THE NEXUS BETWEEN THE DEPOSIT AND RISK-TAKING CHANNELS OF MONETARY POLICY *

José E. Gutiérrez
Banco de España

Enric Martorell
Banco de España

Mariya Melnychuk
Banco de España

January 15, 2026

[Link to the last version]

Abstract

This paper examines the deposit channel of monetary policy during the fastest and most intense tightening cycle of the Euro era. Using the universal Spanish credit register and regional variation in deposit market concentration, we show that limited pass-through of policy rates to deposit rates —driven by banks' regional market power— produces heterogeneous effects on bank credit supply and risk-taking. Following the tightening cycle, banks operating in more concentrated deposit markets reduced credit more sharply to riskier firms. For newly originated loans, this contraction was accompanied by higher interest rates and improved realized returns. We document a novel dimension of the deposit channel: it compels banks to actively optimize their risk-return trade-off. Our results show that preserving deposit franchise value leads banks to prioritize prudence, reversing the "search-for-yield" dynamic observed during the zero-lower-bound era.

Keywords: monetary policy, deposit channel, bank risk-taking, market concentration

*We are grateful to Alejandro Casado, Hans Degryse, Andreas Fuster, David Martinez-Miera, Matias Ossandon, Carlos Perez-Montes, Philipp Schnabl and an anonymous referee from Banco de España Working Papers series for their feedback and suggestions. We also thank seminar participants at Banco de España, 32nd Finance Forum and 9th ChaMP Workshop. The views expressed in this manuscript are those of the authors and do not necessarily represent the views of Banco de España or the Eurosystem.

1. INTRODUCTION

In July 2022, the European Central Bank (ECB) initiated a historically rapid and aggressive tightening cycle, bringing a near-decade of ultra-low interest rates to an abrupt end. This decisive policy shift concluded an era of compressed margins and widespread search for yield characterized by the dominance of the risk-taking channel of monetary policy (Dell'Ariccia et al., 2017). As the economy moved away from the zero lower bound, traditional transmission channels regained prominence. A key feature of this reversal has been a disconnect between soaring policy rates and stagnant retail deposit rates in the Euro Area (Beyer et al., 2024).

Structural features of the European banking sector —such as stronger capital buffers, ample liquidity positions, and a high degree of market concentration— have been identified as key factors contributing to the sluggish transmission of policy rates to deposit rates (Mayordomo and Roibás, 2023). This slow adjustment is consistent with the deposit channel of monetary policy: banks with market power avoid raising deposit rates in lockstep with policy rates (Drechsler et al., 2017). By widening the spread between the policy rate and the deposit rate, these banks significantly increase their interest margins. However, this strategy comes at a cost: the relatively low yield on deposits leads to slower deposit growth or outflows as savers seek better returns elsewhere. Figure 1 provides aggregate evidence of the slow pass-through in the Spanish banking system, accompanied by a subsequent contraction in deposits. Given that banks operate across markets with varying degrees of market power, the decline in deposit growth could have represented a heterogeneous funding shock with consequences for bank lending and, importantly, risk-taking.

[Figure 1]

This combination of a sharp monetary tightening and uneven deposit rate adjustment creates an ideal setting to examine the role of the deposit channel of monetary policy in shaping banks' risk appetite. Building on this framework, we ask: How does a monetary policy shock —transmitted heterogeneously due to differences in deposit market power— affect not just the *quantity* of bank lending, but also its *quality*?

This study contributes by offering an in-depth analysis of the deposit channel's impact on bank lending and, crucially, on risk-taking. We analyze these dynamics through the lens of the *franchise value* hypothesis. In this framework, when banks in concentrated markets do not pass through rate hikes, they accrue substantial rents —through widened intermediation margins—, effectively increasing the value of their deposit franchise. To protect these higher future rents, banks have an incentive to become more prudent. Consequently, we expect that banks exposed to the deposit channel will not only cut lending volume due to funding constraints but will also actively de-risk their portfolios to preserve their financial position.

We test this hypothesis using granular data from Spain during the 2022–2024 tightening cycle. Spain offers an ideal setting due to the large, unanticipated nature of the monetary policy shock and the presence of heterogeneity in local deposit market concentration. We combine regional deposit data with loan-level data from the Spanish Central Credit Register (CIRBE) — a comprehensive dataset that encompasses virtually the entire universe of loans to small and medium-sized enterprises (SMEs) due to its low reporting threshold of 3,000€. These data allow us to trace the transmission from regional deposit shocks to loan-level risk decisions. Our analysis yields three main results.

First, we validate the existence of the deposit channel in Spain. Using branch-level data, we show that within the same banking group, branches in highly concentrated markets experienced significantly lower deposit growth —particularly in time deposits— compared to branches in competitive markets. This confirms that market power allows banks to widen intermediation margins at the expense of deposit volume —as shown by Drechsler et al. (2017) for the US.

Second, we show that this deposit-side funding shock translates into a contraction in lending supply, particularly for risky borrowers. Controlling for demand via firm-by-quarter fixed effects (Khwaja and Mian, 2008), we find that a one-standard-deviation increase in a bank's exposure to concentrated deposit markets lowers lending supply by 10.5% relative to less-exposed banks. Crucially, the contraction is not uniform: banks cut lending to borrowers with high ex-ante probability of default (PD) by an additional 4.6%. This finding supports the franchise value hypothesis: banks richer in deposit rents become more selective, limiting risk exposure in order to preserve their deposit franchise. These effects emerge only after the onset of the tightening cycle, consistent with our deposit-side evidence. The results remain robust when controlling for other bank characteristics, including capital and liquidity ratios —that capture the bank lending channel (Jiménez et al., 2012, 2014)—, underscoring the critical role of regional deposit markets in shaping banks' lending behavior.

Third, and crucially, we extend the analysis beyond quantity and risk to examine pricing and realized returns. We find that exposed banks raised loan rates on new term loans by 20 basis points (bp) more than their peers. Leveraging the richness of our dataset, we control for bank-perceived risk by including fixed effects for municipality, industry, size, and risk-bin. Importantly, this increase in pricing was not accompanied by a deterioration in credit quality; we find no statistically significant difference in ex-post default rates one year after origination. Consequently, the higher loan rates translated directly into higher realized returns. This highlights a novel dimension of the deposit channel: it compels banks to actively optimize their risk-return trade-off. They do not merely de-risk; they reject risky borrowers while exercising market power to increase margins on safe lending, thereby enhancing overall portfolio profitability.

From a policy perspective, these results highlight the central nexus between the deposit and risk-taking channels. We show that the transmission of monetary policy to bank risk-taking depends critically on the structure of deposit market. Beyond influencing funding costs, the deposit channel shapes banks' incentives for risk-taking through the franchise-value mechanism: rents accumulated in concentrated deposit markets acts as a stabilizer that restrain risky lending. Consequently, the deposit channel serves as an amplifier for the risk-taking channel reducing bank's propensity to extend riskier credit when monetary policy tightens. However, this enhanced resilience comes at the cost of lower credit supply, specifically for borrowers with weaker credit profiles.

Related literature. Our work relates to several strands of the banking literature.

First, we contribute to a growing literature on the deposit channel of monetary policy. This area of research emphasizes that deposits are the primary source of bank funding for lending, as they typically entail lower costs (Drechsler et al., 2017), reduced exposure to interest rate risk (Drechsler et al., 2021), and lower liquidity risk (Li et al., 2023). When central banks adjust policy rates, banks tend to transmit these changes only partially to retail deposit rates, with important implications for lending and risk-taking. For example, under negative policy rates since mid-2014, banks avoided imposing negative rates on depositors, prompting euro-area institutions with greater reliance on deposits to cut lending and increase risk-taking (Heider et al., 2021; Bittner et al., 2022). In markets with high deposit concentration, banks exploit market power to further limit this pass-through (Kho, 2025; Beyer, 2024). Specifically, during tightening cycles, this incomplete transmission slows deposit growth, forcing banks to reduce new lending to small businesses (Drechsler et al., 2017; Caetité et al., 2022; Bredl, 2025). However, the implications for risk-taking remain largely unexplored. We contribute to this literature in three ways: (i) we provide external validation of the deposit channel mechanism for one of the main Euro Area economies during a monetary policy tightening cycle; (ii) using loan-level data, we offer a robust identification strategy for the loan supply implications of this channel; and (iii) we document the impact on both ex-ante and ex-post risk-taking behavior stemming from banks' exposure to deposit market concentration. In a related study Cappelletti et al. (2024) examine the lending effects of the deposit channel in the Euro Area by comparing banks that experienced deposit outflows during the tightening period with those that did not. We differ by explicitly testing the deposit channel mechanism using regional deposit data and by analyzing its implications for bank risk-taking.

Second, we relate to the literature on the risk-taking channel of monetary policy (Dell'Ariccia et al., 2014, 2017; Aoki et al., 2023; Coimbra and Rey, 2024) by providing novel evidence on how the deposit channel generates differential risk-taking behavior across banks. We extend this literature by showing that banks raising deposits in more concentrated markets take less risk in lending, consistent with the preservation of the deposit franchise value. Specifically, controlling for firm loan demand, banks with greater market power reduce lending, particularly to firms with higher probability of default (PD), our measure of ex-ante risk. Contemporaneous and related to our work, Duque et al. (2025) examine the link between deposit franchise and risk-taking after monetary tightening episodes in the US. They find that following a tightening shock, banks with weaker pass-through to deposit rates report a lower PD for the same borrower compared to other banks; i.e., less risk-taking. We differ from their study in several important dimensions.

First, we emphasize the role of regional deposit market concentration as a key factor shaping the pass-through to deposit rates. Second, regarding data scope, their analysis centers on large US bank holding companies and corporate borrowers with committed amounts exceeding $1 million. In contrast, the Spanish credit register allows us to focus on SMEs —the segment most reliant on bank credit. Third, we extend the analysis beyond risk-taking to examine how banks actively manage their risk-return trade-off. Specifically, we examine ex-post performance of newly originated loans, assessing how higher spreads charged by banks with greater market power translate into realized returns once non-performing loan dynamics are taken into account.

