policy and Bank Credit Supply

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Abstract

This paper examines how monetary policy shocks influence bank credit supply, drawing on detailed loan-level information from AnaCredit and high-frequency measures of ECB policy surprises. To identify credit supply, we apply a firm–bank decomposition and estimate its reaction to policy changes. We find that monetary tightening generates a persistent and significant decline in loan supply, with particularly pronounced effects among banks with low liquidity. Smaller banks also exhibit stronger contractions, largely reflecting their weaker liquidity positions. Differences related to capitalization and funding structures are comparatively weaker. Overall, the evidence highlights that bank liquidity plays a central role in shaping the strength of monetary policy transmission to bank lending.

1 Introduction

This paper studies how monetary policy shocks affect bank credit supply and how these effects vary across banks with different characteristics.

Monetary policy influences the economy in part by altering the supply of bank credit to firms (the "bank lending channel"). When policymakers tighten policy (e.g. raise interest rates), banks often reduce lending, contributing to a contraction in aggregate demand. However, banks are heterogeneous – they differ in size, funding structure, capital, liquidity and other characteristics – and these differences can affect how each bank responds to a policy shock. This paper investigates how exogenous monetary policy shocks affect bank credit supply, with a focus on heterogeneity across banks. In particular, we examine how the estimated credit supply of banks responds to contractionary shocks and whether these responses vary systematically with bank size, capitalization, liquidity and funding structure.

Two empirical challenges arise. First, observed changes in lending reflect both credit demand and supply shifts. We overcome this by using the Khwaja and Mian (2008) decomposition, which regresses the loan growth rate for each firm–bank pair on firm–time and bank–time fixed effects. In this approach, bank–time fixed effects capture idiosyncratic shifts in each bank's credit supply after controlling for firm-specific demand factors. Thus we interpret the bank–time effect as the bank's credit supply shock at that time. We show that the estimated credit supply shocks correlate strongly with credit standards reported by banks in the Bank Lending Survey (BLS).

Second, we need a source of exogenous monetary policy shocks. Here we adopt the Jarocinski and Karadi (2020) methodology, which isolates "pure" policy surprises from central bank announcements by exploiting the high-frequency co-movement of interest rates and stock prices. In practice, a contractionary policy surprise is identified as one that raises short-term rates while depressing stock prices, whereas information-driven

announcements (which suggest a brighter outlook) move stock prices up even as rates rise.

We then estimate the causal effect of policy shocks on credit supply using local projections (Jorda, 2005). Specifically, we regress the future credit supply of each bank on the current monetary shock, controlling for fixed effects, a lead-lag structure and other relevant macroeconomic factors. Building on this framework, we next explore heterogeneity in the responses across banks. To this end, we categorize banks based on key balance-sheet attributes: (i) size, (ii) capitalization, (iii) liquidity and (iv) funding structure. These characteristics have been emphasized in the literature as crucial to monetary transmission (e.g. Kashyap and Stein, 2000; Kishan and Opiela, 2000; Jimenez et al., 2012; Drechsler et al., 2017). We estimate separate impulse responses for banks in the top versus bottom decile of each characteristic.

Our main findings reveal several important patterns in the transmission of monetary policy through the bank credit supply channel. Contractionary monetary policy shocks lead to a statistically significant and economically meaningful decline in bank credit supply. Crucially, this effect is not uniform across banks: the magnitude of the contraction varies systematically with banks' balance sheet characteristics. Among these, liquidity emerges as a key determinant. Banks with low liquidity, measured by reserves deposited at the ECB relative to assets, experience markedly larger and more persistent declines in lending. This is consistent with the view that such banks are more exposed to funding stress when policy tightens, as they have limited internal resources to cushion the impact of rising interest rates. In contrast, liquidity-rich banks are able to draw on their buffers to maintain lending, dampening the transmission of policy shocks.

We also find that smaller banks contract credit more aggressively following a monetary policy shock. While this pattern is often attributed to tighter external financing constraints and less diversified funding sources, our results suggest that differences in liquidity positions play a central role in explaining this size effect. Smaller banks in our sample hold significantly lower liquidity buffers, which makes them more exposed to funding pressures when policy tightens and amplifies their lending response.

While a large body of work has examined the bank lending channel of monetary policy, this paper advances the literature in at least two important ways. First, we apply the Khwaja and Mian (2008) firm–bank decomposition to AnaCredit, a harmonized loan-level dataset that covers virtually all significant credit exposures across the entire euro area. This high-frequency, high-coverage data allows us to cleanly identify bank-specific credit supply shocks, while also providing broad geographical scope that enhances the external validity of our results. Second, we go beyond average effects by examining systematic heterogeneity in credit supply responses based on multiple bank balance sheet characteristics within a local projections framework. Compared to prior studies that rely on narrower samples or focus on single countries or crises (e.g. Jimenez et al., 2012; Drechsler et al., 2017), our approach combines strong identification, granular measurement and broad institutional coverage, enabling a more comprehensive understanding of how bank fundamentals shape the strength and asymmetry of monetary transmission across a diverse banking system.

The remainder of the paper is organized as follows. Section 2 reviews the related literature on the bank lending channel and heterogeneous monetary transmission. Section 3 describes the data sources used in the analysis. Section 4 outlines the empirical methodology, including the identification of bank-level credit supply shocks and the estimation of their dynamic responses to monetary policy surprises. Section 5 presents

the main results, focusing on both the average effects and heterogeneity across banks based on balance sheet characteristics. Section 6 concludes.

