CHAMP WS1 WORKSHOP

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

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BANCO DE ESPAÑA
Eurosistema

MOTIVATION

- ECB Monetary Policy Shift in 2022

  - After the 2021–22 inflation surge, the ECB launched its most aggressive monetary tightening since the introduction of the euro
  - Conclusion of nearly a decade of ultra-low rates and compressed margins
  - From June 2022 to September 2023, the policy rate increased from 0% to 4.5% – <u>faster and stronger than in 2005-08</u>.

- Moving away from the zero lower bound (ZLB) likely reduced the search-for-yield

  - Prolonged low rates had previously pushed banks toward higher risk-taking (Dell'Ariccia et al., 2017)

- In this context, other transmission channels regained importance

Legend: Index of Consumer Prices (HICP), % — ECB rate, %
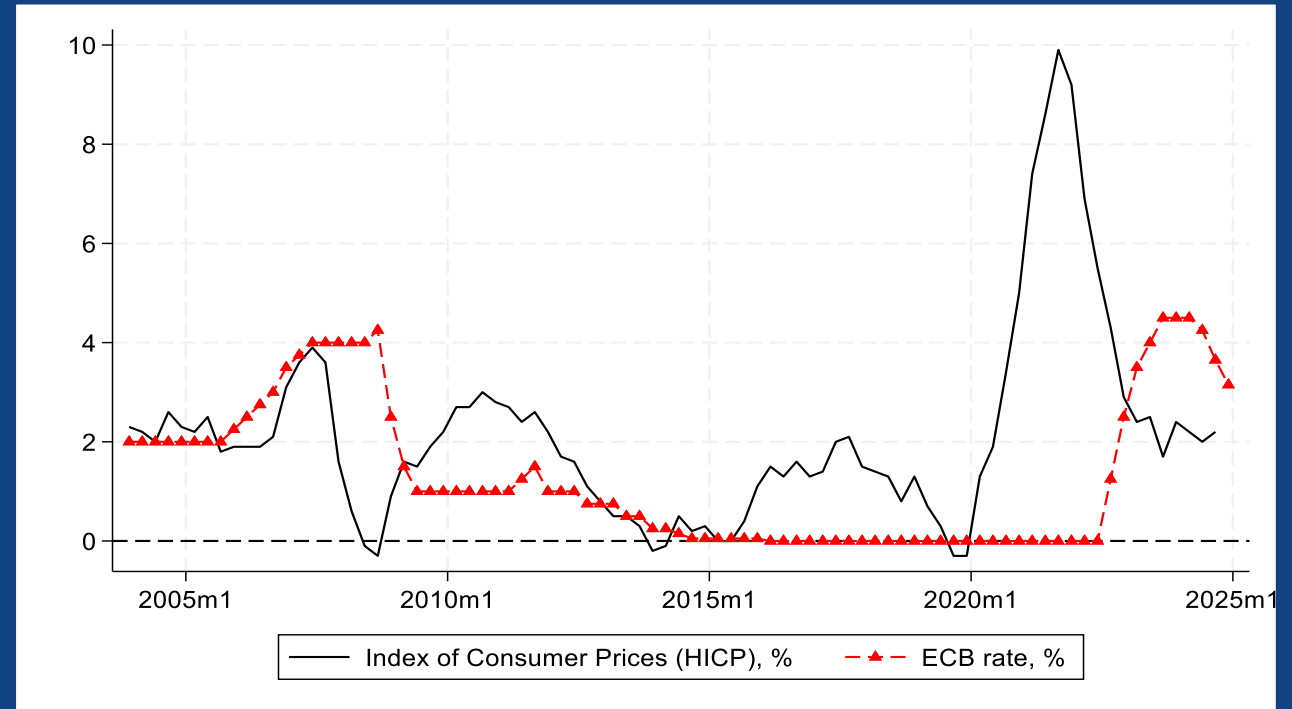
MOTIVATION

- Transmission of monetary policy rates to retail deposits has been stagnant

- Checking deposits are the most common type and are less sensitive to market rate changes

- Large outstanding amounts: 50 bps increase in deposit rates would lead to an 80% surge in total funding costs (Cappelletti, 2024).

- Structural characteristics of banks:
  - stronger capital buffers
  - abundant liquidity
  - high degree of market concentration