Finally, we contribute to the literature on the interplay between market concentration, competition, and financial stability. The franchise value framework of bank risk-taking (Keeley, 1990; Hellmann et al., 2000; Allen and Gale, 2004) argues that banks limit risk exposure to protect the quasi-monopoly profits associated with their charters. Greater competition erodes these rents and franchise value, potentially inducing higher risk-taking and undermining financial stability. In contrast, the risk-shifting paradigm developed by Boyd and De Nicoló (2005) building on Stiglitz and Weiss (1981), suggests that when market power leads to higher loan rates, borrowers engage in riskier projects, increasing their default risk. Conversely, increased competition lowers loan rates, which reduces borrower default risk and, indirectly, bank risk. Martinez-Miera and Repullo (2010) extend this view by showing that while lower rates reduce borrower risk, they also compress banks' revenues from performing loans, which can raise bank failure probabilities. Their findings reveal a non-linear, U-shaped relationship between competition and financial stability. Empirical evidence closest to our work comes from studies incorporating measures of banking business concentration. Jiménez et al. (2013) document that the non-linear competition–stability relationship emerges when concentration proxies are used, whereas direct measures of lending market power tend to support the franchise value hypothesis. Kick and Prieto (2015) employ German bank-level data to examine the competition–stability nexus and its implications for monetary policy transmission using direct risk indicators such as bank distress and default. They conclude that lower competition does not necessarily enhance financial stability or alter monetary policy transmission. We add to this literature by exploring a different dimension: how market concentration influences bank risk-taking through the deposit channel.

Outline. The paper is structured as follows. Section 2 presents the institutional background of the tightening cycle and the concentration in the Spanish banking industry. Section 3 describes the data sources and provides summary statistics. Section 4 is devoted to the deposit channel. Section 5 presents the empirical strategy and main results on the effects of the deposit channel for lending and bank risk-taking. Section 6 concludes.

2. INSTITUTIONAL BACKGROUND

2.1. The 2022-2024 tightening cycle

The period under study marks a sharp and historic departure from the preceding decade of monetary policy in the Euro Area. Following the Global Financial Crisis (GFC) and exacerbated by the COVID-19 pandemic, the ECB maintained a highly accommodative monetary stance. This era was characterized by persistently low—often zero or negative— policy rates, complemented by large-scale asset purchase programs (APP) and targeted longer-term refinancing operations (TLTROs).

This *low-for-long* environment abruptly ended in 2022. Confronted with persistent and mounting inflationary pressures, driven by post-pandemic supply chain disruptions and energy price shocks, the ECB launched a rapid and aggressive monetary tightening cycle. In July 2022, the ECB raised its key policy rates for the first time in over a decade, with an initial increase of 50 bp. This move initiated a sequence of unprecedentedly large and swift hikes. The speed and magnitude of this tightening, particularly at its onset, were largely unanticipated by market participants and financial institutions, conditioned by a decade of stable, highly accommodative policy.[1]

Between June 2022 and September 2023, the policy rate climbed from 0.0% to 4.50%, a cumulative increase of 450 bp in just over a year. This sudden and sharp rise in the cost of funding provides a unique setting to analyze the deposit channel of monetary policy and its implications

[1] The median respondent in the December 2021 Survey of Monetary Analysts anticipated that the deposit facility rate would remain negative until 2025Q1 and that net purchases under the APP would continue through June 2023. Relative to this expected path, the subsequent tightening cycle represented a major surprise. For further details, see Lane (2024). Moreover, in Appendix A.1 we plot monetary policy surprises (Altavilla et al., 2019).

for bank risk-taking.

Importantly, this policy shock occurred against an institutional backdrop markedly different from previous tightening cycles— a feature central to our identification strategy that helps us isolate the effects of the deposit channel from other traditional channels of monetary policy transmission.

First, Euro Area banks entered this cycle with historically high capitalization. Post-GFC regulatory reforms, notably Basel III implementation, left banks with substantially stronger capital positions and buffers than in prior decades. This robust capitalization arguably dampens the relevance of the traditional bank lending channel of monetary policy (Jiménez et al., 2012, 2014), where policy-induced changes in bank capital directly constrain lending and risk-taking behavior.

Second, the banking system operated under abundant liquidity. The prolonged period of quantitative easing and generous refinancing operations —especially TLTROs— left banks saturated with abundant central bank liquidity. Unlike in classic monetary tightening episodes (Kashyap and Stein, 2000), banks were not, on average, liquidity-constrained. This widespread availability of liquidity likely abates the direct effects of the lending channel, which relies on policy tightening creating a scarcity of loanable funds.

This distinctive environment —a rapid, largely unanticipated rate-hiking cycle occurring while banks are well-capitalized and flush with liquidity—provides a clean empirical setting. It allows for a more focused analysis of the deposit channel, as banks' responses are less likely to be confounded by concurrent capital or liquidity constraints.

2.2. Deposit market concentration in Spain

The Spanish banking sector is the second most concentrated among the largest European economies.[2] Since the GFC, it has undergone deep restructuring to correct for the imbalances built up during the preceding expansionary cycle (Cruz-García et al., 2018). In our analysis we use the Herfindahl-Hirschman index (HHI) as a standard measure of market concentration.[3] This measure reveals

[2]See Banking Structural Statistics Indicators (ECB, 2023).

[3]The HHI has been widely used in the banking literature analyzing the effects of market concentration (Jiménez et al., 2013; Drechsler et al., 2017). It is commonly used by competent authorities (e.g., U.S. Department of Justice,

that market concentration has increased notably, as captured by the national HHI depicted by the solid line in Figure 2.[4]

[Figure 2]

The national figure, however, conceals substantial regional disparities. Historically, there were many entities that did not operate nationally, but only within certain regions or even within just a handful of provinces. This implied a high degree of specialization of these banks in certain geographical areas; however, with low market shares at the national level. Following consolidation processes that took place after the GFC, the market share of these regional entities was absorbed by national banks that previously lacked a presence in those regions. While these mergers mechanically increased national concentration, they do not necessarily lead to higher concentration at regional level.

Figure 2 illustrates this divergence between national and regional trends.[5] For the national market concentration measure [6], we observe a steady and pronounced upward trend over the last two decades. In contrast, when we compute the national measure as a weighted average of concentration levels across regional markets, the series starts at a much higher level and remains relatively stable throughout the period.

A key challenge in assessing the impact of concentration on the banking system is determining the relevant market for different bank groups (Kick and Prieto, 2015). Most empirical research typically presumes that a bank's market encompasses the entire country, suggesting direct competition among all banks nationwide. While this assumption may hold for large multi-market banks, it is less applicable to banks that operate primarily within regional markets. Our analysis reveals a clear disconnect between the evolution of deposit market concentration at the national level and that observed within regional markets.

[Figure 3]

European Commission, and European Central Bank) to measure market competitiveness, often pre- and post-merger and acquisition transactions.

[4]The number of individual deposit-taking institutions fell by half, from 362 in 2008 to 187 in 2023.

[5]This divergence has been known to take place in other industries, for instance, in the United States (Rossi-Hansberg et al., 2021).

[6]For the details of the HHI measures calculation, see Appendix A.2

Moreover, although the weighted national concentration measure appears relatively stable over time, it masks substantial variation in deposit concentration across regions, as shown in Figure 3. This pronounced heterogeneity is our key descriptive statistic and underpins the identification strategy employed to test the deposit channel mechanism in Section 4, and as well as its implications for bank lending and risk-taking in Section 5.

3. Data description and summary statistics

Our dataset combines information from multiple sources and covers all banks operating in Spain on a quarterly basis from 2021Q2 to 2024Q2. All data are reported at the consolidated banking group level; therefore, whenever we use the term *banks* we refer to banking groups.

[Table 1]

3.1. Bank-branch level data

We use confidential supervisory data containing information on the outstanding volume of deposits held by each financial institution at the regional level for the entire private residential sector.[7] Hereafter, for ease of exposition, we refer to each bank-province pair as a *branch*.[8]

Our data covers 845 branches from 67 banks operating across 50 provinces over 13 quarters. Panel A of Table 1 reports summary statistics for this dataset. On average, total deposits increased by 6.1 % during the observed period. However, this aggregate growth was not uniform across deposit types: checking deposits increased only marginally, whereas time deposits grew by nearly 40 %. The average share of time deposits is slightly below 13 %, which accounts for the modest overall increase in total deposits. The average HHI is 0.22, with considerable variation across provinces (0.12 to 0.35). We classify provinces into low- and high-concentration groups based on the median HHI. Branches in low-HHI provinces, on average, hold larger deposit volumes and higher shares of time deposits. They also exhibit slightly higher deposit growth, largely driven by lower outflows from checking deposits.

[7] This includes households, non-financial corporations (NFCs) and financial corporations. At an aggregate level households represent approximately 75% of total deposit holdings with NFCs representing roughly 20%.

[8] In practice, banks operate multiple physical branches within a single province. However, data on deposits at a more granular level is not available for the Spanish banking system.

3.2. Bank-firm and loan level data

Our main empirical analysis employs bank–firm matched credit data from the Central Credit Register (CIRBE) maintained by Banco de España. CIRBE is a comprehensive credit register that contains detailed information on credit granted by banks in Spain to virtually all corporate borrowers.[9] Specifically, it includes loan-level information such as the amount of outstanding credit (both drawn and undrawn) granted by a bank to a given borrower; collateral status; issuance date; residual maturity; presence of government guarantees; loan rates; rate type (fixed or floating); provisioning levels; product type (e.g., credit line or term loan); and the probability of default (PD).[10] CIRBE also provides firm-level characteristics such as size, industry, and postal code.

We focus on SMEs located in municipalities that collectively account for 95% of SME credit in Spain, selected according to their ranking by credit share. Our bank-firm level data consists of 6,471,525 observations from 67 banking groups lending to 243,602 firms —excluding defaulted loans as of 2022Q2— over the period from 2021Q2 to 2024Q2.[11,12] Panel B of Table 1 presents summary statistics for outstanding credit amounts in our bank-firm panel. On average, outstanding lending contracted by approximately 4.3% year-over-year during our period of study. The average reported PD is around 4%. Panel C of Table 1 presents summary statistics for newly originated loans. The average new loan is of around 64,000€ and carries a loan rate of 4.3% with a maturity of one year. 30% of the newly originated loans are floating rate and 4% of them are collateralized. Around 10% of new loans fall into distress one year after origination.[13]

3.3. Bank controls

We enhance our datasets by matching them with banks' supervisory financial statements. This allows us to incorporate relevant balance-sheet variables such as Return on Assets (ROA),

[9] The reporting threshold is currently set at 3,000€, covering almost the entire spectrum of business loans.