2 Literature review

Monetary policy affects the real economy not only through interest rates but also via the credit channel, particularly the bank lending channel, where policy-induced changes in banks' funding conditions alter credit supply (Bernanke and Blinder, 1988; Bernanke and Gertler, 1995). Early studies show that monetary tightening reduces bank reserves and deposits, leading to a contraction in lending, especially for bank-dependent borrowers (Ludvigson, 1998).

A large body of work highlights that the strength of the bank lending channel varies across banks. Empirical studies find that smaller, less-capitalized and less-liquid banks contract credit more sharply after a policy shock (Kashyap and Stein, 2000; Kishan and Opiela, 2000; Peek and Rosengren, 1995). For instance, Jimenez et al. (2012) show that in Spain, banks with weaker balance sheets cut lending more following ECB rate hikes. Capital buffers and liquidity cushions help banks absorb funding shocks, mitigating policy transmission to credit supply.

Funding structure is another key determinant. Banks reliant on deposit funding often respond differently than those funded via wholesale markets. Drechsler et al. (2017) describe a “deposit channel”, where deposit-rich banks benefit from sticky funding costs when rates rise. Conversely, in negative rate environments, such banks may suffer from compressed margins, weakening their lending incentives (Heider et al., 2019). Other studies find that banks with excess liquidity and wholesale funding may expand lending by reaching for yield (Bottero et al., 2022).

Recent studies explore risk-taking and unconventional monetary policy. Low or negative rates have encouraged some banks to extend riskier credit (Jimenez et al., 2014; Ioannidou et al., 2015), while others curtailed lending due to margin pressure (Heider et al., 2019; Schelling and Towbin, 2022). Quantitative easing also had differential effects, with banks exposed to targeted asset purchases increasing credit supply (Rodnyansky and Darmouni, 2017).

A parallel strand of research enhances identification of monetary policy shocks. High-frequency financial market data capture unexpected policy changes, minimizing endogeneity bias (Kuttner, 2001). Jarocinski and Karadi (2020) further separate pure policy shocks from information effects, improving causal inference. These techniques reveal stronger and more heterogeneous effects on lending than traditional rate-change indicators (Altavilla et al., 2019; Gertler and Karadi, 2015).

Together, these findings show that monetary policy’s impact on credit supply depends heavily on bank characteristics. Our study contributes to this literature by examining the euro area bank lending channel using high-frequency ECB policy surprises and rich credit registry data. We assess how size, capital, liquidity and funding structures mediate banks’ lending responses to policy shocks.

3 Data

We combine AnaCredit data, bank balance sheets and high-frequency monetary policy shocks to identify bank-specific credit supply responses to monetary policy.

Our analysis combines three data sources. First, we use loan-level credit registry data from AnaCredit to construct bank-specific credit supply shocks. AnaCredit is a harmonized euro area credit registry maintained by the ECB that provides monthly, loan-by-loan information on all on-balance-sheet credit exposures of euro area banks to legal entities above a reporting threshold of €25,000. The dataset covers a wide range of loan characteristics and uniquely identifies both lenders and borrowers, allowing us to track firm–bank relationships over time. We focus on the period from 2020 to 2024, when the reporting framework is fully implemented and data quality is high. The comprehensive coverage of AnaCredit enables us to observe virtually all significant firm credit exposures in the euro area at a monthly frequency, which is essential for identifying bank-level credit supply shocks using within-firm variation in lending across banks. To limit the influence of outliers, loan growth rates are trimmed at the 5th and 95th percentiles.

Second, to characterize banks' balance sheet structures and study heterogeneity in credit supply responses, we use bank-level data from the Individual Balance Sheet Items (IBSI) statistics. IBSI provides harmonized, unconsolidated balance sheet information for euro area banks at a monthly frequency. From these data, we construct key bank characteristics relevant for monetary policy transmission, including size (total assets), capitalization (equity relative to total assets), liquidity (reserves held at the ECB relative to total assets) and funding structure (the loan-to-deposit ratio). We use the leverage ratio as a proxy for capitalization because risk-weighted regulatory capital measures are not available for our sample. The loan-to-deposit ratio is trimmed at the 5th and 95th percentiles to mitigate the influence of extreme values, which mainly arise for banks with very low deposit funding.

Finally, we use monetary policy shocks to identify exogenous changes in the policy stance. These shocks are taken from Jarociński and Karadi (2020), who exploit high-frequency financial market reactions around ECB policy announcements to separate unexpected policy shocks from information effects. The resulting monthly shock series captures the unanticipated component of monetary policy decisions and is centred close to zero by construction. Despite their small average magnitude, the shocks exhibit substantial time variation and provide a suitable source of exogenous policy variation for studying the dynamic response of bank credit supply.

4 Methodology

This section outlines our empirical strategy in two parts. First, we describe how we identify bank-specific credit supply shocks, validated against external survey measures. Second, we detail how we estimate the dynamic response of credit supply to monetary policy shocks using local projections, allowing for heterogeneity across banks based on their balance sheet characteristics.

4.1 Identifying bank credit supply

We isolate bank credit supply using a well-established identification strategy and show that this measure closely aligns with banks' self-reported credit standards in the BLS.