- Deposit market concentration affects the transmission of monetary policy (Drechsler et al. 2017).
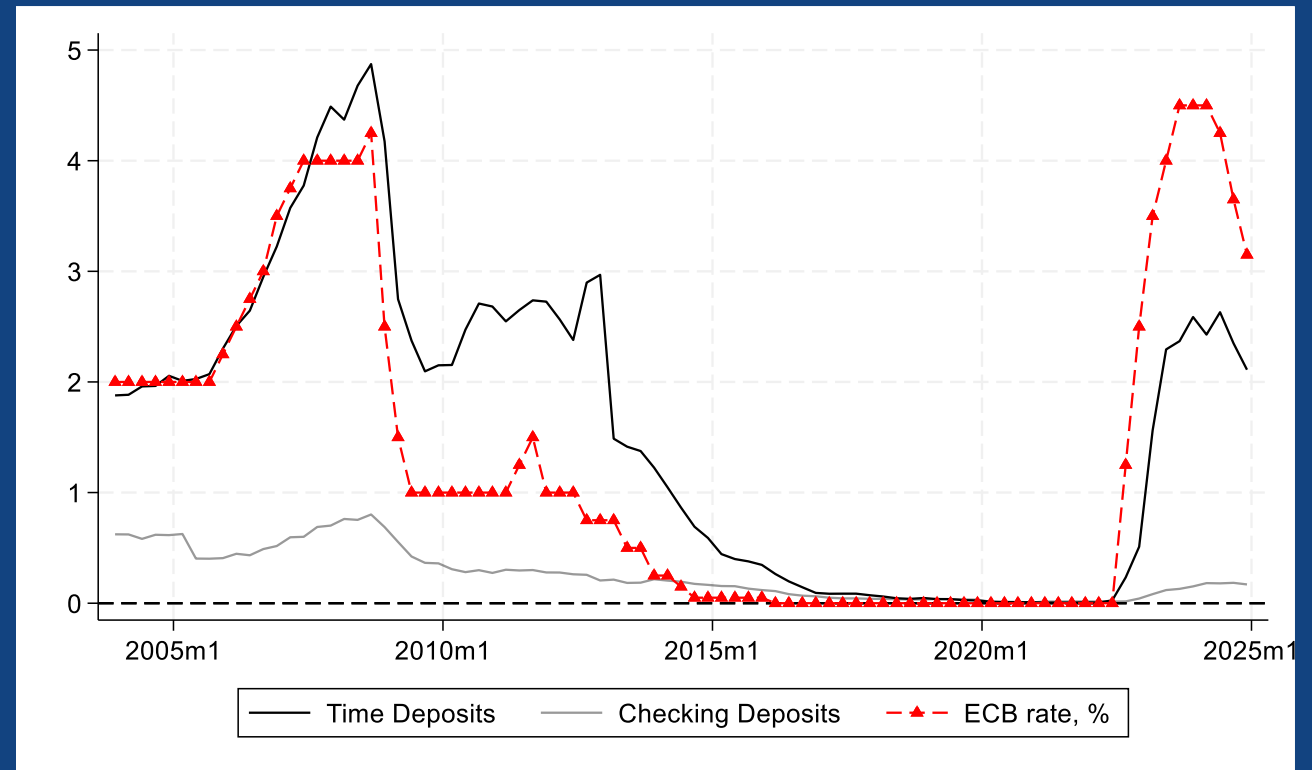
DEPOSIT CHANNEL EXPLAINED

- Banks operating in highly concentrated deposit markets limit pass-through to deposit rates (Drechsler et al., 2017).

  - Higher policy rates increase banks' deposit markdowns and profits
  - Opportunity cost rises, prompting savers to seek higher-yield options
  - Banks allow marginal depositors to exit rather than raising rates
  - Market power enables low pass-through, preserving margins

- Banks strengthen their deposit franchise value, but slow down deposit growth and contract deposits.

- This has implications for **lending and risk-taking**.

Legend:
- Deposits growth (% Δ)
- Checking deposits rate (%)
- Time deposits rate (%)
- ECB rate (%)
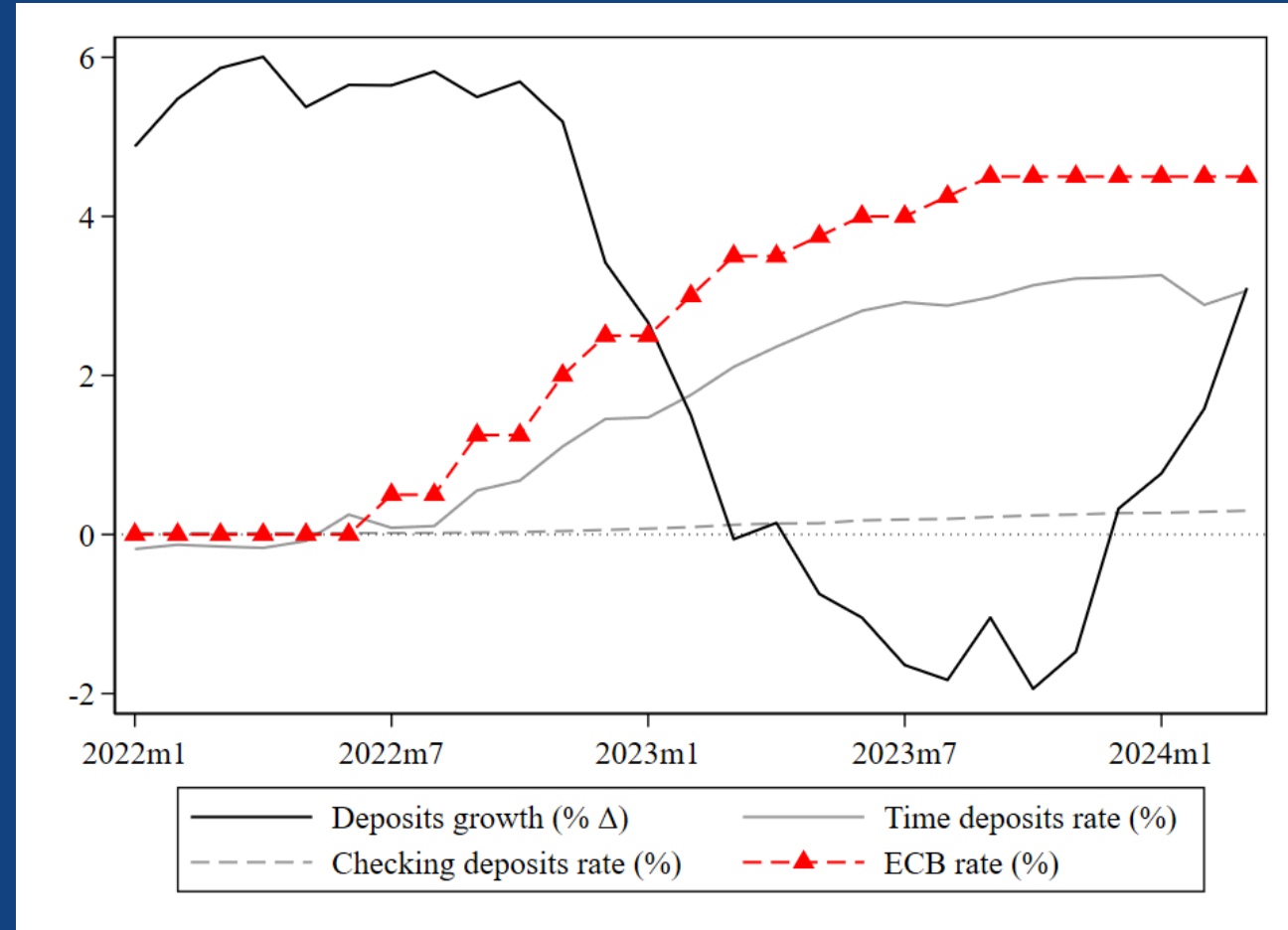
OUR CONTRIBUTION