[10] PDs are reported by banks using internal ratings-based (IRB) models to calculate risk-weights. In our sample, four banks use IRB models, accounting for approximately 68% of total outstanding lending in 2023Q2.

[11] Under the current supervisory definition, an exposure is considered in default if it is more than 90 days past due, or the creditor considers the borrower unlikely to pay its obligation in full (EBA/GL/2016/07).

[12] Only one merger occurred in our sample. For that quarter when both banks coexisted separately we assume they operated as a single entity.

[13] We treat cases in which a loan is forborne due to the borrower's financial difficulties as instances of nonperformance, since, absent the bank's intervention, the loan would have been past due. Including these cases helps mitigate the possibility that weaker banks engage in loan evergreening.

non-performing loan (NPL) ratio, capital and liquidity ratios, and the logarithm of total assets. In particular, the average capitalization is well above the Basel III requirements (see Table A.2 in the Appendix). The loan-to-asset ratio is slightly below 0.45, while deposits-to-funding is 0.76. The NPL ratio remained contained during this period, not exceeding 3.2 on average.

3.4. Monetary policy stance

We define the start of the monetary tightening cycle as 2022Q3, when the ECB began raising its policy rates after maintaining it at zero for an extended period. The main refinancing operations rate —one of the three key interest rates set by the ECB every six weeks— shows that the post-tightening period was characterized by an average rate of approximately 3.6%, with gradual increases over time, rising from 0% in July 2022 to 4.50% by late 2023. Furthermore, monetary policy surprises (Altavilla et al., 2019) indicate that most of these rate hikes and their magnitude were unexpected by market participants. This provides a quasi-experimental setting to study how monetary transmission affects deposit growth and, through this channel, lending.

4. The deposit channel during a tightening cycle

In this section, we provide empirical evidence on the effect of the deposit channel in the transmission of monetary policy in Spain during the 2022-2024 tightening cycle.

4.1.a Empirical strategy

To identify the deposit channel, we exploit cross-regional variation in deposit market concentration. The theoretical premise of this channel is that higher concentration in the deposit market leads to upward stickiness in deposit rates, thereby dampening deposit growth. A key empirical challenge is to isolate the causal effect of monetary policy on deposit supply, since changes in the policy stance may simultaneously reduce lending opportunities, prompting banks to contract deposit supply even in the absence of a deposit channel. Following Drechsler et al. (2017), we address this concern by comparing deposit supply across branches of the same banking institution located in regions with heterogeneous levels of deposit market concentration. This identification strategy hinges on the assumption that banks can accommodate local lending demand through internal reallocation of deposits across branches.

Formally, we estimate the following difference-in-differences specification using bank-branch-quarter level data on deposit holdings of the private residential sector:

$$y_{b,p,t} = \beta \cdot Tightening_t \times HHI\text{-}Prov_p + \alpha_{b,p} + \gamma_{b,t} + \epsilon_{b,p,t}, \tag{1}$$

where $y_{b,p,t}$ denotes the logarithm of deposits holdings for bank b in province p in quarter t;[14] $Tightening_t$ is a dummy variable that takes the value of one from 2022Q3 onward; $HHI\text{-}Prov_p$ is the province level concentration measure, as defined in Equation 6.[15] To ease interpretation, $HHI\text{-}Prov_p$ is standardized. The specification includes branch fixed effects $\alpha_{b,p}$, and bank-by-quarter fixed effects $\gamma_{b,t}$. Standard errors are clustered at the province-by-quarter level.

Our parameter of interest is β. A negative estimate of β would be consistent with the presence of a deposit channel of monetary policy, whereby branches of the same bank operating in more concentrated deposit markets experience lower deposit growth due to weaker pass-through of policy rates to deposit rates. This coefficient captures, following the onset of the tightening cycle, the differential evolution of deposits across branches of the same bank located in areas with heterogeneous market concentration. The inclusion of bank-by-quarter fixed effects is crucial, as it controls for time-varying bank-specific factors —for example, lending opportunities— by exploiting within-bank-quarter variation. Similarly, branch fixed effects absorb time-invariant branch characteristics, such as local management practices or branch's business model.

4.1.b Results

Table 2 presents the main results obtained from the specification in Equation 1. Columns (1)-(2) show that, compared to the pre-tightening period and within the same bank, a one-standard-deviation increase in the $HHI\text{-}Prov_p$ of the region where a branch operates reduces its total deposits holding by 0.4% compared to a branch of the same bank in the average $HHI\text{-}Prov_p$.[16]

[14] We compute deviations from average branch deposit growth and exclude branches at the top and bottom 1%.

[15] We use a time-invariant measure of market concentration for each province, $HHI\text{-}Prov_p$, which is standard practice to ensure exogeneity. Specifically, we fix the $HHI\text{-}Prov_p$ at its value in 2021Q4, prior to the start of tightening period. Results are robust to alternative definitions, such as using the sample-period average.

[16] As shown in Panel A of Table 1, aggregate deposits increased over the sample period.

This finding is consistent with weaker pass-through of policy rates in highly concentrated markets, which translates into slower deposit accumulation (Drechsler et al., 2017). In Appendix A.3, we corroborate this mechanism at the aggregate bank level.[17] Consequently, the opportunity cost of holding deposits in these markets is higher, inducing retail investors to reallocate funds towards more profitable instruments. Aggregate evidence supports this interpretation: the share of short-term Treasury bills purchased by the private residential sector substantially rose during this period — from less than 1% of new short-term government debt issuance in 2021 to over 35% in 2023.

[Table 2]

Columns (3)-(6) in Table 2 report separate estimates for checking and time deposits, respectively. The results indicate that the deposit channel operates mostly through the time deposits segment, which has been shown to be of special relevance for banks' lending business by offering interest-rate sensitivity matching (Supera, 2021). This pattern is not surprising given the negligible pass-through of policy rates to checking deposit rates, as illustrated in Figure 1.[18]. Compared to the pre-tightening period and within the same bank, a one-standard-deviation increase in the $HHI\text{-}Prov_p$ of the region where a branch operates reduces its time deposits holding by 3.8% compared to a branch of the same bank in the average $HHI\text{-}Prov_p$.

A potential concern is that branches in less concentrated markets may have exhibited different deposit dynamics even prior to the tightening cycle. To address this, we examine whether the parallel trends assumption holds around the start of the policy tightening. Figure 4 shows that changes in time deposits across branches in highly concentrated versus less concentrated markets was not statistically different prior to the tightening cycle, displaying a pronounced decline only following the onset of the monetary policy tightening cycle.

[Figure 4]

In sum, we document the presence of a deposit channel in the transmission of monetary policy in Spain during a tightening cycle. This constitutes an essential step toward assessing its implications for bank lending and risk-taking in the following section.

[17] Branch-level deposit rate data are not available for Spanish banking system.

[18] Aside from specific promotional campaigns to attract new customers with in-kind rewards, checking deposit rates remain negligible, offering limited cross-branch variation.

5. Bank lending

In this section, we use bank–firm credit register data from Spain to analyze the effect of the deposit channel of monetary policy on SME lending outcomes.

5.1. Lending and loan rates

5.1.a Empirical strategy

Our identification strategy for estimating the effect of the deposit channel of monetary policy on lending exploits the largely unexpected increase in ECB interest rates during the tightening cycle from 2022Q2 to 2024Q2, combined with bank–firm level data that allows the inclusion of firm-by-quarter fixed effects to control for credit demand factors (Khwaja and Mian, 2008). Specifically, we implement a difference-in-differences strategy, comparing credit outcomes for the same borrower before and after the 2022–2024 tightening cycle between banks that raise deposits in highly concentrated markets and those raising deposits in less concentrated ones.

This approach relies on the assumption that deposits are a special source of funding, not perfectly substitutable, and that banks allocate funds internally. Under this assumption, lower deposit growth from branches in concentrated markets reduces the funding available for lending across all branches. Consequently, banks that raise deposits in highly concentrated local markets reduce their lending supply compared to other banks. We measure the bank-level exposure to deposit market concentration, *HHI-Bank*, as the weighted average of local deposit market concentration across all provinces where the bank operates (see Section A.2).

Formally, to test the effects of the deposit channel of monetary policy on bank lending, we run the following specification:

$$y_{b,f,t} = \theta \, \textit{HHI-Bank}_b \times \textit{Tightening}_t + \Theta' X_{b,f,t-1} + \alpha_b + \gamma_{f,t} + \epsilon_{b,f,t} \tag{2}$$

where $y_{b,f,t}$ denotes the quarterly log difference in the outstanding credit (sum of drawn and undrawn amounts) from bank b to firm f in quarter t, winsorized at the 5% level; $\textit{Tightening}_t$ is an indicator variable equal to one from 2022Q3 onwards and zero otherwise; $\textit{HHI-Bank}_b$ is the bank-level exposure to deposit market concentration; α_b are bank fixed effects; $\gamma_{f,t}$ are firm-quarter fixed effects; and $X_{b,f,t-1}$ is a vector of lagged control variables, including relationship-level controls (share of loans with government guarantees, real collateral, residual maturity of one year or less, share of outstanding credit with bank b, and an indicator for non-performing loans) and bank-level controls (ROA, NPL ratio, log of total assets, regulatory capital ratio, and LCR). To ease interpretation, $HHI\text{-}Bank_b$ is standardized. Standard errors are double-clustered at the bank and firm levels.

A negative estimate of θ indicates that, for the same firm borrowing from multiple banks, banks that raise deposits in highly concentrated markets reduce lending more following a sudden increase in ECB rates. To extend the analysis to single-bank borrowers, we construct firm-bin–quarter fixed effects: if a firm has multiple lending relationships, the bin contains the firm itself, as in Khwaja and Mian (2008); otherwise, single-bank firms of similar size and operating in the same industry and municipality are grouped into the same bin, as in Degryse et al. (2019).

5.1.b Results

Our findings on the impact of the tightening cycle through the deposit channel on lending are presented in Table 3.

[Table 3]

Columns (1) and (2) report results for borrowers with multiple lending relationships, while column (3) expands the sample to include single-bank borrowers. In column (1), we control for credit demand by adding firm-by-quarter fixed effects (Khwaja and Mian, 2008). Column (2) adopts an alternative specification based on size-by-municipality-by-industry fixed effects (Degryse et al., 2019), enabling a comparison with the preferred firm-by-quarter fixed effects. Finally, column (3) introduces firm-bin-by-quarter fixed effects: for multiple-bank borrowers, the bin corresponds to the firm itself, whereas for single-bank borrowers, bins group firms of similar size operating in the same municipality and industry.