To construct a bank-level credit supply shock, we follow the firm–bank decomposition pioneered by Khwaja and Mian (2008). Conceptually, if a firm borrows from multiple banks, then an idiosyncratic tightening by one bank (a supply shock) will reduce that bank's loan to the firm more than other banks' loans. By controlling for the firm's overall borrowing demand (shared across banks), we can isolate bank-specific supply effects. Formally, let L_{fbt} denote the loan amount from bank *b* to firm *f* in month *t*. We estimate a panel regression of firm–bank credit growth (log difference in loan volume) on a full set of firm–time and bank–time fixed effects:

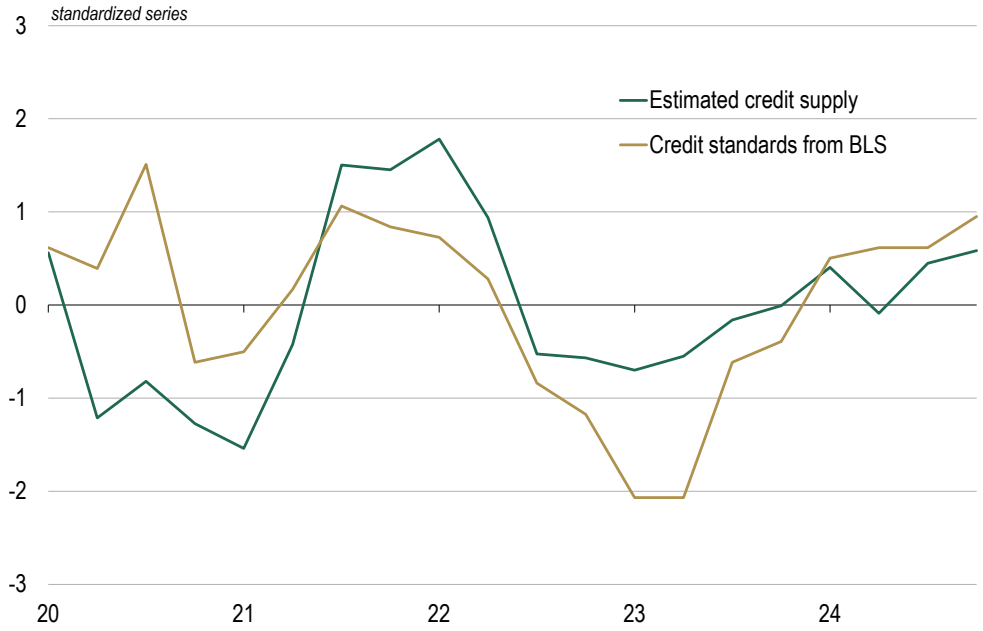
$$\Delta log L_{fbt} = \alpha_{ft} + \beta_{bt} + \varepsilon_{fbt} \quad (1)$$

Here α_{ft} captures all shocks affecting firm *f* at time *t* (demand shifts, macro factors, etc.), while β_{bt} is the bank *b* supply shock at time *t*. The identifying assumption is that within each firm, banks face a common demand pull; differences in lending growth thus reflect bank-specific supply. This approach is widely used in the literature (see e.g. Jiménez et al., 2012; Sivec and Volk, 2023). This methodology relies crucially on having multi-bank firms (firms borrowing from more than one bank). In the AnaCredit data, many large firms have multiple banking relationships, so we can directly apply the decomposition. However, relying only on multi-bank firms can introduce selection bias, so some recent papers develop alternative methods (see e.g. Degryse et al., 2019). To address this concern, we also apply the methodology proposed by Degryse et al. (2019), which allows identification of credit supply effects even for firms with a single banking relationship. The results remain robust under this alternative approach, reinforcing the validity of our main findings.[1]

As an external check, we compare our estimated credit supply indicator with the ECB BLS credit standards index. The BLS is a quarterly survey that, among other things, asks a panel of banks whether they have tightened or eased credit standards. In Figure 1, we plot our estimated credit supply, derived by aggregating the estimated bank-level fixed effects (β_{bt}) using loan amounts as weights, against the (inverted) BLS net tightening. While not identical, a correlation of 0.55 suggests that our supply shocks capture broad changes in credit standards reported by banks. The two series move together broadly: periods when banks in our data show negative supply shocks coincide with

[1] The results using the Degryse et al. (2019) approach are not presented in the paper, but they are available upon request.

Figure 1: **Estimated credit supply shocks and bank credit standards reported in the BLS**



Notes: Estimated credit supply shocks are based on the methodology of Khwaja and Mian (2008), where loan growth at the firm–bank–time level is modelled as a function of firm–time and bank–time fixed effects. The bank–time fixed effects, which capture changes in bank-specific credit supply, are then aggregated across euro area banks using loan amounts as weights. Credit standards from the Bank Lending Survey (BLS) reflect banks' own assessments of lending conditions. The BLS series is inverted, as positive values indicate a tightening of credit standards. Both series are standardized to facilitate comparison.
Sources: AnaCredit, own calculations.

survey reports of tightened lending standards. This gives confidence that β_{bt} indeed reflects banks' lending propensity.

However, the two measures are not identical, and several factors help explain the differences. First, the BLS is based on a sample of banks rather than the full banking universe covered in AnaCredit, whereas our credit supply measure is constructed from actual loan-level data with near complete coverage of the euro area. Second, the BLS reflects self-reported assessments of credit conditions, which may be influenced by perception, reporting bias or strategic responses, whereas our measure is derived from observed lending behaviour. Third, and most importantly, the BLS focuses on credit standards, which may encompass a broader set of factors, including loan terms, collateral requirements and borrower screening, that go beyond the pure quantity of credit supplied. In contrast, our measure captures the realized lending volume net of firm-specific demand and is thus a more direct indicator of supply-side behaviour. These differences notwithstanding, the substantial correlation between the two series provides strong support for the validity of our identification strategy.

4.2 Local projections and heterogeneity

We use local projection methods to estimate how bank credit supply responds to monetary policy shocks over time and examine how these responses vary with key bank balance sheet characteristics.