- This paper examines how **deposit market power** shapes the transmission of monetary policy to (1) lending volumes; (2) loan pricing; and (3) banks' risk-taking behavior

- We explicitly tested the deposit channel in Spain during the recent tightening
    - Within the same bank, branches in highly concentrated markets experienced a drop in deposit amounts right after the onset of the tightening cycle –particularly in time deposits.

- Implications for bank lending and risk-taking using granular loan data
    - Banks that raise deposits in high-concentration markets curtail lending more, particularly to (ex-ante) riskier borrowers
    - This reflects more prudent behavior as deposit franchise value increases

- Financial stability implications: pricing and ex-post risk-taking of new loans
    - Banks with greater exposure to concentration
        - *Charge higher prices*
        - *Experience higher (ex-post) probability of default one year later*
        - *Earn higher realized returns as additional interest income offset losses from non-performing loans*

PREVIOUS LITERATURE

➢ Deposit channel of monetary policy:
- Deposits are the main source of bank funding (Drechsler et al., 2017; 2021; Li et al., 2023).
- Banks only partially pass policy rate changes to retail deposit rates:
  - *Banks avoid negative deposit rates, cut lending and increase risk-taking (Heider et al., 2021; Bittner et al., 2020).*
  - *High deposit concentration amplifies incomplete pass-through via market power (Kho, 2025; Beyer, 2024).*
  - *Deposit outflow constrains lending (Drechsler et al., 2017; Caetité et al., 2022; Cappelletti et al., 2024; Bredl, 2025).*

➢ Risk-taking channel of monetary policy (Dell'Ariccia et al. 2014, 2017, Aoki et al. 2023, Coimbra & Rey, 2024)
- Deposit concentration increases franchise value, discouraging risky lending.
- Duque et al. 2025: US data - following a tightening shock, banks with weaker pass-through to deposit rates report a lower PD for the same borrower compared to other banks

➢ Market concentration, competition, and financial stability
- Franchise value framework (Keeley 1990, Hellmann et al. 2000, Allen & Gale, 2004)
- Risk-shifting paradigm (Boyd & De Nicoló, 2005; Stiglitz & Weiss, 1981)
- Compressed banks' revenues can raise risk of failure (Martinez-Miera & Repullo, 2010, Jiménez et al. 2013, Kick & Prieto 2015)

OUTLINE

1. Motivation

2. Our contribution

3. Previous literature

4. Trends in regional deposit market concentration

5. Data

6. Empirical strategy

7. Results

8. Conclusions

TRENDS IN REGIONAL DEPOSIT MARKET CONCENTRATION

➤ The Spanish banking sector is one of the most concentrated in Europe

➤ National measure conceals pronounced regional heterogeneity:

- many banks operated only regionally, with high local specialization but low national market share.