We find that following the tightening cycle, a one-standard-deviation increase in bank exposure—measured as the weighted average HHI across all regions where the bank operates—reduces lending supply by 10.5% relative to other banks when controlling for firm-by-quarter fixed effects (see column 1).[19] This effect remains largely unchanged (8.4%) when we instead employ municipality-by-size-by-industry fixed effects, suggesting that the two approaches yield similar results (see column 2). When we include single-bank firms and control for firm-bin-by-quarter fixed effects, the estimate is 11.5% (see column 3), suggesting that the findings for multiple-bank borrowers extend to single-bank borrowers as well. On the pricing side, using loan-level data on the rate at origination for new term loans, we find that the contraction in lending was accompanied with an increase in loan rates (see Section 5.3), supporting the loan supply contraction interpretation.

These findings indicate that banks experiencing lower deposit growth —or higher outflows— due to exposure to concentrated markets reduce lending more, consistent with Drechsler et al. (2017). Importantly, the use of bank-firm matched credit register data allows us to control better for unobserved, time-varying firm characteristics —such as credit demand shocks—, offering an advantage over previous studies.

5.1.c Additional checks

To assess whether any pre-existing trends could influence our results, we examine the dynamics of credit growth around the monetary tightening cycle.

[`Figure 5`]

Figure 5 plots the estimated coefficients and their 90% confidence intervals from regressions analogous to Equation 2, replacing *Tightening* with a sequence of quarterly dummies spanning the sample period. As shown, prior to the tightening cycle, lending supply exhibited no differential trend across banks with varying market power in raising deposits. Following the tightening cycle, however, lending declined more for banks raising deposits in more concentrated markets —those one standard deviation above the mean exposure— providing additional evidence of the deposit channel's effect on bank lending.

A potential concern regarding our identification strategy is the influence of other monetary transmission channels, particularly the bank lending channel (Kashyap and Stein, 2000; Jiménez

[19]Lending growth at the bank-firm level was negative during the sample period, as shown in Table 1.

et al., 2012). To address this, we extend the specification in Equation 2 by explicitly including interaction terms between *Tightening* and banks' capital and liquidity ratios. Prior evidence for Spain show that monetary policy effects are shaped by these balance sheet characteristics, Jiménez et al. (2012).

[Table 4]

The results of this extension are reported in Table 4.[20] We find that our coefficient of interest — the interaction between *Tightening* and *HHI-Bank* —remains largely unchanged when we include interactions with voluntary capital buffers and LCR, measured as of 2021Q4. This confirms that the observed effect reflects the deposit channel rather than being confounded by other transmission mechanisms.

Overall, we find robust evidence that the deposit channel of monetary policy —where banks curtail lending in response to weaker deposit growth in concentrated deposit markets— operates through lower quantities and, as shown later, higher prices.

5.2. Ex-ante risk-taking

5.2.a Empirical strategy

We extend the previous analysis to examine whether banks that raise deposits in highly concentrated markets disproportionately reduce lending to ex-ante riskier borrowers. Specifically, we expand Equation 2 to include a triple interaction term

$$\textit{HHI-Bank}_b \times \textit{Tightening}_t \times PD_f, \tag{3}$$

where PD_f is a firm's average probability of default (PD), based on internal estimates under the IRB approach.[21] For interpretability, PD_f is standardized. To further mitigate concerns about

[20] The sample decreases slightly because two small banks lack data on regulatory capital buffers for the specified date.

[21] If a firm maintains several lending relationships but only one with an IRB bank, we assign that bank's internal PD as the measure of firm risk. For firms with multiple IRB relationships, we compute a weighted average of reported PDs, using lending shares as weights. As not all borrowers have IRB relationships, the sample size decreases; however, coverage remains representative, as these firms account for 95% of total credit in our original sample multi-bank borrowers as of 2022Q2.

unobserved supply shocks, we saturate our specification with bank-by-municipality-by-quarter fixed effects, controlling for time-varying factors that uniformly affect credit supply within the same bank and municipality. This approach allows us to assess whether, following monetary policy tightening, banks more exposed to concentrated deposit markets reduce lending to riskier firms —those one standard deviation above the mean PD_f— more sharply than firms at the mean of the PD_f distribution.

5.2.b Results

Table 5 summarizes the results on ex-ante risk-taking.

[Table 5]

For borrowers with multiple lending relationships, we find that banks with exposure one standard deviation above the mean reduce lending by 8.7% on average, and by an additional 4% if the borrower's PD_f is one standard deviation above the mean (see column 2). In our preferred specification (column 3), which includes bank-by-quarter-by-municipality fixed effects, this differential in lending supply is 4.6%, meaning that riskier borrowers experience a sharper contraction in credit supply relative to firms with average PD_f. When we include all borrowers (columns 4-6), the effects remain broadly similar, although they become less precise.

5.2.c Additional checks

Figure 6 shows no evidence of pre-trends suggesting that banks concentrated deposit markets were reducing exposure to risky borrowers prior to the tightening cycle. This supports our interpretation that banks with strong deposit market power de-risk their lending portfolios in response to monetary policy tightening, consistent with a higher deposit franchise.

[Figure 6]

We also rule out the alternative explanation that the bank lending channel drives these results; see Table A.3 in the Appendix.

Overall, these findings show that banks in more concentrated deposit markets cut lending to riskier borrowers more aggressively during the tightening monetary cycle. This pattern reflects incomplete pass-through of policy rates to deposit rates, which enhances the value of the deposit franchise and incentivizes prudence. The results align with mechanisms of risk-taking and on franchise value (Keeley (1990), Hellmann et al. (2000), or Repullo (2004)) and contrasts with the risk-taking channel observed during prolonged low-rate periods, when compressed margins encourage search-for-yield behavior (Martinez-Miera and Repullo, 2017; Heider et al., 2019; Bauer et al., 2023). Thus, following a period of low rates, abundant liquidity and strong capital ratios, a shift in monetary policy can lead to less risk-taking among banks whose deposit franchise appreciates under an active deposit channel.

5.3. New lending

5.3.a Empirical strategy

We use data on new term loans to analyze new loan amounts and loan rates setting among banks with different market power in raising deposit.[22] In particular, we estimate the following equation at a quarterly frequency:

$$y_{\ell,b,t} = \theta\, \textit{HHI-Bank}_b \times \textit{Tightening}_t + \beta \textit{Length}_{f,b,t} + \alpha_b + \gamma_{m,i,s,r,t} + \epsilon_{\ell,b,t}, \tag{4}$$

where $y_{\ell,b,t}$ is either the logarithm of the loan amount or the loan rate of loan l by bank b in quarter t at origination. Importantly, to ensure comparability across new contracts, we include municipality-by-industry-by-size-by-risk-bin-by-quarter fixed effects, $\gamma_{m,i,s,r,t}$. Risk bins are based on quintiles of the loan loss provision rate at origination, which approximates bank's perceived risk of the loan. Note that under the expected loss approach to credit risk, the provision rate at origination reflects the product of the Probability of Default (PD) and Loss Given Default (LGD).[23] $\textit{Length}_{f,b,t}$ is the natural logarithm of one plus the total time elapsed since the lending relationship between bank b and firm f, the recipient of loan ℓ, first began, which proxies for the accumulation of soft information in the lending relationship (Bolton et al., 2016). Finally, α_b

[22] Credit lines are exclude because their variable utilization affects provisioning levels, making loan loss provisions at origination a less reliable measure of perceived risk —an important control variable in specification (4). For instance, Gutiérrez and Lafuerza (2025) show that firms in Spain increased credit lines usage in anticipation of tighter lending standards from banks with worse outcomes in the 2011 EBA stress test.

[23] Provisioning rates at origination better capture the information used during screening process.

represent bank fixed effects.

Our coefficient of interest is θ. In the specification where the dependent variable is the logarithm of the new loan amount, $\theta < 0$ captures whether, for two contracts with similar perceived risk, banks with greater market power in raising deposits supply less credit following the tightening cycle. In the specification where the dependent variable is the loan rate, $\theta > 0$ captures whether, under the same setting, those same banks charge higher loan rates.

Under moral hazard, higher loan rates may induce riskier behavior, as firms retain a smaller share of the project returns in success states (Stiglitz and Weiss, 1981), a mechanism formalized in Boyd and De Nicoló (2005) and Martinez-Miera and Repullo (2010). In order to test this theory —and to have a comprehensive view of banks' credit risk—, we also compare ex-post performance of new loans granted after the tightening cycle with those granted before, across banks with different exposure to regional deposit market concentration. Formally, in the spirit of Casado and Martinez-Miera (2025), we estimate Equation 4 using as dependent variable the loan's performance status one year after origination (or until maturity or 2024Q2). In this specification $\theta > 0$ captures whether, for two contracts with similar perceived risk, banks with greater market power in raising deposits experience more non-performing loans one year after origination following the tightening cycle.

Finally, we compare the realized return per loan one year after origination. To that end, we define the dependent variable as:

$$\text{Ex-post return per loan}_{\ell} = r - \big(r + \underbrace{LGD}_{\substack{\approx \\ \text{Provision rate} \\ \text{in defaults}}}\big) \times \mathscr{I}(\text{default}), \tag{5}$$

where r is the loan rate of ℓ; loss given default (LGD) is measured by the provision rate one year after origination in case of default, reflecting one minus the expected recovery rate; and the first term inside parentheses accounts for the loss of interest income in case of default.[24] Importantly, our granular municipality-by-size-by-industry-by-risk-bin-by-quarter fixed effect enables comparison across lending portfolios with similar characteristics.

[24] Following the release of supervisory guidelines on NPLs, Baskaya et al. (2024) document that banks exert less discretion in the provisioning rate of NPLs, better reflecting realistic expected recovery rates.

In this specification, $\theta > 0$ captures whether banks raising deposits in concentrated areas achieve higher realized returns one year after origination, for comparable lending portfolios. That is, it indicates whether the increase in loan rates more than compensates for the possible increase in default rates, allowing higher pricing to translate into greater lending profitability.[25]

5.3.b Results

Table 6 reports the estimates for new lending.

[Table 6]

Banks with exposure —measured by regional deposit concentration— one standard deviation above the mean reduced new lending by 5% (column 1) and raised loan rates by 20 bp (column 2). This increase in prices translated entirely into higher realized returns, which rose by 21 bp after one year (column 4). This increase is driven entirely by the price component: we find no statistically significant difference in ex-post default rates of high concentration banks (column 3). This confirms that the higher loan rates represent a pure increase in intermediation margins rather than a risk premium required to cover deteriorating credit quality.