With credit supply shocks in hand, we next examine how bank credit supply responds to monetary policy shocks over time. We begin by aggregating the estimated bank–time shocks at the bank level, weighting by each bank's credit amount. To estimate the

dynamic response, we use local projection methods to trace the effect of a monetary policy shock on future credit supply at various horizons (Jordà, 2005):

$$S_{bt+h} = \alpha_b^h + \sum_{j=0}^{3} \beta_j^h MP_{t-j} + \theta^h MP_t z_{bt} + \sigma^h z_{bt} + \rho^h S_{bt-1} + \sum_{j=1}^{3} \gamma_j^h \boldsymbol{x_{bt-j}} + u_{bt+h} \quad (2)$$

where the dependent variable S_{bt+h} denotes the credit supply shock of bank *b* at horizon *t+h*, as previously estimated.[2] MP_t is a monetary policy shock sourced from Jarocinski and Karadi (2020) which isolates the unexpected component of ECB announcements by exploiting the joint behaviour of interest rates and stock prices. Specifically, their methodology decomposes high-frequency market reactions into two distinct components: (i) monetary policy (MP) shocks, reflecting changes in the policy stance, and (ii) information shocks, capturing revisions in the economic outlook revealed by the central bank. We focus exclusively on the MP shocks, which are characterized by rising interest rates and falling equity prices in response to a contractionary surprise. This ensures a cleaner identification of policy effects, free from confounding shifts in expectations about future macroeconomic conditions. This method, now widely adopted in the transmission literature (e.g. Afonso et al. 2025; García-Posada & Paz 2024), helps avoid biases that arise when using changes in policy rates that may reflect endogenous responses to economic conditions.

To capture heterogeneity in transmission, we estimate impulse responses across banks and explore how they differ by balance sheet characteristics. In particular, $\boldsymbol{z_{bt}}$ represents a time-varying bank attribute, including (i) size, measured by the log of total assets, (ii) capitalization, proxied by the leverage ratio, (iii) liquidity, defined as the share of reserves held at the ECB relative to total assets, and (iv) funding structure, captured by the loan-to-deposit ratio.

We control for bank fixed effects (α_b) and include the lag of the dependent variable to account for persistence in credit supply. The vector $\boldsymbol{x_{bt-j}}$ includes lagged values of HICP inflation and industrial production to account for broader macroeconomic conditions that may independently influence credit supply. In addition, we control for bank-specific loan demand by incorporating a weighted average of the estimated firm–time effects (α_{ft}) from equation (1), using each bank's loan amounts as weights. These controls help ensure that the estimated response to monetary policy shocks is not confounded by bank-specific factors or concurrent shifts in inflation, real activity or credit demand.

We estimate local projections over a 12-month horizon. Ideally, a longer horizon would allow us to capture more of the medium-term dynamics of monetary policy transmission. However, this must be weighed against the relatively short time span of the AnaCredit dataset, which limits the number of usable observations at longer horizons and could reduce the reliability of estimates. The 12-month window thus reflects a compromise between capturing meaningful dynamics and maintaining estimation precision.

All variables in equation (2) are standardized prior to estimation. Standardization ensures that coefficients are directly comparable across variables, as each regressor is expressed in terms of standard deviations rather than raw units. This facilitates the interpretation of heterogeneous effects, since differences in scale between, for example, bank size, capitalization or liquidity do not mechanically drive the estimated responses. Moreover, standardization improves numerical stability in the estimation pro-

[2] We estimate the local projections in levels because the credit supply shocks derived from the Khwaja and Mian (2008) decomposition are already expressed as deviations from average lending behaviour—effectively capturing relative shifts in supply. As such, they represent stationary series centered around zero, making level estimation appropriate and interpretable in terms of changes in credit conditions. As a robustness check, we also estimate cumulative changes over the projection horizon ($S_{bt+h} - S_{bt-1}$); the results are quantitatively similar.

cedure and mitigates issues that can arise when variables have very different magnitudes. By working in standardized units, we can more clearly assess the relative importance of distinct bank characteristics in shaping the transmission of monetary policy shocks.

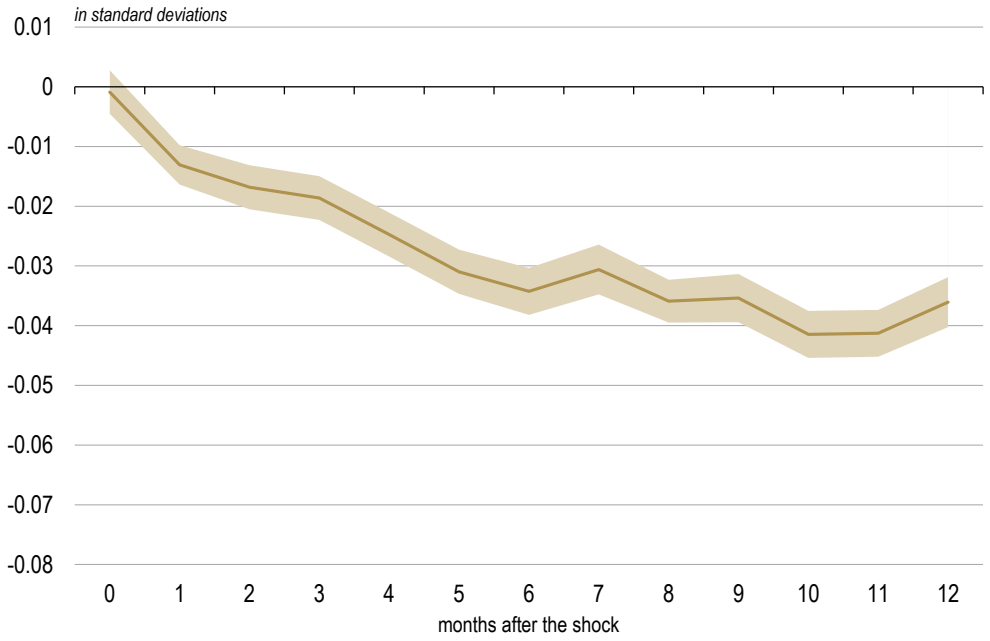
5 Results

Monetary tightening curbs credit supply, mostly for less liquid banks.