- post-GFC consolidation absorbed regional banks into national institutions, increasing national concentration, but not necessarily regional concentration
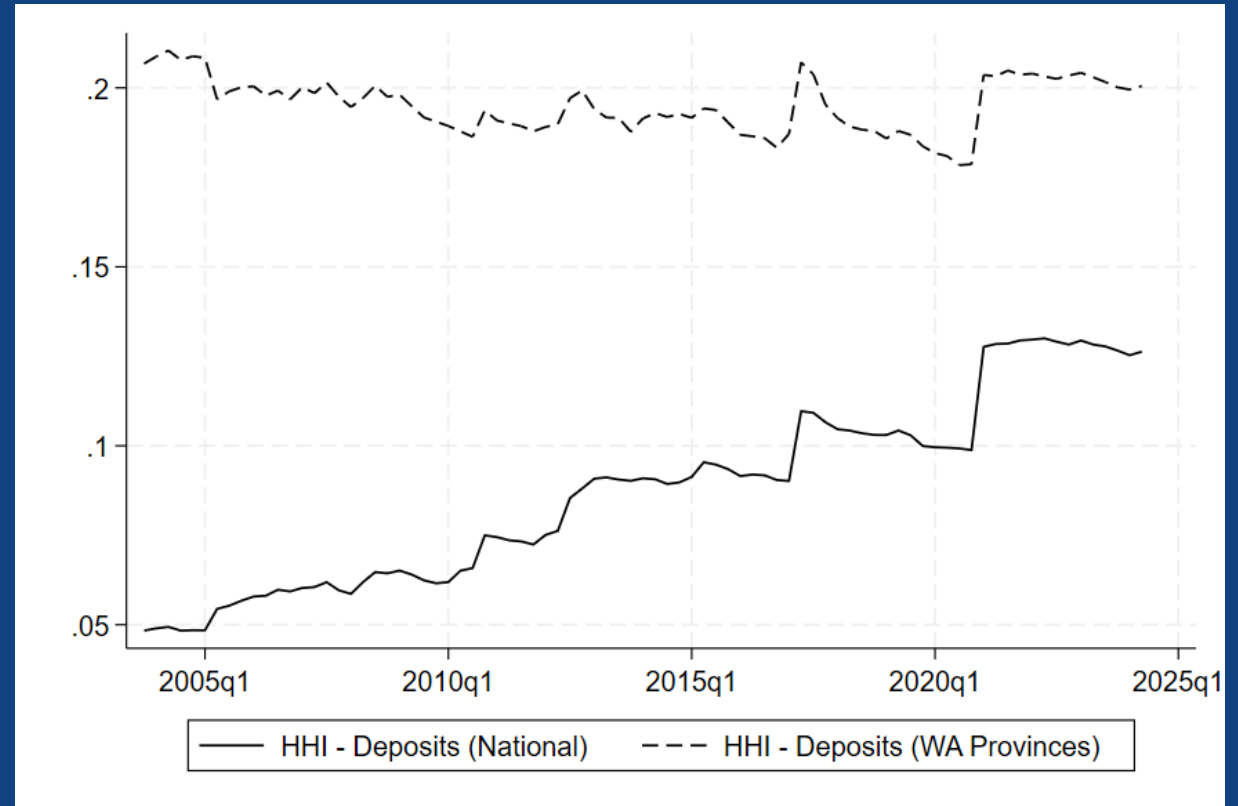
TRENDS IN REGIONAL DEPOSIT MARKET CONCENTRATION

➢ National-level measure fits large multi-market banks but not regionally-focused banks

➢ Pronounced heterogeneity in regional deposit market concentration

  • Key descriptive statistic and identification strategy to test the deposit channel
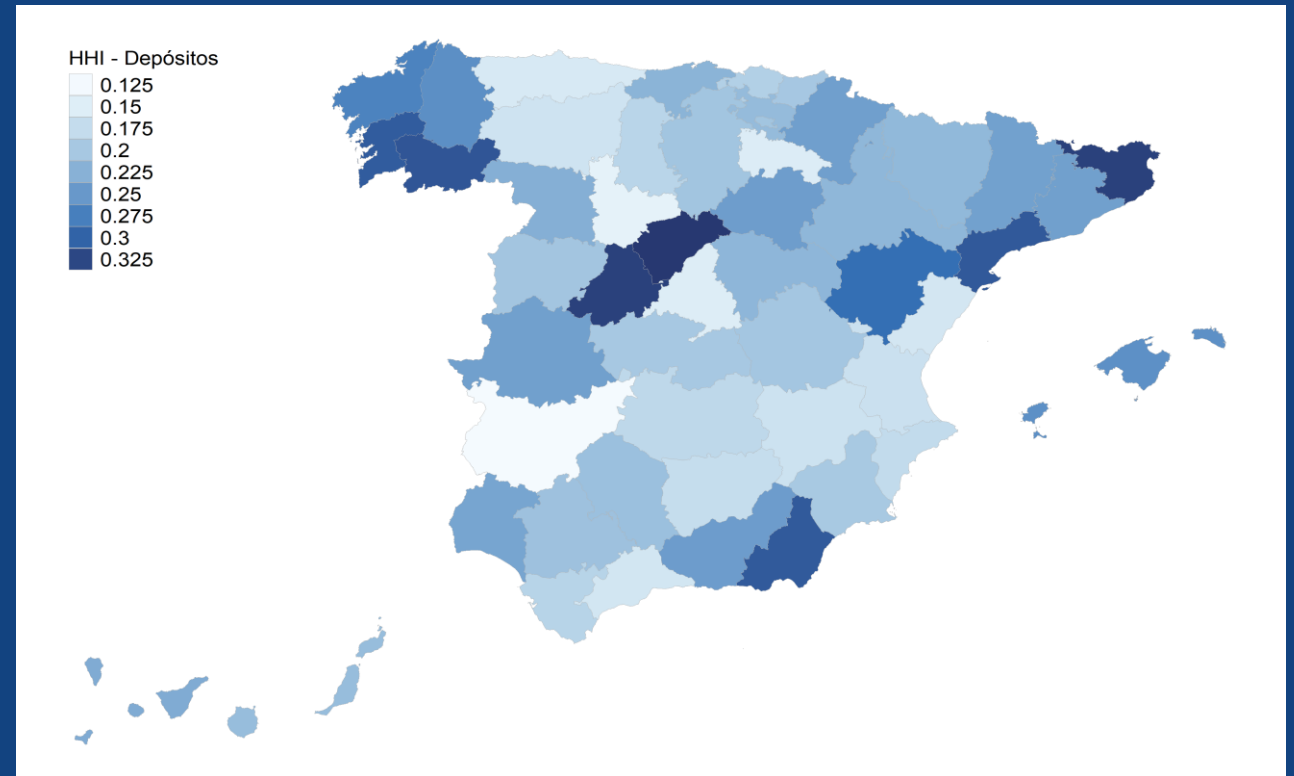
DATA