These findings show that the tightening cycle led banks with stronger deposit franchises to contract lending while increasing loan rates. Higher rates are not statistically associated with weaker borrower performance and instead help improve short-term returns for banks operating in highly concentrated deposit markets. Importantly, we previously observed that banks selected among borrowers, prioritizing safer (ex-ante less risky) clients, potentially those less sensitive to changes in interest rates. This is consistent with the role of deposit market concentration in shaping lending behavior. In line with Martinez-Miera and Repullo (2010), given the current level

[25] Note that in a simple regression

$$y_{\ell,b,t} = \alpha_b + \alpha_t + \theta\,\text{High}_b \times \text{Tightening} + \varepsilon_{\ell,b,t},$$

where High_b splits the sample into high- and low-exposed banks, θ exploits this variation:

$$\theta = \left(\overline{y}_{\text{High=1, Tightening=1}} - \overline{y}_{\text{High=1, Tightening=0}}\right) - \left(\overline{y}_{\text{High=0, Tightening=1}} - \overline{y}_{\text{High=0, Tightening=0}}\right),$$

where $\overline{y}$ captures the average net return on the lending portfolio one year after origination, accounting for interest income from performing loans and losses on non-performing loans. Equation 4 additionally includes contractual terms as controls and incorporates granular fixed effects to enhance comparability across lending portfolios.

of concentration, higher interest rates improve bank profitability and thereby enhance financial stability.

6. Concluding remarks

The literature on the deposit channel of monetary policy and its effect on lending has expanded considerably, yet its implications for bank risk-taking and financial stability remain underexplored.

We document the role of the deposit channel in Spain during the fastest and most intense tightening cycle of the Euro era. Leveraging loan-level data from the Spanish Central Credit Register, we show that banks operating in more concentrated deposit markets reduced lending more, consistent with the higher opportunity cost of funding predicted by the deposit channel. We also uncover a novel effect of this channel on bank risk-taking: following the tightening cycle, these banks cut lending more sharply to riskier firms. Importantly, our findings cannot be attributed to alternative monetary policy transmission channels, such as the bank lending channel.

Analysis of new term loans confirms that banks with greater market power raised loan rates following the onset of the tightening cycle. Crucially, this higher pricing translated directly into higher realized returns, as ex-post credit quality remained stable. This indicates that banks successfully extracted higher intermediation margins without incurring additional risk.

We interpret these findings through the lens of *franchise value* theory. Weaker pass-through of policy rates in concentrated markets generated substantial rents, appreciating the value of the deposit franchise. To protect these increased rents, banks adopted a more prudent stance, contracting lending —particularly to riskier borrowers— rather than chasing yields. Consequently, we identify the deposit channel not merely as a mechanism determining changes in credit quantity, but as a stabilizing force that enhances lending quality during monetary tightening cycles.

However, the financial stability benefits of this mechanism may come at a cost to the real economy. While the contraction in credit supply shields banks from deterioration, it simultaneously tightens financial conditions for a specific segment of riskier borrowers. Understanding whether this differential reduction in access to credit creates significant drag on aggregate output or merely prunes inefficient lending remains an open question.

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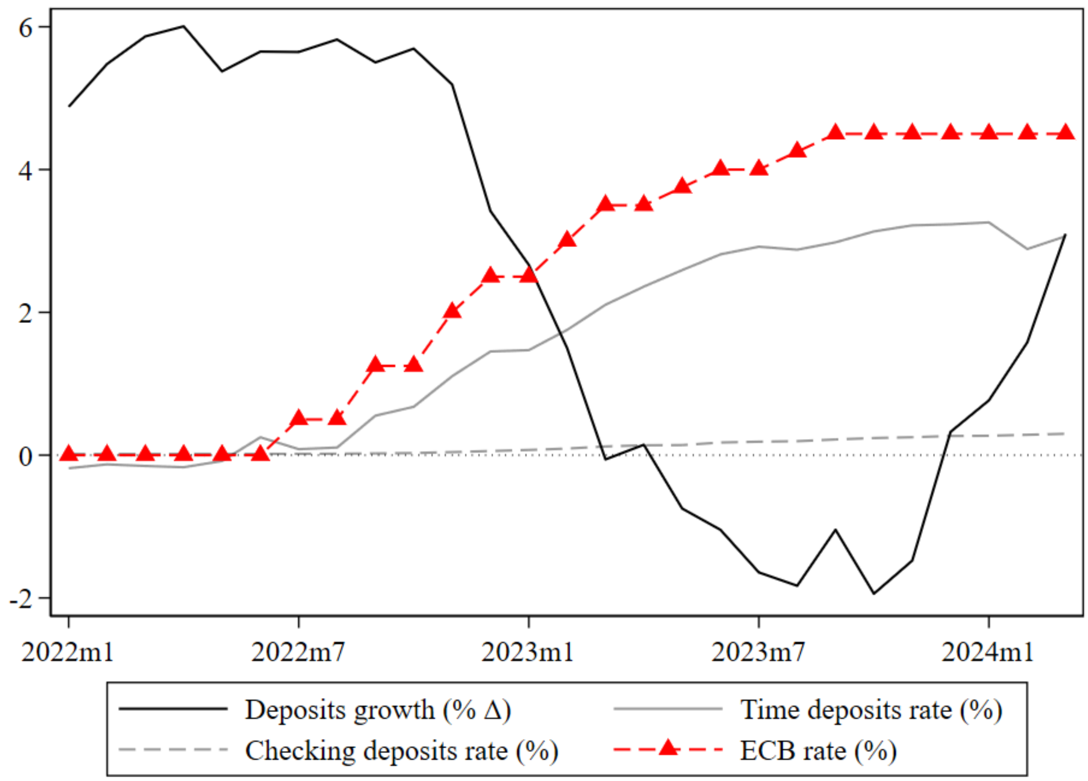
Figures and Tables

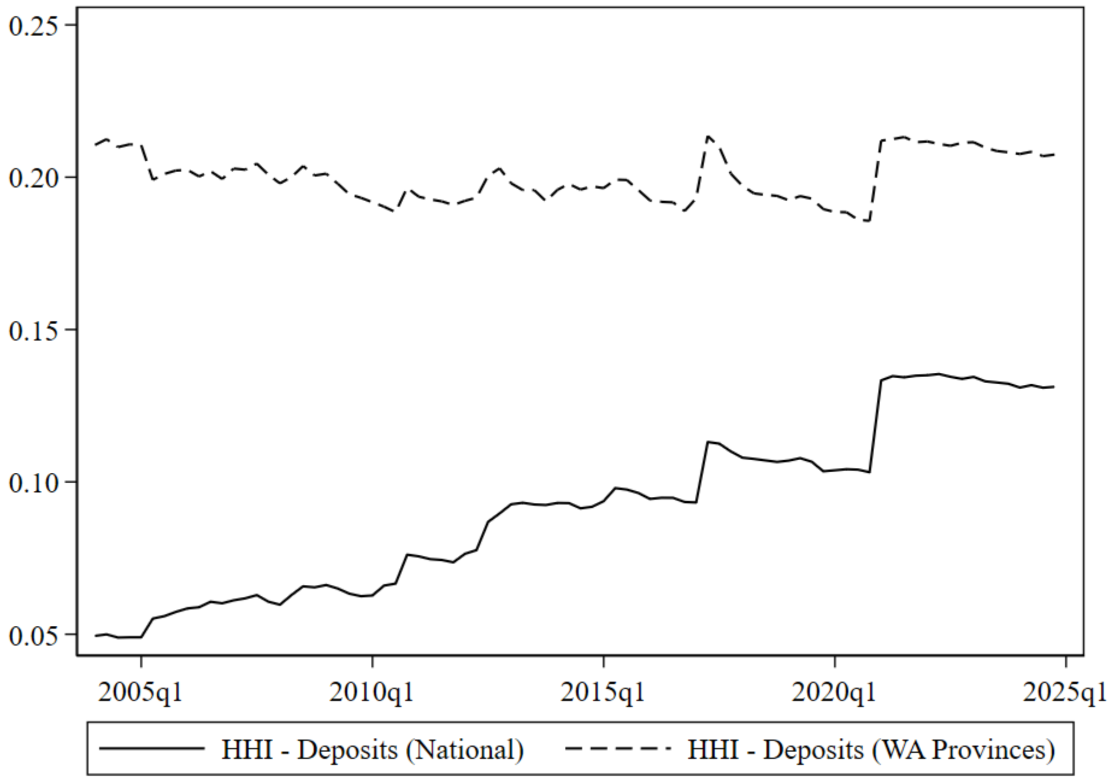
Figure 1: Monetary policy, deposit rates, and deposit growth



Note: This figure shows the evolution of the ECB main refinancing operations rate (red line), the average one-year time deposit rate (solid grey line), the average checking deposit rate (dashed grey line), and deposit growth (solid black line) across Spanish deposit institutions during the tightening cycle 2022Q2-2024Q2.

[Section 1]

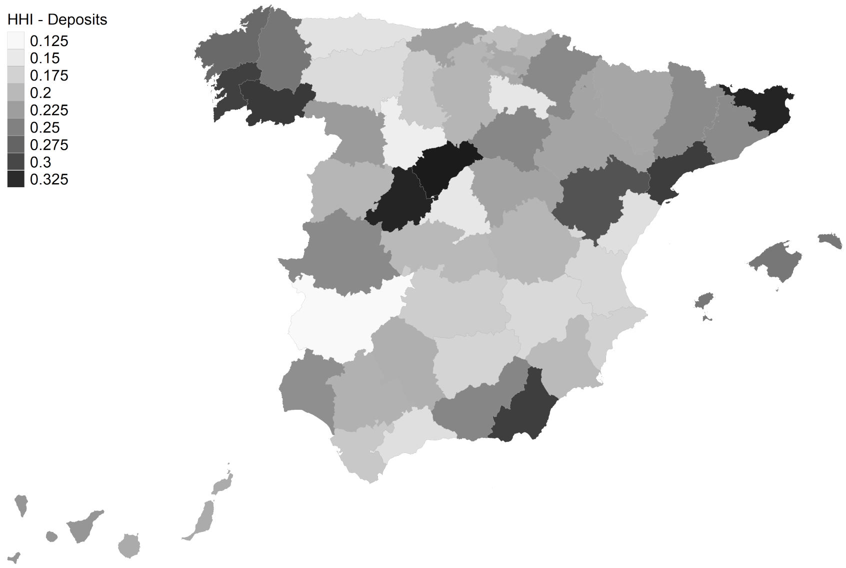
Figure 2: Evolution of deposit market concentration



Note: This figure illustrates the evolution of two measures of national bank deposit market concentration. The solid line represents the nationwide HHI defined in Equation 7, while the dashed line shows the weighted average national HHI, calculated using bank–province level data and defined in Equation 8. The data are quarterly and cover the period from 2003Q4 to 2023Q4.