Having established our empirical strategy for identifying bank-specific credit supply shocks and estimating their responses to monetary policy surprises, we now turn to the results. This section presents the estimated effects of contractionary monetary policy shocks on aggregate bank credit supply, followed by an exploration of how these effects vary across banks with different balance sheet characteristics. By analyzing both the average responses and the heterogeneity along key dimensions, such as size, capitalization, liquidity and funding structure, we aim to shed light on the mechanisms through which monetary policy is transmitted via the banking sector.

Figure 2 presents the impulse response of aggregate bank credit supply to a one-standard-deviation contractionary monetary policy shock. A positive shock (tightening surprise) causes a negative response in credit supply: banks collectively cut lending. The

Figure 2: **Impact of monetary policy shocks on bank credit supply**



Notes: The figure shows the estimated impulse response of bank credit supply to a one standard deviation contractionary monetary policy shock, using local projections. The monetary policy shock is sourced from Jarociński and Karadi (2020). Bank credit supply is estimated using the Khwaja and Mian (2008) decomposition, aggregated to the bank–time level, and standardized. The shaded area represents the 90% confidence interval.
Sources: AnaCredit, own calculations.

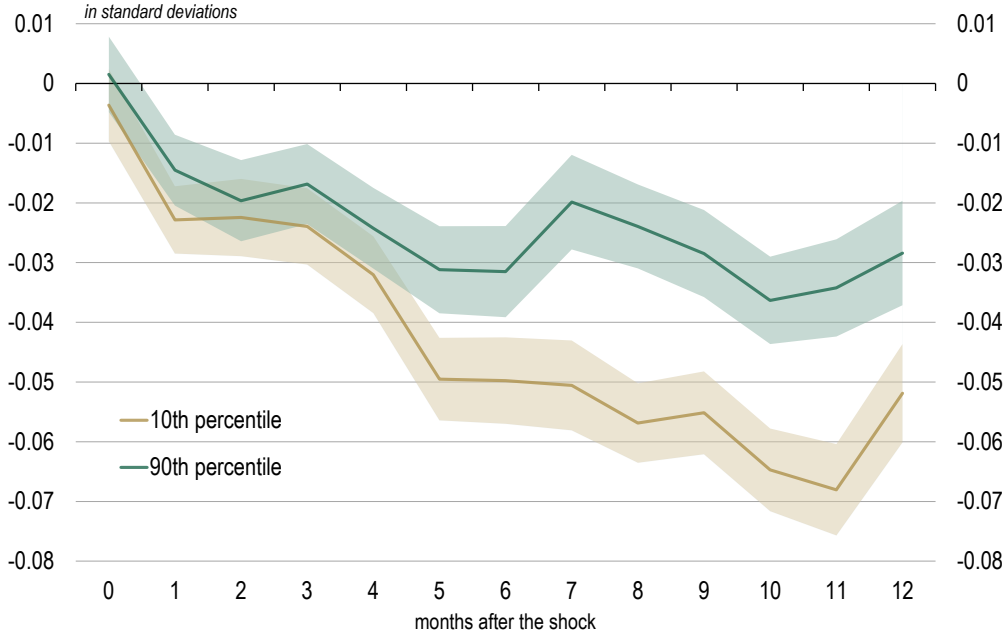
solid line shows the point estimate and the shaded area the 90% confidence band from the local projection. The impact is highly statistically significant. We find that the effect peaks around 10 months after the shock, when a one-standard-deviation monetary tightening reduces aggregate credit supply by approximately 0.04 standard deviations.

This finding of a negative and persistent effect is in line with the conventional bank lending channel of monetary transmission. Contractionary policy raises banks' funding costs and signals a cooling economy. This can make banks more risk-averse and cut back on lending due to potenital increase in credit risk. Early research (e.g. Bernanke and Blinder, 1988) documented that tighter money conditions reduce credit expansion. Our results provide evidence for the euro area, using disaggregated bank-level data, showing that the supply of credit falls even after filtering out demand factors. Moreover, by using an exogenous shock measure (Jarociński–Karadi), we avoid confounding policy with economic news; hence this negative effect more cleanly reflects the causal impact of policy tightening.

Next, we examine how the response of credit supply to monetary policy shocks varies across banks with different balance sheet characteristics. Specifically, we assess how the impulse responses depend on bank size, capitalization, liquidity and funding structure by evaluating them at the 10th and 90th percentiles of each characteristic. Figures 3–6 illustrate these heterogeneous effects.