➢ All banks operating in Spain

- • 13 quarters, from 2021 Q2 to 2024 Q2
- • 845 branches
- • 67 banks
- • 50 provinces

➢ Central Credit Register (CIRBE) of the Banco de España

➢ Universe of loans to small and medium-sized enterprises (SMEs) granted in Spain (loans above 3,000 EUR)

Table 1: Summary statistics

Panel A: Branch Level 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 Level Data

	Full sample		Low HHI-Bank		High HHI-Bank	
	Mean	SD	Mean	SD	Mean	SD
Lending (thou. €)	281.84	1,028.73	284.71	923.57	279.02	1,122.48
ln(Lending)	11.19	1.82	11.20	1.81	11.18	1.83
Δ ln(Lending)	-4.34	13.66	-4.42	13.54	-4.26	13.79
PD	4.17	7.75	4.14	7.70	4.19	7.79
Observations	6,471,525		3,207,067		3,264,458	

Note: This table provides summary statistics. It breaks down the sample into high and low HHI-Prov groups using the median value of the sample. Δ represents year-over-year changes. Panel A presents bank–province (branch) level data sourced from confidential supervisory reports (FINREP) submitted by deposit institutions to Banco de España. Panel B presents bank–firm matched credit data from the Spanish Central Credit Register (CIRBE). The information covers the period from 2021Q2 to 2024Q2.

EMPIRICAL STRATEGY-DEPOSIT CHANNEL

➢ How does the deposit market concentration affect the transmission of monetary policy?

➢ Compare branches of the same bank operating in different regions

$$y_{b,p,t} = \beta \cdot Tightening_t \times HHI\_Prov_p + \alpha_{b,p} + \alpha_{b,t} + \epsilon_{b,p,t}$$

- $y_{b,p,t}$ - logarithm of **deposits holdings** for bank *b* in province *p* in quarter *t*
- *Tightening* is a dummy variable =1 from 2022Q3 onward
- HHI_Prov_p is the province-level concentration measure
- $\alpha_{b,p}$ - branch fixed effects - absorb time-invariant branch characteristics, e.g. local management practices or branch's business model
- $\alpha_{b,t}$ - bank-by-quarter fixed effects - control for time-varying bank-specific factors, e.g. lending opportunities

➢ <u>β captures</u> differential deposit growth across branches of the same bank located in areas with different levels of deposit market concentration.

➢ The decision of how many deposits to raise at a given branch does not depend on the decision of how many loans to make at that branch

EMPIRICAL STRATEGY-LENDING

➢ What is the effect of the deposit channel on lending volumes?

➢ Key assumption: banks can raise deposits in one branch and lend it at another

➢ The bank's lending depends on its exposure to concentration across all markets where it operates:

$$y_{b,f,t} = \theta \cdot HHI\_Bank_b \times Tightening_t + X_{b,f,t-1} + \alpha_b + \alpha_{f,t} + \epsilon_{b,f,t}$$

- $y_{b,f,t}$ - quarterly log difference in the **outstanding credit** from bank *b* to firm *f* in quarter *t*
- *Tightening* is a dummy variable =1 from 2022Q3 onward
- HHI_Bank_b is the bank-level exposure to deposit market concentration
- α_b - bank fixed effects
- $\alpha_{f,t}$ - firm-quarter fixed effects
- $X_{b,f,t-1}$ bank-firm controls and bank controls (ROA, NPL ratio, log of total assets, CET1 ratio, and LCR)

➢ <u>θ captures</u> differential outcomes in bank-firm relationships of the same firm borrowing from multiple banks exposed to different levels of concentration

- Control for credit demand – multiple-bank relationships (Khwaja and Mian, 2008) and single-bank relationship (Degryse et al. 2019)

EMPIRICAL STRATEGY- ex-ante RISK-TAKING

➢ What is the effect of deposit channel on lending volumes and **ex-ante bank risk-taking**?