[Section 2]

Figure 3: Regional heterogeneity in deposit market concentration



Note: This figure illustrates the regional dispersion of deposit market concentration at the province level, measured using the HHI defined in Equation 6. The data correspond to 2021Q4.

[Section 2]

Table 1: Summary statistics

Panel A: Branch Data	Full sample		Low HHI-Prov		High HHI-Prov	
	Mean	SD	Mean	SD	Mean	SD
Deposits (mill. €)	1,587.77	5,898.37	1,891.04	7,068.87	1,262.44	4,279.00
ln(Deposits)	12.32	2.10	12.48	2.14	12.14	2.05
Δ ln(Deposits)	6.11	24.80	7.02	26.13	5.13	23.26
% Time Deposits	12.73	14.26	13.48	14.99	11.93	13.39
Δ ln(Time Deposits)	39.66	78.30	39.69	77.39	39.62	79.26
Δ ln(Checking Deposits)	0.35	24.97	1.11	26.27	-0.47	23.47
Lending (mill. €)	1,339.08	5,332.86	1,612.65	6,567.17	1,045.59	3,538.48
HHI-Prov	0.22	0.05	0.18	0.02	0.26	0.04
Observations	10,652		5,513		5,139	

Panel B: Bank-Firm Data	Full sample		Low HHI-Bank		High HHI-Bank	
	Mean	SD	Mean	SD	Mean	SD
Lending (thou. €)	231.55	1,684.60	236.61	1,354.95	226.71	1,948.51
ln(Lending)	10.80	1.90	10.78	1.91	10.81	1.89
Δ ln(Lending)	-4.46	12.86	-4.46	12.71	-4.47	13.00
PD (%)	4.04	7.76	4.00	7.75	4.09	7.76
Gov. Guarantees (%)	31.99	41.30	30.87	40.88	33.06	41.68
Collateralized (%)	14.77	33.63	14.66	33.45	14.88	33.80
Share of total lending (%)	15.96	31.67	15.46	31.34	16.44	31.98
NPL (%)	3.14	17.45	3.15	17.46	3.14	17.45
Observations	6,471,525		3,207,067		3,264,458	

Panel C: New Loans Data	Full sample		Low HHI-Bank		High HHI-Bank	
	Mean	SD	Mean	SD	Mean	SD
Lending (thou. €)	57.91	436.62	61.78	521.44	55.17	364.83
ln(Lending)	9.94	1.22	9.92	1.24	9.94	1.21
Loan rate (%)	4.27	2.12	4.53	2.18	4.09	2.05
Floating rate (%)	30.76	46.15	7.16	25.78	47.47	49.94
Maturity (months)	13.25	27.07	13.98	28.83	12.74	25.73
Collateralized (%)	4.05	19.72	4.03	19.66	4.07	19.76
NPL 1y (%)	10.81	31.05	13.54	34.22	8.88	28.44
Realized return (%)	1.66	10.84	2.09	9.48	1.35	11.69
Observations	2,255,405		1,064,501		1,190,904	

Note: This table provides summary statistics of the different datasets employed in the empirical analysis. Panel A summarizes the bank–province (branch) level data sourced from confidential supervisory reports submitted by deposit institutions to Banco de España. Panel B summarizes bank–firm matched credit data. PD is only available for a subsample of firms as described section Section 3. Panel C presents loan level both from the Spanish Central Credit Register (CIRBE). Δ represents year-over-year changes. The information covers the period from 2021Q2 to 2024Q2.

[Section 3]

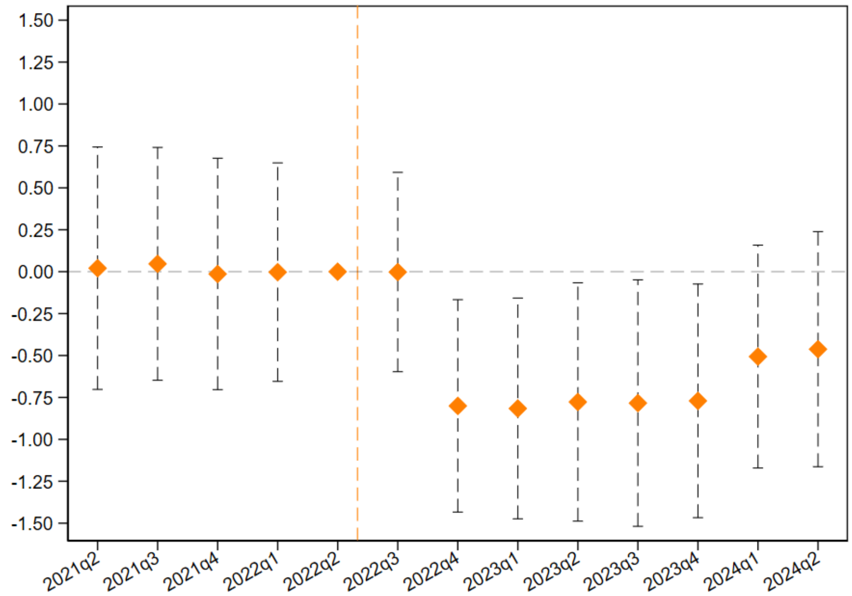
Table 2: Deposits channel

	log(Deposits)					
	All		Checking		Time	
	(1)	(2)	(3)	(4)	(5)	(6)
Tightening × HHI-Prov	-0.00707***	-0.00480**	-0.00158	-0.00426	-0.0542***	-0.0384***
	(0.00224)	(0.00223)	(0.00253)	(0.00264)	(0.0107)	(0.00905)
Bank-Province FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank-Time FE	No	Yes	No	No	No	No
Province-Time FE	No	No	No	No	No	No
Time FE	Yes	No	Yes	Yes	Yes	Yes
Observations	9,763	9,464	9,763	9,464	9,221	8,930
R-squared	0.997	0.998	0.997	0.998	0.928	0.972

Note: This tables estimates how province deposit market concentration shapes the effect of tightening monetary policy. The data is at the branch-quarter level and covers the full tightening cycle 2021q2-2024q2. In columns (1)-(2) the dependent variable is the log of total deposits; in column (3)-(4) is the log of checking deposits; in columns (5)-(6) is the log of time deposits. HHI-Prov measures deposit market concentration in the province where a branch is located as defined in Equation 6. Tightening takes value one after 2022Q3. The data is from the confidential financial statements reported by banks to the Banco de España. Fixed effects are denoted at the bottom of the table. Standard errors are clustered at the province×quarter level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[Section 4]

Figure 4: The deposit channel of monetary policy during a tightening cycle



Note: This figure plots period-by-period coefficients β_t obtained by replacing the variable *Tightening* in Equation 1 with a sequence of quarterly dummies spanning all periods in the estimation window. The dependent variable is the log of time deposits. The dotted line indicates the start of the monetary policy tightening. Confidence intervals are set at 90%. Standard errors are clustered at the province×quarter level.

[Section 4]

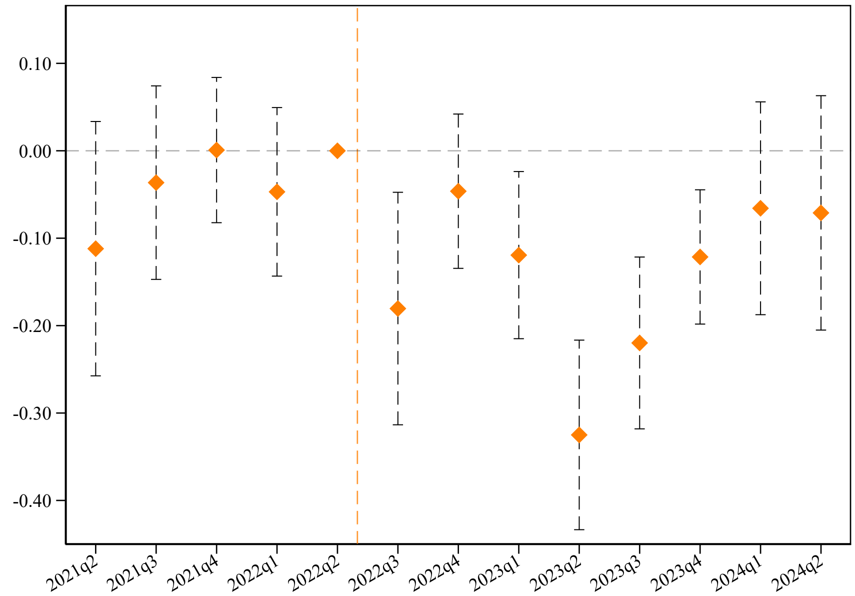
Table 3: Effect on lending

	Change in log outstanding credit		
	Multiple-bank borrowers		All borrowers
	(1)	(2)	(3)
HHI-Bank×Tightening	-0.105***	-0.084***	-0.115***
	(0.022)	(0.028)	(0.027)
Relationship controls	Y	Y	Y
Bank controls	Y	Y	Y
Firm-Time FE	Y	N	N
Ind.-Mun.-Size-Time FE	N	Y	N
Firm bin-Time FE	N	N	Y
Bank FE	Y	Y	Y
Observations	6,471,525	6,471,525	10,395,725
R-squared	0.40	0.15	0.34

Note: This table presents bank–firm level regressions estimating the effect of the 2022Q3–2024Q2 monetary tightening cycle on bank lending, based on bank-level exposure to deposit market concentration. The dependent variable is the quarterly log change in outstanding credit (both drawn and undrawn amounts) granted by bank b to firm f. *HHI-Bank* measures banks' average exposure to regional deposit market concentration, as defined in Equation 9. *Tightening* is a dummy variable equal to one from 2022Q3 onward. Columns (1) and (2) include borrowers with multiple lending relationships: column (1) incorporates firm-time fixed effects, while columns (2) includes municipality–industry–size fixed effects. Column (3) adds borrowers with single lending relationships, where fixed effects are firm-bin–quarter fixed effects: if a firm has multiple lending relationships, the bin contains the firm itself; otherwise, single-bank firms of similar size and operating in the same industry and municipality are grouped into the same bin. Fixed effects are indicated at the bottom of the table. Standard errors are double-clustered at the bank and firm levels and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[Section 5]

Figure 5: Impact of monetary policy tightening on lending



Note: This figure plots period-by-period estimates obtained by replacing the variable *Tightening* in Equation 2 with a sequence of quarterly dummies spanning all periods in the estimation window. The dotted line indicates the start of the monetary policy tightening. Confidence intervals are set at 90%. Standard errors are double-clustered at the bank and firm levels.