We start with breaking down the response by bank size (where z_{bt} is the log of bank total assets). The estimated interaction term θ^h in equation (2) is positive and statistically significant from the 5th month onwards. In line with this, the IRFs in Figure 3 show that small banks reduce lending more in response to a policy tightening than large banks do. In numerical terms, at its peak (11 months after the shock) small banks' credit supply is down by about 0.07 standard deviations, whereas large banks see a more

Figure 3: **Credit supply response to a monetary policy shock conditional on bank size**



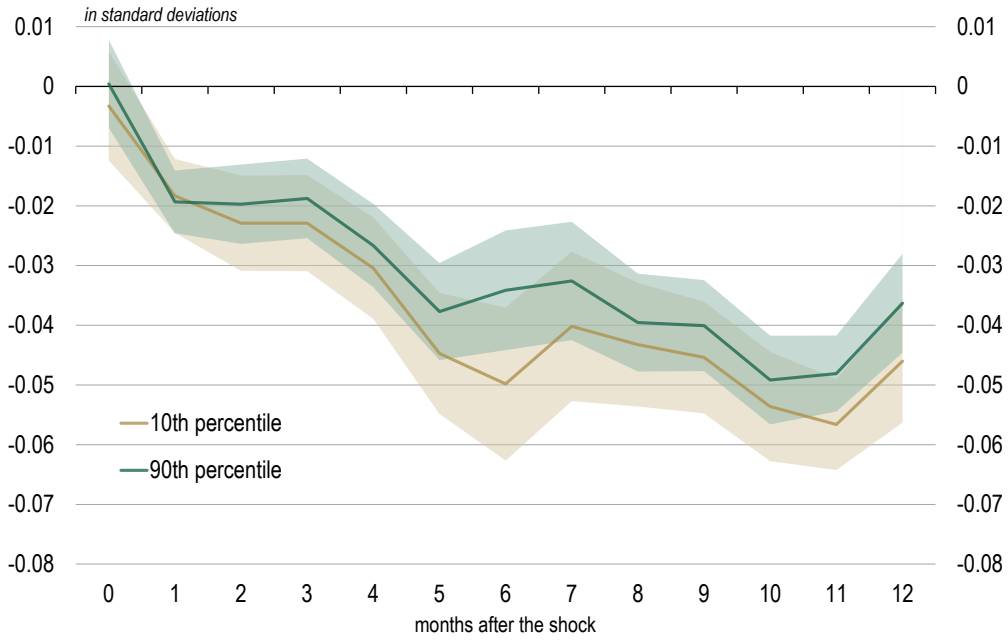
Notes: The figure shows the estimated response of bank credit supply to a one standard deviation contractionary monetary policy shock, using local projections. The response is conditioned on bank size, measured by the log total assets, evaluated at the 10th and 90th percentiles of the distribution. The shaded area represents the 90% confidence interval.
Sources: AnaCredit, IBSI, own calculations.

modest decline of 0.04. This effect is economically intuitive and aligns with prior evidence. Smaller banks tend to have fewer alternative funding sources compared to large banks. They also often have less diversified portfolios and smaller internal capital buffers. Thus a rise in funding costs or tightening liquidity can force them to trim loans more sharply (Kashyap and Stein, 2000).

Next, we examine the role of bank capitalization in shaping the response of credit supply to monetary policy shocks, using the leverage ratio as our measure of capital strength. The estimated interaction coefficient between the policy shock and the leverage ratio is slightly positive, indicating that banks with higher capital ratios tend to reduce lending less in response to a contractionary shock. However, this effect is not statistically significant at conventional levels across any horizon. As shown in Figure 4, the impulse response functions (IRFs) for banks at the 10th and 90th percentiles of the leverage ratio distribution are largely overlapping, with confidence intervals that encompass zero, suggesting limited precision in estimating differential responses by capitalization.

Despite the lack of statistical significance, the point estimates of the IRFs are directionally consistent with theoretical expectations and prior empirical work. In particular, they suggest that less-capitalized banks reduce credit supply more aggressively following a monetary tightening compared to their better-capitalized peers. This pattern aligns with findings in the literature showing that banks with weaker capital positions are more constrained in their ability to absorb shocks, including those from monetary policy or macro-financial stress (e.g. Jimenez et al., 2012; Peek and Rosengren, 1995; Gambacorta, 2005). A possible interpretation is that banks with thin capital buffers may face higher funding costs or tighter regulatory scrutiny during periods of policy tightening, leading them to respond more defensively by curbing lending. In contrast, well-capitalized banks are better positioned to maintain credit supply even in adverse conditions.

Figure 4: **Credit supply response to a monetary policy shock conditional on bank capitalization**



Notes: The figure shows the estimated response of bank credit supply to a one standard deviation contractionary monetary policy shock, using local projections. The response is conditioned on bank capitalization, measured by leverage ratio, evaluated at the 10th and 90th percentiles of the distribution. The shaded area represents the 90% confidence interval.
Sources: AnaCredit, IBSI, own calculations.

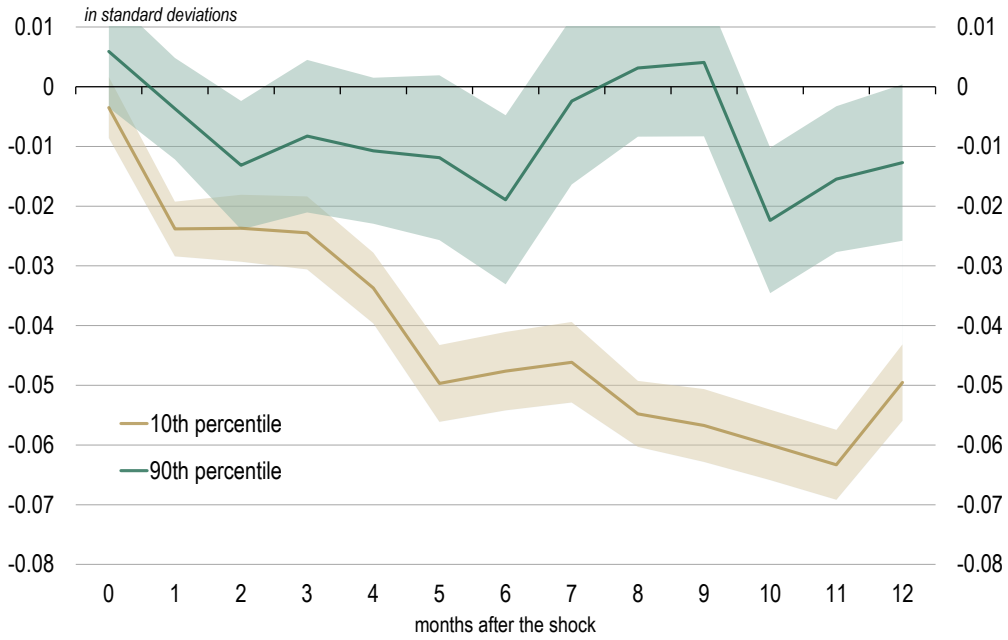
The lack of significance may reflect limited variation in leverage ratios over the sample period or the buffering effects of regulatory reforms that have strengthened capitalization across euro area banks in recent years.