$$y_{b,f,t} = \theta \cdot HHI\_Bank_b \times Tightening_t \times PD_f + X_{b,f,t-1} + \alpha_b + \alpha_{f,t} + \epsilon_{b,f,t}$$

- $y_{b,f,t}$ - quarterly log difference in the **outstanding credit** from bank *b* to firm *f* in quarter *t*
- *Tightening* is a dummy variable =1 from 2022Q3 onward
- HHI_Bank_b is the bank-level exposure to deposit market concentration
- α_b - bank fixed effects
- $\alpha_{f,t}$ - firm-quarter fixed effects
- $X_{b,f,t-1}$ bank-firm controls and bank controls (ROA, NPL ratio, log of total assets, CET1 ratio, and LCR)
- PD_f firm's average probability of default (PD), based on internal estimates under the IRB approach

➢ <u>θ captures</u> differential outcomes in bank-firm relationships of the same firm borrowing from multiple banks exposed to different levels of concentration

- Control for credit demand – multiple-bank relationships (Khwaja and Mian, 2008) and single-bank relationship (Degryse et al. 2019)

PRICE EFFECT AND ex-post RISK-TAKING

➢ What is the effect of deposit channel on **loan price setting** and on ex-post **bank risk-taking**?

$$y_{l,b,t} = \theta \cdot HHI\_Bank_b \times Tightening_t + X_{l,b,t} + \alpha_b + \alpha_{m,i,s,r,t} + \epsilon_{l,b,t}$$

- $y_{l,b,t}$ - **loan amount**, **loan rate** or **performance status** 1 year after origination of loan *l* by bank *b* in quarter *t*

- *Tightening* is a dummy variable =1 from 2022Q3 onward
- HHI_Bank_b is the bank-level exposure to deposit market concentration
- α_b - bank fixed effects
- $\alpha_{m,i,s,r,t}$ - municipality-industry-size-risk-bin-quarter fixed effects to ensure comparability across new contracts. Risk
- bins are based on quintiles of the loan loss provision rate at origination
- $X_{l,b,t}$ - contractual terms: log(1+maturity), collateral and personal guarantees, log(notional amount), an indicator for
- floating versus fixed rates, relationship length.

➢ θ captures differential outcomes for two contracts with similar perceived risk for banks exposed to different levels of deposit market concentration

PRICE EFFECT AND ex-post RISK-TAKING

➢ What is the effect of deposit channel on **loan price setting** and on ex-post **bank risk-taking**?

$$y_{l,b,t} = \theta \cdot HHI\_Bank_b \times Tightening_t + X_{l,b,t} + \alpha_b + \alpha_{m,i,s,r,t} + \epsilon_{l,b,t}$$

$$Ex{-}post\ return\ on\ loan_l = r - (r + LGD) \times \mathcal{I}(default)$$

- $y_{l.b.,t}$ - **ex-post return** 1 year after origination of loan l by bank b in quarter t
- r is loan rate of l; loss given default (LGD) is the provision rate one year after origination in case of default
- $(r + LGD)$ accounts for the loss of interest income in case of default
- *Tightening* is a dummy variable =1 from 2022Q3 onward
- HHI_Bank_b is the bank-level exposure to deposit market concentration
- α_b - bank fixed effects
- $\alpha_{m,i,s,r,t}$ - municipality-industry-size-risk-bin-quarter fixed effects to ensure comparability across new contracts. Risk bins are based on quintiles of the loan loss provision rate at origination
- $X_{l,b,t}$ - contractual terms: log(1+maturity), collateral and personal guarantees, log(notional amount), an indicator for floating versus fixed rates, relationship length.

➢ $\underline{\theta > 0\ captures}$ whether banks raising deposits in concentrated areas achieve higher realized returns one year after origination, for comparable lending portfolios

RESULTS-DEPOSIT CHANNEL

➤ Compared to the pre-tightening period, branches in more concentrated markets experience lower deposit growth.

➤ One standard-deviation increase in the HHI-Prov of the region where a branch operates reduces its total deposits holding by 0.5% compared to a branch of the same bank in the average HHI-Prov

➤ The deposit channel operates mostly through the time deposits segment – not surprising

•

Table 2: Deposits growth

	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
R2	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 (1). 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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure 4: Event study: Monetary policy tightening and deposit market concentration
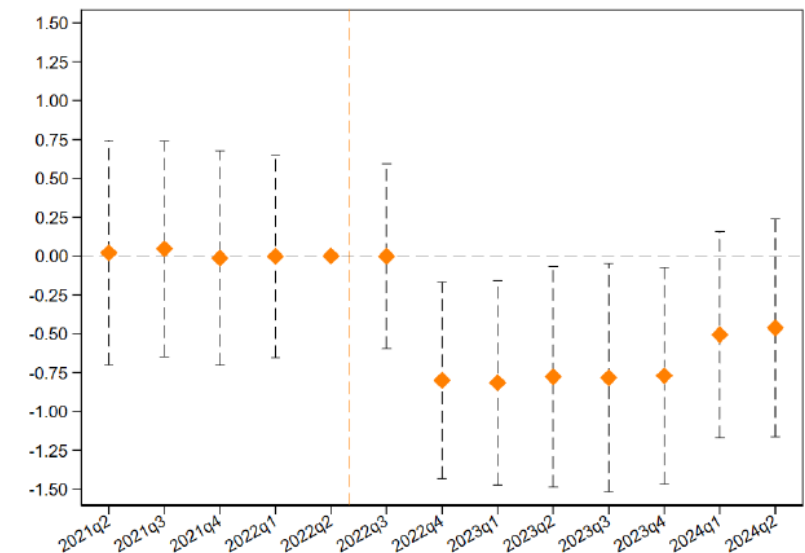
Note: This figure plots period-by-period coefficients β_t obtained by replacing the variable *Tightening* in Equation 5 with a sequence of quarterly dummies spanning all periods in the estimation window. The dependent variable is the log of time deposits. The dotted line indicates the start of the monetary policy tightening. Confidence intervals are set at 90%. Standard errors are clustered at the province×quarter level.