[Section 5]

Table 4: The deposit channel and the bank lending channel

	Change in log outstanding credit			
	Multiple-bank borrowers		All borrowers	
HHI-Bank×Tightening	-0.105***	-0.104***	-0.116***	-0.120***
	(0.023)	(0.028)	(0.026)	(0.032)
Tightening×LCR	N	Y	N	Y
Tightening×Capital Buffer	N	Y	N	Y
Relationship controls	Y	Y	Y	Y
Bank controls	Y	Y	Y	Y
Firm-Time FE	Y	Y	N	N
Firm bin-Time FE	N	N	Y	Y
Bank FE	Y	Y	Y	Y
Observations	6,464,121	6,464,121	10,384,184	10,384,184
R-squared	0.40	0.40	0.34	0.34

Note: This table presents bank–firm level regressions estimating the effect of the 2022Q3–2024Q2 monetary tightening cycle on bank lending, based on bank-level exposure to deposit market concentration, voluntary capital buffers, and liquidity coverage ratio (LCR). The dependent variable is the quarterly log change in outstanding credit (both drawn and undrawn amounts) granted by bank b to firm f. *HHI-Bank* measures banks' average exposure to regional deposit market concentration, as defined in Equation 9. *Tightening* is a dummy variable equal to one from 2022Q3 onwards. Columns (1)–(2) include borrowers with multiple lending relationships. Columns (3)–(4) add borrowers with single lending relationships, where fixed effects are firm-bin–quarter fixed effects: if a firm has multiple lending relationships, the bin contains the firm itself; otherwise, single-bank firms of similar size and operating in the same industry and municipality are grouped into the same bin. Fixed effects are indicated at the bottom of the table. Standard errors are double-clustered at the bank and firm levels and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[Section 5]

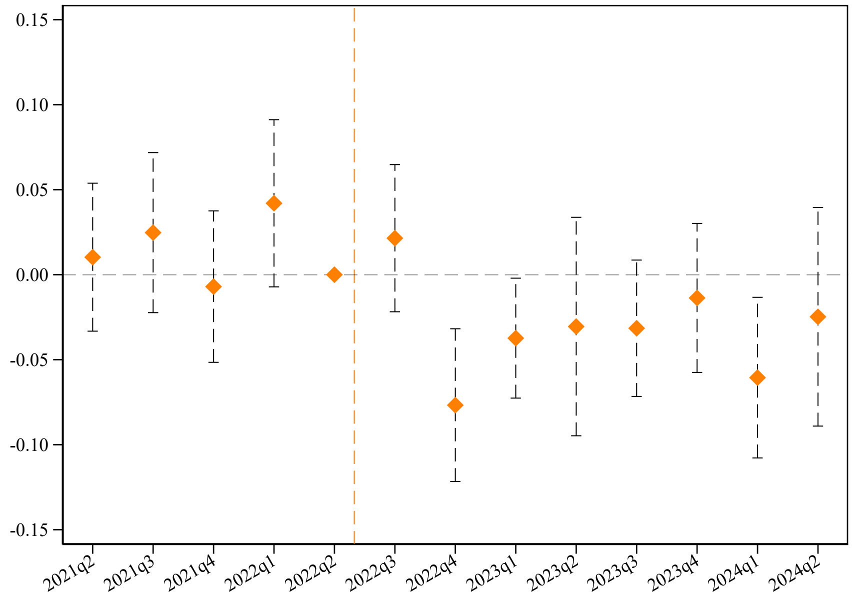
Table 5: Ex-ante risk-taking

	Change in log outstanding credit					
	Multiple-bank borrowers			All borrowers		
	(1)	(2)	(3)	(4)	(5)	(6)
HHI-Bank×Tightening	-0.087***	-0.087***		-0.095***	-0.095***	
	(0.026)	(0.026)		(0.031)	(0.031)	
HHI-Bank×Tightening×PD		-0.040**	-0.046***		-0.043	-0.050*
		(0.015)	(0.015)		(0.026)	(0.026)
Relationship controls	Y	Y	Y	Y	Y	Y
Bank controls	Y	Y	Y	Y	Y	Y
Firm-Time FE	Y	Y	Y	N	N	N
Firm bin-Time FE	N	N	N	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y	Y
Bank-Mun.-Time FE	N	N	Y	N	N	Y
Observations	5,747,729	5,747,729	5,747,729	7,781,747	7,781,747	7,781,747
R-squared	0.39	0.39	0.42	0.35	0.35	0.38

Note: This table presents bank–firm level regressions estimating the effect of the 2022Q3–2024Q2 monetary tightening cycle on lending to risky borrowers, based on banks' exposure to deposit market concentration. The dependent variable is the log change in outstanding credit (both drawn and undrawn amounts) granted by bank b to firm f. *HHI-Bank* measures a bank's average exposure to regional deposit market concentration, as defined in Equation 9. *Tightening* is a dummy variable equal to one from 2022Q3 onward. PD denotes the average probability of default computed for firm f by banks using internal ratings-based approaches. Columns (1)–(3) report results for firms with multiple banking relationships and include firm-time fixed effects. Columns (4) and (6) consider all borrowers, incorporating firm-bin–quarter fixed effects: if a firm has multiple lending relationships, the bin contains the firm itself; otherwise, single-bank firms of similar size and operating in the same industry and municipality are grouped into the same bin. Fixed effects are indicated at the bottom of the table. Standard errors are double-clustered at the bank and firm levels and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[Section 5.2]

Figure 6: Impact of monetary policy tightening on lending to risky firms



Note: This figure plots period-by-period estimates obtained by replacing the variable *Tightening* in the triple interaction term *Tightening*×*HHI-Bank*×*PD* with a sequence of quarterly dummies spanning all periods in the estimation window. The dotted line indicates the start of the monetary policy tightening. Confidence intervals are set at 90%. Standard errors are double-clustered at the bank and firm levels.

[Section 5.2]

Table 6: New term loans

	log(New Lending)	Interest rate	$\mathscr{I}$(one-year default)	One-year return
	(1)	(2)	(3)	(4)
HHI-Bank×Tightening	-0.051**	0.198***	0.232	0.210***
	(0.022)	(0.050)	(0.203)	(0.070)
Relationship Length	Y	Y	Y	Y
Ex-ante-risk-bin FE	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y
Observations	1,524,126	1,524,126	1,516,687	1,516,687
R-squared	0.51	0.80	0.60	0.61

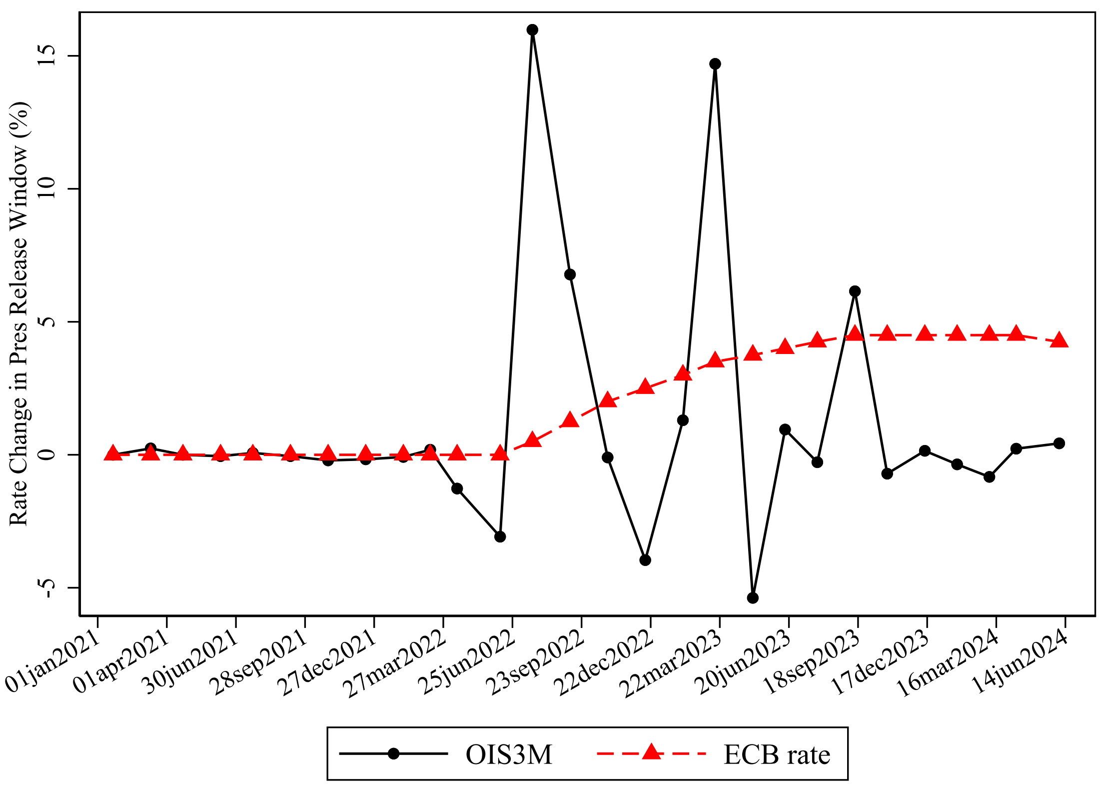
Note: This table presents regression results using new term loan contracts to estimate the effect of the 2022Q3–2024Q2 monetary tightening cycle on interest rates at origination, based on banks' exposure to deposit market concentration. In columns (1)-(4), the dependent variable is, respectively, (1) the log of new lending; (2) the interest rate on new term loan contracts at origination granted by bank b to firm f; (3) an indicator taking the value one if the loan becomes non-performing one year later; and (4) the realized one-year return of the loan, as defined in Equation 5. *HHI-Bank* measures a bank's average exposure to regional deposit market concentration, as defined in Equation 9. *Tightening* is a dummy variable equal to one from 2022Q3 onwards. All regressions control for relationship length and municipality×size×industry×risk-bin×quarter fixed effects, where risk bins are constructed using quintiles of the loan loss provision rate at origination, which serves as a proxy for banks' perceived risk. Fixed effects are indicated at the bottom of the table. Standard errors are clustered at the bank level and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[Section 5.3]

A. Additional Figures and Tables

A.1. Monetary policy surprises

Figure A.1: Monetary policy surprises



Note: This figure shows the evolution of monetary policy surprises from Altavilla et al. (2019) (solid black line), the ECB main refinancing operations rate (red line) during the tightening cycle 2022Q2-2024Q2.