Banks' responses to monetary tightening vary substantially depending on their liquidity positions, highlighting liquidity as a key amplifier of monetary transmission. As illustrated in Figure 5, banks with low liquidity, measured by the ratio of excess reserves held at the ECB to total assets, experience a pronounced and statistically significant decline in credit supply following a contractionary monetary policy shock. In contrast, high-liquidity banks show only a modest and statistically insignificant adjustment in lending, suggesting a much weaker transmission of monetary policy through this group.

This result is consistent with theoretical and empirical work emphasizing the importance of bank liquidity in shaping credit responses to monetary shocks. In particular, Kashyap and Stein (2000) and Gambacorta (2005) argue that banks with ample liquid assets are better able to absorb funding shocks, as they can draw down reserves or adjust their asset portfolios without having to reduce loan supply. These banks are less reliant on external or unstable sources of funding and are thus less exposed to rising marginal funding costs when interest rates increase. By contrast, low-liquidity banks, lacking such internal buffers, must respond more defensively to preserve balance sheet stability – typically by cutting back on lending even when underlying credit demand remains unchanged.

This distinction has become particularly salient in the context of the recent monetary tightening cycle in the euro area. Following years of ultra-loose monetary policy – including large-scale asset purchases and Targeted Longer-Term Refinancing Operations (TLTROs) –, many banks entered the tightening phase with exceptionally large liquidity buffers. As documented by Volk (2023), these reserves played a crucial role in

Figure 5: **Credit supply response to a monetary policy shock conditional on bank liquidity**



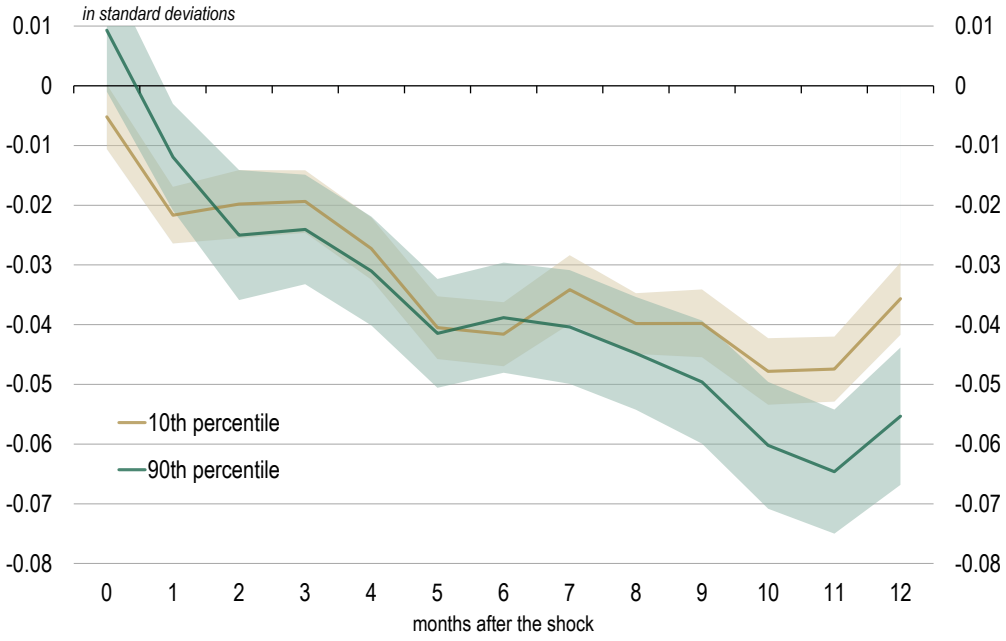
Notes: The figure shows the estimated response of bank credit supply to a one standard deviation contractionary monetary policy shock, using local projections. The response is conditioned on bank liquidity, measured by the share excess liquidity deposited at ECB in total assets, evaluated at the 10th and 90th percentiles of the distribution. The shaded area represents the 90% confidence interval.
Sources: AnaCredit, IBSI, own calculations.

dampening the contractionary effects of ECB rate hikes, as banks were able to rely on accumulated liquidity rather than pass higher rates to deposits and further to credit supply. Our findings confirm this mechanism: liquidity-rich banks exhibit a muted lending response, underscoring the importance of liquidity conditions in determining the effectiveness and speed of monetary transmission. From a policy perspective, this suggests that the impact of interest rate changes depends not just on the size of the rate move, but also on the initial liquidity conditions in the banking sector.