RESULTS-LENDING

➢ One-standard-deviation increase in bank exposure reduces lending supply by 10.5% relative to other banks when controlling for firm-by-quarter fixed effects
➢ The deposit channel effect remains largely unchanged after controlling for interactions with voluntary capital buffers and LCR to rule out confounding with other transmission mechanisms

Table 4: The deposit channel and the bank lending channel

	Change in 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

RESULTS- ex-ante RISK-TAKING

➢ Riskier borrowers experience a sharper contraction in credit supply relative to firms with average PDs.
➢ 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 is one standard deviation above the mean.

Table 5: Ex-ante risk-taking

	Change in 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

RESULTS- NEW LOANS

- ➤ Banks with HHI one standard deviation above the mean reduced new lending by 5% and raised loan rates by 18 bp.

- ➤ This increase was associated with a 37 bp higher probability of default one year later (2 bp additional default risk per 1 bp higher loan rate).

- ➤ Despite this, realized returns rose by 19 bp, as higher interest income more than offset losses on non-performing loans.

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	-0.050***	0.178***	0.371*	0.186***
	(0.015)	(0.036)	(0.187)	(0.064)
Contractual Terms	Y	Y	Y	Y
Mun.-Ind-Size-Risk-Time FE	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y
Observations	1,524,126	1,516,687	1,516,684	1,524,126
R-squared	0.56	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, (i) the log of new lending; (ii) the interest rate on new term loan contracts at origination granted by bank b to firm f; (iii) an indicator taking the value one if the loan becomes non-performing one year later; and (iv) the realized one-year return of the loan, as defined in Equation 9. HHI-Bank measures a bank's average exposure to regional deposit market concentration, as defined in Equation 4. Tightening is a dummy variable equal to one from 2022Q3 onwards. All regressions control for loan contractual terms 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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

CONCLUSIONS

- Contribute to growing literature on the effects of the deposit channel of monetary policy transmission, and its impact on lending.

- Key financial stability implications for bank risk-taking have not yet been fully explored.

- With supervisory data from Spanish banks, we confirm the deposit channel mechanism during latest tightening cycle.

- Exploit loan-level data from the Spanish credit register to show that banks exposed to more concentrated markets decrease lending, specially for risky firms.

- For the new loans, we show that higher borrowing costs subsequently exhibit higher default rates, but are compensated with realized returns

In a nutshell:
- Explicitly test deposit channel during the recent tightening.
- Loan-level data and robust identification of loan supply effects.
- Evidence on ex-ante and ex-post risk-taking linked to deposit market concentration.