[Section 2]

A.2. Deposit market concentration measures

In our analysis we use the Herfindahl-Hirschman index (HHI) as a standard measure of market concentration.[26] To assess the role of bank deposit concentration for the transmission of monetary policy, we define three levels of concentration: regional, national, and bank level. We refer to provinces as regions throughout the paper: Spain is divided into 50 provinces, which serve as the geographic units for computing regional deposit concentration.[27]

Regional concentration: We define the province-level HHI as

$$\text{HHI-Prov}_{p,t} = \sum_b \left(\frac{D_{bpt}}{\sum_b D_{bpt}} \right)^2, \tag{6}$$

where D_{bpt} is the corresponding level of deposits of bank b in province p at time t.

National concentration: We can define the nationwide HHI as follows:

$$\text{HHI}_t = \sum_b \left(\frac{D_{bt}}{\sum_b D_{bt}} \right)^2. \tag{7}$$

where D_{bt} is the corresponding level of deposits of bank b across all provinces at time t.

Alternatively, we construct the nationwide HHI as the weighted average of the concentration across regional markets, where the weight is the share of deposits held by each province across all banks, as follows:

$$\text{HHI}_t^W = \sum_p \left[\text{HHI-Prov}_{p,t} \times \frac{D_{p,t}}{\sum_p D_{p,t}} \right]. \tag{8}$$

where $D_{p,t}$ denotes the total deposits in province p across all banks at time t

Bank concentration: Following Drechsler et al. (2017) and Li et al. (2023), we construct a bank-level measure of exposure to deposit market concentration,

$$\text{HHI-Bank}_{bt} = \sum_p \left[\text{HHI-Prov}_{pt} \times \frac{D_{bpt}}{\sum_p D_{bpt}} \right], \tag{9}$$

that captures the extent to which banks raise deposits in highly concentrated markets.

[Section 2]

[26]The HHI has been widely used in the banking literature analyzing the effects of market concentration (Jiménez et al., 2013; Drechsler et al., 2017). It is commonly used by competent authorities (e.g., U.S. Department of Justice, European Commission, and European Central Bank) to measure market competitiveness, often pre- and post-merger and acquisition transactions.

[27]Provinces in Spain correspond to the level 3 of the EU's Nomenclature of Territorial Units for Statistics (NUTS 3).

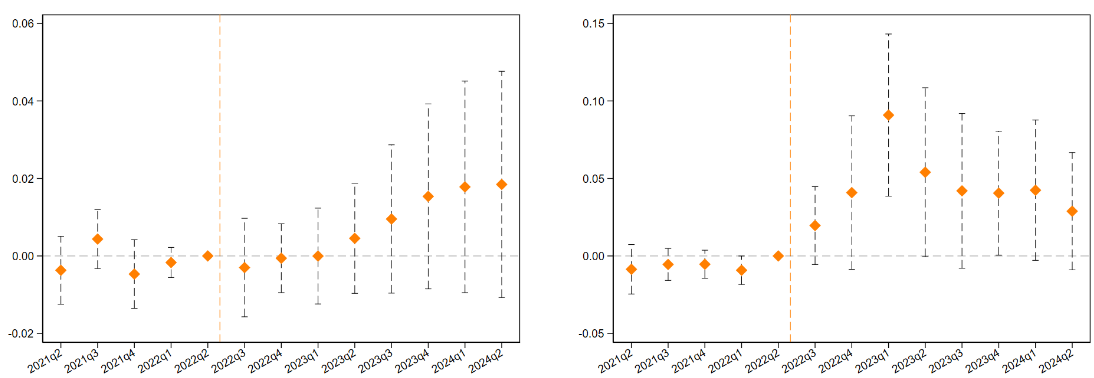
A.3. Bank level analysis

Table A.1: HHI-Bank

	Deposit spreads	
	Checking	Time
Tightening × HHI-Bank	0.000291	0.00139**
	(0.000302)	(0.000621)
Bank FE	Yes	Yes
Time FE	Yes	Yes
Bank controls	Yes	Yes
Observations	507	498

Note: This tables estimates how banks' exposure to deposit market concentration shapes the effect of ECB rate changes on deposit quantities and deposit rates. The data is at the bank-quarter level and covers the full tightening cycle 2021q2-2024q2. In column (1)-(2) the dependent variable is the aggregate bank deposit spread –defined as the ECB reference rate minus the deposit rate– of checking and time deposits respectively. HHI-Bank measures banks' exposure to deposit market concentration as defined in (9). Tightening is a dummy variable equal to one from 2022Q3 onwards. The data is from the confidential financial statements reported by banks to the Bank of Spain. Fixed effects are denoted at the bottom of the table. Standard errors are clustered at the bank level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure A.2: Deposit spreads



(a) Checking (b) Time

Note: This figure plots period-by-period estimates obtained by replacing the variable *Tightening* in the double interaction term *Tightening*×*HHI-Bank* with a sequence of quarterly dummies spanning all periods in the estimation window for an aggregate panel of banks. The dotted line indicates the start of the monetary policy tightening. Confidence intervals are set at 90%. Standard errors are clustered at the bank level.

[Section 4]

A.4. Summary statistics

Table A.2: Bank level summary statistics

	Full sample		Low HHI-Bank		High HHI-Bank	
	Mean	SD	Mean	SD	Mean	SD
ECB rate	2.22	1.97	2.23	1.97	2.22	1.97
Δ ECB rate	1.36	1.45	1.34	1.45	1.37	1.46
Assets (mill. €)	38,285.15	120,492.22	5,966.41	17,171.89	72,070.14	164,972.28
ln(Assets)	15.11	2.10	14.22	1.62	15.96	2.21
Deposits (All, mill. €)	17,964.23	51,550.25	2,861.46	9,969.54	33,849.74	69,651.88
Δ ln(Deposits) (All)	11.46	60.55	6.59	23.38	4.84	6.64
% Deposits HH	74.87	20.29	71.73	26.09	76.52	11.53
Δ ln(Deposits) (NFC)	1.68	49.36	-4.59	69.17	7.55	13.24
Δ ln(Deposits) (HH)	12.25	60.12	8.71	16.77	4.27	7.59
Lending (All, mill. €)	15,642.24	45,271.99	2,151.36	7,923.65	29,587.32	61,275.67
Δ ln(Lending) (All)	2.76	27.52	4.41	39.25	1.31	5.52
% Lending HH	51.96	22.91	46.84	26.21	54.58	16.10
Δ ln(Lending) (NFC)	1.78	65.68	2.66	94.83	0.38	7.42
Δ ln(Lending) (HH)	4.01	23.83	6.35	33.89	2.02	6.16
HHI-Bank	0.20	0.03	0.18	0.01	0.22	0.02
CET1 ratio	20.94	15.69	24.89	21.00	17.46	5.42
LCR	732.80	1,134.23	904.78	1,411.16	469.60	363.92
Lending-to-Assets	0.42	0.19	0.35	0.21	0.48	0.13
Deposits-to-Funding	0.76	0.23	0.75	0.28	0.79	0.12
% NPL	3.17	2.33	2.53	2.26	3.55	1.98
ROA	0.55	0.71	0.53	0.71	0.65	0.47
Observations	930		451		453	

Note: This table provides summary statistics of the bank level data. It breakdowns the sample by high and low HHI-Bank using the median value of the sample. Δ represents yer-over-year changes. The underlying data is from supervisory confidential reports reported by deposit institutions to Banco de España for the period 2021q2-2024q2.

[Section 3]

A.5. Effects on lending

Table A.3: Ex-ante risk-taking and the bank lending channel

	Change in outstanding credit					
	Multiple-bank borrowers			All borrowers		
HHI-Bank×Tightening	-0.086***	-0.095***	-0.094***	-0.094***	-0.109***	-0.109***
	(0.026)	(0.029)	(0.029)	(0.031)	(0.034)	(0.034)
HHI-Bank×Tightening×PD	-0.037**	-0.036**	-0.037**	-0.042	-0.040	-0.044**
	(0.015)	(0.016)	(0.015)	(0.026)	(0.026)	(0.021)
Tightening×LCR	N	Y	Y	N	Y	Y
Tightening×Capital Buffer	N	Y	Y	N	Y	Y
Tightening×LCR×PD	N	N	Y	N	N	Y
Tightening×Capital Buffer×PD	N	N	Y	N	N	Y
Relationship controls	Y	Y	Y	Y	Y	Y
Bank controls	Y	Y	Y	Y	Y	Y
Firm-Time FE	Y	Y	Y	N	N	N
Firm bin-Time FE	N	N	N	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y	Y
Observations	5,743,541	5,743,541	5,743,541	7,777,433	7,777,433	7,777,433
R-squared	0.39	0.39	0.39	0.35	0.35	0.35

Note: This table presents bank–firm level regressions estimating the effect of the 2022Q2–2024Q2 monetary tightening cycle on bank lending, based on bank-level exposure to deposit market concentration, voluntary capital buffers, and liquidity coverage ratio (LCR). The dependent variable is the quarterly log growth in outstanding credit (both drawn and undrawn amounts) granted by bank b to firm f. HHI-Bank measures banks' average exposure to regional deposit market concentration, as defined in Equation 9. Tightening is a dummy variable equal to one from 2022Q3 onwards. Columns (1)–(3) include borrowers with multiple lending relationships. Columns (4)–(6) add borrowers with single lending relationships, where fixed effects are firm-bin–quarter fixed effects: if a firm has multiple lending relationships, the bin contains the firm itself; otherwise, single-bank firms of similar size and operating in the same industry and municipality are grouped into the same bin. Fixed effects are indicated at the bottom of the table. Standard errors are double-clustered at the bank and firm levels and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[Section 5]