Banks' lending responses to monetary tightening also vary based on their funding structure, as captured by the loan-to-deposit ratio (LTD). Banks with high LTD, those that rely more on wholesale or market funding rather than stable deposits, experience a slightly stronger decline in credit supply after a policy shock (Figure 6). While the immediate response is modest and statistically similar across banks, the gap widens over time. The mechanism is straightforward: banks heavily reliant on non-deposit funding face greater refinancing pressure when interest rates rise, forcing sharper cutbacks in lending. In contrast, deposit-funded banks benefit from more stable, policy less sensitive funding – another factor that played a significant role in the recent tightening cycle.

It is important to note that the bank characteristics considered above – size, capitalization, liquidity and funding structure – are not independent dimensions, but are closely interrelated and may reflect common underlying balance sheet mechanisms. In particular, bank size is systematically associated with differences in liquidity holdings, capital buffers and funding models, making it difficult to interpret heterogeneity along any single dimension in isolation. As a result, the heterogeneous responses documented above should be viewed as capturing overlapping channels rather than mutually exclusive effects.

Figure 6: **Credit supply response to a monetary policy shock conditional on bank funding structure**



Notes: The figure shows the estimated response of bank credit supply to a one standard deviation contractionary monetary policy shock, using local projections. The response is conditioned on bank funding structure, measured by loan-to-deposit ratio, evaluated at the 10th and 90th percentiles of the distribution. The shaded area represents the 90% confidence interval.
Sources: AnaCredit, IBSI, own calculations.

To shed further light on the stronger contraction in lending observed among smaller banks, we compare their balance sheet profiles to those of larger institutions. Small banks are, on average, substantially less liquid, holding markedly lower reserves at the ECB relative to total assets. At the same time, they tend to be more highly capitalized and more deposit-funded than large banks – characteristics that would, if anything, dampen their sensitivity to monetary tightening. Taken together, these patterns suggest that liquidity differences provide the most compelling explanation for the stronger lending response of small banks. This interpretation is consistent with our earlier results showing that liquidity is the dimension along which monetary policy transmission differs most strongly across banks, whereas heterogeneity by capitalization and funding structure is weaker and less precisely estimated. Overall, the evidence points to bank liquidity as the central mechanism shaping heterogeneous credit supply responses, with size primarily acting as a proxy for differences in liquidity buffers.

6 Conclusion

The effectiveness of monetary policy hinges not only on the stance, but also on the structure of those who transmit it.

This paper provides new evidence on how contractionary monetary policy shocks affect bank credit supply, highlighting the critical role of bank-specific balance sheet characteristics in shaping the transmission of monetary policy. Using granular loan-level data and exogenous policy shocks, we isolate the supply side of credit and show that, on average, monetary tightening leads to a significant and persistent decline in bank lending. However, this aggregate effect masks substantial heterogeneity across banks.

In particular, banks with lower liquidity respond more strongly to policy shocks by sharply cutting credit supply. Smaller banks also exhibit larger contractions in lending, largely reflecting their systematically weaker liquidity positions rather than size per se. Differences related to funding structure are present but less pronounced, with deposit-funded banks showing somewhat lower response than those reliant on market-based funding. Capitalization plays a comparatively modest role, with heterogeneity along this dimension generally weaker and less precisely estimated.

These findings have several implications for the conduct of monetary policy. First, they indicate that the strength of the bank lending channel depends not only on the policy stance, but also on the liquidity environment shaped by past and concurrent policy measures. In particular, the large liquidity buffers accumulated by euro area banks, largely reflecting ECB asset purchases and targeted longer-term refinancing operations (TLTROs), appear to have moderated the response of bank credit supply to increases in policy rates. When banks hold ample excess liquidity, funding conditions remain relatively stable, and the pass-through of tighter monetary policy to lending is correspondingly weaker.

This observation is relevant for the ongoing and future normalization of monetary policy. As liquidity is gradually reduced, for instance through balance sheet runoff, the sensitivity of bank lending to policy rate changes may evolve over time. Our results

suggest that banks with lower liquidity are more responsive to tightening, implying that changes in the liquidity environment could alter the composition and strength of monetary transmission across banks. From a policy perspective, this highlights the importance of accounting for bank-level liquidity conditions when assessing the expected impact of interest rate adjustments.

From a regulatory and supervisory perspective, our findings highlight a trade-off between resilience and transmission. On the one hand, ample liquidity buffers enhance financial stability by reducing banks' vulnerability to funding shocks; on the other, they can attenuate the pass-through of monetary policy to credit supply, potentially requiring stronger or more persistent policy actions to achieve the desired macroeconomic outcomes. This underscores the importance of coordination between monetary policy and prudential regulation. Liquidity requirements, such as the Liquidity Coverage Ratio, while essential for stability, also shape the strength and heterogeneity of monetary transmission. Supervisors may therefore need to consider how liquidity regulation interacts with the monetary policy cycle, especially during periods of rapid tightening or normalization.

In addition, the presence of a large stock of customer deposits, accumulated during the period of loose monetary policy and in particular during the pandemic, has provided banks with a stable and relatively cheap source of funding. According to our estimates, this funding structure, characterized by a lower reliance on volatile wholesale markets, has cushioned the transmission of policy shocks to credit supply. Furthermore, while the effect of capitalization appears relatively modest in our estimates, the generally high capital buffers across the euro area banking system, largely a result of regulatory reforms implemented in the aftermath of the Global Financial Crisis, may have further contributed to the lower lending supply response.

Together, the evidence suggests that the aggregate responsiveness of bank lending to monetary tightening is heavily mediated by the prevailing financial conditions within the banking sector. As such, the effectiveness of monetary policy cannot be fully understood without accounting for the evolving composition of bank balance sheets. Going forward, policymakers need to consider not only the stance of policy but also the structural features of the financial system when assessing the likely transmission of interest rate changes.

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