Many thanks for your attention!
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Figure A.1: Monetary policy surprises
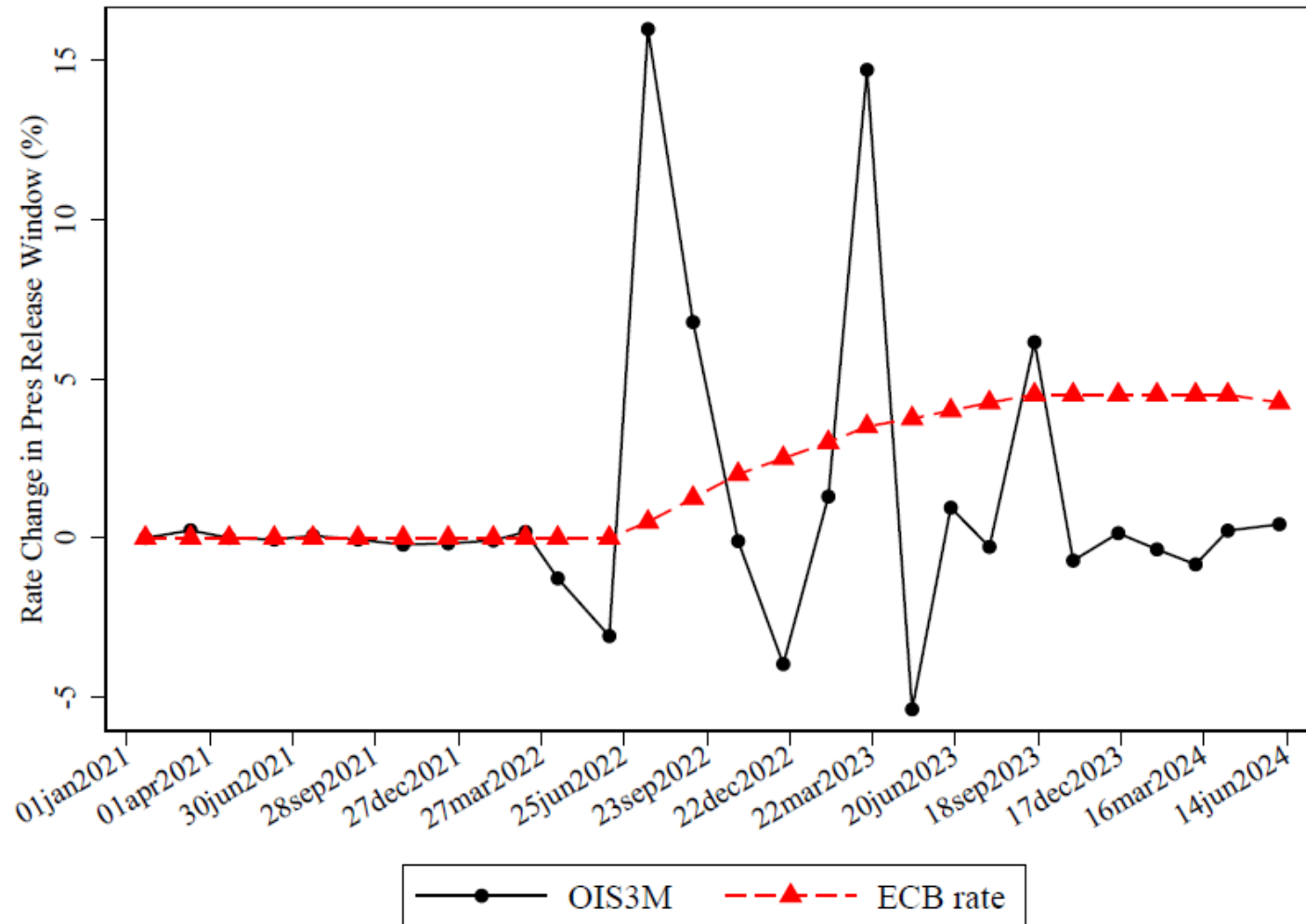
Note: This figure shows the evolution of monetary policy surprises from Altavilla et al. (2019) (solid black line), the ECB main refinancing operations rate (red line) during the tightening cycle 2022Q2-2024Q2.

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RESULTS-LENGING

➤ One-standard-deviation increase in bank exposure reduces lending supply by 10.5% relative to other banks when controlling for firm-by-quarter fixed effects
➤ The deposit channel effect remains largely unchanged after controlling for interactions with voluntary capital buffers and LCR to rule out confounding with other transmission mechanisms

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Figure 5: Impact of monetary policy tightening on lending
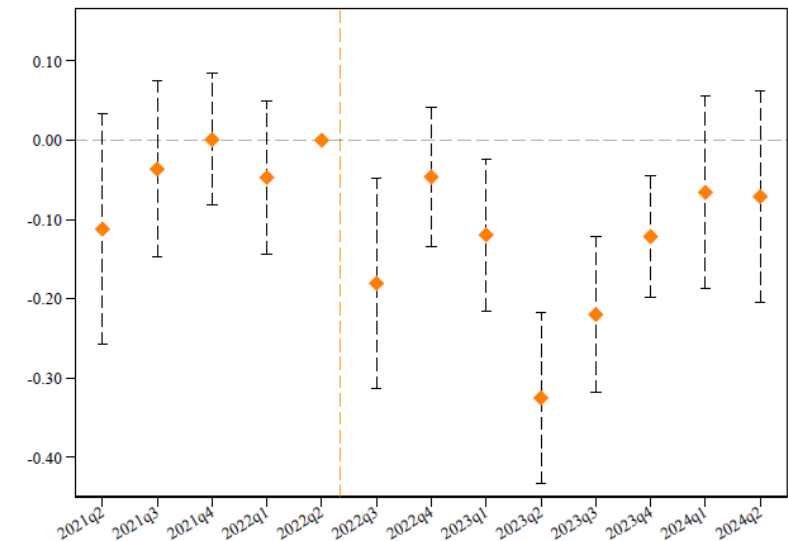
Note: This figure plots period-by-period estimates obtained by replacing the variable *Tightening* in Equation 6 with a sequence of quarterly dummies spanning all periods in the estimation window. The dotted line indicates the start of the monetary policy tightening. Confidence intervals are set at 90%. Standard errors are double-clustered at the bank and firm levels.

RESULTS- ex-ante RISK-TAKING

➢ Riskier borrowers experience a sharper contraction in credit supply relative to firms with average PDs.

➢ 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 is one standard deviation above the mean (or 4.6% if include bank-by-quarter-by-municipality fixed effects).

Table 5: Ex-ante risk-taking

| | Change in outstanding credit | | | | | |
| | Multiple-bank borrowers | | | All borrowers | | |
	(1)	(2)	(3)	(4)	(5)	(6)
HHI-Bank×Tightening	-0.087***	-0.087***		-0.095***	-0.095***	
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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

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

• back